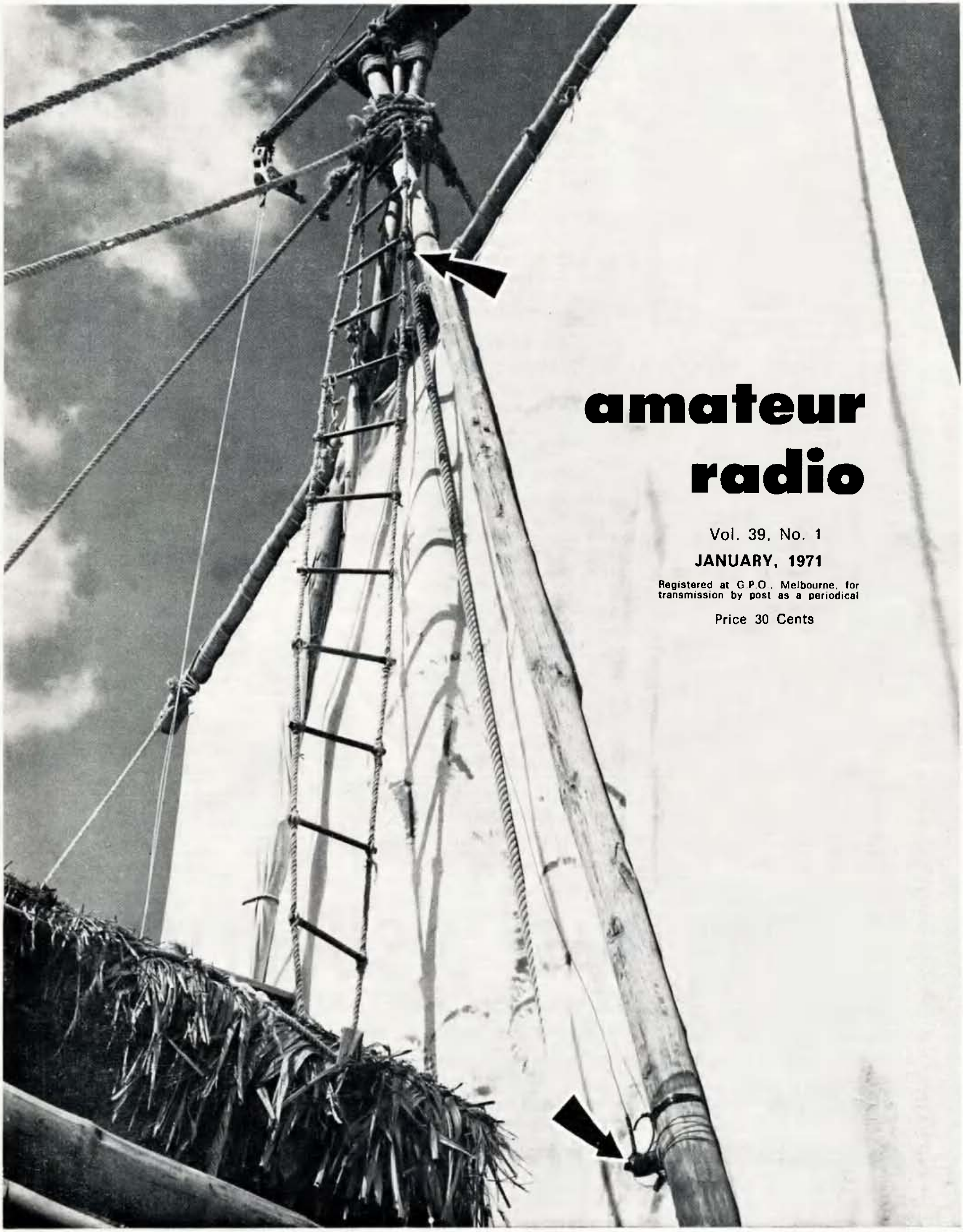

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Members of the W.I.A. should refer all enquiries regarding delivery of "A.R." direct to their Divisional Secretary and not to "A.R." direct. Two months' notice is required before a change of mailing address can be effected. Readers should note that any change in the address of their transmitting station must, by P.M.G. regulation, be notified to the P.M.G. in the State of residence; in addition, "A.R." should also be notified. A convenient form is provided in the "Call Book".

CONTENTS

COVER STORY

Arrows point to the insulators at the top and bottom of the 14 MHz. quarter wave vertical aerial on the starboard leg of La Balsa's mast. See story on page 4.

FEDERAL COMMENT

It was my original intention to devote this Federal Comment to a review of the year just past. I would have preferred to have paid tribute to all those who made the 60th year of the Institute such a special year, particularly all those who supported the Cook Bi-Centenary Award so magnificently, and who turned it into one of the high points in the history of Amateur Radio in Australia.

Unfortunately I cannot do this. At a time when I know that so many of you are on a holiday, I must turn, not to the past, but to the present and to the future. In this holiday season, as I convey to you all the Season's Greetings of the Federal Council and the Federal Executive, I have also to tell you of the serious crisis that we face, and seek your support for the solution we propose.

That we faced a very real crisis in our Federal Administration and with this magazine has been apparent for some time. Both have, since there inception, relied on the labour of honorary officers. But as the years have passed, so our organisation has grown. What was once basically a social group with a common interest has grown into an organisation that is fundamental to our very existance.

The amount of work done by officers such as the Federal Secretary, the members of the Federal Executive generally and those responsible for this magazine has grown to the extent that it is no longer possible to maintain the present level of activity by reliance on volunteers alone. How many of us realise the hours of work each week, each day, that the Editor of "A.R." or the Federal Secretary is called upon to do? I joined the Federal Executive after the Easter 1968 Federal Convention. Before that, as Victorian Federal Councillor, at each Convention, I had been able to sit back and offer the Federal Executive the benefit of my advice as to how they should undertake the many tasks they faced. Now I realise only too well how much work must be done.

Certainly we express our gratitude to those doing the work. But to those people neither gratitude nor the satisfaction of doing something worthwhile is enough. The job itself is too big. They want to be able to earn their living without having to steal time for the Institute. They want to be able to spend a reasonable time with their families. They even want to enjoy their hobby. In a word, they want "out".

The use of volunteers has slowly drifted into the exploitation of volunteers. These are hard words indeed, but I can assure you, they are justified.

What are the choices open to us?

There are only two. To be effective, and I do believe that at present the Institute is effective, and that the magazine is effective, we cannot do less than we are doing now. Indeed, we are not doing all we should; I am particularly unhappy that we are not giving the Federal Councillors, or the members, nearly as much information as we should. No, we cannot cut back and remain effective.

Can we use even more volunteers? Already, in the metropolitan area of Melbourne there is one job going for each 5½ full members. Quite apart from the fact that we have reached a level of saturation, administration cannot be channelled through an indefinite number of people. In the end, the co-ordination of that kind of administration takes just as much effort as the job itself.

Our choice is simple. We can either have a paid, high level permanent administration, both for the Federal body and the magazine, or we can go back to a vastly lower level of activity and effectiveness, where things **might** be done when someone has the time, with the magazine perhaps duplicated and produced five or six times a year.

The Councils of the New South Wales Division and the Victorian Division have, together with Federal Executive, exhaustively examined the problem. They realise that we cannot go back, and the only solution is the first one.

This means that each member will have to pay more in subscriptions each year. Despite this, both the Victorian and New South Wales Divisions have pledged to a programme involving the employment of a Secretary/Manager. Events have moved quickly. Executive has been able to inform some Divisions, but not all, as fully as we would have wished.

To our surprise, we have found nothing but support. Our members seem to have been more aware of the problem than perhaps we thought. In this issue we advertise for a person to fill this post. Remember, when you read this advertisement, that how our organisation grows will depend very much on the man we get. Accordingly, we are looking for a man with top ability and experience, mainly administrative.

The cost to each member rather depends on the financial structure of the member's Division. Some Divisions will be able to effect some economies by the utilisation of the proposed centralisation of certain records, feasible with a permanent administration. Generally speaking, the direct increase to members in the smaller Divisions (which have lower fees than the larger Divisions) will be greater. It will not be more than $3 per annum.

I earnestly seek your support. Each member can do two things. First, give your Division your support in these moves. Let your Division know they have your support; when faced with a need to increase subscriptions we are always hesitant. It's not that we do not wish to pay the increase ourselves, it's just that we are worried about the other fellow. We are all "other fellows"—let your Division know that they do not have to fear a general exodus if they increase the fees.

Secondly, each of you can do something to get new members. Only 54% of all licensees are members of the W.I.A. Please, take the time to have a look at the table set out on page 16 of the April 1970 issue. The 46% who are not members take the benefit of the privileges obtained and the protection given by the W.I.A. No membership drives can be as successful as the efforts of each individual member to get new members. The more members we have to share the burden, the lighter the burden is on each individual.

Yes, I would rather have written a Federal Comment dealing with the achievements of the Institute, but this matter cannot wait until February. In my report to the Federal Council last year I said that I believed that the Institute can justify the support it needs.

May we count on your support?

—MICHAEL OWEN, VK3KI,
Federal President, W.I.A.

La Balsa—a Triumph for Amateur Radio

By DON MARSHALL*

THE search could be likened to looking for a needle in a haystack. In fact, it was for little more than a switch click somewhere in the Pacific Ocean south of the Equator!

The fact that through the perseverance of Amateur Radio operators in at least four countries, and perhaps only because of their discovery, has the incredible story of La Balsa been told.

It is now history that Vital Alsar, a Spaniard, Marc Modena, a Frenchman, Normand Tetreault, a Canadian, and Gabriel Salas, a Chilean, left Ecuador, South America, on a balsawood log raft last May 29.

On November 4 at 11.50 p.m., they arrived under tow in the Mooloolaba River, 65 miles north of Brisbane, after a voyage of 8,500 miles.

The report of their Amateur Radio activities during that time, as compiled from the men and operators, will have a special place in the minds of all who took part or who at least heard the raft signals.

Although Vital Alsar was primarily an adventurer seeking to prove that an ancient type raft could be sailed with some direction, he also realised some modern radio gear, together with a petrol generator and a fuel supply, would be a necessity on his raft.

On the advice of his friend, Vice-Admiral Samuel Fernandes, a Mexico City Ham, XE1EB, and radio co-ordinator Raphael L. Corcuera, XE-1EEI, a business man, of Guadalajara, Mexico, Vital installed a Hallicrafters SR-150 transceiver.

Installation was under the eye of electronics engineer Joe HC2OM, of Guayaquil, Ecuador, where the raft was built.

Vital was given the call sign of HC9EBP/MM.

The transceiver was largely pre-set to operate on about 14,105 KHz. to limit operating time and thus exposure to the sea air.

The radio was stored in the plaited cane cabin and protected by eight plastic bags.

The aerial was a quarter wave loaded vertical mounted on two insulators taped to the starboard leg of the mast with a lead into the cabin.

Transmissions after the raft started its cross-Pacific drift were good with regular s.s.b. contacts to Fernandes and Corcuera and later with Liliana HC2IS.

Vital joined in La Rueda, the wheel in Spanish but radio net in English, every four days with hardly any interference.

Besides the Mexican and Ecuador stations, there were calls from Nicaragua, San Diego (California) and Montreal (Luc VE2BBS).

Raphael was even able to arrange a rendezvous with a U.S. Navy ship when the La Balsa was down to half a gallon of petrol from an original 17 gallons—enough only for an hour and a half's operating.

MICROPHONE USELESS

In mid-September came a storm in which waves reached 30 feet and the transceiver in its plastic bags was put under the ceiling for safety as water swept through the cabin. Some shack!

It was little wonder then that on October 3 with the raft east of New Caledonia and approaching the most dangerous part of the voyage, the microphone became faulty.

The next day it failed.

Vital tinkered with it while Raphael and the Admiral, so far away, wondered what to do.

But Vital shorted out the insert so that by pushing the microphone switch he could trigger a signal.

The Admiral devised the system where Vital could give an affirmative answer by pressing the microphone switch and remaining silent for a negative answer.

Then by transmitting digits one-two-three and so on, and listening in between each, he could get a signal from Vital giving the raft's longitude, latitude, air and sea temperatures, wind direction and strength, sea conditions and the condition of those on board.

ZL THEN VK HELP

Enter into this strange communication, Mr. A. T. "Gus" Knox, ZL1RO, of Epsom, Auckland, an Air New Zealand operations man.

The Mexicans explained all and said that although the raft seemed to hear

* 23 Karowara St., The Gap, Brisbane, Qld., 4061

QSL CARD OF LA BALSA

Block by courtesy of Courier-Mail, Brisbane

Raft discussion. From left: Keith VK4KS, Marc Modena, Normand Tetreault, Vital Alsar and Gabriel Salas. Photo courtesy The Courier-Mail, Brisbane.

them without difficulty, they were having growing difficulty in hearing the reply clicks as the raft drifted west.

At this time, the signals were travelling more than 6,500 miles.

Gus offered to help since with his rotating beam he could hear the clicks easily and his signal on the raft was strong.

This was October 10 and the raft was in danger from the D'Entrecasteaux Reefs ahead, a danger apparently not realised by the men back in Mexico.

A suggestion that a new microphone be dropped from the air was not taken up.

Luckily, the raft passed the northern end of New Caledonia and headed west in the current towards Australia.

On October 12, the raft's position was 162 deg. 43 min. E., 17 deg. 38 min. S., and from that day an alternate day schedule was kept.

For three weeks, Gus hurried home from his job to relay the Mexicans' questions and to relay the clicked replies.

Meanwhile in Sydney, Syd Molen, VK2SG, a senior t.v. technician, had heard about the proposed drift from Raphael, one of his regular contacts.

He had listened on the set frequency but had never talked to La Balsa, so as not to waste the raft's power.

Raphael asked Syd if he would have a go at taking over contact with the raft and Syd made his first contact on his home-brew gear from his 12 ft. x 12 ft. shack at Pendle Hill on Oct. 24.

Then it was his turn to take over from Gus and transmit the questions and then the replies. Gus stood by.

By October 28, the sea temperature had risen 3°C. in two days, which tended to confirm that they were encountering a warm current from the Coral Sea.

Australia was near at hand, but then there were the treacherous Great Barrier Reefs ahead.

By October 29, Les Bell, VK4LZ, a farmer, of Airlie Beach, near Proserpine, North Queensland, and Keith Schleicher, VK4KS, of Aspley, Brisbane, had joined in the relays.

NEWS BREAKS

The first news reports appeared.

It was important that Les and Keith joined in, along with several others known to be listening on the side, since the raft was approaching the Swain Reefs, east of Rockhampton, the southern end of the main Barrier Reef.

By 1.45 p.m. E.A.S.T. on Saturday, October 31, there can be little doubt that scores of beams, including that of Raphael in Guadalajara, and a Solomon Is. man to the north, were swinging to the Coral Sea area.

This scheduled sked had been published in newspapers and broadcast on radio and t.v.

But such was the discipline of all that Syd and Les between them, with Gus and the Solomon Is. station on the side, were able to make contact at 2 p.m. and there was only one breaker for a brief time.

The raft was then becalmed some 250 miles odd out from Rockhampton.

This day, the Brisbane Sunday Mail newspaper spent hundreds of dollars on an aircraft charter to spot and photograph the raft, but, unfortunately, the plane had to return from the area before the raft's exact position was transmitted.

The newspaper telephoned Gus and Raphael to confirm that the raft and its signal were no hoax.

Air Force authorities in Townsville declined news media requests to put one of their Neptune aircraft specially equipped for sea searching into the air. No request had come from Canberra.

Otherwise, official statements that there was no raft, that such a drift was impossible and that the radio signals were a hoax might never have been made.

It was revealed later that the authorities did not have the equipment to pick up the raft's signals. Nor did they have the beam aerials of the Amateurs concerned that were confirming the raft's position.

SEARCH PERMIT REFUSED

On Sunday, November 1, Civil Aviation Department officers in Rockhampton refused permission to allow a twin-engined aircraft proposed chartered by the Australian Broadcasting Commis-

Hallicrafters Transceiver back for the La Balsa crewmen at a Brisbane DX Radio Club function at the QTH of Keith VK4KS at Aspley, Brisbane, on November 15. Picture shows (from left) Club President Mr. C. I. Patterson, Gabriel Salas, W.I.A. Queensland Division President Norm Wilson (VK4NP), Vital Alsar, Keith Schleicher (VK4KS), Marc Modena and Normand Tetreault. Photo courtesy The Courier-Mail, Brisbane.

sion and then later by the Brisbane Courier-Mail to search for the raft since the search area was too far off the coast.

For reporters and photographers, a major news event was so near and yet so far, **and reporters had to rely on Amateur Radio reports.**

On Monday, November 2, from 2 p.m. E.A.S.T., there was the normal position report. The raft was sailing south towards Brisbane and all was well. There was a similar report on the Tuesday with Les and Syd making the contact.

Crisis day came on Wednesday, November 4, when the raft reported its position at 154 deg. 20 min. E., 26 deg. 05 min. S., or about 66 miles north-east of Double Island Point on the Australian mainland.

The raft was being buffeted by a 30-knot south-easter. The crew were all well but were worried by the strong wind.

As they felt they were within Australian waters and near landfall, they thought it advisable to request assistance to stand by.

Following the report, two newspapers put separate aircraft up to search for the raft, but in poor visibility and failing light, it was not sighted.

At Airlie Beach, Les offered to stay up all night keeping a listening watch on the frequency. At Syd's suggestion, the raft was back on the air at 8 p.m. It was then only 16 miles east-north-east of Double Island Point with a 30-knot south-easter still blowing.

At Mooloolaba, 50 miles to the south, a pilot launch with a doctor on board put to sea to search unsuccessfully and returned to port soon after midnight.

At 2 a.m. on Thursday, November 5, the fishing launch Capri, chartered by the local Nambour newspaper, left Mooloolaba to search.

By 5 a.m., the Mexicans were back on the air asking Vital his position, which was two miles off Double Island Point. However, lighthouse men there could not see the raft.

At this time, skip distance prevented Brisbane Amateurs from hearing the raft. It was Syd who asked the questions and Les confirmed the raft's replies.

The untold scores of Amateurs who must also have been listening did not break in.

SEEN FROM THE AIR

As air-sea rescue authorities were still maintaining the whole matter was a hoax, the raft was spotted from the air.

After Syd was unable to reach Brisbane authorities by telephone, he asked Keith VK4KS, standing by in Brisbane, to contact them to see if Syd's services were still required. The authorities released Syd and took control.

The raft was later taken in tow by the Capri and it reached Mooloolaba at 11.50 p.m. E.A.S.T.

W.I.A. OFFICIALS AT WELCOME

There to welcome them on behalf of Amateurs were the W.I.A. Queensland Div. President Norm Wilson (VK4NP), Vice-President Theo Marks (VK4MU), Keith VK4KS and Ken Chiverton (VK4VC).

About 2.30 a.m., Vital was at Norm's station wagon to contact the Admiral (XE1EB) to confirm the end of a fantastic voyage.

But all was not ended there so far as Amateurs were concerned.

The next day Vital paid a visit to the shack of Kev in Nambour and while there was able to communicate with Mexico and Ecuador.

On Friday, November 13, the four crewmen were in Brisbane and visited the shack of Keith for a late lunch and again were able to have a few words with XE1EEI, XE1EB and HC2OM.

Then on Sunday, November 15, they returned to Keith's for a dinner in their honour, given by the Brisbane DX Radio Club and attended by 50 members and their wives.

At this, Vital was presented with a club certificate and made an honorary member. Here, too, the men received back their transceiver, repaired to first class condition.

Salt water spray had got inside and the microphone had been damaged by electrolysis action. Also, the transmitter was putting out only 30 watts, two tubes were "soft" and tuning was poor. Luck had prevailed!

The debt to all Amateur operators involved with La Balsa from Ecuador to Australia has been acknowledged many times since by Vital.

But who would take anything from the magnificence of the feat by four brave men?

TECHNICAL ARTICLES

Readers are requested to submit articles for publication in "A.R.," in particular constructional articles, photographs of stations and gear, together with articles suitable for beginners, are required.

HOW MANY MIKES?

COL HARVEY, VK1AU*

Not for the audiophile—but a simple approach to the problem of testing capacitors in the tens of microfarads range

The long standing practice of bridging a replacement capacitor across a suspect electrolytic has much to commend it, particularly in filter and decoupling applications. However, in solid state equipment where even interstage coupling capacitors are likely to be many microfarads, it is generally a nuisance to remove suspect capacitors for test, and more a problem to prove capacitor value and serviceability. As very few Amateurs seem to have access to a polarised capacity bridge, a simple self contained capacity and leakage tester can be a useful substitute. The method used does not give absolute readings, but compares the suspect component with a calibration obtained from newish similar items.

Experience to date shows that capacitor values measured for electrolytics are higher than the equivalent values given by paper capacitors. Apart from the effect of differing leakage, no explanation for this has been attempted. The problem is easily overcome, however, by using a supplementary calibration for paper capacitors in the microfarad range.

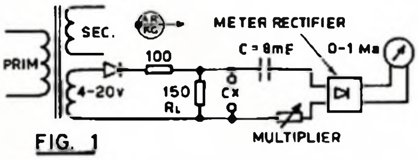


Fig. 1.—The Capacity Meter.
Values are not critical. C is needed to keep d.c. off the meter rectifier. Set meter to full scale by adjustment of the multiplier before connecting condenser under test. Choose a value for the multiplier which will allow f.s.d. with the voltages and meter available.

The concept of the tester is that it should be simple and cheap, should cover the range 5 to 200 μF., provide a leakage test and allow measurements to be made without having to disconnect the suspect item.

Take any half wave a.c. to d.c. rectifier and apply the output to a load resistor. If there is no filter, there will be a substantial a.c. component across the load. A low range a.c. voltmeter can be coupled across the load and the multiplier set to give a full scale reading of the ripple. The more substantial the capacity subsequently placed across the load, the lower the meter reading of ripple. Calibration is then achieved by the simple expedient of recording meter readings against the labelled value of newish capacitors in series-parallel combinations to cover the preferred values in the range 0-200 μF.

Since testing is incomplete unless we have an assurance that leakage is within reasonable limits, we also need to provide an adjustable source of reasonably pure d.c., and a means of indicating within broad limits the amount of leakage. With low value mica/ceramic capacitors a conventional neon lamp is well proven, but with the higher leakage of electrolytics a less sensitive indication is needed. The meter used to display capacity can therefore be switched (and shunted as required) to read leakage.

There is considerable freedom in the way in which an appropriate test voltage can be obtained, ranging from a simple half wave supply with no choice of voltage; through a voltage doubler arrangement with switched voltage divider networks to provide precise ratings for test. However, with a 250 volt supply, providing a push to test switch is provided, a 2 watt 50K potentiometer can be calibrated to show the approximate voltage available for test. The ultimate choice depends mainly on the characteristics of the available transformer and the size of the instrument cabinet which is to be used.

In practice only one important refinement is needed to the simple capacity test circuit described above. If the capacitor under test, or the test leads are shorted, the output of the transformer rectifier will also be shorted. To avoid the smell of burning insulation, a series resistor of about 50-100 ohms must be used in series with the load resistor. Since both resistors will dissipate about 6 watts (depending on transformer voltage), it is necessary to use wire wound bias resistors together with a diode that will handle 60 mA. plus the peak charging current.

So far as the transformer secondary voltage is concerned, any voltage between 4 and 40 can be used, providing the series resistor is altered to maintain about 5 watts dissipation in the load, and that the meter multiplier is varied to permit full scale deflection with whatever end-voltage results. It is a slight advantage to have some portion of the meter multiplier adjustable from the front panel, so that the scale can be set before each set of readings of capacity.

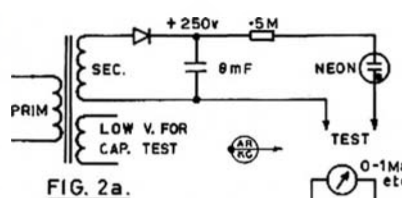
The meter full scale deflection is not significant either, but the combination of a 6-12 volt transformer secondary and an 0-1 mA. meter has proved very satisfactory. Almost any available junk box combination can be fiddled into a satisfactory device. However, don't forget the low value blocking capacitor to keep d.c. off the meter rectifier.

After the instrument is completed, it is wise to measure the d.c. voltage across the load resistor, so that tests on small electrolytics of lesser working voltage can be avoided.

Calibration is not linear, but the difference between 5 and 8 μF. can be seen easily. If the readings of newish electrolytics are graphed, it is a simple matter to extract scale readings corresponding with preferred values, such as 8, 16, 25, 40, 50, 64, 100, 160 μF. By using a parallel rheostat across the test capacitor, the value of in-circuit shunt resistance which will affect the accuracy of readings can be found. In general, a 1,500 ohm bias resistor across 25 μF. will not affect the reading.

As with most test procedures, a few clues as to interpretation of results are sometimes needed. With this gadget—

- A shorted capacitor reads 200 μF.
- A leaky capacitor shunts the ripple and consequently gives an erroneously high capacity reading. If the capacity reading is more than about 20% high on the labelled value—suspect a leaky capacitor and test further.
- Readings less than the labelled value are likely to be valid.
- A low voltage electro run at higher than rated d.c. voltage will initially show excessive capacitance, soon followed by a progressive drop to a low reading of capacity, probably accompanied by overheating.
- Paper capacitors although labelled the same value as electros, do not produce the same scale reading.



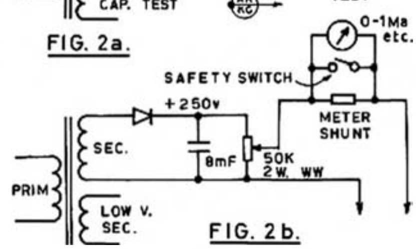


Fig. 2a.—Simple Leakage Tester.
For use with paper and mica capacitors. If electrolytics are to be tested frequently, it would be better to make provision for a meter indication of leakage as well.

Fig. 2b.
Addition of a potentiometer calibrated for voltage, allows low voltage electros to be checked. The safety switch is needed as a precaution against high charging currents. A "normally closed" push button switch (such as is used for refrigeration lights) would be ideal. For clarity, switching has been omitted.

* 16 Leane St., Hughes, A.C.T., 2605.

HARMONICS

LECTURE No. 10B

C. A. CULLINAN,* VK3AXU

Now it is rather unfortunate that if we operate a valve in its most linear condition its efficiency is low, but luckily it is possible to operate under certain conditions with a considerable increase in efficiency whilst retaining low distortion characteristics.

Let us make some comparisons, taking data from an A.W.V. valve data book after detailing some definitions.

● Continuing the series of lectures by C. A. Cullinan, VK3AXU, at Broadcast Station 3CS for students studying for a P.M.G. Radio Operator's Certificate.

CLASS OF SERVICE

Class A Amplifier

This is a valve amplifier in which the grid bias and the alternating grid voltages are such that plate current in a specific valve flows at all times.

The ideal class A amplifier is one in which the alternating component of the plate current is an exact reproduction of the form of the alternating voltage applied to the grid and plate current flows during the entire 360 degrees of the electrical cycle.

The characteristics of a class A amplifier are low output and low efficiency.

The efficiency of a class A amplifier may lie between 25% and 30%. One main characteristic is that grid current never flows during any part of the exciting voltage cycle.

In most valve type receivers the r.f. stages operate in class A. Also in the early days of radio telephony, using valves, the modulator valves were operated in class A.

Class AB Amplifier

An amplifier in which the grid bias and the applied alternating grid voltages are such that plate current in a specific valve flows for appreciably more than half but less than the entire electrical cycle.

The characteristics of a class AB amplifier are greater output and greater efficiency than a class A amplifier. However, the plate current will not remain steady. The bias is such that without an exciting voltage at the grid, the plate current will be lower than in class A operation and will rise considerably as the exciting voltage increases.

Class AB amplifiers are divided into two types known as AB1 and AB2.

In class AB1 amplifier grid current never flows during any portion of the grid excitation, but the efficiency is greater than in a class A amplifier.

But in class AB2 operation grid current does flow during part of the exciting voltage cycle and greater power can be obtained because the efficiency is still greater.

Class B Amplifier

An amplifier in which the grid bias is approximately equal to the plate current cut-off value so that plate current is approximately zero when no grid exciting voltage is applied, so that plate current in a specific valve flows for approximately one half of each cycle when an alternating voltage is applied to the grid.

The characteristics of a class B amplifier are high output and high efficiency (up to 78%).

However, there is a price to pay for this in that grid current may flow for almost the whole of the half cycle, the plate current without grid excitation is low but rises to a very high value with full excitation, hence the regulation of the driver amplifier and that of the power supply must be extra good.

The wave-form of such an amplifier would be generally similar to the current wave I2 in Fig. 1b, from the time axis upwards, with the top made to look more like a sine-wave.

Now as far as audio frequencies are concerned, the use of a single valve in class AB would not be of much use because of the serious distortion which would result (as per Fig. 1b), but, fortunately, there is a way out and that is by connecting two valves in what is known as push-pull.

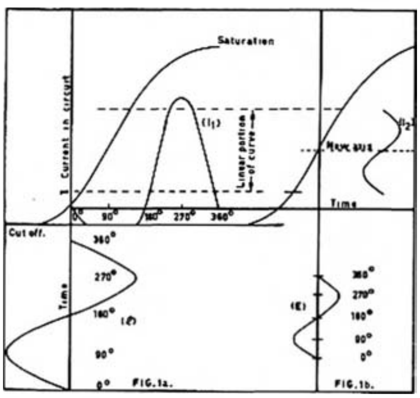


FIG. 1a. FIG. 1b.

In this connection one valve amplifies over one half of the exciting voltage cycle and the other valve amplifies over the other half cycle. (In an ideal amplifier.)

The plates of the two valves are connected to a load having the h.t. applied to the centre tap. Usually the load will take the form of a transformer having a centre-tapped primary, into which the actual load has been reflected.

If the two halves of the primary are well balanced as regards inductance, self-capacitance and resistance, then the output of each valve will combine to produce a complete electrical cycle in the transformer, for each complete cycle of grid exciting voltage, also even-order harmonics (2nd, 4th, 6th, etc.) will cancel and in practice the even-order harmonics, particularly the 2nd, will be virtually non-existent, therefore it becomes possible to obtain good quality audio frequency power from class AB or class B operation. Also, push-pull operation may be applied to two valves in class A.

Class C Amplifier

This is an amplifier in which the grid bias is appreciably greater than the cut-off value so that the valve plate current is zero when no alternating grid voltage is applied, and so that the plate current in a specific valve flows for appreciably less than one half of each cycle when an alternating grid voltage is applied.

The characteristics of a class C amplifier are high plate circuit efficiency and high power output. However, as plate current flows only over portion of the grid voltage cycle there will be a considerable departure from linearity between the grid and plate wave-forms.

Class C amplifiers find their main use in radio frequency applications. For such purposes the valve operates into a tuned circuit, usually known as a "tank circuit", and this has the property of appearing as a "fly-wheel" converting the plate current pulses into a sine-wave usually with considerable harmonic content. Two valves used in class C operation in push-pull will have little even-order harmonic distortion due to the reduction of the even order harmonics because of the push-pull connection.

A similar state of affairs exists if a class B amplifier is operated at radio frequencies and it is possible to obtain excellent linearity if the valve and its associated circuits are correctly adjusted. Such an amplifier is often referred to as a linear amplifier.

Unfortunately a valve used as a class B radio frequency amplifier has low efficiency, about 33.3% and attempts to make it more efficient frequently cause considerable harmonic and intermodulation distortion.

Valve type 6L6 was developed before World War II., and has been a very popular valve. Although designed for audio frequency work, Radio Amateurs soon found that it was excellent at radio frequencies for transmitters, and later a variant called an 807 was developed expressly for high power audio and radio frequency work.

To illustrate the operation of valves as amplifiers under the various clases of operation, we are listing some of those for 6L6 and 807s from the A.W.V. valve data books, 6L6G is a glass envelope equivalent of the 6L6.

* 6 Adrian Street, Colac, Vic., 3250.

Type 6L6
Single Valve—Class A

Plate voltage	250 v.
Screen voltage	250 v.
Grid voltage	—14 v.
Peak a.f. grid voltage	14 v.
Zero signal plate current	72 mA.
Max. signal plate current	79 mA.
Zero signal screen current	5 mA.
Max. signal screen current	7.3 mA.
Load resistance	2500 ohms
Max. signal power output	6.5 watts
Total harmonic distortion	10%

This valve is a tetrode and under class A operation there is a slight change in plate current. Grid current does not flow, however plate current flows at all times.

Note that there is a very high total harmonic distortion.

Let us compare what happens if two 6L6 valves are operated in class A push-pull for the same plate and screen voltages (for two valves).

Plate voltage	250 v.
Screen voltage	250 v.
Grid voltage	—16 v.
Peak grid to grid voltage	32 v.
Zero signal plate current	120 mA.
Max. signal plate current	140 mA.
Zero signal screen current	10 mA.
Max. signal screen current	16 mA.
Load resistance (pl. to pl.)	5000 ohms
Max. signal power output	14.5 watts
Total harmonic distortion	2%

Comparison of these two sets of data shows that the push-pull connection gives more than twice the output of a single valve, also that the total distortion has dropped to 2%.

By increasing both the plate and screen voltages as well as the grid bias, it is possible to operate two 6L6s in class AB1 push-pull and keep within the maximum ratings for the valves.

Here is one set of data for two valves.

Class AB1

Plate voltage	360 v.
Screen voltage	270 v.
Grid bias voltage	—22.5 v.
Peak a.f. grid to grid	45 v.
Zero signal plate current	88 mA.
Max. signal plate current	132 mA.
Zero signal screen current	5 mA.
Max. signal screen current	15 mA.
Load resistance (pl. to pl.)	6600 ohms
Max. signal power output	26.5 watts
Total harmonic distortion	2%

For this mode of operation there has been amost twice the power output as obtained from the same valves in class A push-pull, and the total harmonic distortion has remained the same. However, it must be pointed out that there is considerable variation in plate current and the screen voltage should be stabilised to keep it at 270 volts. Also, the regulation of the power supply must be very good to keep the h.t. voltage constant as the plate current swings from 88 mA. to 132 mA.

Grid current. Note that in all the examples given so far the peak grid exciting voltage does not exceed the bias voltage on either positive or negative peaks, hence grid current does not flow, nor is the valve driven beyond plate current cut-off.

Class AB2

Plate voltage	360	400 v.
Screen voltage	270	300 v.
Grid bias voltage	—22.5	—25 v.
Peak a.f. g.-g. voltage	72	80 v.
Zero sig. plate current	88	102 mA.
Max. sig. plate current	205	230 mA.
Zero sig. screen current	5	5 mA.
Max. sig. screen curr't	11	20 mA.
Load resistance (plate to plate)	3800	3800 ohms
Max. sig. power output	47	60 watts
Total harm. distortion	2%	—
Peak grid pow. input	270	350 mW.

Two sets of operating conditions have been given. In the first set of data (A.W.V.) the major change from class AB1 operation is in the plate to plate load resistance. However, the grids are now driven into grid current on the positive peaks of the exciting grid voltage and as a result considerably more plate current flows.

However, there are penalties to be made good. The grids require 270 milliwatts of driving power, which means that the driver stage must have good regulation as it supplies this power. Also, the regulation of the plate and screen supplies must be very good.

The second set of data (R.C.A.) shows that with an increase in plate, screen and grid bias voltages and an increase in grid driving power up to 60 watts output can be obtained. However, no distortion figures are quoted.

It would appear that 47 watts output is the maximum that two 6L6 valves can deliver in class AB2 push-pull operation. Above this there is great danger of internal breakdown in the valves.

However, the 807 is essentially a 6L6 valve with different external appearance. The plate is brought out to a metal cap on the top of its glass envelope and the base uses a "low loss" UY configuration.

For Continuous Commercial Service (C.C.S.) the 807 may be operated with the same ratings as for the 6L6, but for Intermittent Commercial and Amateur Service (I.C.A.S.) it is possible to get as much as 120 watts from two 807s in class AB2 push-pull operation.

No data is available for 6L6 or 807 valves for operation as class B audio frequency amplifiers.

All the data presented so far shows that class A operation is the least efficient, although the simplest, and that to obtain greater power from a specific valve it is necessary to use more than one valve in one of the other classes or several valves in parallel.

It is possible to operate in class A, AB1, AB2 and B so that the distortion in the output wave is very low, but the power output, too, will be low, also there is an enormous difference in the linearity between input and output wave forms for different types of valves.

Important.—It must be throughly understood that data in valve handbooks refers to an ideal amplifier and such things as power output and distortion are those to be obtained at the valve or valves' plates. The output coupling device is not considered so in designing amplifiers the losses and any distortion in the coupling system must be taken into account.

It is possible to build valve amplifiers with nominally 1% total harmonic distortion and this can be reduced further if negative feedback is employed.

(to be continued)

N.Z.C.—NEW ZEALAND COUNTIES AWARD

Initial award requires confirmations from 20 different New Zealand counties. Stickers for 40, 60, 80, 100 with a special award for the full 112 counties. Charges: initial certificate with any endorsements, 25 cents or four IRCs; later endorsements 10 cents or two IRCs. Checking sheets with all county information available for 10 cents or two IRCs. This sheet remains a complete record of the counties worked and endorsements obtained—it is returned after each application. Applications and information from ZL2GX, 152 Lytton Rd., Gisborne, N.Z.

Results of the 1970 Victorian 432 MHz. Antenna Gain Contest

By J. JENNINGS, VK3AVJ*

Incorporated in the 1970 Victorian V.h.f. Convention held in Melbourne over the week-end of October 10 and 11 was a contest in which the gains of 432 MHz. antennas were measured.

The results are as follows:

Type	Submitted by	Gain dB.
32 element extended-expanded colinear	VK3ZYO	16
32 element extended-expanded colinear	VK3AOT	15
VK3ABP 15 element yagi	VK3AOT	11
12 over 12 skeleton slot	VK3ZTE	9
90° corner reflector	VK3AUI	8
VK3AGV 9 element yagi	VK3ZMU	7
Commercial 450 MHz. 7 over 7 skeleton slot	VK3AOT	5
11 element yagi	VK5ZDY	4
9 over 9 yagis	VK3ZCK	4
9 element yagi	VK3ZKB	2
7 over 7 skeleton slot ..	VK3AOT	2
Yagi	VK3AKC	1
Yagi	VK3ASV	1

The antenna with the lowest measured gain was a halo brought by VK-3ZBJ.

MEASURING TECHNIQUE

The measuring technique used is illustrated in Fig. 1. At the beginning of each measurement a reference dipole was connected so as to receive the signal from a low power transmitter 300 ft. away. Receiver gain was adjusted for a convenient "S" meter reading with the variable attenuator in the 0 dB. position. The antenna under test was then connected in place of the reference dipole and the variable attenuator adjusted until the "S" meter reading corresponded with that for the dipole. Hence the antenna gain was read directly from the scale of the variable attenuator.

The variable attenuator used was calibrated for a 50 ohm source and load. To ensure that these conditions were met, 6 dB. pads were connected as shown in Fig. 1. Hence attenuator reading was made accurate almost regardless of antenna impedance and receiver input impedance.

Antenna gain measurements can also be effected by ground reflections. In theory results can be effected by between +6 dB. and —∞ dB., depending on the amplitude and phase difference between direct and reflected waves. It is believed that measures taken to reduce this source of error were effective since consistent results were obtained in several positions.

EVALUATION OF RESULTS

It is believed that the technique used allowed gains to be **compared** to within $\pm\frac{1}{2}$ dB. The absolute error cannot be determined except by estimation. Theoretical antenna gains can be most easily determined for the colinears and corner reflector. Measured results are about 2 dB. below theoretical, which indicates that the figures for all antennas measured **may** be 2 dB. low. This could be attributed to the mismatch existing between the 70 ohm reference dipole and the 50 ohm transmission line and to other deficiencies of the reference dipole.

Some antennas which exhibited reasonable directivity measured very low in gain. This probably can be attributed to (1) poor surface conductivity of elements and other resistive losses, and (2) incorrect matching between antenna and 50 ohm transmission line. Mismatch is less of a problem in normal use since the tuning and loading controls of a final amplifier will usually cater for a wide range of load impedances. Such is not the case for a mismatched antenna delivering power into a line terminated in a 50 ohm pad.

(continued on page 16)

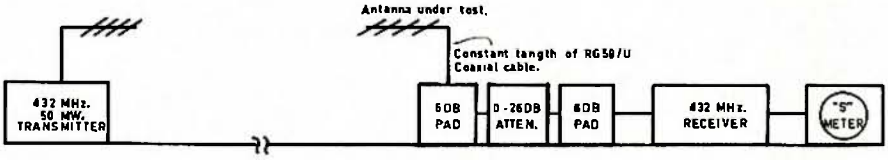


FIG. 1. MEASURING TECHNIQUE

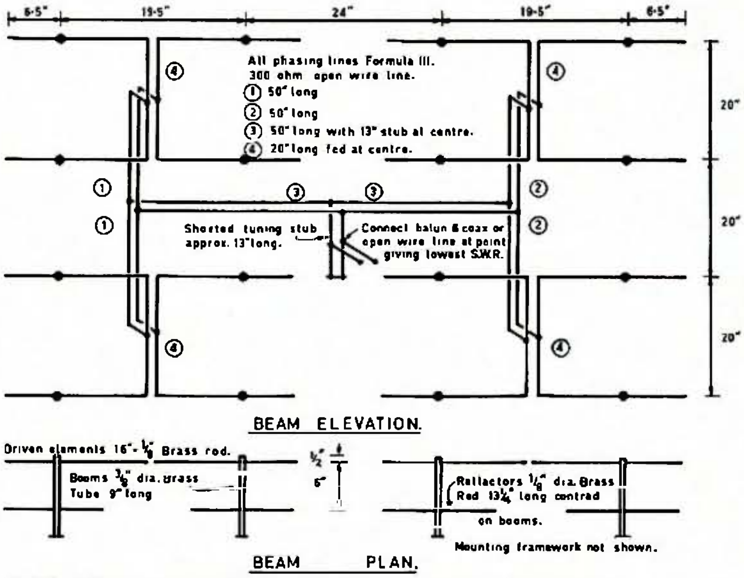


FIG. 2. 432 MHz. COLINEAR ARRAY WITH MEASURED GAIN OF 16 DB.

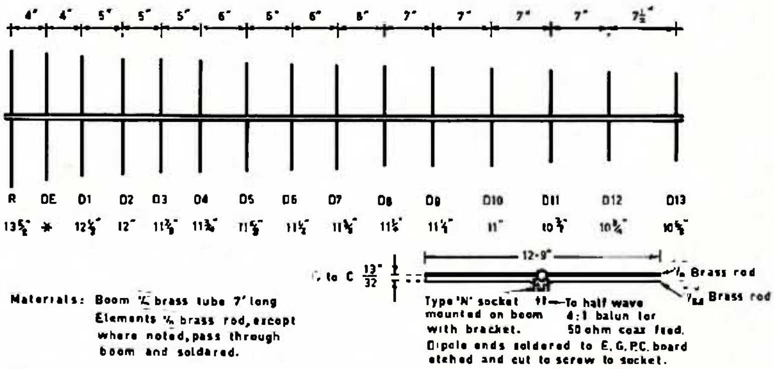


FIG. 3. 432 MHz. YAGI - BASED ON DESIGN BY VK3ABP.

* 11 Dunbar Avenue, Caulfield, Vic., 3161.

AUSTRALIAN DX CENTURY CLUB AWARD

OBJECTS

1.1 This Award was created in order to stimulate interest in working DX in Australia and to give successful applicants some tangible recognition of their achievements.

1.2 This Award, to be known as the "DX Century Club" Award, will be issued to any Australian Amateur who satisfies the following conditions.

1.3 A certificate of the Award will be issued to the applicants who show proof of having contacted one hundred countries, and will be endorsed as necessary, for contacts made using only one type of emission.

REQUIREMENTS

2.1 Verifications are required from one hundred different countries as shown in the Official Countries List.

2.2 The Official Countries List will be published annually in "Amateur Radio" and will be amended from time to time as required. Should a country be deleted from the Countries List at any time, members and intending members will be credited with such country if the date of contact was before such deletion.

2.3 The commencing date for the Award is 1st January, 1946. All contacts made on or after this date may be included.

OPERATION

3.1 Contacts must be made in the H.F. Band (Band 7) which extends from 3 to 30 MHz., but such contacts must only be made in the authorised Amateur Bands in Band 7.

3.2 All contacts must be two-way contacts on the same band. Cross-band contacts will not be allowed.

3.3 Contacts may be made using any authorised type of emission for the band concerned.

3.4 Credit may only be claimed for contacts with stations using regularly-assigned Government call signs for the country concerned.

3.5 Contacts made with ship or aircraft stations will not be allowed, but land-mobile stations may be claimed provided their specific location at the time of contact is clearly shown on the verification.

3.6 All stations must be contacted from the same call area by the applicant (except as below), although if the applicant's call sign is subsequently changed, contacts will be allowed under the new call sign providing the applicant is still in the same call area.

If the applicant moves to another call area, contacts must be made from within a radius of 150 miles of the previous location to qualify for award purposes. If the distance of the new location from the old exceeds a radius of 150 miles, a separate application for a new award must be made claiming only contacts made from the new location.

3.7 All contacts must be made when operating in accordance with the Regulations laid down in the "Handbook for the Guidance of Operators of Amateur Wireless Stations" or its successor.

VERIFICATIONS

4.1 It will be necessary for the applicant to produce verifications in the form of QSL cards or other written evidence showing that two-way contacts have taken place.

4.2 Each verification submitted must be exactly as received from the station contacted, and altered or forged verifications will be grounds for disqualification of the applicant.

4.3 Each verification submitted must show the date and time of contact, type of emission and frequency band used, the report and the location or address of the station at the time of contact.

4.4 A check list must accompany every application setting out the details for each claimed station in accordance with the details required in Rule 4.3.

APPLICATIONS

5.1 Applications for membership shall be addressed to the **Federal Awards Manager, W.I.A., P.O. Box 67, East Melbourne, Vic., 3002**, accompanied by the verifications and check list with sufficient postage enclosed for their return to the applicant, registration being included if desired.

5.2 A nominal charge of 25c, which shall also be forwarded with the application, will be made for the issue of the certificate to successful applicants who are non-members of the Wireless Institute of Australia.

5.3 Successful applicants will be listed periodically in "Amateur Radio". Members of the D.X.C.C. wishing to have their verified country totals, over and above the one hundred necessary for membership, listed will notify these totals to the Federal Awards Manager.

5.4 In all cases of dispute, the decision of the Federal Awards Manager and two officers of the Federal Executive of the W.I.A. in the interpretation and application of these Rules shall be final and binding.

5.5 Notwithstanding anything to the contrary in these Rules, the Federal Council of the W.I.A. reserves the right to amend them when necessary.

AUSTRALIAN V.H.F. CENTURY CLUB AWARD

OBJECTS

1.1 This Award has been created in order to stimulate interest in the V.H.F. bands in Australia, and to give successful applicants some tangible recognition of their achievements.

1.2 This Award, to be known as the "V.H.F. Century Club" Award, will be issued to any Australian Amateur who satisfies the following conditions.

1.3 Certificates of the Award will be issued to the applicants who show proof of having made one hundred contacts on the V.H.F. bands, and will be endorsed as necessary, for contacts made using only one type of emission.

REQUIREMENTS

2.1 Contacts must be made in the V.H.F. Band (Band 8) which extends from 30 to 300 MHz., but such contacts must only be made in the authorised Amateur Bands in Band 8.

2.2 In the case of the authorised bands between 30 and 100 MHz., verifications are required from one hundred different stations at least seventy of which must be Australian. The Amateur Bands 50 to 54 MHz. and 56 to 60 MHz. will be counted as one band for the purposes of the Award.

2.3 In the case of the authorised Amateur Band between 100 to 200 MHz., verifications from one hundred different stations are required.

2.4 It is possible under these rules for one applicant to receive two certificates, one for each of the authorised Amateur Bands nominated in Rules 2.2 and 2.3.

2.5 The commencing date for the Award is 1st June, 1948. All contacts made on or after this date may be included.

OPERATION

3.1 All contacts must be two-way contacts on the same band, and cross-band contacts will not be allowed.

3.2 Contacts may be made using any authorised type of emission for the band concerned.

3.3 Fixed stations may contact portable/mobile stations and vice versa, but portable/mobile station applicants must make their contacts from within the same call area.

3.4 Applicants, when operating either portable/mobile or fixed, may contact the same station licensee, but may not include both contacts for the same type of endorsement.

3.5 Applicants may only count one contact for a station worked as a limited licensee with a Z call sign who is subsequently contacted as a full A.O.C.P. holder.

3.6 All stations must be contacted from the same call area by the applicant (except as below), although if the applicant's call sign is subsequently changed, contacts will be allowed under the new call sign providing the applicant is still in the same call area.

If the applicant moves to another call area, contacts must be made from within a radius of 150 miles of the previous location to qualify for award purposes. If the distance of the new location from the old exceeds a radius of 150 miles, a separate application for a new award must be made claiming only contacts made from the new location.

3.7 All contacts must be made when operating in accordance with the Regulations laid down in the "Handbook for the Guidance of Operators of Amateur Wireless Stations" or its successor.

VERIFICATIONS

4.1 It will be necessary for the applicant to produce verifications in the form of QSL cards or other written evidence showing that two-way contacts have taken place.

4.2 Each verification submitted must be exactly as received from the station contacted, and altered or forged verifications will be grounds for disqualification of the applicant.

4.3 Each verification submitted must show the date and time of contact, type of emission and frequency band used, the report and the location or address of the station at the time of contact.

4.4 A check list must accompany every application setting out the following details:—

4.4.1 Applicant's name and call sign, and whether a member of the W.I.A. or not.

4.4.2 Band for which application is made, and whether special endorsement is involved.

4.4.3 Where applicable, the date of change of call sign and previous call sign.

4.4.4 Details of each contact as required by Rule 4.3.

4.4.5 The applicant's location at the time of each contact if portable/mobile operation is involved.

4.4.6 Any relevant details of any contact about which some doubt might exist.

APPLICATIONS

5.1 Applications for membership shall be addressed to the **Federal Awards Manager, W.I.A., P.O. Box 67, East Melbourne, Vic., 3002**, accompanied by the verifications and check list with sufficient postage enclosed for their return to the applicant, registration being included if desired.

5.2 A nominal charge of 25c, which shall also be forwarded with the application, will be made for the issue of the certificate to successful applicants who are non-members of the Wireless Institute of Australia.

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5.4 In all cases of dispute, the decision of the Federal Awards Manager and two officers of the Federal Executive of the W.I.A. in the interpretation and application of these Rules shall be final and binding.

5.5 Notwithstanding anything to the contrary in these Rules, the Federal Council of the W.I.A. reserves the right to amend them when necessary.

AUSTRALIAN D.X.C.C. COUNTRIES LIST

	Phone	C.W.
A2C, ZS9—Botswana		
AC3—Sikkim		
AC4—Tibet		
AC5—Bhutan		
AP—East Pakistan		
AP—West Pakistan		
BV—Taiwan		
BY—China		
C21, VK9—Nauru		
C31, PX—Andorra		
CE—Chile		
CE9AA-AM, FB8Y, KC4AA-US, LA, LU-Z, OR, UA1, VK0, VP8, ZL5, 8J—Antarctica		
CE0A—Easter Is.		
CE0X—San Felix		
CE0Z—Juan Fernandez		
CM, CO—Cuba		
CN—Morocco		
CP—Bolivia		
CR3—Portuguese Guinea		
CR4—Cape Verde Is.		
CR5—Principe, Sao Thome		
CR6—Angola		
CR7—Mozambique		
CR8—Portuguese Timor		
CR9—Macao		
CT1—Portugal		
CT2—Azores		
CT3—Madeira		
CX—Uruguay		
DJ, DK, DL, DM—Germany		
DU—Philippine Is.		
EA—Spain		
EA6—Balearic Is.		
EA8—Canary Is.		
EA9—Rio de Oro		
EA9—Spanish Morocco		
EI—Republic of Ireland		
EL—Liberia		
EP—Iran		
ET3—Ethiopia		
F—France		
FB8W—Crozet Is.		
FB8X—Kerguelen Is.		
FB8Z—Amsterdam and St. Paul Is.		
FC—Corsica		
FG7—Guadeloupe		
FH8—Comoro Is.		
FK8—New Caledonia		
FL8—French Somaliland		
FM7—Martinique		
FO8—Clipperton Is.		
FO8—French Oceania		
FO8M—Maria Theresa		
FP8—St. Pierre and Miquelon		
FR7—Glorioso Is.		
FR7—Juan de Nova		
FR7—Reunion Is.		

	Phone	C.W.
FR7—Tromelin		
FS7—Saint Martin		
FW8—Wallis and Futuna Is.		
FY7—French Guiana and Inini		
G, GB—England		
GC—Guernsey and Dependencies		
GC—Jersey Is.		
GD—Isle of Man		
GI—Northern Ireland		
GM—Scotland		
GW—Wales		
HA, HG—Hungary		
HB9—Switzerland		
HB0—Liechtenstein		
HC—Ecuador		
HC8—Galapagos Is.		
HH—Haiti		
HI—Dominican Republic		
HK—Columbia		
HK0—Bajo Nuevo		
HK0—Malpelo Is.		
HK0—San Andres and Providencia		
HL, HM—Korea		
HP—Panama		
HR—Honduras		
HS—Thailand		
HV—Vatican		
HZ, 7Z—Saudi Arabia		
I, IT—Italy		
IS1—Sardinia		
JA, JH, JR, KA—Japan		
JD1, KA1, KG6I—Bonin and Volcano Is.		
JD1, KA1, KG6I—Marcus Is.		
JT—Mongolia		
JW—Svalbard		
JX—Jan Mayen		
JY—Jordan		
K, KN, W, WA, WB, WN—United States of America		
KB6—Baker, Howland and American Phoenix Is.		
KC4—Navassa Is.		
KC6—Eastern Caroline Is.		
KC6—Western Caroline Is.		
KG4—Guantanamo Bay		
KG6—Guam		
KG6—Mariana Is.		
KH6, WH6—Hawaiian Is.		
KH6—Kure Is.		
KJ6—Johnston Is.		
KL7, WL7—Alaska		
KM6—Midway Is.		
KP4, WP4—Puerto Rico		
KP6—Palmyra Group, Jarvis Is.		
KR6, 8—Ryuku Is.		
KS4—Swan Is.		
KS4B, HK0—Serrana Bank and Roncador Cay		
KS6—American Samoa		

	Phone	C.W.
KV4, WV4—Virgin Is.		
KW6—Wake Is.		
KX6—Marshall Is.		
KZ5—Canal Zone		
LA, LJ—Norway		
LU—Argentina		
LX—Luxembourg		
LZ—Bulgaria		
MP4B—Bahrein		
MP4D, T—Trucial Oman		
MP4M—Sultinate of Muscat and Oman		
MP4Q—Qatar		
OA—Peru		
OD5—Lebanon		
OE—Austria		
OH—Finland		
OH0—Aland Is.		
OJ0—Market Reef		
OK, OL—Czechoslovakia		
ON—Belgium		
OX, KG1, XP—Greenland		
OY—Faroe Is.		
OZ—Denmark		
PA, PE, PI—Netherlands		
PJ—Netherlands Antilles		
PJ—Sint Maarten		
PY—Brazil		
PY0—Fernando de Noronha		
PY0—St. Peter and St. Paul's Rocks		
PY0—Trinidade and Martim Vaz Is.		
PZ1—Surinam		
SK, SL, SM—Sweden		
SP—Poland		
ST—Sudan		
SU—Egypt		
SV—Crete		
SV—Dodecanese		
SV—Greece		
TA, TC—Turkey		
TF—Iceland		
TG—Guatemala		
TI—Costa Rica		
TI9—Cocos Is.		
TJ—Cameroun		
TL—Central African Republic		
TN—Congo Republic		
TR—Gabon Republic		
TT—Chad Republic		
TU—Ivory Coast		
TY—Dahomey Republic		
TZ—Mali Republic		
UA, UV, UW1-6, UN1—European Russian S.F.S.R.		
UA, UV, UW9, 0—Asiatic R.S.F.S.R.		
UA1—Franz Josef Land		
UA2—Kaliningradsk		
UB5, UT5, UY5—Ukraine		
UC2—White Russian S.S.R.		
UD6—Azerbaijan		
UF6—Georgia		
UG6—Armenia		
UH8—Turkoman		
UI8—Uzbek		

	Phone	C.W.
UJ8—Tadzhik		
UL7—Kazakh		
UM8—Kirghiz		
UO5—Moldavia		
UP2—Lithuania		
UQ2—Latvia		
UR2—Estonia		
VE, VO—Canada		
VK—Australia		
VK2—Lord Howe Is.		
VK4—Willis Is.		
VK9—Christmas Is.		
VK9—Cocos Is.		
VK9—Norfolk Is.		
VK9—Papua Territory		
VK9—Territory of New Guinea		
VK0—Heard Is.		
VK0—Macquarie Is.		
VP1—British Honduras		
VP2A—Antigua, Barbuda		
VP2D—Dominica		
VP2E—Anguilla		
VP2G—Grenada and Dependencies		
VP2K—St. Kitts, Nevis		
VP2L—St. Lucia		
VP2M—Montserrat		
VP2S—St. Vincent and Dependencies		
VP2V—British Virgin Is.		
VP5—Turks and Caicos Is.		
VP7—Bahama Is.		
VP8—Falkland Is.		
VP8, LU-Z—South Georgia Is.		
VP8, LU-Z—South Orkney Is.		
VP8, LU-Z—South Sandwich Is.		
VP8, LU-Z, CE9AN-AZ—South Shetland Is.		
VP9—Bermuda Is.		
VQ1—Zanzibar		
VQ9—Aldabra Is.		
VQ9—Chagos Is.		
VQ9—Desroches		
VQ9—Farquahar		
VQ9—Seychelles		
VR1—British Phoenix Is.		
VR1—Gilbert, Ellice and Ocean Is.		
VR2—Fiji Is.		
VR3—Fanning and Christmas Is.		
VR4—Solomon Is.		
VR5—Tonga Is.		
VR6—Pitcairn Is.		
VS5—Brunei		
VS6—Hong Kong		
VS9K—Kamaran Is.		
VU—India		
VU—Laccadive Is.		
VU—Andaman and Nicobar Is.		
XE, XF—Mexico		
XF4—Revilla Gigedo		
XT2—Voltaic Republic		
XU—Cambodia		
XW8—Laos		
XZ2—Burma		
YA—Afghanistan		

	Phone	C.W.
YB, YC, YD, 8F—Indonesia		
YI—Iraq		
YJ—New Hebrides		
YK—Syria		
YN—Nicaragua		
YO—Rumania		
YS—El Salvador		
YU—Yugoslavia		
YV—Venezuela		
YV0—Aves Is.		
ZA—Albania		
ZB2—Gibraltar		
ZD3—The Gambia		
ZD5—Swaziland		
ZD7—St. Helena		
ZD8—Ascension Is.		
ZD9—Tristan da Cunha & Gough Is.		
ZE—Rhodesia		
ZF1—Cayman Is.		
ZK1—Cook Is.		
ZK1—Manahiki Is.		
ZK2—Niue		
ZL—New Zealand		
ZL/A—Auckland and Campbell Is.		
ZL/C—Chatham Is.		
ZL/K—Kermadec Is.		
ZM7—Tokelaus		
ZP—Paraguay		
ZS1-6—South Africa		
ZS2—Prince Edward and Marion Is.		
ZS3—South-West Africa		
1M—Minerva Reefs		
1S—Spratly Is.		
3A—Monaco		
3B6, 7, VQ8—Agalega and St. Brandon		
3B8, VQ8—Mauritius		
3B9, VQ8—Rodriguez		
3C, EA0—Equatorial Guinea		
3V8—Tunisia		
3W8, XV5—Vietnam		
3Y—Bouvet Is.		
4S7—Ceylon		
4U1—I.T.U. Hq. Geneva		
4W—Yemen		
4X4, 4Z4—Israel		
5A—Libya		
5B4, ZC4—Cyprus		
5H3—Tanzania		
5N2—Nigeria		
5R8—Malagasy Republic		
5T—Mauritania		
5U7—Niger Republic		
5V—Togo Republic		
5W1—Samoa		
5X5—Uganda		
5Z4—Kenya		
6O1, 2, 6—Somali Republic		
6W8—Senegal Republic		
6Y5—Jamaica		
7G1—Republic of Guinea		
7O, VS9—South Yemen Republic		
7P8—Lesotho		
7Q7—Malawi		

	Phone	C.W.
7X, FA—Algeria		
8P—Barbados		
8QA, VS9M—Maldive Is.		
8R—Guyana		
8Z4—Saudi Arabia/Iraq Neutral Zone		
9A1, M1—San Marino		
9G1—Ghana		
9H1—Malta		
9J—Zambia		
9K2—Kuwait		
9K3, 8Z5—Kuwait/Saudi Arabia Neutral Zone		
9L1—Sierra Leone		
9M2, 4—Western Malaysia (fr. 16/9/63)		
9M6, 8—Eastern Malaysia (fr. 16/9/63)		
9N1—Nepal		
9Q5—Republic of the Congo		
9U5—Burundi		
9V1, VS1, 9M4—Singapore (prior to 16/9/63 or after 8/8/65 only. From 16/9/63 to 8/8/65 Singapore counts as 9M2—West Malaysia)		
9X5—Rwanda		
9Y4—Trinidad and Tobago		
*—Blenheim Reef		
*—Geyser Reef		

* Since there is no apparent claim by any country to these reefs, no prefix will be shown. Confirmations for contact only after 4/5/67 will be accepted for D.X.C.C. credit.

DELETED COUNTRIES LIST

	Phone	C.W.
C9—Manchuria (prior 16/9/63)		
CN2—Tangier (prior 1/7/60)		
CR8—Damao, Diu (prior 1/1/62)		
CR8—Goa (prior 1/1/62)		
EA9—Ifni (prior 13/5/69)		
ET2—Eritrea (prior 15/11/62)		
FF8—French West Africa (pr. 7/8/60)		
FI8—French Indo China (pr. 21/12/50)		
FN—French India (prior 1/11/54)		
FQ8—French Equ. Africa (pr. 17/8/60)		
I1—Trieste (prior 1/4/57)		
I5—Italian Somaliland (prior 1/7/60)		
JZ0—Nether. New Guinea (pr. 1/5/63)		
PK1, 2, 3—Java (prior 1/5/63)		
PK4—Sumatra (prior 1/5/63)		
PK5—Netherlands Borneo (pr. 1/5/63)		
PK6—Celebes & Moluc. Is. (pr. 1/5/63)		
UN1—Karelo-Finnish Rep. (pr. 1/7/60)		
VO—Newfoundland (prior 1/4/49)		
VQ6—Brit. Somaliland (prior 1/7/60)		
VS4—Sarawak (prior 16/9/63)		
VS9H—Kuria Muria Is. (pr. 29/11/67)		
ZC5—Brit. North Borneo (pr. 16/9/63)		
ZC6—Palestine (prior 2/7/68)		
ZD4—Gold Coast, Togol'd (pr. 6/3/57)		
9M2—Malaya (prior 16/9/63)		
9S4—Saar (prior 1/4/57)		
9U5—Ruanda-Urundi (between 1/7/60 and 1/7/62 only)		

AMSAT 1970 ANNUAL REPORT

By DR. PERRY I. KLEIN, K3JTE, President*

On March 3, AMSAT reached its first anniversary of incorporation and entered its second year of activity. Membership grew from 264 members and 11 member clubs on January 1, 1970, to over 370 members and 26 member clubs in 25 countries. The following comprises the second annual report presented at the AMSAT annual meeting, held on November 21, 1970.

ACCOMPLISHMENTS TO DATE

AUSTRALIS OSCAR 5

This first full year of AMSAT's operation witnessed the launch of the fifth Radio Amateur satellite of the Oscar series. Australis Oscar 5 (AO-5), built by the WIA Project Australis group in Australia, was launched from the Western Test Range, Calif., on Jan. 23, 1970. The spacecraft's two metre beacon transmitter operated for 23 days, and its commandable ten metre beacon transmitter reached end of life after 46 days.

The AO-5 mission was technologically significant in several respects. Of particular significance was the command system which was used to control the operation of the ten metre beacon. Commands were successfully transmitted by stations in Australia and the United States, marking the first time that successful operation of a command system has been demonstrated in a satellite in the Amateur Service.

The passive magnetic attitude stabilisation system employed in AO-5 was also very successful. The bar magnet and eddy-current damper brought one axis of the spacecraft into alignment with the earth's magnetic field within a week after launch. The rapid stabilisation was indicative of the effectiveness of this method of reducing the spin in Amateur satellites.

AO-5 was the first satellite in the Amateur Service to transmit in an HF Amateur band. Many reception reports of the 29.45 MHz. ten metre beacon were received from Amateurs and S.w.l's using simple long-wire or dipole antennas. Reports of skip propagation and antipodal reception were reported by a number of observers.

Reports were received from several hundred stations in at least 27 countries, including the Soviet Union. All telemetry reports were forwarded to WIA Project Australis in Melbourne for processing and QSL acknowledgment. Reports from I.A.R.U. Region I. Amateurs were collected and handled by Bill Browning, G2AOX, Region I. Oscar Co-ordinator.

The results of the AO-5 project are contained in the "AO-5 Summary Report" submitted June 9 to the FCC and NASA, and reprinted in the June 1970 issue of the "AMSAT Newsletter". Two other reports, one detailing the propagation results and the other dealing with the spacecraft telemetry results were also submitted to FCC and NASA, and appear in the October and December 1970 issues of "QST," respectively.

ATS-G EXPERIMENTAL PROPOSAL

In November 1969, AMSAT submitted a proposal to NASA to provide two Amateur experiments for the NASA Applications Technology Satellite G (ATS-G) synchronous satellite. This 83-page formal document proposed an experimental channelised repeater which would receive signals in the two metre band and re-transmit them in the 70 centimetre band. The second experiment proposed the transmission of Amateur Television in the 70 centimetre band. Both experiments would take advantage of the 30-foot parabolic antenna on the ATS-G spacecraft and of ATS-G's synchronous ("stationary") orbit.

At NASA's request, an addendum to the proposal was prepared and submitted on January 7, 1970, dealing with the choice of frequency bands proposed and the question of the possibility of interference to and from other services. On January 23, again at NASA's invitation, AMSAT gave an oral presentation of the proposal before a NASA advisory committee evaluating the ATS-G experiments.

WORLD ADMINISTRATIVE RADIO CONFERENCE PREPARATIONS

In preparing for the June 1971 World Administrative Radio Conference on Space Matters, which will be dealing with the allocation of frequencies for Amateur satellites, AMSAT prepared two documents for the ITU's International Radio Consultative Committee (CCIR). One is a report entitled "Technical Feasibility of Frequency Sharing in the Amateur Radio Service when using Space Communication Techniques," and the other is a recommendation on the same subject. Both documents were approved by the U.S. CCIR National Committee for forwarding to the other ITU member countries. AMSAT also assisted the ARRL in preparing material to the FCC on frequency requirements for future Amateur satellites. The text of one filing to the Commission is reprinted in the August issue of "QST".

AMSAT ADDRESSES AND PRESENTATIONS

In conjunction with the 1970 ARRL National Convention held in Boston, Sept. 25-27, AMSAT sponsored the first Radio Amateur Satellite Conference, with sessions presenting the results of AO-5 and plans for future satellite projects. Addresses were given at several other Amateur gatherings, including the Dayton Hamvention, the Roanoke Division Convention, the Syracuse, Tarrytown and Central States VHF Society conventions, and a number of radio club meetings. An AMSAT paper entitled "Radio Amateur Satellites for Education and Research" was presented at the 1970 IEEE Electronics and Aerospace Systems Conference held in Washington in October.

CURRENT ACTIVITY— AMSAT-OSCAR B

Work is proceeding on AMSAT-Oscar B (A-O-B), the first of a series of long lifetime Amateur communications satellites designed for launch as secondary payloads on Thor-Delta or Agena missions. A detailed specifications document on this series of spacecraft was prepared in April and distributed as guidance material for persons indicating a serious interest in developing experiments for these satellites. There are now several experiments under development.

A four-channel, channelised, hard-limiting FM repeater is being breadboarded by members of WIA Project Australis who had been involved in the construction of Australis Oscar 5. The repeater is of the demodulation-remodulation type and employs a frequency of approximately 145.9 MHz. for the uplink and 432.1 MHz. for the downlink, with a satellite transmitter power output of one watt per channel.

A linear repeater with a bandwidth of 50 KHz. is under construction by the Euro-Oscar group in Marbach, West Germany. This repeater has an input frequency of 432.1 MHz. and an output frequency of 145.9 MHz., with a satellite transmitter power output of ten watts. The repeater is designed for use with SSB, CW, AM, FM, RTTY or SSTV, with as many stations as can fit within its 50 KHz. passband.

Also being breadboarded is a linear repeater under construction by AMSAT members in the United States. This repeater has an input frequency of 145.9 MHz. and an output frequency around 29.6 MHz., with a satellite transmitter power output of two watts. This repeater will be capable of being used with any method of modulation permitted in these two bands.

The WIA Project Australis group has developed an Oscar telemetry encoder which transmits telemetered satellite parameters directly in 850 Hz. audio frequency-shift keyed teletype format, for printout on an ordinary 60 w.p.m. teleprinter. Any station having a tape reperforator will be able to send or retransmit the received data directly to AMSAT headquarters for computer processing, or they may decode the telemetry data themselves using calibration information which will be made available prior to launch.

John Goode, W5CAY, has designed and breadboarded an Oscar telemetry encoder which transmits satellite telemetered parameters directly as numbers in Morse Code, so that only pencil, paper and calibration information are needed for reception and interpretation of data from the satellite.

A breadboard of a command encoder capable of providing up to 35 separate command functions has been constructed by the WIA Project Australis group. The command encoder is designed to provide a reliable and secure means of controlling the emissions of Oscar satellites to minimise any possibility of interference.

Several panels of solar cells left over from NASA and ESSA satellite programmes have been made available for use in the A-O-B series of satellites. Several of these panels are being reconfigured for use in A-O-B. Rechargeable nickel-cadmium batteries have also been made available and have been undergoing charge-discharge cycle testing under simulated satellite power loads. The solar cells and rechargeable batteries are expected to make possible satellite operating lifetimes in excess of one year.

Following designs prepared by AMSAT's A-O-B Project Manager, Jan King, W3GEY, the A-O-B internal structural assembly and experiment modules have been fabricated at the facilities of W2QJT in Ithaca, New York. This is actual flight hardware, and represents the beginning of construction of the A-O-B spacecraft.

An AMSAT proposal to NASA for the launch of AMSAT-Oscar-B was submitted in August and an oral presentation was given in November. Much of the A-O-B description and justification material included in the proposal was reprinted in the Sept. issue of the "AMSAT Newsletter".

In connection with the A-O-B satellite project, a third-party agreement has been arranged between Australia and the United States to permit the exchange of third-party Amateur traffic concerning the satellite. This agreement extends the previous AO-5 third-party agreement arranged last year until several months after the end of life of Oscar 6.

FUTURE ACTIVITY

AMSAT is giving highest priority to the development of long-lifetime, solar-powered Oscar satellites that can be used regularly and reliably to augment Amateur communications, particularly on the VHF Amateur bands. Thus it is planned that the satellites to come, beginning with A-O-B, will open the door to the international use of Amateur satellites as an additional mode of communications for Amateur Radio.

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*P.O. Box 27, Washington, D.C., 20044, U.S.A.

CHANGE IN INTRUDER WATCH CO-ORDINATOR IN N.S.W.

Bill Jenvey, VK2ZO, has been appointed Intruder Watch Co-ordinator for New South Wales in place of Ross Treloar, who has been forced to retire due to overseas work commitments.

Bill Jenvey's (VK2ZO) address is 9 Forsyth Street, Willoughby, N.S.W., 2068.

A & R-SOANAR 25th ANNIVERSARY

Now one of Australia's leading components and equipment manufacturers and distributors, the A & R-Soanar Group of Companies are currently celebrating 25 years in business.

During the last five years, A & R diversified their manufacturing activities by developing a range of electronic and electrical equipment, specialising in power supplies for communications, educational and laboratory apparatus, and consumer electronic products.

A variety of air-cooled transformers from sub-miniature to 10kva. have been developed as ex-stock items.

The scope of activity by the Group runs into many millions of dollars a year, with offices in three States, employing approximately 200 people in the manufacture and merchandising of equipment, transformers and components; with the consolidation of offices and plant at Box Hill, buildings now embrace over 35,000 square feet of space.

A continual research and development programme involving two groups, transformers and equipment, are all part of overall plans for further expansion to keep pace with industry and to meet future requirements from industry, consumers and government departments.

By early 1971, a Tokyo office will be established to meet the expanded activities of Soanar Electronics and to provide improved availability of capacitors, resistors and other components.

The A & R-Soanar Group, with 25 years' operational success behind them, look forward to the next 25 years with excitement and optimism, as part of Australia's fastest growing industry.

THE CALL BOOK

The 1971 issue of the Call Book is now in the course of preparation. The schedule we are working to means that the book will be available some time during April, and will include all alterations and additions as notified to us by the P.M.G's Department up to and including the December 1970 lists.

In previous years, we have received some severe criticism over errors that have appeared in the Call Book, but our experience has shown that the errors which have occurred have been due to the fact that many licensees have failed to notify the Department when there has been a change of address, despite the fact that any such change of station location can (according to the regulations) only be made with the permission of the Department. The fact that this regulation is not strictly enforced in no way relieves the licensee of his responsibility of making sure that his address is correctly advised to the proper authorities.

In an endeavour to produce the most up-to-date Call Book possible, we will notify the Department of any changes of address of which we are aware, but have not appeared in any official Departmental lists up to December 1970.

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LICENSED AMATEURS IN VK AT AUGUST 1970

	Full	Limited	Total
VK0	7	0	7
VK1	83	28	111
VK2	1401	457	1858
VK3	1294	635	1929
VK4	527	194	721
VK5	516	233	749
VK6	356	140	496
VK7	160	72	232
VK8	31	10	41
VK9	84	8	92
Grand Total	4459	1777	6236

Brian Armstrong, G3EDD, Executive Vice-President of R.S.G.B. recently visited Melbourne. Les Jenkins, VK3ZBJ, Project Manager of W.I.A. Project Australis Group, is showing Brain a 438 MHz. transceiver. On the left is W.I.A. Federal President Michael Owen, VK3KI.

Results of 432 MHz. Aerial Gain Contest

(continued from page 10)

COLINEAR DESIGN

The two antennas exhibiting highest gain (15 and 16 dB. respectively) were 32 element extended-expanded colinears. These antennas originated in the San Francisco Bay area of California and have become increasingly popular in the United States. The lengths of the driven elements are extended to 5/8 of a wavelength and the spacing between parallel elements expanded to 3/4 of a wavelength. In conventional colinears these dimensions are both 1/2 wavelength. The detailed dimensions are given in Fig. 2.

YAGI DESIGN

The most successful yagi (11 dB.) was based on the highly reputed VK3ABP design, the dimensions of which are given in Fig. 3.

CONCLUSION

It is expected that the antenna gain measurement will become an annual event, thus providing Amateurs in the Eastern States with a means of evaluating their antennas and determining trends in antenna design.

W.I.A. D.X.C.C.

Listed below are the highest twelve members in each section. Position in the list is determined by the first number shown. The first number represents the participant's total countries less any credits given for deleted countries. The second number shown represents the total D.X.C.C. credits given, including deleted countries. Where totals are the same, listings will be alphabetical by call sign.

Credits for new members and those whose totals have been amended are also shown.

PHONE

VK5MS	319/343	VK5AB	297/314
VK6RU	317/342	VK4FJ	287/307
VK4HR	313/332	VK4TY	284/288
VK3AHO	311/326	VK2APK	281/287
VK6MK	304/324	VK2AAK	272/277
VK4KS	300/315	VK3TL	271/277

Amendments:

VK4PX	251/252	VK3JW	224/225
VK3AMK	227/227	VK4RF	192/192

Correction:

VK2AMU shown in the Nov. 1970 list as Cert. No. 113, should read Cert. No. 114.

C.W.

VK2QL	303/326	VK3YL	279/296
VK3AHQ	301/315	VK3NC	274/300
VK4FJ	290/315	VK3XB	270/287
VK4HR	289/311	VK3ARX	270/279
VK2AGH	282/296	VK6RU	266/289
VK2APK	280/288	VK4TY	259/272

Amendments:

VK4RF	169/181	VK4PX	107/111

OPEN

VK6RU	318/343	VK6MK	304/324
VK4HR	316/341	VK2EO	302/325
VK2AGH	314/334	VK4KS	301/325
VK2VN	310/328	VK2APK	298/309
VK4SD	306/321	VK4FJ	298/323
VK4TY	306/321	VK3ARX	297/306

Amendments:

VK4PX	263/268	VK6HD	191/191
VK4RF	235/247		

New Member:

Cert. No.	Call	Total
130	VK6JK	129/136

NEW CALL SIGNS

AUGUST 1970

VK1DA—A. Davis, 49 Dulgan St., Scullin, 2614.
VK1GY—G. E. Smith, 22 Gluyas St., Farrer, 2607.
VK1JX—H. L. Daniell, 4 Bandjalong Cres., Aranda, 2600.

VK2LW—L. M. Stone, Lot 10, Trafalgar Rd., Tuross Heads, 2537.
VK2WL—E. W. Bastow, 33 Essilia St., Collaroy Plateau, 2098.
VK2ADX—S. A. Mann, 9 Birubi Ave., Pymble, 2073.
VK2AHK—G. B. Moss, 18 Montreal Ave., Killara, 2071.
VK2ALK—B. W. Smeaton, 91 Carina Rd., Oyster Bay, 2225.
VK2APX—G. H. Dennis, 21 Leichhardt St., Leichhardt, 2040.
VK2ATC/T—R. R. Iwasenko, 3 Rosedale St., Canley Heights, 2166.
VK2ATR—P. R. Lorentzen, 21 Fennell St., Blackalls Park, 2283.
VK2AVY—G. A. Tritter, 568 Buchhorn St., Lavington, 2641.
VK2AYS—R. J. Irving, 7 Lena Pl., Merrylands, 2160.
VK2BAH—D. G. Hoskins, 24 Lucinda Ave., Wahroonga, 2076.
VK2BBI—R. A. Day, 37 Ranclaud St., Booragul, 2284.
VK2BBD—N. L. Kinch, 9/12-18 Morwick St., Strathfield, 2135.
VK2BIV—H. M. Smith, 11 Clarice St., Lithgow, 2790.
VK2BNI—P. T. Nicholson, 99 Copeland Rd., Beecroft, 2119.
VK2BRH—R. L. Helton, Wentworth Hotel, Sydney, 2000.
VK2ZIX—G. D. Wilson, 23 Swift St., Port Macquarie, 2444.
VK2ZKW—K. A. Wallis, 54 Combined St., Wingham, 2429.
VK2ZLN—L. A. Davies, 90 Cambridge St., Stanmore, 2048.
VK2ZZI—D. W. Friend, "Weldon," Old Northern Rd., Dural, 2158.

VK3ANA—P. W. Colee, 155 Mackie Rd., East Bentleigh, 3165.
VK3AWG—A.C.I. Electronics Radio Club, 310-324 Ferntree Gully Rd., Clayton North, 3168.
VK3BEC—B. E. Cabena, 2 Stirling St., Kew, 3101.
VK3BRT—Box Hill Boys' Technical School Radio Club, Box Hill Boys' Technical School, Dunloe Ave., Box Hill, 3128.
VK3BSJ—St. John College Radio Club, 204 Churchill Ave., Braybrook, 3019.
VK3YAX—D. E. Burgess, 43 Canberra St., Moe, 3825.
VK3YEB—A. J. Cartwright, 38 Rose St., Highett, 3190.
VK3YEH—S. Hyne, 11/74 Auburn Rd., Hawthorn, 3122.

VK4BC—C. W. Bennetts, 351 East St., Rockhampton, 4700.
VK4MM—W. C. Mitchell, Station: Cr. Coe's Creek Rd. and Glenys St., Nambour, 4560; Postal: P.O. Box 309, Nambour, 4560.
VK4RP—W. D. Macaulay, 25 Parkmore St., Boondall, 4034.

VK5AJ—A. P. Jordon, 94 Allinga Ave., Glenunga, 5064.
VK5AT—R. A. Couzens, 17/3 Philips Hwy., Elizabeth, 5112.
VK5JJ—J. J. Piechnick, 15 Bringalow Ave., Seacombe Gardens, 5047.
VK5JT—J. Kilgariff, Station: 15 Patawalonga Frontage, Nth. Glenelg, 5045; Postal: Moseley St., Glenelg, 5045.
VK5CY—G. C. Ford, Station: Stansbury Rd., Minlaton, 5575; Postal: P.O. Box 60, Minlaton, 5575.
VK5QN—P. Clark, Station: Portable; Postal: C/o. Supt. Radio Branch, Adelaide, 5000.
VK5QP—J. T. O'Donald, 11 Parkhouse Ave., Seaton, 5023.
VK5XC—E. E. Leist, Station: Portable; Postal: C/o. Supt. Radio Branch, Adelaide, 5000.
VK5YD—W. R. Ogden, Station: Portable; Postal: C/o. Supt. Radio Branch, Adelaide, 5000.
VK5ZAA—J. D. Bishop, 11 Auburn Ave., Myrtle Bank, 5064.
VK5ZPP—P. Philbrook, 39 Secombe St., Elizabeth Grove, 5112.

VK6HI—E. A. Hayward, 121 Hopkins St., Boulder, 6432.
VK6LD—P. H. Long, 15 Camberwell Rd., Balga, 6061.
VK6XK—B. A. Wheeler, R.F.D.S. Base, Meekatharra, 6642.
VK6ZS—W. J. Smith, 152 Fraser St., Geraldton, 6530.
VK6AWI—Wireless Institute of Aust. (W.A. Div.), Station: Portable; Postal: G.P.O. Box N1002, Perth, 6001.
VK6CIF—P. B. Dodd, Station: Portable; Postal: C/o. 34 Iluka Ave., Elanora Heights, 2101.
VK6ZCB—C. B. Howard, C/o. Coogee Caravan Park, Coogee Beach, 6164.
VK8JZ—J. S. Zinns, 19 Nicker Cres., Alice Springs, 5750.
VK8KP—C. K. Perry, 68 Milner Rd., Alice Springs, 5750.
VK9AU—S. A. Sibly, Station: D.C.A. Res., 254 Springgarden Rd., Konedobu, P.; Postal: P.O. Box 2087, Konedobu, P.
VK9YR—R. C. McPhee, Cocos Keeling Island.
VK0JM—J. A. Carr, Davis Base.
VK9TM—A. A. Morgan, Macquarie Island.

CANCELLATIONS

VK1ZRN—R. W. Nash. Not renewed.
VK2ZSI—R. R. Iwasenko. Now VK2ATC/T.
VK3EA—E. Anderson. Deceased.
VK3AAV—N. W. Deague. Transferred to N.S.W.
VK3ADD—H. L. Daniell. Now VK1JX.
VK3AGB—A. G. Bolton. Transferred to S.A.
VK3AUY—S. A. Sibly. Now VK9AU.
VK3YCV—D. J. Bainbridge. Incorrectly advised. VK3BDJ March Supplement.
VK3ZPT—F. H. Birkbeck. Not renewed.
VK3ZUH—A. K. Hore. Not renewed.
VK4KF—W. D. Macaulay. Now VK4RP.
VK4KN—G. J. Cohen. Transferred to N.S.W.
VK4NI—A. H. Nicholls. Not renewed.
VK4YS—R. A. Sedunary. Transferred to S.A.
VK4ZBG—C. W. Bennetts. Now VK4BC.
VK5GW—N. G. Wallage. Not renewed.
VK5KQ—F. T. Park. Not renewed.
VK5TN—B. G. Tideman. Not renewed.
VK5ZBV—C. A. Appleby. Not renewed.
VK5ZXD—J. J. Piechnick. Now VK5JJ.
VK6LU—L. Stagg. Deceased.
VK6TM—W. E. Muhleison. Deceased.
VK6UT—T. G. Miller, Jnr. Returned to U.S.A.
VK8XI—B. Hannaford. Transferred to S.A.
VK9KY—K. Y. Young. Transferred to N.S.W.
VK9AB—E. R. Metzger. Not renewed.
VK9MJ—J. Mullen. Not renewed.
VK9GR—Goroka Radio Club. Not renewed.
VK9NT—N. T. Casey. Not renewed.
VK9ZDW—D. Weston. Not renewed.

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COOK BI-CENTENARY AWARD

The following additional stations have qualified for the Award:

Cert. No.	Call	Cert. No.	Call	Cert. No.	Call
887	WA5TGU	916	W4ORT	944	ZM1ACL
888	JA4FHE	917	PZ1AV	945	K1GUD
889	ZM1CK	918	JA3HTT	946	ZL1BHO
890	AX2SA	919	WA5UCT	947	SM2ALU
891	KL7GRP	920	WA5YXA	948	KR6TAB
892	AX5QB	921	ZM1AYQ	949	OK2BMH
893	ZM1NX	922	G3TJW	950	SP3DOI
894	OE5RI	923	G3TUF	951	ZM1IB
895	AX8ZQ	924	AX3YD	952	AX4HW
896	ZL2ABD	925	DL8OA	953	AX3AXK
897	ZM1BEV	926	OE2WR	954	ZM1JK
898	AX8HA	927	DK3BS	955	AX2BIN
899	AX2BBA	928	DK2XZ	956	AX3AAM
900	G5CP	929	AX2BNL	957	JA4BJO
901	ZM2BFJ	930	WA2OOQ/	958	SM6DKU
902	WA3GJZ		KG6	959	AX2BEG
903	WA0UTH	931	W4CRW	960	W5HCJ
904	AX3BM	932	W0AXE	961	VE3II
905	9M8FMF	933	EP2BQ	962	W8OAR
906	W3GFB	934	GM3TDS	963	G3SWV
907	DK1KO	935	W9ELG	964	JA8CAU
908	KL7GQD	936	G3MVZ	965	G6GU
909	6Y5DW	937	W2JVU	966	ZM1PZ
910	GM3CFS	938	W9IHN	967	WB4JLO
911	DJ0VY	939	VE2ANS	968	I1ANE
912	WA4FDR	940	G8TY	969	AX2AWN
913	AX6DD	941	WA2IDM	970	DJ7HZ
914	GM3HGA	942	AX3FC	971	HP1AC
915	G3WFY	943	W9AES	972	AX2AJL

Correction: Certificate No. 887 shown on the previous list as W5YOR should read Cert. No. 887 WA5TGU.

V.H.F./U.H.F. SECTION

The following additional stations have qualified for the Award:

Cert. No. 5—AX3ZQN
Cert. No. 6—AX7ZIF

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CANBERRA EASTER CONVENTION

The popular Easter Convention which for many years in the past has been conducted by the Canberra Radio Society (an affiliate of the W.I.A.) is to be resumed after a spell of three years.

The 1971 Easter Convention will be staged at Canberra City on April 9, 10, and 11. As well as the many usual attractions that Canberra offers, a strong convention committee is arranging a superb week-end of Amateur Radio and social activity, with an emphasis on family participation.

Special attractions will include a barbecue luncheon on Springbank Island, a two-hour cruise on Lake Burley-Griffin aboard a modern ferry chartered for you by the Canberra Amateurs, and conducted coach tours for wives and children while father is engaged in competitive Amateur Radio events. These attractions, plus swimming and trout fishing, will be at no extra cost.

A comprehensive programme is now being prepared and will be sent to you on receipt of your enquiry—either by post or through any member of the Canberra Radio Society. Accommodation will be limited, please book early to avoid disappointment.

SO YOU HAVE CHANGED YOUR QTH

For as long back as we can remember, the first page of this magazine has shown details for the procedure to be adopted to correctly ensure that your copy of "A.R." will reach you after a change of address. However, it is becoming more and more apparent that the procedure is not being followed as it should be, many members trying to short-circuit the system by notifying us direct.

Instead of helping, this procedure only delays the change in our records, as we have to refer these changes back to the Division concerned. We now make a plea that the procedure that has been laid down be followed, namely when you have a change of address, notify your Divisional Secretary—NOT US. Your Secretary will include the change in his monthly list to us. He knows when and where to send it.

You can help yourself by making sure to advise your Secretary in plenty of time, and not two or three months later. The number of copies of "A.R." which are returned to us each month with the endorsement "not known at this address," or similar, is reaching quite a large figure. This is involving us in much extra work and expense, as we have to locate the member concerned and re-post the magazine. We have no way of knowing how many "A.R.'s" are deliverd although wrongly addressed. May we suggest you check the wrapper from this issue, and if there is any error, notify your Secretary immediately.

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AWARDS FOR TECHNICAL ARTICLES

The Publications Committee considered the allocation of these awards at the December meeting, and as a result, awards have been made to Mr. R. H. Black, VK2QZ, Mr. R. F. Dannecker, VK4ZND. The various articles covering "Australis" were also voted into an award, but in view of the number of people involved it was considered impractical to try to make a worthwhile award to each and every individual worker on the project. It was, therefore, decided to make the award to the Project Australis Fund.

Our congratulations to the recipients. To the other contributors who just failed to make the grade this year, our thanks, and we hope you will try again.

☆

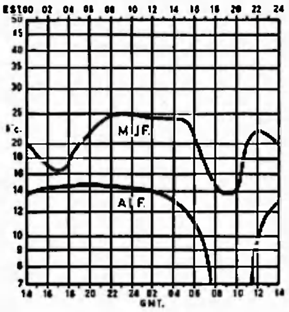
HIGGINBOTHAM AWARD

This year a somewhat unusual result came from the voting for this award. Two previous winners were well up in the voting, and one man almost made it for the third time. The final outcome was to make the award to the VK3 V.h.f. Group in recognition of the large amount of work they have devoted to their projects over the last two years. Once again, the number of individuals concerned was too many to allow awards to each and everyone, hence the award has been made to the Group as a whole, for them to apply as they wish.

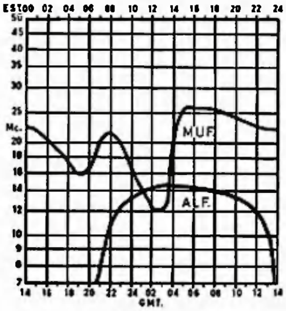
PREDICTION CHARTS FOR JANUARY 1971

(Prediction Charts by courtesy of Ionospheric Prediction Service)

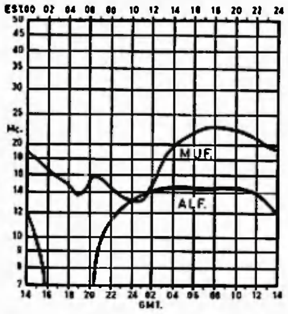
BARBADOS



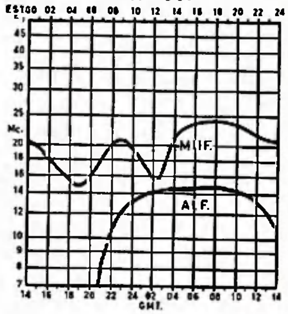
CAIRO



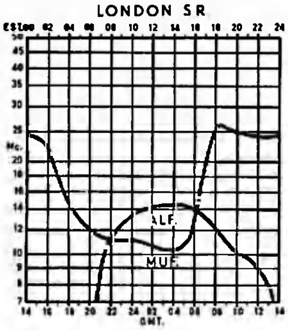
JOHANNESBURG



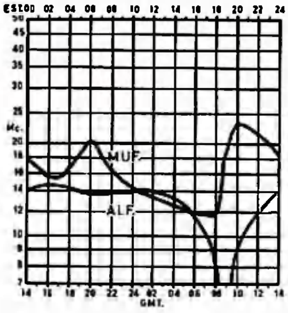
NAIROBI



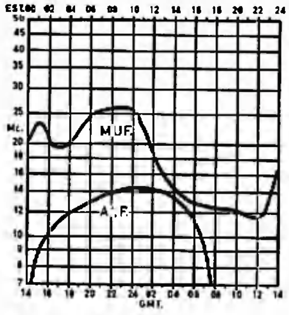
LONDON S.R.



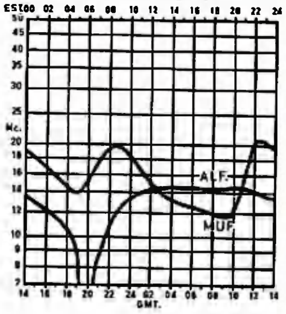
LONDON L.R.



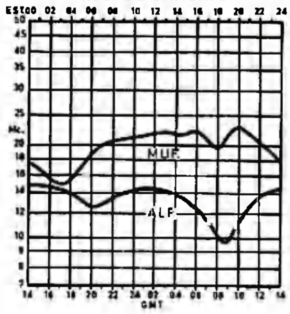
MONTREAL S.R.



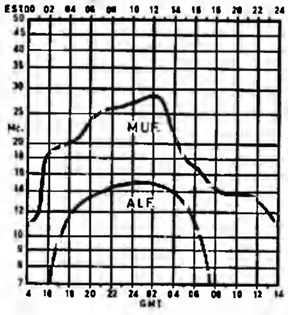
MONTREAL L.R.



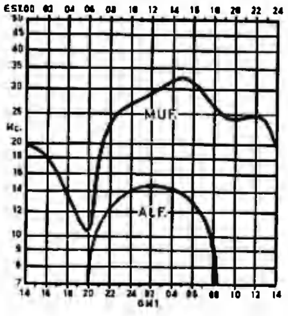
RIO DE JANEIRO



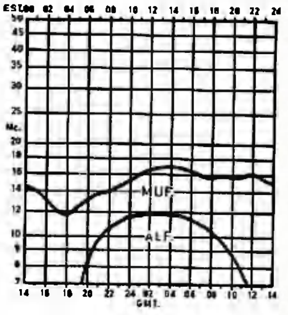
SAN FRANCISCO



TOKYO



WILKES



VHF

Sub-Editor: ERIC JAMIESON, VK5LP
Forreston, South Australia, 5233.
Closing date for copy 30th of month.
All Times in E.S.T.

AMATEUR BAND BEACONS

VK4	144.390	VK4VV, 107m. W. of Brisbane.
VK5	53.000	VK5VF, Mt. Lofty.
	144.800	VK5VF, Mt. Lofty.
VK6	52.006	VK6VF, Tuart Hill.
	52.900	VK6TS, Carnarvon.
	144.500	VK6VE, Mt. Barker.
	145.000	VK6VF, Tuart Hill.
	435.000	VK6VF (on by arrangement).
VK7	144.900	VK7VF, Devonport.
VK9	146.000	VK9XI, Christmas Island.
ZL3	145.000	ZL3VHF, Christchurch.
JA	51.995	JA1IGY, Japan.
W	50.091	WB6KAP, U.S.A.
HL	50.100	HL9WI, South Korea.

As of this writing, 6 metres is beginning to warm up in readiness for the DX season. Probably the most important news this month was contained in a message from Bill VK2ZBU who advised hearing the W land beacon WB6KAP (see list above) at strength up to 5 x 9 on 8th November between 1300 and 1430. Everything possible was done to try and get a signal back the other way, but frustratingly, no results. No further details of the station are available, and therefore it is not known whether anyone monitors the station during key up periods. JAs were also heard in Sydney at the same time. Around the same time a rumour went around VK5 that Eddie VK1VP had worked HL9WI, but since then advice has come through that the station was heard but not worked.

A number of minor 6 metre openings to various States have been noted during November. Strong signals were received from a few VK4s in S.A. (also Vic.—Ed.) on Sunday, 29th November, John VK4ZJB/4, operating from a high location about 20 miles from Brisbane and using his much advertised 10 element yagi, certainly put a rock-crushing signal into this State. John also passes on the news that during peak 6 metre openings, Channel B F.M. on 146 MHz. will be receiving plenty of attention in VK4, so operators throughout the land should remember to keep an ear on that frequency, particularly as Channel B is now being used in a big way in Queensland. John further reports that Roy VK4ZQ worked into Sydney a few weeks ago on Channel B, so the distance is being lengthened considerably. JAs have been scarce in Brisbane for the past few weeks, however, not withstanding, John has now worked more than 500 of them, with 110 confirmations. Not a bad effort!

Last month details were given of operating schedules of Bob VK3AOT, and you are reminded to read the information again. He will be operational on 52, 144, 432, 576 and 1296 MHz. from Mt. Cowley, 80 miles south-west of Melbourne, from 18/12/70 to 11/1/71. If you want a telephone contact during that time contact Eric Gray, VK3ZSB on (03) 25-3249 (home) or (03) 630-6613 (business). Bob will be looking for skeds on 2 metres with a view to trying 432, 576 and 1296 MHz., and on 6 metres between 24th and 30th December with a view to establishing contacts via sporadic E with VK2, 4 and 8 on 2 metres.

There appears to be quite an upsurge in portable and general DX activity this season. From the VK6 V.h.f. News Bulletin comes the following information. Operation is planned by VKs 6WA, 6ZDY, 6ZGV from the Albany region on 52 MHz. s.s.b., 52.525 f.m., 52.656 f.m., 144 s.s.b., 146 f.m., also the possibility of inclusion of some 432 MHz. gear. An attempt will be made to work Bob VK3AOT from there. Bob VK6ZFY is planning operation from either Esperance or Hopetown on 1st, 2nd and 3rd January, using 6 and 2 metres a.m. Percy VK6DD will be operating from Augusta on 52 MHz. a.m., 52.656 f.m. and 146 MHz. f.m. from about 26th December for three weeks, in addition to activity of h.f. bands 80 to 10 metres.

There seems to be no definite portable plans from VK5 during the DX season, other than reports that Wally VK6ZWW and John VK5QZ may be operating from Cowell, on Eyre Peninsula. Of interest to VK6 operators will be Kerry VK5SU at Ceduna, who is a bit more than half way between Perth and Adelaide. He is probably now operational on both 6 and 2 metres, so bear this in mind in VK6.

The only letter received this month is from Bob VK3AOT (bless him! He never let's me down!). Amongst other matters which have already been included at odd points above, he reports Norm VK3ZUT will be operating from Mt. Matlock, 50 miles north-east of Melbourne from 1st to 3rd January, using a.m. on 52, 144 and 432 MHz. There is also the VK3 V.h.f. Field Day on 3rd January between 1100 and 1600.

In general, it looks as though the DX season, providing conditions are right, could be a real winner this year, the amount of interest being shown is quite exceptional, and with more and more stations getting their equipment in a condition suitable for portable operation, some very interesting contacts could be forthcoming. It is to be hoped various portable and other operators will drop me a line and tell me all about it.

And if you are not completely satisfied with all the above proposed operating, you may be interested to know there is to be a balloon sent up from Mildura some time in February carrying translator equipment. Input on 146 MHz. f.m., output on 432.17 MHz. f.m. Power output is about 2 watts. The launch is an experiment as part of the Australis project.

A further news item from Bob VK3AOT mentions he has received a letter from Ray VK3ATN with a preliminary announcement to the effect that some time next year he will have his dish antenna and a very large 2 metre antenna available to any interested V.h.f. Group for moon-bounce experiments. Provided any group brings it's own gear, Ray does not mind if those concerned use their own call sign. That's a kind offer Ray, further details will be published later, in the mean time, those likely to be interested might care to contact Ray direct and find out what is needed.

Keep an ear on 52.157 MHz. each night as Leigh VK6WA beams east at 2000 hours and is looking for contacts. The path to VK3 was open from VK6 on 24th November between 1630 and 1730, so keep those antennas turning. Finally, on this round up of the DX scene, bear in mind the portable operations being undertaken by the South-East Radio Group from "The Bluff," 14 miles north-west of Mt. Gambier; they will be operating the club station VK5SR over the New Year holiday week-end and using all bands from 80 metres through to 1296 MHz.

From "Break-In" of N.Z.A.R.T. comes the following paragraph and I quote: "Big Sam . . . Again. From a contact with one of the KP4s at Arecibo, Don ZL4DS tells me of the latest activities of Sam Harris, KP4BPZ. Maybe Sam lets the grass grow under his 100 foot dish, but he certainly doesn't let it grow under his feet. He has just bought 28 acres in the area near the 1,000-ft. radio telescope and is to make 'some improvements'. He's going to build a 300-foot dish!!! Not only will this improve his already devastating signal from the moon, but it will give him a greatly improved sky area to scan. The KP4 Don was talking to seemed to think that Sam will now be able to acquire stations as far south as Australia and New Zealand. I certainly hope so."

MEET THE OTHER MAN

This month we take a look at the activities of Ray Naughton, VK3ATN, who lives at Birchip, Victoria, at an elevation of 330 feet, and 200 miles north-west of Melbourne. Ray will probably be best remembered by many for his moon-bounce efforts, particularly with K2MWA/2 in New Jersey, U.S.A. (10,417 miles). For his efforts in this direction he was awarded the A.R.R.L. Technical Merit Award 1967, and is the only non-American to win it.

First licensed in 1950, Ray is operational on all bands s.s.b. 1.8 MHz. to 30 MHz. and v.h.f. bands 52, 144 and 432 MHz. He runs 120 watts of a.m. on 52 MHz., using QQE06/40 in the final to a 9 element wide spaced yagi or two stacked rhombics 360 feet per leg and 75 feet high. (Quite a choice—5LP.) The 9 element is 100 feet high. Converter uses a 6CW4 front end. On 144 MHz. Ray runs 400 watts p.e.p. of s.s.b. to a 4CX250B to a 56 element array at 110 feet, the converter having a 6CW4 front end. On 432, he is currently running 150 watts of a.m. (s.s.b. to follow), using a 4X150A to a 64 element extended-expanded array 125 feet high, solid state converter. The tunable i.f. for all converters is a Collins 75A4.

With this array of equipment Ray has worked on 52 MHz. VK1, 2, 3, 4, 5, 6, 7, 8, 9; ZL1, 2, 3, and 4; ZK1, and all JA districts. On 144 MHz. he has worked VK1, 2, 3, 4, 5, 6, 7, and by scatter to ZL1AZR, and almost making it to VK8, VK9. By moon-bounce and using stacked rhombic antennas he has worked W6, W0 and W2. On 432 MHz. contacts have been made with VK3, 5 and 7, and adds a comment "no activity in VK2???" His plans for the future include completion of a 28-foot fully steerable dish for E.M.E. on 1296 MHz., and local work on 1296 and 432. He has a partially completed 50-foot dish which will employ feed steering with semi-adjustable holding frame. However, his work has been retarded considerably by the loss of a very good serviceman recently due to family illness, and until another is found some of his projects will have to be delayed. His antenna farm at present is spread over about 8 acres with 100-foot towers dotted everywhere. Some years ago when I was there I was certainly impressed with the set up, and particularly of the 160 metre vertical, which from memory is 161 feet high and which was constructed by Ray and hoisted up into position in ONE piece! Quite an imposing structure.

To conclude these notes this time, mention should be made that Wally VK5ZWW and David VK8AU are still conducting meteor scatter experiments on 52.010 MHz. Their efforts were rewarded on 14th November at 0600 when Wally recorded 90 seconds of s.s.b. from David. No wonder Wally was babbling almost incoherently for several days after so such excitement! Good work chaps. (That's included because I have been invited to Wally's birthday party on 1st January—5LP.)

Thought for the month: "Things tend to even up. The more bodily weight you carry around, the shorter time you'll likely have to carry it." That's all for now, hope you are having plenty of DX and may 1971 be a prosperous and bountiful year for you. 73, Eric VK5LP. The Voice in the Hills.

B.A.R.T.G. SPRING RTTY CONTEST

The committee of B.A.R.T.G. wish to thank your readers for their past support of these annual events which are organised in order to promote interest in the RTTY mode as used by Radio Amateurs and they hope that the Group will continue to enjoy the continued participation of readers in any future RTTY Contests that the Group may organise. The contest manager looks forward to receiving reader's logs or comments in connection with future RTTY Contests.

RULES

When: 0200 GMT, Saturday, March 13, until 0200 GMT, Monday, March 15, 1971.

The total contest period is 48 hours, but not more than 36 hours of operation is permitted. Times spent in listening periods count as operating time. The 12-hour non-operating period can be taken at any time during the Contest, but off-periods may not be less than two hours at a time. Times on and off the air must be summarised on the log and score sheets. The Contest is also open to SWL RTTY operators.

Bands: 3.5, 7, 14, 21 and 28 MHz. Amateur bands.

Stations may not be contacted more than once on any one band, but additional contacts may be made with the same station if a different band is used.

Country Status: ARRL Countries List, except KL7, KH6 and VO to be considered as separate countries.

Messages exchanged will consist of:
(a) Time GMT.
(b) Message number and RST.

Points:
(a) All two-way RTTY contacts with stations within one's own country will earn TWO points.
(b) All two-way RTTY contacts with stations outside one's own country will earn TEN points.
(c) All stations will receive a bonus of 200 points per country worked including their own. Note: Any one country may be counted again if worked on another band, but continents are counted once only.

Scoring:
(a) Two-way exchange points times total countries worked.
(b) Total country points times number of continents worked.
(c) Add (a) and (b) together to obtain your final score.

Sample score:

Exchange points (302) x countries (10)	3020
Country points (2000) x continents (3)	6000
Total	9020

Logs and Score Sheets: Use one log for each band and indicate any rest periods. Logs to contain: Band, Time GMT, Message and RST Numbers sent and received and Exchange Points Claimed. **All logs must be received by 22nd May, 1971, to qualify.**

Awards: Certificates will be awarded to the leading RTTY stations and SWL's.

The final positions in the Results Table will be valid for entry in the "World Champion of RTTY" Championship.

The judges' decision will be final and no correspondence can be entered into in respect of incorrect or late entries.

Send your Contest logs to:

Ted Double, G8CDW,
B.A.R.T.G. Contest Manager,
89 Linden Gardens, Enfield,
Middlesex, England.

☆

OPERATION FROM TWO N.Z. COUNTIES

The Gisborne Branch of the N.Z.A.R.T. has decided to operate radio stations in counties with no permanent Amateur activities. The two counties are Waikohu and Waiapu.

Following is a schedule of bands and operating times:

Saturday, 6th February, 1971:
80 Metres: 1800z to 2400z
20 Metres: 1600z to 2400z
15 Metres: 1400z to 1600z

Sunday, 7th February, 1971:
80 Metres: 0700z to 1000z
20 Metres: 1500z to 1700z
15 Metres: 1400z to 1600z

Operators will keep a listening post and calls will be made every hour on the hour on the following frequencies:

Waikohu: 3675 KHz., 14225 KHz., 21310 KHz.
Waiapu: 3650 KHz., 14250 KHz., 21320 KHz.

OBITUARY

C. W. PETERS, VK2SV

We regret to announce the death of Charles William Peters, VK2SV, affectionately known as "Buffalo Bill". Bill passed away on 19th November, 1970, following a long illness.

First on the air in early thirties, Bill went through all the stages of early radio and had great fun with slop jar rectifiers and graduated through 245s, 210s, right through to the Swan 350.

Bill's kindly disposition endeared himself to all and he was at all times ready and eager to assist the younger members. Bill, unfortunately, had to retire before retiring age and it was then that Amateur Radio came to his aid. He will long be remembered as base station for the mobiles. He would call them in turn and see them all into their stables, as he used to say.

We extend our sincere sympathies to his XYL Eva, his son Bill and relatives.

CENTRAL COAST AWARD

Commencing from 1st December, 1970, a new award, to be known as the Central Coast Award, will be available to Radio Amateurs throughout Australia and the world.

The award is being sponsored by the Central Coast Tourist Authority through the Central Coast Branch. Details are as follows:

1. Operators of overseas stations may qualify by making radio contact with any two stations in the Central Coast area and by submitting log, together with two IRCs for return postage by surface mail.

2. VK operators (excluding Central Coast operators) can gain an award by contacting four stations in the Central Coast area plus the club station VK2AFY and submitting a log, together with 10 cents in stamps.

3. Central Coast operators can also gain an award by contacting ten stations in the Central Coast area plus the club station VK2AFY and submitting a log, together with 10 cents in stamps.

4. This award is made available as a h.f. or v.h.f. award. Operators must qualify on either h.f. or v.h.f. bands.

5. Logs to be sent to Awards Manager, Central Coast Branch W.I.A., P.O. Box 238, Gosford, N.S.W., 2250.

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TELECOMMUNICATIONS AND ELECTRONICS (TE/-)

The second meeting of this Industry Standards Committee was held in October following a meeting of the executive of the committee. The chairman, Mr. P. R. Brett (P.M.G. Department), reported that all the technical committees recommended at the first meeting had been constituted and that the seven active technical committees had aggregated a total of 40 meetings. Several sub-committees had been formed covering such subjects as micro-circuits, radio-reception, radio transmission and aerials, while a special panel had been formed to deal with polyethylene insulation of telecommunication cables. The committee organisation had been productive, with six new standards reaching the stage of publication, seven drafts being circulated for public review, and many other documents currently under consideration.

Other matters discussed were the metrication programme, the programme of future work, and the formation of new technical committees covering capacitors, resistors and printed circuits.

The executive of the Telecommunications and Electronics Industry Standards Committee has met to discuss what may be required in their sector by way of metric standards. Their general comment was that the major problems would be associated with the supply of materials and components and with other mechanical engineering aspects of the industry rather than with electrical requirements, which are already effectively in terms of SI units.

The executive went on to analyse the types of problem that would be faced by the telecommunications and electronics industry, and noted that there would be some which would be matters for the Metric Conversion Board and its Advisory Committees, e.g. in relation to economic availability of basic materials in rationalised metric sizes, the time programme for conversion, education and training, and some aspects of instrumentation and test equipment. It was observed also that there would be some matters for reference to the S.A.A. Metric Standards Advisory Committee, such as conversion data and procedures, and rationalisation and preferred numbers.

Finally, the executive recognised that the technical committees under their supervision would need to consider both existing and future standards, to decide what was required by way of conversion of such standards into fully metric terms.

—S.A.A. Monthly Information Sheet.

SUBSCRIPTIONS DUE

All members of the W.I.A. are reminded that annual subscriptions are now due and should be paid promptly to their Divisional Secretary. Non financial members will not receive a copy of "A.R.," and back copies may not be available upon request. To preserve continuity of your files of "A.R.," please pay your annual subscription now.

☆

PROVISIONAL SUNSPOT NUMBERS

OCTOBER 1970

Dependent on observations at Zurich Observatory and its stations in Locarno and Arosa.

Day	R	Day	R
1	62	16	93
2	56	17	83
3	42	18	75
4	54	19	82
5	74	20	69
6	52	21	68
7	71	22	72
8	72	23	88
9	67	24	99
10	72	25	110
11	74	26	116
12	79	27	141
13	83	28	130
14	86	29	138
15	86	30	125
		31	116

Mean equals 85.0.

Smoothed Mean for April 1970: 106.6.

Predictions of the Smoothed Monthly Sunspot Numbers

November	92	February	86
December	90	March	84
January	88	April	82

—Swiss Federal Observatory, Zurich

Overseas Magazine Review

Compiled by Syd Clark, VK3ASC

"BREAK-IN"

September 1970—

More Circuits and Diodes, ZL4IO. For the solid staters.

T.V. Line Output Tubes as R.F. Amplifiers, ZL1AFO. "For those in peril. In inexperienced hands these tubes have a life measured in minutes. Once the techniques are mastered there is no reason why they should not achieve 1,000 hours."

Burglar Alarms, Some Thoughts and Ideas, ZL2AHS. How to build and fit a device which will let the insiders know the outsiders are in.

October 1970—

Diode Signal Isolators, ZL4IO. Solid state switches.

Circuits for All, VK3GK. Describes a simple method of drafting.

Up the Pole, ZL2AHY describes a tilt-over mast.

S.W.R. and All That, ZL1TAT. Theory for those in need.

S.S.B. Exciter 9 MHz. Phasing Type, ZL4LV. Some addenda.

"CQ"

October 1970—

A Solid State Permeability Tuned V.F.O. with Digital Readout, PY2PEC. Two BF115 transistors, a few other components and you are away.

"CQ" Reviews the Collins 30L-1 Linear Amplifier, W2AEF. Four 811A triodes and some cute tricks enable Collins to run 1 kw. to this linear from a built-in power supply which provides filament, bias, relay and 1800v. plate supplies.

An Efficient Multiband Loop Antenna, by GW3NJY/W8. Take one quad type element, turn horizontally, feed at the midpoint of one side with co-ax. and you have a simple antenna with an effective gain over a dipole.

Evolution of the Decibel, K2BZ. It even helped me to brush up my theory.

Digital CQ and Meteor Scatter Data Generators. Part 1 described the basic building clocks. Part 2 describes the circuits for four generators, two of each type, using the building blocks of the first instalment.

The Resistor-Rite, W6IEL. This box uses five linear taper potentiometers with ranges of 100 to 1 megohm to provide any value from 0 to 1,111,111 ohms.

A Simple Audio Test Oscillator, W6JTT. Three transistors in a phase shift circuit.

The Case of the Elusive T.V.I., W5BWV. An interesting story of how a CB operator and an Amateur who were blamed for causing t.v.i. tracked the source down to a colour t.v. receiver. Bushmanship was terrific.

"QST"

October 1970—

There is an interesting line-up of articles in "QST" for October. My vote for the "article of the month" goes to Doug de Maw, W1CER, for his article "The Ham Builder's Nightmare." Solid state components have so altered the industry that many of the "receiving components" which could be used in transmitting applications are no longer available.

The Ham Builder's Nightmare, W1CER. Component problems for designer and builder are discussed and substitutes suggested.

A Frequency Counter for the Amateur Station, W1EO. Designed to suit the Collins line of gear and provide digital readout of frequency.

The Junker Amplifier, W1ICP. 3.5 to 30 (or 21) MHz. depending upon whether you used 811As, 813 or 803. Types which are available from disposals. 500 watts input from a t.v. type transformer in voltage doubler power supply.

High Performance H.F. Converter, W1KLK and W1NPG. 160 to 10 with an 80 metre tuner. FET r.f. amp. and FET mixer. Five bands.

Frequency Multiplication Technique for V.H.F. and U.H.F. S.S.B., DJ4ZC. Signal processing to eliminate distortion produced by conventional frequency multiplication methods.

A Scope Adaptor for Transmitter Monitoring, W1KLK. Adds to the usefulness of your c.r.o.

Combination Wattmeter, Voltmeter and F.S. Meter for V.H.F., WA0UZO. 1, 10 and 100w. f.s.d. forward and reverse. Inexpensive and accurate.

An External V.F.O. for the SB100 Transceiver, VK2JZ. As I remember the spec. for this SBE line, it did not cover the bands of interest in VK. Now it will.

Under the heading of **Recent Equipment**, the Heath GR-78 and Knight R-195 receivers are reviewed.

Australis Oscar, K2QBW. Ionospheric propagation results.

For the DXer the 37th A.R.R.L. November Sweepstakes and 36th A.R.R.L. International DX Competitions are discussed.

"RADIO COMMUNICATION"

September 1970—

A New Approach to V.H.F./U.H.F. Receiver Design, G3NNG. Part 2 continues with i.f. amplifier, board layout, etc.

A V.H.F. FET Dip Oscillator, G3HBW. Covering a frequency range of 29-460 MHz., this instrument uses a pair of TIS88/2N5245 FETs.

Technical Topics, G3VA. Synchrodyne Receivers, vertically polarised aerials, all-band vertical, directional verticals, Butler v.x.o. and other oscillator topics. Cathode coupled FET oscillator using MPF102s.

Simplified Stripline Filter for 144 MHz., P. T. Bellamy. About 3 MHz. wide and centred on 145 MHz. Ideal for v.h.f'ers.

"RADIO ZS"

August 1970—

80 Metre Transceiver, ZS6AJM. Small s.s.b. transceiver using valves and based on a "QST" article.

Helical Whip Antenna Plus, ZE6JP. "The Rhodesian Mobile Antenna" is described as a wonderful gadget that can be tuned to any band, 10 to 40 metres, using a normal pi network. Winding details are given.

Some Linear Considerations, ZS5HF, Part 2. Power supplies.

Things Haven't Changed Much Over the Years, ZS1CD. The story of the Golden City Radio Club.

Intruder Watch, HS5ABD. Reprinted from "Ohm".

September 1970—

FET Front End and Pre-Mixer with Electronic Bandswitching, PA0KSB. Cascode MPF102s.

Some Linear Considerations, Part 3, ZS5HF. A form of cathode coupled circuit which does not use filament chokes and power measurements are discussed.

The H.F. Discone, ZS5HF. The discone is a vertically polarised, broad-band antenna with low v.s.w.r. over a frequency range of about 10/1.

Professor Nutzenbamm and the Speed Key, ZS6-231. A fantasy.

R.C.A. "HAM TIPS"

August 1970—

2 and 10 Metre Band Transceiver, K2BBX. Looks reasonably simple and uses those old fashioned heat generating electronic devices known as tubes.

"SHORT WAVE MAGAZINE"

September 1970—

The Milliwatter Six, G3WLT. Describes an all transistor tx for top band QRP operation.

Basic Two Metre Transmitter, GI8BDR. Four stages in three valves for medium power input. Final QQV03/20A.

More on Clapp V.F.O. Design, G3BGJ presents another mathematical approach.

Linear R.F. Ammeter, G6HL. Described as a useful practical design which will cater for aerial feeder currents varying from about 20 mA. to 3 amp.

"73"

September 1970—

Integrated Circuit C.W. I.D. Generator, by W7PUG. Automatic identification for your station.

Six Volts from Twelve Volts, K3GSY. Six buck solid state voltage dropper.

The Indicating Oscillator, KH6AF. Another dipper circuit, 1-400 MHz.

Tuning V.H.F. Receivers, K1CLL. Clever infinite attenuator and oscillator unit.

Code Practice a la Baby Talk, W9PXA. Everybody's doing it.

Using Those Bargain ICs, WA2IKL. Three testers will test most of the ICs you are likely to encounter.

Repeater Antenna Separation, K6MVH. One of the easiest ways to improve repeater ranges.

Diode Stacks, W2BDG. Replacing those high power rectifier tubes.

De Luxe Receiver Gain Control, VU2JN. Using one transistor and a zener.

A New Approach to Communications Equipment, K9ALD. A call for manufacturing standardisation.

Reed Relays for Co-axial Switching, W7CRY. Work very well for u.h.f. low power applications.

File Box Resistance Decade, WB4ITN. First in a series of file box test gear.

The DY-Comm. V.H.F. F.M. R.F. Amplifier, Staff. Transistorised, 15 watts out.

What Really Happened to Hamdom? W9HBF. The horrible truth about C.B.

Beer Can Two Metre Co-axial Antenna, by WA0RWQ/6. Drink your way to a good signal.

Converting 24 Volt Relays to 115V. A.C., Douglas. Using a couple of cheap diodes.

Versatile MOSFET Converter, WB6YVT. Low noise, high gain, ultra stable.

October 1970—

This month the accent is on **IC Projects** and the W2NSD diatribe is that the ARRL will not let him run a "73" show at their National Convention.

Understanding and Using ICs. W6DNS explains the theory behind it all.

ICs for Amateur Use, K1CLL. Discusses the various types on the market and what they can do for you.

Practical IC Regulator Circuits for Hams, WB2EGZ. Makes a simple regulated supply.

Camouflage. K9AZG describes one way of convincing your XYL that your new piece of gear "didn't cost much". My personal feeling is that the price he paid was too high!

The Phase Locked Loop Comes of Age, K5JKX. Synchronous detection and how the IC makes it practical.

Low Cost Function Generator for the Experimenter, WA2IKL. 0.01 Hz. to 4 KHz.

Toning Repeaters, K6MVH. How, why and the gadget to do it.

IC Power Source, W1RAN. Simple regulator.

Solid State Timer, WB4MYL. Ten minutes.

Four-Wire Inverted Vee, WA6COB. Better than average antennas.

IC Marker Generator, K4BBC. 200, 100, 50 and 25 KHz.

Improving Regulation, K6BW. In solid state high voltage supplies.

General Class Study Guide, Staff, Part 3. Power.

DXing in Roumania, YO2BO. Peking behind the iron curtain (very punny).

☆

Book Review

"AMATEUR RADIO TECHNIQUES"

By Pat Hawker, G3VA. Third edition, published by the Radio Society of Great Britain, London, England. 208 pages, 9½ in. x 7¼ in.

This third edition of "Amateur Radio Techniques" is a somewhat enlarged version of the second edition published two years ago. Approximately 33 per cent. of the contents are additional material. In this book Pat Hawker, G3VA, has successfully combined the best of all items presented by him as a monthly feature in the R.S.G.B. journal.

"Amateur Radio Techniques" is written in a straight forward and easily understood manner and is copiously illustrated with circuit diagrams. These alone provide a wonderful source of inspiration for any Amateur.

The following is a list of chapter headings: Semiconductors, Components and Construction, Receiver Topics, Oscillator Topics, Transmitter Topics, Audio and Modulation, Power Supplies, Aerial Topics, and Fault-Finding and Test Units.

An appendix lists the IF's of most commercially built receivers, both disposals and present day.

The publication is not meant to be a textbook, nor does it supplant the recognised Amateur Handbooks. However, the material contained in its pages, particularly in relation to semiconductors, will be of great value as a reference for those just commencing to dabble with solid state devices.

"Amateur Radio Techniques" is a must for all Amateurs, whether you are strictly commercial in your approach or an inveterate home-brew man.

If you already have a copy of the second edition you will probably want this edition as well for the new information it contains. If you do not have a copy at all, then this book is a must.

The review copy came direct from R.S.G.B. and copies should be available shortly through the usual sources. British price is twenty shillings sterling.

Correspondence

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers.

CAN YOU HELP?

33 Spring Street,
Lismore, N.S.W., 2480.

Editor "A.R.," Dear Sir,

You may be able to assist me with some information or pass on my request to someone who can.

I have obtained an ancient radio receiver which I would like to put in working order. It is a 1924 American King's "Newtrodyne" receiver. It is a d.c. five valver on 6, 4-5, 90 volts, and was complete but for valves. I sought advice here and obtained four A609s and a UX226 for it. However, it performs not much better than a good crystal set. As it is in good order, I think it should be better despite its age. Possibly the tubes are incorrect. The UX226 has burnt out its filament. If the above performance is usual, it wouldn't need the volume control fitted!

I would welcome any information you may send, possibly from a collector of obsolete equipment you may know of. Congratulations on "A.R.," it is a good magazine, I enjoy it.

Thank you for any information you may be able to obtain.

—John Alcorn.

"ASTRONET"

Editor "A.R.," Dear Sir,

Ever heard of such a net? It is my privilege to make an effort and try to explain all about this particular "net". Beginning with Apollo 12, the astronauts were instructed from ground control to dump waste water from the spacecraft at specific times. This "water dumping" was done for the benefit of Professional and Amateur Astronomical Societies alike, around the world. The dumped water consists mainly of a by-product of their electrical system. Some of it is consumed by the astronauts, the remainder is jettisoned from the spacecraft. This jettisoned water forms a cloud vapour around the spacecraft like a "halo". The astronomical Societies are asked to observe the three magnitudes of brightness of the "vapour cloud" and furnish their findings back to Houston.

What has all this to do with Astronet?

Houston confirms the exact times of "dumpings" to Bellcon., who in turn conveys the messages to Amateur Radio stations in the U.S.A. which consist of six call signs, "Astronet". Very little publicity has been given to this particular "Net" with the inevitable results, QRM. I have co-operated with our local Observatory in the past, who was supplied with yards of computer data sheets, straight from Houston, comprising the exact course of the Apollo's.

All we had to know was the times of the actual water dumpings, and that is where yours truly came in. The exact times were transmitted from 0100-0200 hours GMT on 21.285 MHz. and from 0100-0300 hours GMT on 14.255 MHz.

The point I would like to make is to urge the authorities to give this project its fullest support in publicising and asking Amateur Radio operators to keep the mentioned frequencies clear at those particular times. I can assure you that it was quite hopeless in the past, to note down figures and terms with which you are not 100 per cent. familiar, through the QRM.

So how about some co-operation from this side of the globe to give this project its fullest support; it darn well deserves it.

Footnote.—At present, negotiations with Mt. Wilson Observatory, California, are well advanced for the flight of Apollo 14, scheduled for take-off in the end of January 1971.

—Clem Stegginк, VK4FD.

SILENT KEY

It is with deep regret that we record the passing of—

VK2SV—C. W. Peters
VK3PI—L. F. Pearson

TO AND FROM THE MOON

Editor "A.R.," Dear Sir,

May I submit the following information for possible future inclusion in "A.R."

On 12th June, 1965, from a transmitting site approximately 20 miles north of Brisbane, at 1800 hours EAST, with a 30 degree rising moon, signals on 144 MHz. were successfully reflected and received from the moon.

The persons conducting this experiment were Dane VK4ZAX, David VK4ZEK and Peter VK4ZPL.

As these chaps apparently have no intention of announcing their outstanding effort, I feel that full publication of these facts is highly warranted.

Regrettably, time has a habit of obscuring facts, and it is with this in mind only, that I request that this article be given sincere attention.

—John Bisgrove, VK4ZJB.

AX PREFIX MAKES SUCCESS OF AWARD

Editor "A.R.," Dear Sir,

I would like to take the opportunity through this column to thank the many Australian Amateurs who took part in the recent "Cook Bi-Centenary Award" and in fact all who during 1970 made use of the optional AX prefix. From the outset it was clear that the whole success of the Award would be dependent on the use by Australian stations of the AX prefix. The adoption of the new prefix by almost all active h.f. band operators was most gratifying and the basis of the subsequent success of the Award.

At the time of writing, over 1,000 Awards have been issued and as the closing date for applications is not until the end of this year (1971) the present total is sure to be substantially exceeded.

During the past year I have received many letters from overseas and local operators commenting upon the operating habits of Australian Amateurs using the AX prefix, unfortunately space would not permit reproduction of even a small percentage of these, but I can assure readers that in every case the writers had nothing but praise for the operating ability and courtesy shown by Australian stations. It is quite obvious that a very good image of local operators has been given to the rest of the world during 1970.

I hope at some future date to be able to give a breakdown on the number of countries, etc., which have claimed the Award, but as the entries are still arriving it would be a little premature to do so at this stage, the final figures I feel sure should be most interesting.

To all those who used the AX prefix I would again say "thank you" as the stations who obtained the Award did so ONLY through your efforts.

—Geoff Wilson, VK3AMK,
Federal Awards Manager, W.I.A.

[Amateurs are reminded that the permit to use the AX prefix ceased on 31st December, 1970.—Ed.]

amateur radio

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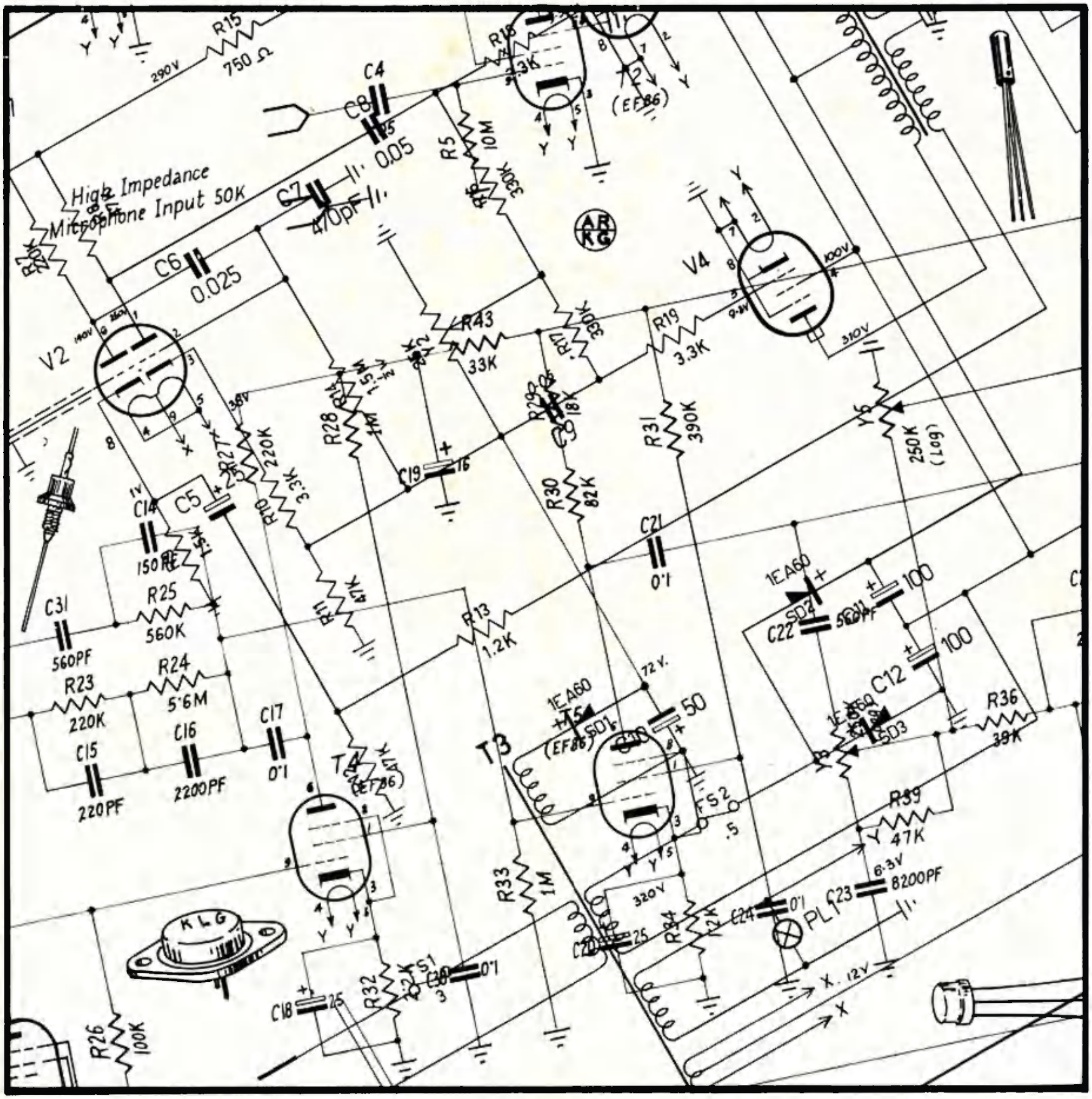

amateur radio

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FEDERAL COMMENT

ON PROJECT AUSTRALIS, *by John Battrick, VK3OR*

I guess your first reaction to this Federal Comment is why is the W.I.A's I.A.R.U. Region 3 Association Director commenting on Project Australis? There are several reasons for my doing so.

Firstly, as you know this current satellite project — known as AO-B (AMSAT-OSCAR B) is a combined effort between Region 1, Region 2, and Region 3 Amateurs. Certainly not on an official regional basis, but the **launch** of the second of the AMSAT series of Amateur Radio spacecraft experiments (the sixth of the widely-known OSCAR series) and the **specification** of the general requirements necessary for the design, fabrication and test of the spacecraft is the responsibility of the U.S.A.-based Radio Amateur Satellite Corporation.

The design and fabrication of a translator with an uplink frequency in the 432 MHz. band and a downlink frequency in the 144 MHz. band is being undertaken in Germany, and is referred to as the DJ4ZC experiment. Conversely, the design and fabrication of a translator with an uplink frequency in the 144 MHz. band and a downlink frequency in the 432 MHz. band is being undertaken in Australia and is the activity being undertaken by the W.I.A. Project Australis Group. So the ultimate package envisaged at the moment will fly and operate as a result of a combined effort by Amateurs in all of the regions of the I.T.U.

However, that is not the real reason why I comment, although it is certainly an aspect of the activity which I believe to be most important; **the next Amateur satellite will be a "talk-through" satellite and it will be operable as a result of this combined effort of Amateurs across the world!** The real reason is, that at its last meeting the Federal Executive of the W.I.A. appointed me tc the position of W.I.A. FEDERAL OSCAR CO-ORDINATOR.

This office was formerly held by Richard Tonkin in his capacity as the Chairman of the Project Australis Group. Richard and the members of his group (Les Jenkins, VK3ZBJ, who builds the translators; Peter Hammer, VK3ZPI, who builds the telemetry; Harold Hepburn, VK3AFQ, who handles procurement and builds sub-systems; Derek Brumley, VK3AVW, who is group treasurer; Edwin Shoell, VK5NZ, who assists with design), yes, that is about all the "group" comprises; these fellows asked the Institute for some assistance with co-ordination, publicity, administration, etc., and for some reason requested my assistance.

The Federal Executive discussed the matter with Richard and myself and all agreed that the two functions should be separated, that of the chairman of the Project Australis Group from that of the W.I.A. Federal Co-ordinator. So Richard and I now work together, and effect the liaison between the group responsible for the design and fabrication of the spacecraft, and the Amateurs of Australia and the world who we hope will use the ultimate system when it flies. So my first real job in my new position is to report briefly to you on the progress of the project.

At the time of reading this, a prototype translator will have been sent to AMSAT in U.S.A. for testing. It has been thoroughly tested in Melbourne, and meets the published specifications. Other prototype modules have been in operation as repeaters in Melbourne, and also will be flown to 100,000 feet on HIBAL balloon launches from Mildura during March. In addition to this prototype testing, the actual flight package will be completed and sent to the U.S.A. during March this year. This package will contain the translator, the command system and the telemetry systems.

The main problems of course in a combined experiment like this are the "interface" requirements — that is the physical and electrical specifications necessary so that the W.I.A. part, and the DJ4ZC part, and the launch vehicle all fit together so the final package flies and works. Many skeds between the Project Australis Group and AMSAT have been undertaken and much correspondence has been entered into in order to actually finalise the specifications, especially interface specifications.

I mention this to point out that this is not a simple experiment like the previous Oscar 5, but a complex affair needing intense and exact co-ordination across the world. The Federal Executive of the W.I.A. believes that the people engaged at the design and fabrication level had done an outstanding job, but they don't have much time left to report to you, the members of the W.I.A. Any hour spent in writing reports, preparing articles, etc., leaves less time to draw up printed circuit boards or fit large quantities of ICs in confined spaces. As the AMSAT boys require the space hardware about now, the group has concentrated its limited resources of private time on the actual building of the spacecraft package.

My function will be to assist them with what they do not have time to do. I hope to feed information to your State Co-ordinators regularly, to other Amateur Societies, and generally assist in the overall co-ordination.

Of course, I have another function. The W.I.A. is financing this Project. To date about $1,200 has been spent, about $24,000 worth of components has been donated and installed, and we require by the end of March a further $2,000 cash. May I make a personal plea for you as individual members to donate, and for you as members of a Division to direct your Councils to donate as your resources allow to a project which will, I believe, achieve more to raise the status of the W.I.A. and the Amateur Service generally than any other single activity undertaken during the long history of this Institute. I am pleased to have been asked to assist. **Will you also please assist?**

COUNTER USED FOR FREQUENCY MEASUREMENT

PART ONE—GENERATION OF TIME INTERVALS

ROBERT H. BLACK, M.D., VK2QZ*

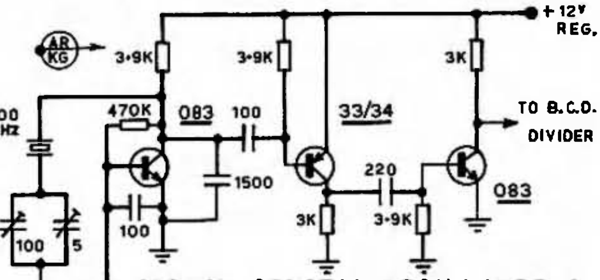
Frequency is the expression of the number of events occurring per unit of time. A previous article (Black, 1970) described a method of counting the events; the present article describes the generation of accurate time intervals using a 100 KHz. crystal oscillator and a series of binary coded decimal frequency dividers. This method of frequency division has been found to be more reliable than one using multivibrators, particularly at pulse intervals of 0.1 sec. and longer.

The diodes and 300 pF. capacitors come "free" on the boards, as may some of the resistors. Each decade is built on a particular type of board which had transistors mounted along the side—this saves a certain amount of drilling time. The whole timing unit will cost about $20, power being obtained from a second regulated supply.

Using 083 transistors this circuit will divide appropriate pulses arriving one million times per second and this property is used for frequency division of the input signal when its frequency is greater than, say, one or two hundred thousand (and up to 1 million) times per second. The pulse shaping amplifier and the dividing decade are shown beside the time unit in the photograph (the amplifier being the same as the one following the crystal oscillator except for 3.5 mH. RFC in the collector circuits on the transistor side of the 3K resistors). If you want a significant last digit (±1) you can count for 10 seconds.

At the lower frequencies the speed-up capacitors (39 pF.) and recovery diodes (R.D.) should not be necessary.

The final article in this series will describe the method of timing bursts of pulses which are counted and displayed and then counted again and displayed and so on. The whole unit then being a frequency meter which measures frequencies accurately up to 1 MHz.



100 KHz CRYSTAL OSCILLATOR & PULSE SHAPING AMPLIFIER

REFERENCES

Black R. H., 1970. Putting the Decades to Work: A Low Cost Counter. "Amateur Radio," October 1970.

Kench, E. J., 1967 (Ed.). Electronic Counting, London, Mullard.

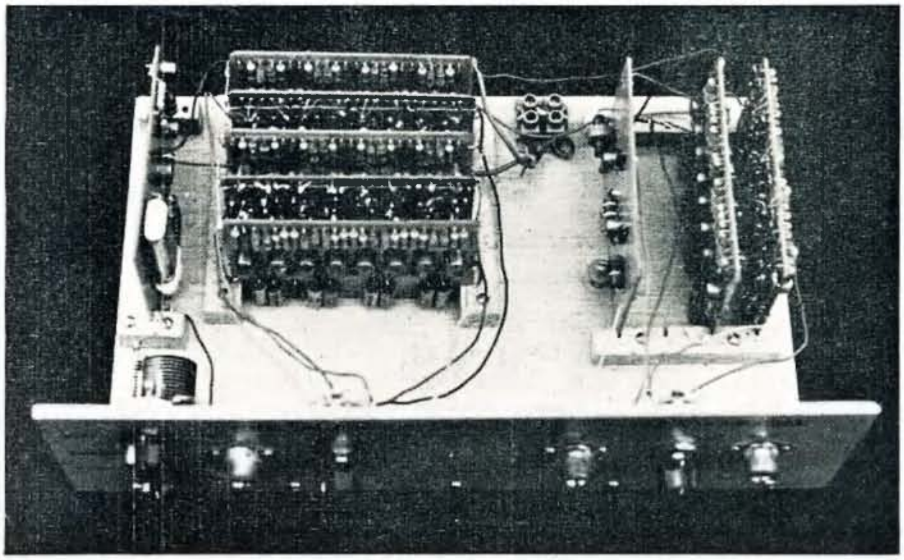
There is nothing unusual about the crystal oscillator in which there are two variable capacitors in series with the crystal, one of 100 pF. for coarse and one of a few pF. for fine frequency adjustment using VNG on 4.5, 7.5 or 12 MHz., or WWV as reference.

The oscillator is followed by pulse shaping and amplifying stages. The output consists of negative pulses with a p.r.f. of 100,000/sec. The crystal was obtained by airmail order from U.S. for about $4.50 and was delivered eight days after the order was posted.

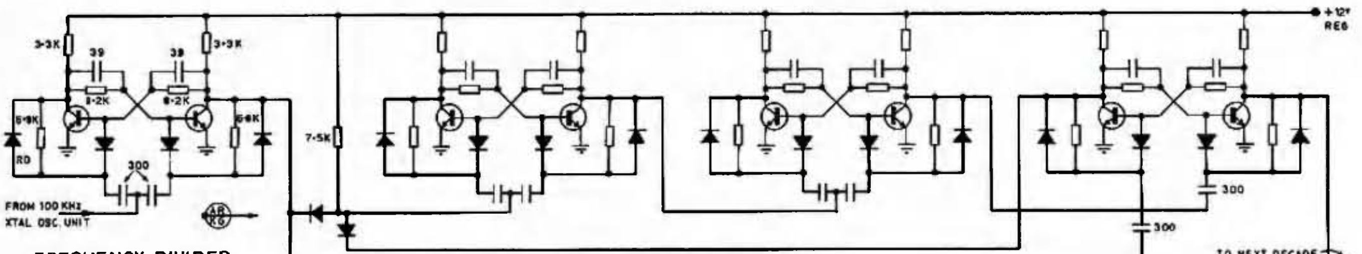
The frequency dividing unit consists of a series of six binary coded decimal frequency dividers (Kench, 1969). Outputs having intervals of 1/100, 1/10, 1 and 10 sec. are useful for frequency measurements with the counter described and these are obtained by switching to the appropriate decade. The cost of a decade is calculated as:

8 transistors at 7.5c each	60c
25 resistors at 3c each	75c
8 39 pF. capacitors at 10c ea.	80c
	$2.15

* 2 Yerton Avenue, Hunter's Hill, N.S.W., 2110.



The crystal oscillator and amplifier is seen on the left; five frequency dividing decades are to the right of this, and on the right hand side the amplifier and two decades for signal frequency division.



FREQUENCY DIVIDER

Binary coded decimal counter used as frequency divider for generation of time intervals. Transistors are 083 and diodes are germanium type from circuit boards.

HARMONICS

LECTURE No. 10C

C. A. CULLINAN,* VK3AXU

So far we have shown how harmonic distortion will be produced, if an amplification system is not linear and whilst in the amplification or electrical transmission of speech or music we aim for the lowest amount of harmonic distortion we can achieve, there are times when harmonics can be useful, and this lecture was started because of a problem which required use of harmonics.

Reference has already been made of the use of harmonics in a radio transmitter in order to obtain a high frequency from a much more stable lower frequency. Also it sometimes happens, particularly if a self-excited oscillator is used to generate a carrier frequency in a telephony transmitter using amplitude modulation, that there may be feedback through the transmitter and some of the amplitude modulation causes frequency modulation of the oscillator if the oscillator and the modulated stage are on the same frequency. Operating the oscillator at a lower frequency and using one of its harmonics to derive the final frequency is one way of getting over this problem.

Now the plate efficiency of a class C plate modulated amplifier will be between 66.6 and about 77%. However, in recent years some transmitters have been made having plate efficiencies around 90%.

One manufacturer told the writer that at times it had been found that a transmitter in a series of similar ones was giving appreciably more output, for the same plate input, as the others. Investigation showed, however, that this transmitter was producing more odd-harmonic distortion of its r.f. output than normal.

All designers of radio transmitters, no matter the size or purpose, are faced with the problem of preventing the generation of spurious frequencies, that is, frequencies which are not harmonically related to the fundamental frequency.

A method which assists considerably to prevent spurious or parasitic oscillation is to connect a small radio frequency choke as close as possible to the plate of the valve, electrically between the plate valve and the plate tuned circuit.

The investigation into transmitters having the very high plate efficiency showed that this choke, in the output r.f. amplifier plate circuit, was resonating at one of the odd-order harmonics due to the stray capacitance to ground of the choke, the choke and stray capacitance forming a parallel resonant circuit.

Later it was found that if a parallel resonant circuit was connected in the cathode circuit of the valve and tuned to the same harmonic then with both tuned circuits in operation the plate efficiency of the stage could be as much as 90%, i.e. 90% of the d.c. power fed to the plate of the valve, appeared as useful r.f. power.

* 6 Adrian Street, Colac, Vic., 3250.

● Continuing the series of lectures by C. A. Cullinan, VK3AXU, at Broadcast Station 3CS for students studying for a P.M.G. Radio Operator's Certificate.

Of course the output contained a considerable amount of the harmonic, but this could be reduced to negligible proportions by the use of filters.

Many broadcast transmitters, some with r.f. power outputs as great as 50 kW. are employing this method of the practical use of harmonics. (Usually either the 3rd or 5th.)

The method is not very practical with a variable frequency transmitter because of the need to re-adjust the parallel tuned circuits for each frequency, as well as the harmonic filters.

CHECKING CALIBRATION OF MOD. OSCILLATOR

(Also applies for Calibration of Frequency Meter)

Now for the tape recorder. A fault had occurred in the erase-bias oscillator and a number of new components had replaced defective ones. It was most essential to be certain that the oscillator was operating on its nominal frequency, 58 KHz.

No equipment was available to check this directly so it was decided to use harmonics of the oscillator and check these with stations in the medium frequency broadcast band.

Since June 1968, the A.B.C.B. has required all Australian m.f. broadcasting stations to hold frequency within ± 10 Hz. of the assigned frequency. Incidentally, the Standard of Reference must be the P.M.G. Standard of Frequency, and it was known that many stations do much better than the permitted tolerance.

For instance, the following are the measured deviations from the assigned frequencies of the four stations of Associated Broadcasting Services Limited, on 23/7/69:

3UL—Assigned freq. 530 KHz.
deviation, +1.5 Hz.

3CS—Assigned freq. 1130 KHz.
deviation, —1.2 Hz.

3YB—Assigned freq. 1210 KHz.
deviation, +4.0 Hz.

3SR—Assigned freq. 1260 KHz.
deviation, +1.35 Hz.

The manual which accompanied the recorder gave the nominal frequency of the oscillator as 58 KHz. and as 3WV operates on 580 KHz., it appeared to be worthwhile to try and find out if the 10th harmonic of the oscillator would zero-beat with 3WV. The 9th harmonic would fall outside the m.f. broadcast band whilst the 11th, 12th and 13th would not be exactly on the same frequency as any b.c. station. Fortunately in our location, 3WV could be heard sufficiently strongly to make the trial feasible.

A Palec modulated oscillator type 1, possibly of World War II. vintage, was available but its accuracy was an unknown quantity so the first thing to do was to check its calibration against b.c. stations so that it could be substituted as a signal source in identifying the 11th, 12th and 13th harmonics of the recorder oscillator.

The overall accuracy of this procedure would be sufficient for our purpose.

A transistorised radio receiver with a ferrite rod aerial was obtained and tuned to 3UL, the modulated oscillator having been switched on for about two hours to warm up thoroughly, was then tuned to the same frequency, getting the best possible zero-beat with 3UL, and the dial reading noted. This was repeated with 3AR, 2CO, 3LO and 3GI.

Careful adjustments to the m.o. trimmer condenser brought the calibration right on the dot with 3GI, whilst adjustment of the iron-cored slug in the m.o. coil former brought the calibration right on 3UL. Actually there was quite a bit of re-adjusting to get both calibraticns correct because of some interaction between the adjustments. This modulated oscillator covers the b.c. band in two sections and we were not interested, at this stage, in frequencies outside the band 830 to 530 KHz., our main purpose being to get as many calibration points in between as accurately as possible.

With the m.o. calibrations well established, the next step was to search for harmonics of the recorder oscillator.

With the recorder in "Record" and the m.o. tuned well away from 580 KHz., the radio receiver was placed near the recorder oscillator, then carefully tuned around each side of 580 KHz. The receiver was turned around physically so that the directional effect of its ferrite rod aerial would **reduce** pick-up of 3WV.

● The frequencies of all the stations mentioned in this lecture were as stated at the time the lecture was written. However, with the passage of time, some station frequencies may change, therefore any Amateur wishing to calibrate equipment by using b.c. stations as frequency references should verify the frequency of each station beforehand. A list of stations may be obtained from the Australian Broadcasting Control Board, 373 Elizabeth Street, Melbourne, Vic., 300.

Slightly on the low-frequency side of 3WV could be heard a whistle or beat of about 1,000 Hz. Switching the recorder on and off "Record" caused the beat to come on or go off accordingly, thus identifying an harmonic from the recorder oscillator.

The oscillator coil of this particular recorder was fitted with an adjustable iron-core and slight adjustment of this core enabled the beat to be reduced to zero-beat.

Due to the presence of programme material on 3WV, it was necessary to make final adjustments during short pauses in the programme. Because of metal used in the construction of the building, and some direct pick-up in the receiver wiring, it was not possible to get a complete null in reception of 3WV. Also, it was not practicable to use the modulated oscillator at this stage.

When zero-beat had been accomplished at 580 KHz., we knew that one of the recorder harmonics was at 580 KHz. and although we assumed that it was the 10th harmonic of 58 KHz., there was no absolute guarantee that this was so. It could have been the 9th harmonic of about 64.4 KHz. as the recorder oscillator could have been on this frequency because of the tolerance in the inductance of the oscillator coil and its associated condensers.

The next step was to tune the receiver very carefully higher in frequency to try and find the next higher harmonic. A weak "rushing" noise was located between 3AR and 3LO and was identified as an harmonic of the recorder oscillator. The modulated oscillator was then tuned to produce zero-beat with this "noise" and as near as could be determined from the calibration of the m.o. its frequency was almost 640 KHz., the dial indicating about 637.5 KHz. (the dial calibrations are in steps of 10 KHz. so that frequencies in between have to be estimated by eye).

If the frequency was 638 KHz., then the difference between 580 KHz. and 638 KHz. is 58 KHz., so that we would have located the 10th and 11th harmonics respectively of a fundamental frequency of 58 KHz.

But to be certain we went looking for the 12th harmonic and again we found one between 3AR and 3LO, and fairly close to 7NT (Kelso) 710 KHz., which could be received weakly.

Tuning the modulated oscillator zero-beat at this new harmonic, gave by eye estimation 695 KHz. (the 12th harmonic of 58 KHz. is 696 KHz.) and in the circumstances this was taken to be 696 KHz. in actual fact.

Out of curiosity, we located another harmonic on approx. 755 KHz. (the 13th would be on 754 KHz., but as already mentioned, the reading between successive 10 KHz. steps had to be estimated by eye so took this one to be 754 KHz.).

It will be observed that we could make use, directly, of one broadcasting station only, but could use others indirectly to check the calibration of the modulated oscillator.

The results we got were tabulated as follows:

Tuning Sequence	Frequency	Actual Harmonic	Difference from previous Frequency
A	580 KHz.	10th	—
B	638 KHz.	11th	58 KHz.
C	696 KHz.	12th	58 KHz.
D	754 KHz.	13th	58 KHz.

As the frequency between successive harmonics was 58 KHz., this meant that the fundamental frequency of the recorder oscillator was 58 KHz., which was what we set out to find.

Later the entire calibration of the modulated oscillator was checked. Its frequency ranges are:

A	150 - 335 KHz.
B	340 - 870 KHz.
C	870 - 2200 KHz.
D	1.9 - 5.1 MHz.
E	4.9 - 12.1 MHz.
F	12.1 - 30.0 MHz.

A receiver was not available which would cover Band A and all of Band B, but one was available which would cover from the broadcast band right through to 30 MHz., so some calculations were made to determine the feasibility of using some broadcasting stations as frequency references, then by harmonic techniques checking the calibration of the modulated oscillator.

Band A—Proposal.—Zero-beat harmonics of the m.o. against b.c. stations.

Band B—Proposal.—Zero-beat harmonics or direct against b.c. stations.

Band C—Proposal.—Zero-beat direct at low frequency and against b.c. stations.

However, there are no Australian broadcasting stations operating on 2.2 MHz. and as mentioned it would not be feasible to try and rely on harmonics of b.c. stations, particularly at a distance.

For instance, in August 1969, field strength measurements were made of the harmonic radiation of station 3CS, at 0.9 mile from the centre of the aerial array and in the major lobe (3CS uses a directional aerial). The values were:

2nd harmonic:
2260 KHz., 187 micro-volts.

3rd harmonic:
3390 KHz., 20 micro-volt.s

The calculated values for one mile becomes 168.3 and 18 micro-volts respectively and as a result of these low values of field strength it is well-nigh impossible to use the harmonics of 3CS, in the city of Colac, as they are well down in the general noise level.

However, there was a way out of this difficulty by obtaining a second modulated oscillator or signal generator and using its harmonics after checking its calibration in the m.f. b.c. band.

The method used was to tune a well warmed-up second m.o. to zero-beat with a selected b.c. station, then the multi-band receiver was used to find one of the harmonics in approximately the correct position on the receiver dial. Next the Palec m.o. was tuned and adjusted to give zero-beat with this harmonic, care being taken to determine that the Palec m.o. was switched to the correct band and that it was beating directly and not via one of its harmonics.

In all cases the multi-band receiver was used to locate the next harmonic, either above or below the desired one to determine that it was the correct numerical one (as outlined earlier when discussing the tape recorder).

Fortunately sufficient harmonic output from the second m.o. was available to identify 30 MHz.

It must be appreciated that all zero-beating was done by ear as it was felt that this was sufficiently accurate and, in any case, equipment to detect the exact zero-beat was not available, also it must be realised that any error in the fundamental is multiplied by the numerical frequency of the harmonic.

However in all cases given, the worst error would not exceed 200 Hz. at 30 MHz. and would more likely be not more than about 40 Hz. at this frequency.

Most of the work was done at night because some of the stations were interstate.

This method may be used for frequency calibration of equipment using other selected broadcast stations, also under some circumstances VNG can be used.

If precision measuring equipment is available VNG will probably be more accurate than either WWV or WWVH since signals from both of these stations are subject to distance (via ionosphere hops as well as Doppler effect caused by rotation of the earth).

Here is a tabulation of the frequencies and b.c. stations used in the above project:

Band A: 150 KHz. - 335 KHz.—
Then $150 \times 4 = 600$ KHz. = 7ZL.
Then $335 \times 2 = 670$ KHz. = 2CO.

Band B: 340 KHz. - 870 KHz.—
Then $340 \times 2 = 680$ KHz. = 2KP.
Then $870 \times 1 = 870$ KHz. = 2GB.

Band C: 870 KHz. - 2200 KHz.—
Then $870 \times 1 = 870$ KHz. = 2GB.
Then $2200 \div 2 = 1100$ KHz. = 4LG.

Band D: 2200 KHz. - 5 MHz.—
Then $2200 \div 2 = 1.1$ MHz. = 4LG.
Then $5.0 \div 5 = 1.0$ MHz. = 3HA.

Band E: 5.0 MHz. - 12 MHz.—
Then $5 \div 5 = 1.0$ MHz. = 3HA.
Then $12 \div 8 = 1.5$ MHz. = 3AK.

Band F: 12 MHz. - 30 MHz.—
Then $12 \div 8 = 1.5$ MHz. = 3AK.
Then $30 \div 20 = 1.5$ MHz. = 3AK.

Further checks of the Palec m.o. calibrations were made in m.f. broadcast and higher bands by using the signals of 3UL, 3CS, 3YB and 3SR as their accuracy was known.

This lecture has shown how harmonics are generated when an electrical wave is passed through a non-linear device. Also, it has shown that generally harmonics are undesirable, but occasionally use can be made of them.

AMATEUR FREQUENCIES:
ONLY THE STRONG GO ON — SO SHOULD A LOT MORE AMATEURS!

Federal Repeater Secretariat Report

1970 has come to an end with several repeaters now on the air. The Secretariat will have a report available early in the new year. This will be sent to known active groups. Anybody else who would like a copy should send a large stamped, self-addressed envelope to the Federal Repeater Secretariat, P.O. Box 342, Crows Nest, N.S.W., 2065. We would also like to receive information from any group as to progress in your area.

ACTIVITIES

Here, briefly, is the activity as we know it:

VK4: Last reports indicated that systems were being tried for both Brisbane and the Gold Coast.

VK2: A channel 4 system is operating in Sydney with good coverage. A channel 4 application is pending for Newcastle. Interest is being shown in a channel 1 system for Gosford. Orange in the Central West is still running their network on 146.1 in and 145.854 out. It is expected that the output will be changed to 145.6 at some future time.

VK3: We understand that there is an operational channel 4 system at both Gippsland and Geelong, and a proposed system for Mildura. There appears to be no Melbourne activity and the original Z1 system is off the air.

VK7: No up-to-date report, but there may be some activity in the north of the island.

VK5: We understand that the channel 4 system destined for the slopes of Mt. Lofty is currently being checked out at an Amateur QTH.

VK6: Work is under way for a channel 4 system in Perth which will be installed, after tests, on high ground near the t.v. sites. Albany in the south is showing interest in a repeater. It is likely that VK6 will develop a channel 4 network to serve the needs of the State.

The American scene has also been interesting during the past year with the F.C.C. directing a new policy for their repeater operation. Those who have read the American Amateur Radio publications will have seen what has happened. It is to be hoped that it does not occur in this country and we urge all users and developers of repeaters to co-operate with your local repeater co-ordinator and in turn with the Federal body.

If anybody can add to the above report would you please advise the F.R.S. care of the above address.

VK2 have been checking with the F.R.S. on 6 metre f.m. frequencies and have announced that they intend to introduce a local f.m. channel in addition to the national channels of 52.525 MHz. (prime) and 52.656 MHz. (secondary) already in use in that State. The reason is to have available a channel which will be reasonably free from Interstate traffic for emergency/broadcast use at times when either of the national channels are open Interstate. This frequency is 52.7 MHz.

With this allocation in mind, the F.R.S. suggests that similar State channels be introduced to all States. These channels are at 50 KHz. spacing:

VK5	52.6 MHz.
VK6	52.656 MHz. (existing)
VK2	52.7 MHz.
VK7	52.750 MHz.
VK3	52.8 MHz.
VK4	52.850 MHz.

As these are at this stage only suggestions, the F.R.S. would like to hear from users in all areas with their thoughts.

The F.R.S. is also seeking information on the use of 6 metre a.m. nets. To date we have the following information, which we wish to confirm and add to, so that the records may be up dated.

VK6	52.586 MHz.
VK5	53.100 MHz.
VK7	53.035 MHz.
VK3	53.032 MHz.
VK4	53.032 MHz.
VK2	53.866 MHz. (Sydney)
VK2	53.982 MHz. (Wollongong)

We would like to know what areas these frequencies are being used and if there are any additional ones.

It is pleasing to note the list of beacons being maintained by Eric VK5LP in his "A.R." column. The Sydney repeater is usually automatically keyed every five minutes with its call sign—VK2BWI—in m.c.w. (145.9 MHz.). The choice of 146 MHz. by VK9XI on Christmas Island is interesting, we would like to hear if it is copied anywhere as the majority of stations on this frequency would be using f.m. receivers.

We would like to wish all Amateurs all the best for the New Year and a reminder that if you have any question or problem with the national side of v.h.f. repeater, beacon or net operation, then please send your inquiry either direct or through your State's Federal Councillor to the Federal Repeater Secretariat, who are a sub-committee of Federal Executive. The address of the F.R.S. is P.O. Box 342, Crows Nest, N.S.W., 2065.

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N.Z.A.R.T. SUBSCRIPTION

Please take note that as from this notice the subscription to N.Z.A.R.T. for "Break-In" is increased to $3.00 per annum. It is regretted that prior notice could not be given and any renewals or new subscriptions will be accepted only at this increased rate.

ERRATA

The author of the Lecture Series advises of the following errors:—

No. 5, July 1970, p. 15, col. 3, para. 2 and 4: Change word "average" to "effective" (lines 7 and 14).

No. 6, August 1970, p. 22, col. 1: Theorem of Pythagoras should be Hypotenuse^2 = side a^2 + side b^2. Also on page 23, last col.: Change 194.2 watts to 1194.2 watts.

No. 10A, Dec. 1970, p. 13: Postcode for A.B.C.B. is 3000. Col. 3, para 7: "as can a valve rectifier which is wrongly biased . . ." should read "as can a valve amplifier which is wrongly biased . . ."

WINNING DIVISIONS OF R.D. TROPHY—1948 TO 1970

1948	VK2	1960	VK7
1949	VK7	1961	VK6
1950	VK7	1962	VK6
1951	VK7	1963	VK4
1952	VK6	1964	VK5
1953	VK6	1965	VK5
1954	VK5	1966	VK6
1955	VK5	1967	VK3
1956	VK6	1968	VK7
1957	VK6	1969	VK7
1958	VK6	1970	VK4
1959	VK7		

W.I.A. WORKED ALL STATES (AUST.) AWARD

OBJECTS

1.1 This Award has been created in order to stimulate interest in the v.h.f./u.h.f. bands and is of a high standard to fully acclaim the proficiency of the recipients on their achievements.

1.2 This Award, to be known as the "Worked All States (Aust.) Award", will be issued to any Amateur in Australia or overseas who satisfies the conditions following.

1.3 A certificate of the Award will be issued to applicants who show proof of having made two-way contact with the specified areas of the Commonwealth of Australia. Additional credit will be given for proof of contact with overseas countries, viz. New Zealand or Papua Territory. Countries, for the purposes of this Award, are set out in the Australian D.X.C.C. Countries List.

REQUIREMENTS

2.1 Contacts must be made on the v.h.f./u.h.f. bands 52 MHz. and above (Bands 8 and 9). Contacts made on 50-52 MHz. prior to 1/4/64 will count towards the 52 MHz. Certificate.

2.2 One verification from each of the following areas of the Commonwealth of Australia is required:—

(a) Australian Capital Territory.
(b) New South Wales.
(c) Victoria.
(d) Queensland.
(e) South Australia.
(f) Western Australia.
(g) Tasmania.
(h) Northern Territory.

In all, eight (8) verifications are required.

2.3 It is possible under these rules for one applicant to receive one Award for each of the Authorised Bands between 30 and 3,000 MHz.

OPERATION

3.1 All contacts must be two-way contacts on the same band and crossband contacts will not be allowed.

3.2 Contacts may be made using any authorised type of emission for the band concerned.

3.3 Portable operation will be permitted provided that the portable location shall be in the State in which the licence was granted and in the call area in which the licence was granted in the case of overseas operation.

3.4 All contacts must be made in accordance with the Regulations laid down in the "Handbook for Operators of Radio Stations in the Amateur Service" or its successor for Australian stations or in accordance with those Regulations applying in the country of the applicant in the case of overseas stations.

VERIFICATION

4.1 It will be necessary for the applicant to produce verifications in the form of QSL cards or other written evidence showing that two-way contacts have taken place.

4.2 Each verification submitted must be exactly as received from the station contacted, and altered or forged verifications will lead to the disqualification of the applicant.

4.3 Each verification submitted must show the date and time of contact, type of emission and frequency band used, the report and the location or address of the station at the time of contact.

4.4 A check list must accompany every application setting out the details for each claimed station in accordance with Rule 4.3. If any contacts were made whilst portable, this must be stated and the portable location given. The applicant must also state whether they are members of the W.I.A. or not.

APPLICATIONS

5.1 Applications for membership shall be addressed to the **Federal Awards Manager, W.I.A., P.O. Box 67, East Melbourne, Vic., 3002**, accompanied by the verifications and check list with sufficient postage enclosed for their return to the applicant, registration being included if desired.

5.2 A nominal charge of 25c, which shall also be forwarded with the application, will be made for the issue of the certificate to successful applicants who are non-members.

5.3 Successful applicants will be listed periodically in "Amateur Radio". Members wishing to have their verified country totals listed over and above those submitted at the time of application for membership, will notify these details, in writing, to the Federal Awards Manager.

5.4 In all cases of dispute, the decision of the Federal Awards Manager and two officers of the Federal Executive, W.I.A., in the interpretation and application of these Rules shall be final and binding.

5.5 Notwithstanding anything to the contrary in these Rules, the Federal Council of the W.I.A. reserves the right to amend them when necessary.

HEARD ALL VK CALL AREAS (H.A.-VK-C.A.) AWARD

At the last Federal Convention held in Adelaide at Easter it was agreed that the scope of the S.w.l. H.A.-VK-C.A. Award be enlarged to allow Australian S.w.l.'s to become eligible applicants. The amended rules are given below and the S.w.l. Awards Manager will consider Australian applicants for the award as from the date of publication of these new rules in "Amateur Radio".

In particular, the requirements of Rule 1.2 should be noted. This requires that the applicant S.w.l. must be a member of an affiliated I.A.R.U. (International Amateur Radio Union) Society. For Australian applicants this means they must normally be members of the W.I.A.; for applicants in the U.K., to me members of the R.S.G.B.; for Japanese S.w.l. to be members of J.A.R.L., and so on. This rule will be strictly enforced and Rule 4.4 requires the applicant to state the name of the society of which he is a member.

OBJECTS

1.1 This award was created in order to stimulate interest in the logging, by both Australian and overseas Shortwave Listeners, of the various call areas of the Commonwealth of Australia and its Territories and to give successful applicants some tangible recognition of their achievements.

1.2 This award, to be known as the H.A.-VK-C.A. award, will be issued by the Wireless Institute of Australia to any Shortwave Listener in the world who is a member of an affiliated society of the I.A.R.U. who satisfies the following conditions. An S.w.l. resident in Australia or its territories may be eligible for the award.

1.3 A certificate of the award will be issued to the applicants who show proof of having logged stations in all of the Australian call areas as listed in the Appendix. No endorsements are available.

REQUIREMENTS

2.1 Verifications are required from all the call areas of Australia and its Territories as shown in the Appendix. In all, 22 verifications are necessary.

2.2 The commencing date of the award is 1st January, 1946. All loggings made on or after this date may be included.

OPERATION

3.1 Loggings may be made of Australian stations using any authorised frequency band or type of emission permitted to Australian Amateurs.

3.2 Credit may only be claimed for logging stations using regularly-assigned government call signs.

3.3 Loggings of ship or aircraft stations in Australia or Australian Territories will not be eligible, but land-mobile or portable stations may be claimed, provided their specific location at the time of logging is clearly shown on the verification.

VERIFICATIONS

4.1 It will be necessary for the applicant to produce verifications in the form of QSL cards or other written evidence showing that specific loggings have been made.

4.2 Each verification submitted must be exactly as received from the station logged, and altered or forged verifications will lead to the disallowance of those items and may lead to the disqualification of the applicant.

4.3 Each verification submitted must show the date and time of transmission, type of emission and frequency band used and the location or address of the station at the time of logging.

4.4 A check list must accompany every application setting out the following details.

4.4.1 Applicant's name, S.w.l. number, if any, and address;

4.4.2 Name of affiliated Society (see Rule 1.2);

4.4.3 Details of each logging as required by Rule 4.3.

APPLICATIONS

5.1 Applications for membership shall be addressed to the "S.w.l. Awards Manager, P.O. Box 67, East Melbourne, Victoria, Australia, 3002," accompanied by the verification cards and the check list (Rule 4.4). Sufficient postage (International Reply Coupons are required from overseas applicants) must be enclosed to cover return postage of the cards to the applicant.

5.2 Where a reciprocal agreement exists between the W.I.A. and the applicant's Society, the appointed officer of that Society may carry out the check, and if correct, may forward a written application for the award on behalf of the applicant. The list (Rule 4.4) must also be forwarded.

5.3 Applications will be examined by the S.w.l. Awards Manager, who will arrange for the award to be forwarded either direct, or through the applicant's Society as required.

5.4 In all cases of dispute, the decision of the S.w.l. Awards Manager and two officers of the Federal Executive of the W.I.A. in the interpretation and application of these rules shall be final and binding.

5.5 Notwithstanding anything to the contrary in these Rules, the Federal Council of the W.I.A. reserves the right to amend them as necessary.

APPENDIX

Territory	Call Area	QSLs Required
Australian Antarctica Heard Island Macquarie Island	VK0	1
Australian Capital Territory	VK1	1
Lord Howe Island State of New South Wales	VK2	3
State of Victoria	VK3	3
State of Queensland Thursday Island Willis Island	VK4	3
State of South Australia	VK5	3
State of Western Australia	VK6	3
Flinders Island King Island State of Tasmania	VK7	3
Northern Territory	VK8	1
Admiralty Islands Bougainville Island Christmas Island Cocos Island Nauru New Britain New Guinea New Ireland Norfolk Island Papua Territory	VK9	1

Note.—In areas above, where more than one confirmation is required, loggings may be made with any or all of the Territories listed in brackets.

AMATEUR EQUIPMENT AND CUSTOMS DEPT.

We were recently asked to investigate a complaint that the Customs Department had confiscated some Amateur equipment from a migrant to this country. The complaint was made to us by the holder of an Australian licence. Either he was not given the full story or failed to pass it on.

Investigation showed that the migrant did not have a current licence from the country from which he migrated, nor did he have the qualifications to obtain a licence either there or in Australia. There is much more to the story, but we have no desire to embarrass anybody involved, sufficient to say the equipment will not be returned.

Should any of your overseas Amateur friends have thoughts of migrating you can assure them that provided they play by the rules, they will have no trouble.

Briefly, licensed Amateurs may bring commercial gear with them for their own use (and not for sale for a period of 12 months from arrival in Australia) provided the equipment was purchased at least 12 months prior to their departure for Australia; no duty is payable. A receipt must be produced to the Customs Department, showing clearly the date of purchase.

The same provisions apply to ancillary equipment. Home-built equipment is not subject to restrictions.

It must be remembered that an Australian licence must be obtained before the equipment can be used.

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F.M. BROADCASTING

The inquiry by the Australian Broadcasting Control Board into the desirability or otherwise of introducing frequency modulation broadcasting into the Commonwealth will be held in Sydney, Melbourne and Adelaide as follows:

Sydney: From 1st March, 1971, to 5th March, 1971, in the Theatrette, Commonwealth Centre, Chifley Square, Sydney, commencing at 10 a.m. on Monday, 1st March, 1971.

Melbourne: From 15th March, 1971, to 19th March, 1971, at Ian Clunies Ross House, 191 Royal Parade, Parkville, commencing at 10 a.m. on Monday, 15th March, 1971.

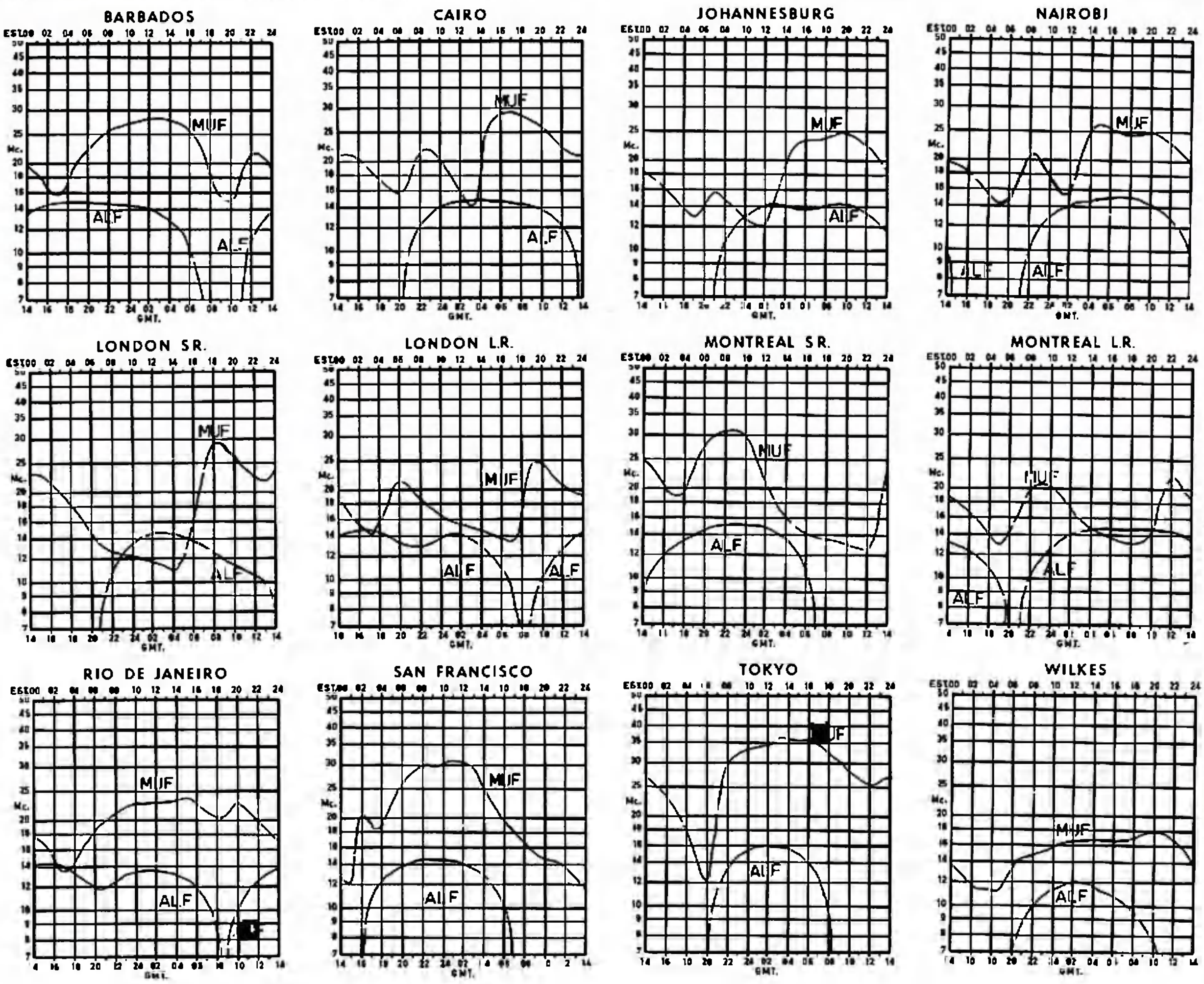
Adelaide: On 24th March, 1971, in the Board Room, Australian Broadcasting Control Board, 32 South Terrace, Adelaide, commencing at 10 a.m.

Announcing this, the chairman of the Board, Mr. Myles F. E. Wright, said that all persons who had submitted written statements to the Board in response to the Board's Notification dated 10th June, 1970, would be advised in writing of the time and place at which they would be required to attend the Board's inquiries for the purpose of giving evidence in relation to their written statements.

Mr. Wright added that in response to the Board's invitation for interested persons to give evidence at its inquiry, a total of 39 submissions had been received involving 56 witnesses.

PREDICTION CHARTS FOR FEBRUARY 1971

(Prediction Charts by courtesy of Ionospheric Prediction Service)



COOK AWARD

385 Whippoorwill Lane,
Stratford,
Connecticut, 06497, U.S.A.

Dear Sir.

This award has a special meaning for our family. My wife is a direct descendant of Captain Cook, and our one-year-old son, James Cook Monde, is named for his great-great-etc. grandfather who is honoured by your award. So you can be sure that, should our logs qualify us for the certificate, it will assume a place of honour in our home. I have taken the liberty of enclosing a photograph of myself and "Jamie".

Thank you very much, and 73.

(Signed) James W. M. Monde, W1OKG.

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"CQ" W.W. DX CONTEST AUST. RESULTS

ALL-TIME RECORDS INVOLVING VK CONTESTANTS

Phone—Single Operator, All Band

	Points	QSOs	Zon.	Cts.
VK2ADY/9 (1967)	5,045,115	3,310	153	334

(This is a world record)

C.W.—Single Operator, Single Band

MHz.		Points	QSOs	Zon.	Cts.
1.8	VK5KO (1964)	6	1	1	1
3.5	VK3APN (1969)	8,904	130	11	17
7.0	VK5NO (1969)	87,542	411	26	48
14	VK3APJ (1967)	422,240	1,150	35	95
28	VK8UG (1967)	320,008	1,048	32	72

Multi-Operator, Single Transmitter

	Points	QSOs	Zon.	Cts.
VK5NO (1963)	945,248	1,199	86	185

R.S.G.B. CERTIFICATES AND AWARDS

As a result of discussion between the British Amateur Radio Teleprinter Group and the Radio Society of Great Britain, the R.S.G.B. have agreed that any of the Certificates and Awards for which they are responsible can be endorsed for r.t.t.y. operation subject to the normal submission of evidence such as QSL cards. A list of Awards follows.

RULES

The following general rules and conditions apply to all Certificates and Awards issued by the Radio Society of Great Britain and should be read in conjunction with the conditions which govern the award of the individual Certificates:

1. R.S.G.B. Certificates and Awards will be issued free of charge to members of the R.S.G.B. R.S.G.B. Certificates will also be issued on payment of a fee of 7/- (35np), or the equivalent in other currency, per Certificate, to non-members of the R.S.G.B. (7/- equals 10 international reply coupons).

2. In the case of transmitting Certificates and Awards, claimants must certify in writing that their licensed power was not exceeded in effecting the contacts upon which their claim is based.

3. All claims must be sent to R.S.G.B. headquarters. Cards will only be returned by registered or recorded delivery mail if sufficient extra money is sent with the claim.

4. In the case of transmitting Awards each claim from within the U.K. must be accompanied by documentary proof in the form of letters or cards showing that two-way communication has taken place. In the case of claims from outside the U.K., a statement from the applicant's national society that the necessary cards have been checked will be accepted.

5. Contacts with mobile stations (other than ships) located in the British Commonwealth will be accepted, provided the exact location of each station at the time of contact is clearly stated on the evidence submitted.

6. Holders of an R.S.G.B. Certificate or Award are authorised to use the initial letters of the Certificate or Award.

7. Post-war cards only may be submitted as proof of contact or reception.

8. In the case of transmitting Awards, endorsements for 100 per cent. telegraphy, 100 per cent. telephony and 100 per cent. single sideband contacts and/or single band, may be made on the submission of cards clearly confirming the mode or frequency of transmission.

9. Contacts may be made from any location in the same call area, or if no call area exists then from the same country, except that no claimant may submit cards confirming contacts with his station call when used for the purpose of an R.S.G.B. National Field Day event.

10. Claims submitted by radio societies must be signed by the licence holder and the honorary secretary. If they are the same person then by the licence holder and the chairman.

11. In the case of any dispute concerning a claim the decision of the Council of the R.S.G.B. shall be final.

COMMONWEALTH DX CERTIFICATE (CDXC)

This Certificate may be claimed by any licensed Radio Amateur who can produce evidence of having made two-way communication with Amateur Radio stations located in at least 50 of the call areas of the British Commonwealth of Nations on the 14 MHz. band, and in addition with at least 50 of the same call areas on other Amateur frequency bands. In the case of the "other" Amateur frequency bands a particular call area may be claimed only once, irrespective of the band on which the call area was worked. The "other" call areas do not have to be the same as those contacted on 14 MHz.

Members of the R.S.G.B. only may claim the CDXC lapel badge at an additional cost of 7/-, 35np or 10 international reply coupons.

BRITISH COMMONWEALTH RADIO TRANSMISSION AWARD (BCRTA)

This Award may be claimed by any licensed Radio Amateur who can produce evidence of having effected two-way communication with Amateur Radio stations located in at least 50 call areas of the British Commonwealth of Nations.

WORKED BRITISH COMMONWEALTH CERTIFICATE (WBC)

This Certificate may be claimed by any licensed Radio Amateur who can produce evidence of having effected two-way communication with at least one British Commonwealth Amateur radio station located in each of the five recognised continental areas as defined by the International Amateur Radio Union. (North and South America count as one continental area.)

BRITISH COMMONWEALTH RADIO RECEPTION AWARD (BCRRA)

This Certificate may be claimed by any person not holding an Amateur Radio transmitting licence who submits evidence that he has received signals from Amateur Radio stations located in at least 50 of the call areas of the British Commonwealth of Nations.

I.A.R.U. REGION 1 AWARD

This award may be claimed by any licensed Radio Amateur who can produce evidence of having effected two-way communication with stations located in countries whose national societies are members of the Region 1 Division of the International Amateur Radio Union. This Award shall be issued in two classes: Class 1, for contacting all member countries, and Class 2 for contacting 20 member countries.

DX LISTENERS' CENTURY AWARD (DXLCA)

This Award may be claimed by any person not holding an Amateur Radio transmitting licence who submits evidence that he has received signals from Amateur Radio stations located in at least 100 of the countries listed in the R.S.G.B. Countries List. Stickers will be available for every 25 additional countries confirmed.

FOUR METRES AND DOWN CERTIFICATES

These Certificates are available to both licensed Amateurs and Listeners, and cover operating achievements in the 70, 144 and 432 MHz. bands. A complete set of rules and further information are obtainable from the Society headquarters. The rules listed herewith do not apply to these Awards.

Address all correspondence to R.S.G.B. Honorary Certificates Manager, Radio Society of Great Britain, 35 Doughty St., London, WC1N, 2AE.

SUBSCRIPTIONS DUE

All members of the W.I.A. are reminded that annual subscriptions are now due and should be paid promptly to their Divisional Secretary. Non financial members will not receive a copy of "A.R.," and back copies may not be available upon request. To preserve continuity of your files of "A.R.," please pay your annual subscription now.

NEW CALL SIGNS

SEPTEMBER 1970

VK1ZAD—J. S. Bland, 15 Abeckett St., Watson, 2602.
VK1ZQR—R. C. Quick, 123 Theodore St., Curtin, 2605.
VK1ZWP—W. B. Pywell, 2 Birbai Place, Waramanga.
VK2BZ—E. J. Mulholland, Kapooka Military Camp, Kapooka, 2661.
VK2AMG—K. R. F. Trevenar, 11 Grey St., Glenbrook, 2773.
VK2ASY—D. K. W. Bradbury, "Karana," Derriwong, 2745.
VK2BAT—J. T. McMillan, 28 Glossop St., St. Mary's North, 2760.
VK2BBT—N. W. Deague, 1/55A Darling Point Rd., Darling Point, 2706.
VK2BCH—K. Y. H. Young, 138 Wolli St., Kingsgrove, 2208.
VK2BVP—R. H. Little, 4 Fisher St., Parkes, 2870.
VK2ZDL—R. G. Lukin, 6/2 Grosvenor St., Kensington, 2033.
VK2ZKE—K. J. Allcock, 1 Martin St., Ryde, 2112.
VK2ZKJ—G. H. Barnes, 30 Tweed St., Brunswick Heads, 2483.
VK2ZLF—M. A. Menchin, 21 Maxwell Ave., Glenroi Heights, Orange, 2800.
VK3FF—P. J. Fitzherbert, 45 Mount Pleasant Rd., Belmont, 3216.
VK3AEU—R. J. Flanagan, 51 Valetta St., Carrum, 3197.
VK3AIN—E. R. Dolman, Station: 55 Como Pde., Mentone, 3194; Postal: 15 Bowes Ave., Westbrook, Margate, Kent, England.
VK3AIY—R. Dorin, 12 Oleander St., Glen Waverley, 3150.
VK3AJK—J. Spark, 87 Lloyd St., Moe, 3825.
VK3AKR—S. King, 1 Kalmia Ave., Mount Waverley, 3149.
VK3ANM—J. G. Finlay, 84 Carpenter St., Brighton, 3186.
VK3AQO—P. J. Solly, Station: Rainbow, 3424; Postal: P.O. Box 102, Rainbow, 3424.
VK3ARY—W. R. Badrock, 2 Kalmia Ave., Mt. Waverley, 3149.
VK3ASG—I. W. Brown, 19 Emerald St., Preston, 3072.
VK3AVW—D. W. Brumley, 32 Faversham Rd., Canterbury, 3126.
VK3BDR—R. E. Clarke, 5 Homebush Cres., Hawthorn, 3123.
VK3BDZ—V. W. Harrison, Rowville Ave., Sorrento, 3943.
VK3BEA—R. H. Pallett, 4 Milloo Cres., Swan Hill, 3585.
VK3BEB—E. McA. Gray, 27 Kenney Rd., Shepparton, 3630.
VK3BED—P. L. E. Bennett, 22 Charles St., Traralgon, 3844.
VK3BEM—G. N. Marks, 67 Stewart St., Rupanyup, 3388.
VK3BEW—N. D. White, 59 Charles St., Ascot Vale, 3032.
VK3YEC—D. J. McDonald, 24 Higgins Ave., Sunbury, 3429.
VK3YED—S. A. Cleaveland, Jersey Rd., Bayswater, 3153.
VK3YEJ—J. E. Rising, 169 Centenary Rd., Melton, 3337.
VK3YEM—J. E. McKenna, 14 Marshall Ave., Moe, 3825.
VK4MX/T—J. R. Martin, Station: 22 Thistle St., Blackall, 4723; Postal: P.O. Box 180, Blackall, 4723.
VK4ZH—C. R. Saunders, Advanx St., Kenmore, 4069.
VK5KS—R. A. Sedunary, Lot 134, Compass Dr., Seaford, 5165.
VK5QO—M. L. Severson, 5 Charlbury Rd., Medindie Gardens, 5081.
VK5TT—A. G. Bolton, Mountford Ave., Aldgate, 5154.
VK5XD—K. G. Ellis, 5 May St., Henley Beach, 5022.
VK5ZIH—I. A. Rourke, 24 Edmund St., Norwood, 5067.
VK5ZJF—I. J. Moody, 30 Aquamarine Dr., Salisbury East, 5109.
VK5ZJJ—C. J. W. Cook, 28 North Pde., Kingswood, 5062.
VK6AN—L. A. Ball, 55/50 Cambridge St., West Leederville, 6007.
VK6BY—G. S. Byass, 79 Parramatta Rd., Doubleview, 6018.
VK6NH—N. H. Hyde, Flat 4, Tijuana Court, 19 Blackwood Ave., Hamilton Hill, 6163.
VK6SG—R. J. Caldwell, House No. 651, Tom Price, 6751.
VK6WA/T—J. L. Harrison, 7 Frimley Way, Morley, 6062.
VK6ZGG—G. R. Gaiger, 453A Sevenoak St., Beckenham, 6107.
VK6ZGO—K. M. Peterson, 1 Walney Ave., Dianella, 6062.
VK8AJ—A. C. Johnson, Anna-Roula Carapark, Cr. McMillans Rd. and Sturt H'way, Berrimah, 5788.
VK8KG—K. F. Gosling, Station: Nhullunbuy, Gove; Postal: C/o. Nabalco Pty. Ltd., Nhullunbuy, Gove, 5797.
VK8ZHT—H. G. Tremethick, 1905 Bald Circuit, Alawa, 5792.
VK9BT—D. T. Trickett, C/o. Bechtel Wke Mine Site Quarters, Panguna, Bougainville.
VK9FH—F. G. Hargesheimer, C/o. Airmen's Memorial School, Ewasse, P.
VK9GH—G. R. Hughes, Lot 3, Section 146, Tokarara, Port Moresby, P.
VK9LM—L. G. Meek, C/o. A.W.A. Ltd., P.O. Box 1935, Boroko, P.
VK9LV—R. L. Varney, Lot 17, Section 91, Boroko, P.
VK9XK—K. J. Hiam, Christmas Island, Indian Ocean.
VK9XX—A. P. Kershaw, Christmas Island, Indian Ocean.
VK0CC—C. R. Christiansen, Mawson.
VK0IN—K. D. Hanson, Mawson.
VK0PF—P. J. Fitzherbert, Casey Base.

CANCELLATIONS

VK1EM—E. J. Mulholland. Now VK2BZ.
VK3WZ—R. F. Whalley. Deceased.
VK3AEA—R. J. Caldwell. Now VK6SG.
VK3AYE—L. A. Ball. Now VK6AN.
VK3YDK—S. King. Now VK3AKR.
VK3ZGC—W. R. Badrock. Now VK3ARY.
VK3ZHI—J. G. Finlay. Now VK3ANM.
VK3ZRD—R. Dorin. Now VK3AIY.
VK3ZTF—P. J. Fitzherbert. Now VK3FF.
VK3ZTN—P. J. Solly. Now VK3AQO.
VK3ZUV—D. W. Brumley. Now VK3AVW.
VK3ZWJ—N. D. White. Now VK3BEW.
VK4OQ—P. J. Murdoch. Not renewed.
VK4PT/T—C. R. J. Paton. Deceased.
VK4QL—M. S. Pedder. Not renewed.
VK4ZT—H. N. Sandford. Transferred to A.C.T.
VK5ZDB—C. J. McCarthy. Not renewed.
VK6LV—Christian Brothers College. Not renewed.
VK6SF—J. C. Watson. Not renewed.
VK6ZDB—G. S. Byass. Now VK6BY.

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VK2 AREA 5 MEETING

All Amateurs, W.I.A. members and Associates and S.w.l.'s in the South-West, Area 5, of VK2 are invited to a special meeting on **Sunday, 28th February, 1971**, at 3 p.m. in the R.S.L. Room at the Memorial Hall, Lockhart, next to the Post Office.

Agenda: Formation of Area Committee; future conventions and field days; repeaters; awards; any other business you have.

Area 5 is about 250 miles by 200 miles in extent and has about 20 cities, towns and villages with active Amateurs. The Area 5 hook-up is held every Monday night at 2000 hours E.A.S.T. on about 3567 KHz. and has been going now for over seven years.—Harry VK2AEC (Area Officer).

OBITUARY

ROY D. NICHOLLS, VK7RN

We regret to report the sudden passing of Roy D. Nicholls, VK7RN, in early November at Burnie.

Roy commenced his career as an apprentice to an electrical contractor, subsequently serving four years in Army Signals. After the war, he spent a short time with the P.M.G. before going to the A.P.P.M. paper mills at Burnie where he was engaged in electronics for 17 years.

For the past few years Roy conducted his own business in t.v. and electrical servicing and p.a. service.

Roy was an active member of the local zone of the W.I.A. for many years, and to his widow and family we extend our sincere sympathy.

VHF

Sub-Editor: ERIC JAMIESON, VK5LP
Forreston, South Australia, 5233.
Closing date for copy 30th of month.
All Times in E.S.T.

AMATEUR BAND BEACONS

VK3	144.700	VK3VE Kilsyth, 20m. E. of Melb.
VK4	144.390	VK4VV 107m. W. of Brisbane.
VK5	53.000	VK5VF Mt. Lofty.
	144.800	VK5VF Mt. Lofty.
VK6	52.006	VK6VF Tuart Hill.
	52.900	VK6TS Carnarvon.
	144.500	VK6VE Mt. Barker.
	145.000	VK6VF Tuart Hill.
	435.000	VK6VF (on by arrangement).
VK7	144.900	VK7VF Devonport.
VK9	144.600	VK9XI Christmas Island.
ZL3	145.000	ZL3VHF Christchurch.
JA	51.995	JA1IGY Japan.
W	50.091	WB6KAP U.S.A.
HL	50.100	HL9WI South Korea.

Another beacon has been added to the growing list this month with the great news that the VK3 beacon, long proposed, is now operating on 2 metres on a frequency of 144.700, running 10 watts c.w. to a cloverleaf antenna. By the time this is in print, it should be located at its permanent site at Kilsyth, about 20 miles east of Melbourne on the Colonial Gas building, and 650 feet above sea level. I am indebted to Bob VK3AOT for this great piece of news, it fills a long awaited vacant spot in southern Australia. My happiness will be complete when I receive the same news from VK2.

While on the subject of beacons, news comes from Christmas Island Amateur Radio Club from the pen of Tony VK9XX, Secretary, that their beacon using the call sign VK9XI operates on a frequency of 144.600 MHz., not 146.000 MHz. as published last month. The beacon beams towards Carnarvon on the west coast of Western Australia. It sends the call sign of the club station, VK9XI, in c.w. followed by a long dash. Tony says he feels the beacon should be heard from time to time in W.A., as during a good 2 metre opening early in November at 1900 hours the harbour-master at Christmas Island made contact with the harbour-master at Port Hedland using the commercial v.h.f. channel 16 on 156.8 MHz., a calculated distance of 960 miles. The beacon uses a converted commercial radio telephone unit and the 6 element beams are on top of a 200 ft. commercial radio station tower.

Tony goes on to say, "I have just erected an antenna system which includes a 3 element h.f. beam plus a 6 element 2 metre beam and a 3 element 6 metre beam, coupled to a Yaesu receiver with 6 and 2 metre converters. At present I cannot transmit on v.h.f., but am quite willing to listen and if necessary work cross-band with anyone interested. I have already contacted Darwin on h.f. and trust we may stir up some activity from there. Anybody interested can write to the Amateur Radio Club, Christmas Island, Indian Ocean, and we will see what can be done." Thanks indeed for your interesting information Tony, and please keep me informed of your activities over there.

Everyone seems to have had their fair share of 6 metre DX so far this season. Many of the openings have been quite good, and stations have been available for many hours at a time. New Zealand stations have been worked in VK5 this year after an absence last year, ZM3QK and ZL3RZ plus a ZL2 seems to have been about the only starters. ZL t.v. has been noted strongly for hours on end but with no other activity.

Charlie C21AA in Nauru right up near the equator, has been causing quite a stir in the eastern States. Roger VK2ZRH was one of several stations to work him. Charlie operates on s.s.b. and is v.f.o. controlled using a Swan 350. A message from Bob VK4ZRW indicates he too worked C21AA, on 20th Dec. Bob further indicates on this day the band was open all the way from Nauru, and possibly further, to VK5, so you could take your pick. A recent card from JA3XPO now only leaves a QSL to come from JA8 to give Bob all JA areas.

Probably the best day in VK5 was 26th Dec., this is often the best day of the season and one I look forward to anyway. So many signals around you had plenty to choose from. Pleased to see s.s.b. is still gaining in popularity, and the absence this year of stations calling CQ DX a.m. stations only. Personally, I got quite a kick out of listening to Colin VK5DK in Mt. Gambier on back scatter when the band was wide open to VK4. Despite several calls to Colin, I could not latch on to him, however the signals had the characteristic flutter and were not there when the beam was pointed at him.

With quite a lot of good 6 metre DX around for the last couple of weeks of 1970, many should have had an excellent opportunity of getting together 100 or more AX call signs for the Cook Award, v.h.f. section. As there were a number of us who did plenty of lobbying to get this section added, it is hoped as many as possible will now follow up by submitting a log and claiming the award. Although you have until the end of 1971 to submit your claim, I suggest you do it soon or you will surely forget.

On the 2 metre scene, there has certainly not been any sign of stagnation. Probably the prize for this month's best goes to Garry VK5ZK, ever vigilant as usual, for his contact with Bernie VK6KJ in Albany on 2 metres on 15th December. Garry goes about things the hard way and the list of events runs something like this. First he heard VK6VE, the beacon on 144.500 MHz. about 2300, strength rising to S7-8. Garry called, no results. Tuned on to 20 metres and who should he find but Bernie VK6KJ, back only one night from an overseas trip! Garry linked up with Bernie and tactfully manoeuvred him to 2 metres, culminating in a 2-way contact about 0030, signals 5 x 4 rising to 5 x 7, lasting 15 minutes, after which signals faded down. John VK5QZ listened in on the contact but by the time Garry had finished Bernie was too weak to work. Moral: "You've got to be listening to work 'em!"

Tony VK5ZDY, at Stirling in the Mt. Lofty Ranges, in number 1 DX position in VK5, has been having a ball with DX. On 21st Dec. he had a 20 over 9 contact with Bob VK3AOT at Mt. Cowley on 2m. On 22nd, Tony fired an S7 signal to Bob on 432 MHz. Not just content with these bands, Tony had a successful 2-way contact with John VK5QZ and Wally VK5ZWW from their portable site at Mt. Olympus on Eyre Peninsula during Christmas week on 576 MHz. In between, many contacts to Melbourne and other places. Tony's 2m. and higher log entries must now be making interesting reading. He's certainly exploiting his choice locality.

Bob VK3AOT has sent in quite a lot of information concerning his portable activity, and that of general interest has been put together to produce the following. 144 MHz. signals excellent on 21st Dec. to VK5s ZFB, ZDR, BC and ZDY. 432 into Melbourne same night S9. Things looked like going very well until Forestry Commission people turned up on their site and then found hash from their 2 kva. alternator was getting into the F.C. 2.7 MHz. equipment. Four days were spent trying to solve the problem, and 300 miles of road travelling looking for bits and pieces for filters, etc. Operating time was severely curtailed as one could imagine, so there is one reason for several disappointed portable parties looking for signals from Bob. Alternator trouble began to plague operation by now, some good early morning contacts were missed. It is to be hoped the latter two weeks of Bob's operating portable will give him more pleasure than the first two. I know Wally VK5ZWW and John VK5QZ, who went out more or less especially to try 432 and 576 MHz. to Bob, were disappointed missing out the possibility of two-way contacts when the bands were in such good shape around 21st December.

Re Wally VK5ZWW and John VK5QZ's v.h.f. and u.h.f. DX-pedition, Cowell Eyre Peninsula, here are their comments: "Boxing Day 1970 looked good as we left Adelaide in a temperature of 94 degrees at 0800. By mid afternoon at Whyalla it had reached 107. Just south of Whyalla there was a cold south-westerly with a 30 degree temperature drop—we didn't waste any time setting up the gear! The distance from Adelaide averages around 140 miles and our first contact was at 1930 with VK5CU on 144 and 432 with 5/9 sigs both ways. From then on, Saturday evening was very busy. Some Adelaide stations were sceptical of our location as signals were too strong for our 6 watts output!! At 2200 a 5/7 contact was made with VK3ZKN, followed by a 432 contact 5/6 given 5/8 received with VK5DK at Mt. Gambier—a distance of 370 miles. At 0030 VK5ZDY was worked 5/9 on 576, and was the last contact for a very busy first evening.

"The morning of the 27th saw conditions going down fast and our only new contact of note was VK3AYH/P3 at 'Little Desert' National Park near Nhill. From the 27th to the 31st conditions got worse and no spectacular contacts were made. 30 stations were worked on v.h.f./u.h.f. during the period for a total of 80 contacts. We found later that Bob VK3AOT/P3 at Mt. Cowley was away from his location on the Saturday evening due to equipment troubles—well you can't win them all but it was worth trying.

"Equipment used was 03/12 at 15 watts input on 144 plus an 06/40 amplifier giving up to 100 watts a.m., into a 10 el. yagi. On 432 a 3/20 running 30 watts input to a 16 el. colinear and on 576 a 3/20 with 30 watts input to a 32 el. expanded array. The power supply was a 12 volt 120 a.h. battery."

Further news from Bob VK3AOT, VK3 Publicity Officer, indicates Noel VK9GA is operating a beacon nightly between 1800 and 2200 hours on 52.150 MHz. Identification in the form of voice announcement runs continuously. The transmitter is a modified Pye Mk. 3A running 10 watts to a turnstile antenna. In addition, Noel transmits 40 watts of s.s.b. to a 5 el. yagi on 6 metres and looks for contacts nightly. He listens on the 6m. liaison frequency of 14.130 MHz. at 2000 hours nightly.

Appropos my advice last month that Ray VK3ATN would have a dish and an extremely large 144 MHz. antenna available for other groups to try moon bounce experiments this year, Ray requests some help from interested people to "assist in the building, development, adjusting and testing of the equipment". So if you are able to give Ray some help, why not enquire what can be done? Better still, organise a group to do the job properly, and try some E.M.E. experiments as a reward.

Television stations have provided quite a lot of interest to me this year. In the course of my work as a technician repairing the beastly things, during periods of high sporadic E activity, tremendous signals have been observed mainly from VK4. On no less than four occasions three stations have been observed on Channel 3 (92 MHz.) with quite good signals, each fading in and out in turn. Call signs could easily be read from the test patterns, indicating they were in Rockhampton, Townsville and Darling Downs (exact location unknown). On 28th Dec. Ch. 3 from Rockhampton was so strong its signal was equally as good as that of our Ch. 2, only 20 miles away. Signals have been observed on two occasions on Ch. 4 (not Port Pirie, S.A.), Adelaide Ch. 2 has been badly interfered with by Ch. 2 in Brisbane on seven occasions in some of the higher locations of the Adelaide Hills. In some cases necessitating service calls to pacify the customers!! All this in addition to numerous signals on Ch. 1 and 0. The M.U.F. this year seems to have gone over the 100 MHz. at times. I personally think next year will see the start of some good 2 metre DX again, probably into VK4 and ultimately to ZL. Best times from past experience seems to be around mid-December to about 26th to 28th. Conditions for 2 metre DX likely to produce signals up to 1,000 miles seem to drop off rapidly after that.

Keep in mind the John Moyle Memorial Field Day Contest for the week-end of 13th and 14th February. Details have been published in "Amateur Radio" in Dec. 1970. Go out portable if you can, if you are unable to do so, at least come on the air and give the portable stations some contacts.

To conclude, here is the thought for the month: "Even the wisest men make fools of themselves about women, and even the most foolish women are wise about men." Until next month, plenty of DX. 73, Eric VK5LP, The Voice in the Hills.

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VK2 FIELD DAYS AND ACTIVITIES FOR 1971

Feb. 21—Central Coast Field Day at Gosford.

Feb. 28—Area 5 Get-together at Lockhart. Details from Harry VK2AEC.

Mar. 13/14—Area 2 Dinner/Field Day at Scone. Details from Max VK2BMK.

Mar. 26—Annual General Meeting of the VK2 Division.

Mar. 27—Annual Dinner. Details from Admin. Secretary.

Mar. 28—Annual Divisional Field Day at VK-2WI, Quarry Road, Dural.

Easter—Annual Convention/Field Day at Canberra. Details from VK1ACA—C.R.S.

Easter—Annual Convention at Urunga. Details from anyone on the North Coast.

DX

Sub-Editor: DON GRANTLEY
P.O. Box 222, Penrith, N.S.W., 2750
(All times in GMT)

The gradual decline in conditions has been more than obvious over the past weeks. The vast amount of solid DX which has been apparent on the 20 metre band has dropped, as is the case with the higher bands. Forty still provides much good DX and as a listener I have logged quite a lot. Maybe if I were on the air I would not be so anxious to compete with the QRM down there. The prospects for 1971 are not so good, but to all and sundry, let me wish you a very successful year, both in the DX and personal field.

At this time of the year, in the period just after the Christmas break, we don't have a lot to write about, but it will be a chance to catch up on some of the QSL information and managers which I have been unable to fit in over the past year.

Here is a round-up from DX-pedition of the month, W2GHK, Box 7388, Newark, N.J., 07107. The following stations were active under their banner in the latter months of 1970: AX3BM, AX9DR, AX9XI, CN8HD, CR5SP, CX2CO, FM7WF, FM7WQ, G3AWZ, HK0AI, JW1EE, K8ITH/DL, KV4FZ, LA1H, OY7ML, PY2PA, PY2PE, VE8RCS, VP7NY, VP8JV, VS-6DO, W4EXI and 9Y4VT. Cards for the operation from 3A0FJ back in July should have been completed, and if you have missed out, send another to the above address.

W2GHK/4 expects to be active during the current season on 160 metres, both modes, using a KW2000 transceiver and a modified inverted vee antenna.

YV0AI and YV0AI/MM are the only stations from that call area for which Stew Meyer and his gang are responsible. Other YV0 stations and their managers are: YV0BBU to YV5BBU, BPG, BPJ, EL, LA and PP also go to their respective YV5 calls. Stew wishes it known that he is currently not associated with any 4W1 stations, despite the fact that he has been receiving a flood of cards for several of them.

QSL arrangements for stations managed by D0TM are simply mail them to the address shown, if the return IRC's etc. are enclosed, then they will be returned direct, but if not, they will be returned via the Bureau. Unlike many QSL managers, DX-pedition of the Month definitely forwards all cards via the Bureaus if they come in by that route. These mailings are made to the various Bureaus around the world on a regular basis. This includes both shortwave listeners and Amateur QSL cards. Incoming cards with self-addressed envelopes and IRC's are sent out direct.

JT1 has been a hard country to get confirmed in the past, but UA9VH/JT1 now has a stateside manager, W3HNK, J. Arcure, Box 14, Norwood, Pennsylvannia, 19074. He has logs covering the past 12 months, so if you have missed out, an IRC to the above address will do the trick.

Market Reef has seen a couple of successful operations during the past year and it is understood that there will be more frequent operation from that spot as one of the new lighthousekeepers has acquired a ticket and hopes to be active whenever possible, using c.w.

San Marino is quite busy these days with three stations, M1D, M1AP, and M1B fairly active. M1D has I1KN as manager, M1AP says QSL to Box 23, San Marino. The first two are on 15 and 10 metres quite regularly.

F0RM has been worked in recent weeks. He claims to be on Clipperton Is. and gives QSL manager as F2OH. However, there is some doubt as to the authenticity of this one according to the Long Is. bulletin.

ST2SA is still about and can be heard here in the region of 1900z, usually in the American phone band at about 14220. Sid says QSL to Box 253, Madani, Sudan.

VP8LK is on Grahamland Peninsula in the Antarctic, his manager is G3NOM. Other Antarctic stations in the news at present are VP8LR on Falkland Is. whose manager is WB4FIN, and VP8LV in the South Orkneys.

I noted AX0TM coming in from Macquarie Is. a few nights ago, he was working into VK2 with a very strong signal without the usual flutter. He said that at present he has no QSL manager, and it would be 12 months before cards would be answered.

I noted also that Louis, ex-G5RV, is now VK9LV from Port Moresby, and gives his QTH there as Box 900. He was putting a good signal into VK2 at around 1000z on 20 s.s.b.

ZS2MI, running a kw. and a rhombic into the States, transmits on 14194, listening on 14200-205. Name is Fanie and his QSL manager is ZS6LW.

LA1GM reports via the Long Is. DX Assn. that 3Y3CC is definitely on Queen Maude Land, counting as Bouvet Is. and will be there until mid-February. His main frequency is 14040 and is particularly looking for W contacts. LA1GM also advised that plans are under way for operation from 4W1 Yemen and advance notice will be given as soon as details are known.

CE0AE has the following remarks to all and sundry in a recent issue of the Long Is. DX Assn. bulletin: "On Mar. 20, 1970, I was licensed to operate my Amateur station from Easter Is. with the call CE0AE. I have been operating this call since May 20 and work all bands c.w. and s.s.b. Only twice have I operated on the 15 metre band at a frequency above 21400. My name is Dave, my QSL manager is WA3HUP. I do not have an A.P.O. address. I have received fewer than one QSL card for every three contacts and would appreciate more. My usual frequencies are 28550, 21360, 14332, 7030 and 3530."

The recent jaunt, due to commence in ZD3 thence TY, XT, TZ, 5V and CT3 by Walter DJ6QT and Gerd DJ1QP, covering quite a lot of time and territory, ask for QSLs to their home QTHs. DJ1QP, Gerd Schnautz, Falkstr, 1/59 Siegen, and DJ6GT, Walter Skudlarek, Klostermaurer, 3/6471, Hirzenbain.

Several A.R.R.L. pronouncements are listed in a recent bulletin to hand here. Briefly, ZA operations by recent OH and DL stations have been approved for DX credit. LG5LG from Morokulian will not be granted separate status, this also applies to Snares Is. which is too close to the N.Z. mainland. A.R.R.L. headquarters has two definite affirmative statements that although Rockall Is. might have a GM prefix, for administrative purposes, it would count as a separate country, not only for R.S.G.B. but according to D.X.C.C. ethics. Bondeuse Kay, Etoile Key, Bertaut Reef all activated by Gus recently, have been accepted, but will count as Seychelles.

FR7 was in the news late in 1970, and here is the QSL information for as much as I have. FR7AG to Box 819, Reunion Is.; FR7CP goes to W2CTN; FR7ZX goes to F6AFM; FR7ZU/G on Glorioso goes to Box 819, St. Denis, Reunion Is.; while FR7ZU/T, Jacques on Tromelin, goes to Box 52, San Andre, Reunion Is.

VR4s currently active are, amongst others, VR4CG, George Cruickshank, Box 310, Honiara; VR4EN, Neville, Box 332, Honiara. Both are quite active and are usually heard here in VK2 at around 0600z.

Requests often come in here for QSL information on the YB stations. The following list is as up-to-date as possible. YB0AAE goes to DJ1OJ; YB0AAO to DL0AK; YB1AAK to K9EYZ; YB3AAI to Box 27, Surabaja, Java; YB9AAJ to W7VRO; YB0AAB to WB4GCL; YB0AAD to K9CSM; YB0AAF to DL1SU; YB-0AAG to DJ2JB; YB0AAL to W5NW, whilst YB0AAN goes to K7DVK.

We still have a lot of good workable stations in and around the Pacific area, some of these together with QSL info are Robert FG8AH, whose cards can go via W2CTN or the R.E.F. Mac KG6APP, Box 445, Guam. Reg 9M6BB asks for his cards to go to Box 520, Sandakan, Sabah, Malaysia. KC6JC in the East Carolines has W2RDD handling QSL chores, and all cards must be accompanied by two IRCs. Not exactly Pacific, but close enough is HS0ISB, Radio Club, Bangkok High School, Box 2008, Bangkok. Across the other side we have Bob WA4UTP/KP4, whose address is U.S.N., F.P.O., Box 797, New York, 09555, U.S.A.

Newer listings in Papua include Tom VK9AC, Box 5122, Boroko, Papua (that box number doesn't look right to me, hi); VK9DM, R. Martin, C/o. P.O. Kerema, and VK9RY, R. Johns, Box 2073, Konedobu.

The FB8 boys are still putting out a mass of good signals. FB8XX on Kerguelen often on 7001 c.w., now has a rhombic beaming in a northerly direction. Andre FB8YY active from 1600-1900 daily and looking for r.t.t.y. QSOs, while FB8WW on Crozet is mainly on during the same period. His manager is F5QE, and 8XX's cards go to F2MO.

K3QOS/KB6 became active on Dec. 11 and proposes to remain for three months. Name is Odus, he is usually on around 0900, and QSLs go to INDXA, Box 125, Simpsonville, Maryland, 21150. KH6ASN/KB6 has been active from the same spot.

Further to the 1Z4NG paragraph in the Dec. notes, it is reported that the U.S. Navy Hydrographic Office have never heard of "Northday Is." and knows of no island between Clipperton and Cocos.

5H3MV is now active on 20 metres using an FTDX400 plus v.f.o. into a dipole pending erection of his TH3. He is ex-VE7BEM/ZS9L, his address is Box 23059, Oyster Bay, Dar-Es-Salaam, Tanzania, but you can also send to manager VE7SE.

QSL information to hand for the 5R8 chaps. 5R8AP is Ishmael Mason, N.A.S.A., Box 3242, Tanarive; 5R8AH has JA3BVW as manager; 5R8AS goes to W6FQ, whilst 5R8AR's manager is WB4GQH. Main activity from this area is around 1400.

5V4AH was due to return to Germany in December, and QSLs for his past activity should go to DL1HH. 5V4JS is still active, name is Jupp and he uses 150w. to a 2 element quad at 45 feet, and QSLs via 5N2AAJ.

Another popular DX man to return home after a long period of successful operation is Joe 9G1HM, who was due to leave in December after a 5-year jaunt. His home call is OK3HM, J. Horsky, Krajinska, 3029, Piestany.

AWARDS

Four new awards from the D.A.R.C., Ortsverband, Kempen, Parkstr 24, 4152, Kempen (North Germany). Each cost one dollar or 10 IRCs, GCR list, and all are available to S.w.l's also.

Atlantic Award.—For working or hearing on any one band, 20 of these countries: CN, CO, CT, CX, EA, EI, EL, F, G, HH, HI, HK, HP, HR, LU, PY, TF, TG, TI, TJ, TN, TR, TU TY, VE, VP7, VP9, W, XE, YN, YV, ZD3, ZS, 5N, 5T, 5V, 6W, 6Y, 8P, 8R, 9G, 9L, 9Q.

Baltic Sea Award.—For working on one band all seven countries: DL, DM, OH, OZ, SM, SP, U.

North Sea Award.—For working on one band the following six countries: DL, G, LA, ON, OZ, PA.

River Rhine Award.—For working on one band, four of the following DL, F, HB, HB0, OE, PA.

All QSOs for above awards must be after 1st January, 1960.

Worked Italian Islands Award.—The DXOTC, Box 143, Palermo, Sicily, has come up with this one, which at the price of 25 IRCs or three dollars is a bit steep. However, for what it's worth, DX stations need to work five different Italian Islands after January 1971. The list of islands you can chose from are I1A Asinara, IC1 S. Antioco, S. Pietro, ID1 Tremiti, IE1 Eolie, IF1 Egadi, IG1 Tuscan Arch, IP1 Pantelleria, IS1 Sardinia, IT1 Sicily, IU1 Ustica and IZ1 Ponziane.

DX Old Timers' Club (DXOTC) address as in above award, will issue a certificate of honour to any Amateur OP who received his ticket at least 20 years ago and has 250 DXCC countries confirmed. Cost is three dollars or 25 IRCs, plus documentation.

QSL MANAGER OF THE MONTH

The golden microphone award by WA5UHR for December has been awarded to popular Mary Ann Crider, WA3HUP.

My thanks for assistance this month to Jack VK3AXQ, Ernie Luff, Geoff Watts DX news sheet, Long Island DX Assn., DX-pedition of the Month, and George Studd, ZL2AFZ. 73 de Don L2022.

☆

PROVISIONAL SUNSPOT NUMBERS

NOVEMBER 1970

Dependent on observations at Zurich Observatory and its stations in Locarno and Arosa.

Day	R	Day	R
1	79	16	126
2	75	17	128
3	72	18	128
4	76	19	125
5	61	20	126
6	87	21	112
7	84	22	103
8	67	23	94
9	75	24	75
10	76	25	60
11	95	26	63
12	87	27	72
13	98	28	87
14	108	29	76
15	118	30	101

Mean equals 91.1.

Smoothed Mean for May 1971: 106.1.

Predictions of the Smoothed Monthly Sunspot Numbers

December	88	March	82
January	86	April	80
February	84	May	78

—Swiss Federal Observatory, Zurich.

Correspondence

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers.

DO YOU PLAY CHESS?

Editor "A.R.," Dear Sir,

Subsequent to a QSO with LU2EB, I received a letter from him, asking whether I would play chess with him by correspondence.

As I regrettably have never learned the game, it is not in my power to oblige him. It has occurred to me, however, that there must be quite a few VK or ZL Amateurs to whom this would be of considerable interest.

He is able to write in English, and his full address is: A. Monsalvo (LU2EB), Calle 19, No. 768, Mercedes (B.A.), Argentina.

His signal into Australia on 7 MHz. is a good one. Perhaps this letter will help to achieve what he desires.

—N. A. Loffman, VK2APL.

NOVICE LICENSING

Editor "A.R.," Dear Sir,

The N.S.W. Divisional Council has been requested by F.E. to convene a committee to consider and to make recommendations on the subject of Novice Licensing. At the 1970 Federal Convention the matter of this form of licensing was raised and discussed and when a vote was taken it appears that a deadlock resulted, Tasmania, Queensland and Victoria voting against, and New South Wales, South Australia and Western Australia voting in favour of the introduction of Novice Licences. However, the matter has not been permitted to lapse entirely and F.E. wishes to have a reasoned statement with arguments FOR and AGAINST so this matter may be discussed further at the 1971 Easter Convention.

As your readers are aware, the subject has been ventilated in the pages of "Amateur Radio" and elsewhere, so various arguments are available for the new committee's consideration. However, it is felt that the Amateurs who have definite opinions pro or contra should have a further opportunity to express their opinions and to submit rational arguments to support their points of view. Accordingly, I should be very grateful to any Institute members who would be willing to submit their ideas in writing—no matter how roughly presented. The committee would not be interested in mere statements but would be able to accept reasoned arguments, which would be used and quoted in the projected submission to F.E.

Especially we would be interested in information gained by Amateur operators who make frequent contacts with stations in U.S.A., Japan, U.S.S.R., Israel, India and other countries where low-level licensing exists. The opinions of DX operators in those areas are sought regarding the value of Novice Licensing, its contribution to the development of Amateur Radio in those countries, the difficulties which may have arisen with Novice operators, the proportion of Novices who progress to Full licensee standard, the operating standards of such operators, the extent to which undue interference is caused to other Amateurs and other services, problems caused in t.v.i. and b.c.i. by Novice operators; in short, we can use any relevant information that can assist in assessing the need for such a system in Australia.

Various Institute members have visited other countries and have, no doubt, seen some evidence of Novice activities. Any valid opinions would be useful if based upon personal observation and/or discussion with responsible members of the Amateur movements with constructive ideas and the capacity to make intelligent assessments.

It is felt that useful information could be gained from Amateurs who have or are now engaged in instruction of A.O.C.P. students. Some Divisions conduct A.O.C.P. courses for evening students and by correspondence and useful data could be obtained if we could find out the numbers of starters over past years, the numbers who completed the courses and passed, the numbers who dropped out before completion. Also, such instructors would be able to assess the value of lower-level licensing as a supplement to their courses, working on the assumption that Novice-type licences are not regarded as ends in themselves but are merely steps towards the Full A.O.C.P.

I have suggested that we should not slavishly follow the American terminology and use the designation "Novice Licence" when referring to this level of qualification. Surely we are capable of devising a title which is more distinctive and Australian in concept. The terms "Restricted", Conditional", Provisional", "Temporary", "Instructional", "Beginners", and "Learners" are some possibilities, and members are invited to state which term they prefer and reasons for such preference.

At this stage I feel that the following persons could make good use of this form of licensing:

1. Students in A.O.C.P. courses conducted by (a) State Divisions of the Institute, and (b) District Radio Clubs offering such training.
2. Members of Youth Radio Clubs who progress by stages towards A.O.C.P. status but would be able to get on the air under supervised conditions in terms of "Restricted" licences.
3. Students of government, semi-government and private radio schools which could supplement their courses by "Restricted" licensing.
4. Holders of Limited licences who wish to improve their Morse Code speeds by on-the-air practice until they reach the 10 w.p.m. required for Full A.O.C.P. status.

Members are invited to suggest extensions to this list.

It is realised, of course, that many Amateurs are not interested in the field of instruction of potential Amateurs, are not at all perturbed by the need to use our bands to greater advantage, are concerned only with their own operating activities in fields of DX or v.h.f. or local rag-chewing and so on. In short, a considerable proportion of the Amateur movement will be quite apathetic towards the concept of a lower-level transmitting licence. However, there are some who have been concerned with training others, who have contributed to the expansion of Institute membership, who realise the need to utilise our bands gainfully to prevent non-Amateur interests from encroaching and demanding further slices of our unused segments, who resent the fact that Australians are barred from transmitting privileges which are regarded as normal in more advanced countries—in short, who can see that "Restricted" (lower-level) licensing offers a means whereby more people can be attracted to Amateur transmitting as a hobby for self-satisfaction and as a contribution to the public interest.

PLEASE give this matter some thought and discussion and submit your suggestions and ideas as soon as possible.

—R. C. Black, VK2YA.

SILENT KEYS

It is with deep regret that we record the passing of—

VK2ALX—Don Kirby.
VK2ANF—John Miller.
VK7RN—Roy D. Nicholls

HAMADS

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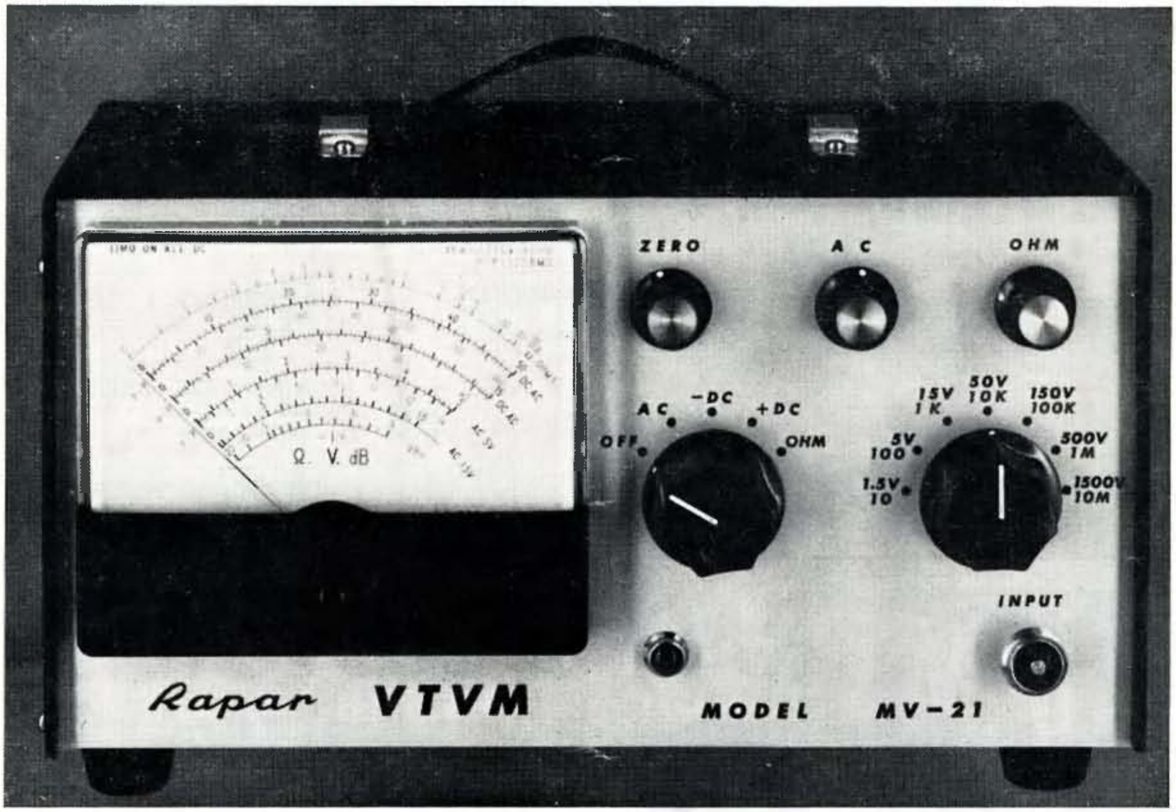

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CONTENTS

COVER STORY

Pictured on our front cover this month is a 'Rapar' V.T.V.M., one of many pieces of test equipment designed for amateur and commercial use, that is available from Radio Parts, Melbourne.

FEDERAL COMMENT—MEMBERS

In recent months I have attended a number of meetings of Amateurs in various parts of Australia. I have usually been asked to speak on the present activities of our Federal body and in doing this I have referred to many of the difficulties that presently face us. One topic that has very often given rise to quite spirited discussion is whether or not we should be able to look to a significant increase in our membership and, if so, how this can be achieved.

You may recall that in the Federal Executive's report submitted to the last Federal Convention, a table was published showing the number of members as against the number of licensees in each State. As we have not yet received the membership figures from all of the Divisions as at 30th December, 1970, we as yet have been unable to up-date that table. However, this will be included in the Federal Executive report to be submitted to the next Federal Convention which will be held in Brisbane at Easter this year.

Australia-wide, as at 30th December, 1969, 54% of all licensees were members of the Institute. It is this figure that generally gives rise to extensive discussion. Of course, this figure must be treated with some caution. There are a certain number of people who retain their licence for many years but are in no way active. These people may have developed other interests or may retain the call sign allocated to them for only sentimental reasons. It is, I think, probably unreal to expect a 100% membership; the really difficult question is to determine what is a realistic percentage of licensees that the Institute can expect to be members. We know, for example, that the Radio Society of Great Britain has a membership of approximately 65%.

I would suggest that a 75% membership or even an 80% membership should be attainable. This figure would take into account all of those licensees who are really no longer interested, in a long term sense, in the hobby.

I do not think that we should disregard those who have temporarily other interests. If someone is contemplating coming back to the hobby, then he probably will have sufficient interest to remain or become a member.

The discussions I have heard on this topic have produced a number of suggested reasons as to why people are not members. It is worthwhile considering some of these suggestions as the reasons, if valid, may provide solutions.

There are, of course, some people who are "anti-Institute", either because of some incident in the past or because they do not know enough about the Institute and are proceeding on the basis of their own assumptions as to what the Institute is all about. There are, it is suggested, many people who are not members because, whilst not being "anti-Institute", they just did not know enough about what it is doing. Then, there are those people who are not members simply because they feel that the Institute cannot offer them anything worthwhile to justify their being members.

In a way, people falling into these various categories have something in common—a lack of knowledge of the fundamental role of the Institute to represent the Amateur Service. Perhaps even if the Institute offered nothing more than an effective medium to defend Amateur frequencies, many of these people would be prepared to become members.

But is it important that we seek more members? More and more of the Institute's resources and, therefore, its funds, are being directed to the representation and the defence of the position of Radio Amateurs. Our involvement in the I.A.R.U. Region 3 Association—which takes 20c per annum from each member's subscription—is because the Federal Council sees the importance of the attitudes of other administrations to the Amateur Service when questions of frequency allocation and regulation arise at an International level.

More and more, the Federal Executive is called upon to prepare detailed submissions in support of its position in its discussions with the Central Administration of the Postmaster-General's Department.

What results can the Institute show for which it is doing? I can now state that the proposals of the Australian Administration to the World Administrative Radio Conference Relating to Space Communications, which will commence in Geneva in June this year, contain no proposal that affects either directly or consequently any Amateur frequency below 20 GHz.

In addition, the Australian Administration has adopted almost in toto the Wireless Institute's submissions in relation to the use of space by the Amateur Service and these proposals now form part of the Australian proposal.

If the Wireless Institute of Australia is successful in retaining, against pressure, any new privilege, this is to the benefit of not only our members but for the benefit of all Amateurs. To put it even more succinctly, Amateurs who take the benefit of what the Institute does, but do not, by being non-members, share the cost, make the cost greater for those who are members.

These facts have been highlighted by many of the discussions I have heard on this topic.

Usually the discussion has then turned to membership drives and other means of attracting new members. There are various things that can be done at a Divisional level though I believe that the best salesmen for membership are, in fact, the existing members. If each member made it his business to seek one new member in the forthcoming year, I am sure that we could see a significant change in our membership pattern, particularly in the three larger States of Queensland (in terms of size), New South Wales and Victoria, where the percentage of licensees as members is smallest.

There are, of course, other areas of the Institute's activities that can be improved and which will, if they are improved, make membership more attractive. For example, any improvement in this magazine should make the direct tangible benefits of membership more attractive. Have you any ideas? Let's hear them—perhaps write a letter to the Editor.

In the last resort though, it is our own enthusiasm as members that will attract more members. This magazine only goes to members, therefore it is going only to those people who already support the organisation. Can you support it now by finding another member?

MICHAEL J. OWEN, VK3KI,
Federal President, W.I.A.

A Transistorised Carphone

PART ONE—THE RECEIVER

By L. B. JENKINS,† VK3ZBJ, and H. L. HEPBURN,‡ VK3AFQ

To a greater or less extent most readers will be aware that the engineering team working on the Australis Oscar project must, of necessity, be examining, selecting and using fairly advanced techniques. This and subsequent articles will attempt to show how some of the Australis work has been utilised to produce a fully transistorised f.m. carphone for the two metre nets.

INTRODUCTION

This article will describe the receiver portion of the complete transceiver and will be followed by a second article on the transmitter.

Fig. 1 gives the block schematic of the unit, whilst Figs. 2 and 3 give the appropriate circuit diagrams.

In the electrical design two i.f's were used. The first i.f. is on 10.7 MHz. to allow use of freely available filters on this frequency and to be high enough to minimise image problems. The second i.f. is on 455 MHz., again to make use of freely available components.

Since the most likely end use for a transistorised f.m. receiver is in mobile systems, the h.t. supply was set at 12.5 volts and all design centred round this voltage. The unit will operate satisfactorily between 11.5 and 13.6 volts although, naturally, the transmitter output falls off at the lower figure.

Considerable attention has been paid to physical layout both from the constructional point of view and also with respect to ease of adjustment. Although the finished transceiver is small (the prototype is housed in a cabinet 4¼" high x 10" wide x 10" deep) no attempt has been made to fully miniaturise it.

The complete receiver has been made on one p.c.b. 7½" x 4¼", while the transmitter is made in three parts. The exciter/audio modulator is on a p.c.b. 1½" x 7½" and provides a 100 mW. f.m. modulated signal to the second p.c.b. which uses a Motorola 2N5589 to raise the power to some 1-2 watts. This stage in turn feeds a 2N5590 p.a. stage on a third p.c.b. to give a conservative 10 watts of output.

All p.c.b's are mounted on a shallow "U" shaped aluminium sub-chassis with the receiver board in the bottom of the "U", the exciter board on one vertical side of it and the two power stages on the other vertical side. The front panel contains the speaker and the various operating controls. Fig. 4 gives the general layout of the boards and control components.

THE RECEIVER CONVERTER SECTION

The front end of the receiver uses two r.f. stages, the first a single neutralised TIS88 followed by a pair of TIS88s in a shunt cascode configuration. The choice of the shunt cascode was determined largely by the higher voltages per device that can be obtained. While a series cascode could have been used the roughly equal division of the available 12-13 volts supply would have meant that each device would only have about 6 volts of supply, a condition not conducive to the best results from FETs.

Double tuned circuits are used between the first and second r.f. stages and again between the second r.f. stage and the mixer. This method of coupling has been used to achieve an adequate band pass for use on the f.m. nets centred on 146 MHz., although there is no reason why the converter could not be centred on, say, 144.5 MHz. for a.m. work. In this case a normal tunable i.f. would be necessary.

† 54 Tennyson Street, Highett, Vic., 3190.
‡ 4 Elizabeth Street, East Brighton, Vic., 3187.

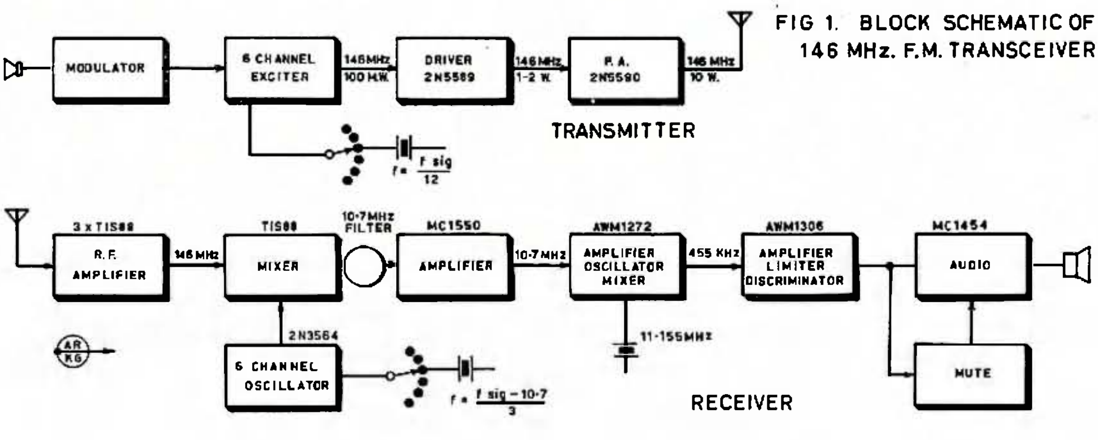


FIG 1. BLOCK SCHEMATIC OF 146 MHz. F.M. TRANSCEIVER

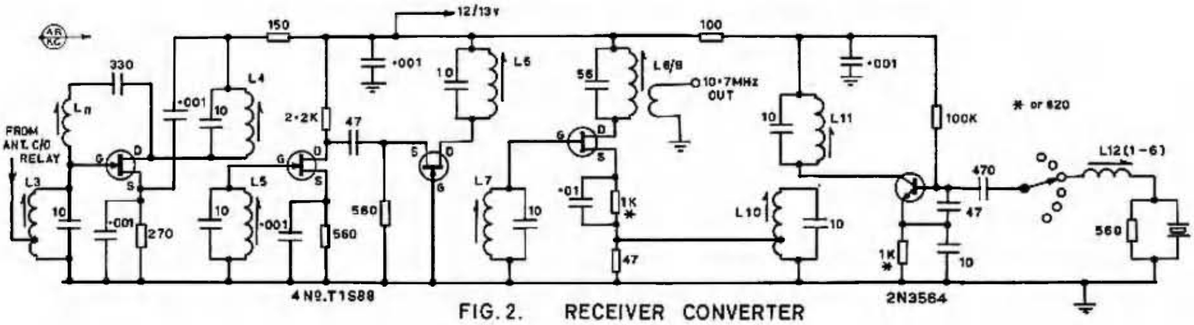


FIG. 2. RECEIVER CONVERTER

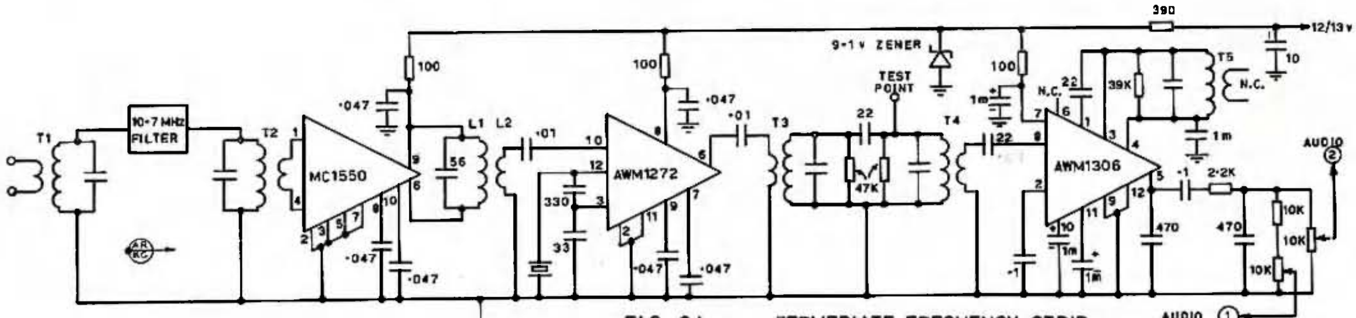


FIG. 3A. ~~IN~~TERMEDIATE FREQUENCY STRIP

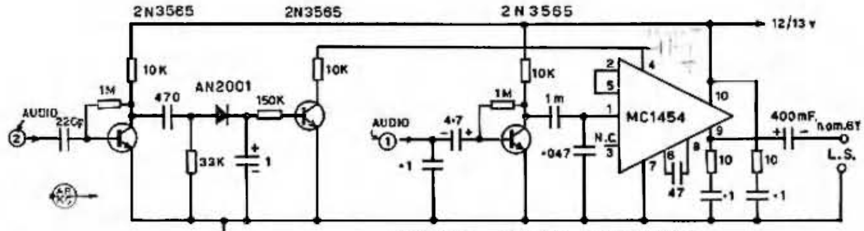


FIG. 3B. AUDIO AND MUTE

The mixer is a single TIS88 using low impedance injection from the oscillator into the source.

No dramatically new techniques have been used in the converter section of the receiver, but the resultant high performance and ease of alignment has been achieved only after much detail work on layout and circuit constants. The need to go through this (quite frustrating!) phase of development underlines the often forgotten maxim that at v.h.f. the circuit diagram alone is not a guarantee of success.

The six-band oscillator section is about as simple as it can be. A single 2N3564 uses third overtone crystals in the 45 MHz. range and triples into the collector tuned load. A second tuned circuit ⅜" away from the collector tank cleans up the injection waveform and is tapped to provide impedance transformation into the mixer source. Adequate injection voltage is available.

Crystal switching uses the tried and true rotary switch. Considerable work was done on a diode switching system, but it did not prove to be completely reliable under service conditions. The reasons for this are not fully known, but appeared to be tied up with the small (but finite and variable) resistance of the diode in its switched-on condition.

THE RECEIVER I.F. SYSTEM

It is in this part of the receiver that the most interesting technical developments have been used.

Input from the converter at 10.7 MHz. is applied to a Toyo Type 10M2A1 filter having a 3 dB. bandwidth of 30 KHz. and a passband ripple of less than 2 dB. Narrower filters were tried, but it was found that off-frequency and/or over-deviated stations were unintelligible. Note that the filter input and output transformers are supplied with the filter and are essential to its proper performance. The bandpass and shape of the passband on the four filters so far tried have been very close indeed to the individual calibration sheets supplied with each filter.

Output from the second filter transformer at low impedance is amplified in a conventional MC1550 stage whose output feeds an AWM1272 oscillator/amplifier/mixer device. This device is made by A.W.V. and has only recently become available.

Fig. 5 gives the internal circuitry of the 1272. It contains two Clapp type oscillators (only one of which is used in the receiver under discussion) and an emitter coupled balanced mixer. This one device has replaced the large number of discrete components used in some of the earlier experimental work.

Using a 10.7 MHz. input and a heterodyning crystal on 11.155 MHz. (or 10.245—it makes no difference) the output of the 1272 is on 455 KHz. Two standard Rapar miniature transistor i.f. transformers are used back to back to couple output into the AWM1306 stage. The two transformers are top coupled and resistively loaded to give optimum bandpass.

The 1306 is another multipurpose A.W.V. microcircuit. Its configuration and mode of operation were described in an excellent article by John Reynolds, VK3ZMU, in the June 1970 issue of "A.R."

Essentially the 1306 acts as an amplifier, a limiter and a quadrature detector and gives two audio outputs. In the Australis circuitry the second audio output is used to give a.f.c. and mute, but in the current design, a.f.c. is not used and a very simple mute circuit has been adopted.

The whole i.f./detector strip is run from a 9-volt zenered rail.

AUDIO AND MUTE

The audio section proper consists of a Motorola MC1454 IC to give a watt of output with an 8 ohm speaker. A very simple 2N3565 pre-amplifier is used to give some audio lift.

Muting is obtained as follows. Audio output from the 1306 is taken to the "tops" of two paralleled 10K potentiometers. One of these potentiometers acts as a normal volume control and feeds the audio pre-amplifier (Audio 1). The slider of the second potentiometer, the mute control, is taken to a second pre-amplifier (Audio 2) whose coupling capacitors emphasise the higher audio components. Amplified output from this stage is rectified and the resultant d.c. applied to the base of a third 2N3565. The collector of this transistor is connected to pin 4 of the 1454 via a 10K resistor.

With the mute control in the off position no d.c. is applied to the base of the 2N3565 switch and pin 4 of the 1454 is at its normal working level. As audio noise is applied to the pre-amplifier and rectified, the 2N3565 switch approaches the "on" stage. When "on" pin 4 of the 1454 is pulled down towards earth potential and cuts off the IC.

Some delay time is achieved by means of the 1.0 μF. capacitor immediately following the AN2001 noise rectifier.

GENERAL

The receiver as described has been in one writer's vehicle for a long shakedown period. While the signal generator says that the mute will open with less than 0.3 microvolt of input, the effect of this sort of sensitivity is only really apparent when used mobile over a long period of time under a wide variety of circumstances and over many different routes.

Suffice it to say that on the most used route (to work and back!!) copy has been consistently made from all parts of Melbourne when modified commercial units (both valve and transistor) have heard only noise.

Since the converter part of the receiver is that to be used in the next satellite for reception of 2 metre f.m. signals, the performance obtained augurs well for the future.

With the exception of two ICs, the p.c.b's, the filter and of course the crystal, no special components are needed and in fact those used were obtained ex stock through the VK3 W.I.A. components service.

Much interest has been shown in the development of this receiver and many enquiries received for information on availability. P.c.b's are available in any case and, if sufficient demand exists, the authors will undertake to provide kits, instructions, etc. Those interested are asked to contact either author at the addresses given.

RECEIVER COIL DATA

I.F. Strip

T1—Supplied with filter.

T2—Supplied with filter.

L1—34 turns 29 B & S enamelled wire close wound on Neosid 722/1 former. Hot end to base of the former. F29 slug.

L2—8 turns 29 B & S, close wound over cold end of L1.

T3, T4, T5—Miniature 5-pin 455 KHz. i.f. transformers. ("Rapar 6" replacement i.f.t. from Radio Parts, Melbourne).

Converter

L3—4¾ turns 18 gauge tinned copper, 7/16" long on Neosid former, F29 slug. Tapped 2 turns from cold end. Cold end to top of former.

Ln—15 turns No. 22 B & S enamelled wire, close wound on Neosid former. F29 slug.

L4, L5—3¾ turns 18 gauge tinned copper, 7/16" long on Neosid former. F29 slug. Hot end to top of form.

L6, L7—As L4, L5 but cold end to top of former.

L8, L9—As L1, L2.

L10—5¾ turns 18 gauge tinned copper, 7/16" long on Neosid former. Tapped 2 turns from cold end. F29 slug. Hot end to top of the coil.

L11—5¾ turns 18 gauge tinned copper, 7/16" long on Neosid former. F29 slug. Hot end to top of coil.

L12 (1-6)—12 turns 26 B & S enam., close wound on Neosid former. F29 slug.

Note.—All coils wound in the same direction.

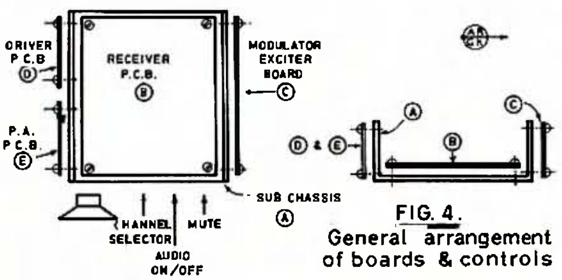


FIG. 4. General arrangement of boards & controls

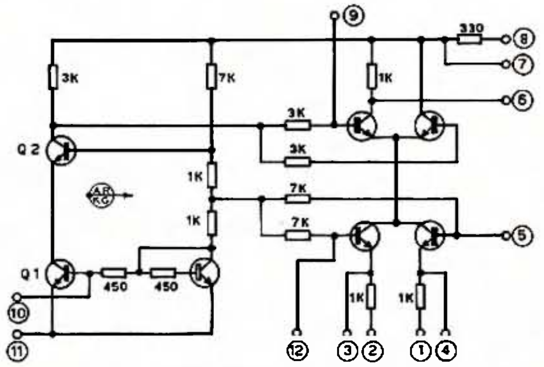


FIG. 5 AWM1272 SCHEMATIC

NEW CALL SIGNS

OCTOBER 1970

VK3KB—E. G. Mackay, 390 Upper Heidelberg Rd., Ivanhoe, 3079.

VK3QO—D. T. Bellair, 1 Mossman Dr., Heidelberg, 3084.

VK3AWX—S. Davies, 3 Laurens St., Rosebud, 3939.

VK3BCZ—B. G. Tideman, "Weller Lodge," 169 Canterbury Rd., Canterbury, 3126.

VK3BEK—C. E. Middleton, 7 Shamrock Ave., Cheltenham, 3192.

VK3YBB—J. E. McKenna, 14 Marshall Ave., Moe, 3825.

VK3YEG—A. H. Hambleton, 10 Sharrow Rd., Mitcham, 3132.

VK3YEI—L. N. Osborne, 18 Male St., Brighton, 3186.

VK3YEQ—B. J. Kemp, 1/17 Sydney St., Murrumbeena, 3163.

VK3YES—E. S. Rendell, 71 Broadway West, Yallourn, 3838.

VK3ZSR—A. C. Greening, 32/72 Altona St., Kensington, 3031.

VK3ZXR—J. E. Rising, 169 Centenary Rd., Melton, 3337.

VK4CU—C. V. Whale, 237 Newman Rd., Geebung, 4034.

VK4HI—H. D. McDougall, Station: 5A Rocky Point, Weipa, 4874; Postal: P.O. Box 23, Gordonvale, 4865.

VK4HJ—H. J. Simpson, 13 Clayton St., Ayr, 4807.

VK4RM—R. E. McDermott, Ridge St., Tewantin, 4565.

VK4ST—P. J. Weir-Smith, 19 Sourris St., Toowoomba, 4350.

VK4ZBJ—B. J. Riddell, 93 Harold St., Stafford, 4053.

VK4ZDI—G. J. Dickson, 4 Pullen Rd., Everton Park, 4053.

VK4ZMA—A. W. Manson, 39 Bellata St., The Gap, 4061.

VK5DK—C. M. Hutchesson, Yahl, via Mt. Gambier, 5290.

VK5QY—N. J. Kennedy, 26 Elizabeth St., Tea Tree Gully, 5091.

VK5TA—R. A. Couzens (call sign incorrectly advised as VK5AT in August list).

VK5ZTR—D. T. Rhodes, 3 Angas Crt., Modbury, 5092.

VK6DO—D. W. White, Station: U.S. Navcomsta, Exmouth; Postal: P.O. Box 20, Exmouth, 6707.

VK6EE—W. Schmitz, 16 Cowrie Cres., Mt. Pleasant, 6153.

VK6HK—D. E. Graham, 42 Purdon Rd., Wembley Downs, 6019.

VK6MD—M. D. Scott, Station: U.S. Navcomsta, Exmouth; Postal: P.O. Box 20, Exmouth, 6707.

VK7BC—C. F. Beech, McEwans Rd., Legana, 7251.

VK7CS—A. Szopko, Beach Rd., Legana, 7251.

VK7JM—J. W. McCulloch, "Tally Ho," Pitcairn St., Port Sorell, 7307.

VK7MA—P. M. Anderson, 21 Watchorn St., Launceston, 7250.

VK7NL—W. C. N. Larsen, 43 Upton St., Launceston, 7250.

VK8DW—D. W. Stephens, 55 Carruthers Cres., Alice Springs, 5750.

VK8ZSS—S. A. Stephens, 55 Carruthers Cres., Alice Springs, 5750.

CANCELLATIONS

VK3BL—D. Barney. Not renewed.
VK3KK—E. T. J. Kerby. Not renewed.
VK3MM—M. P. Marschall. Not renewed.
VK3MY—L. D. Money. Not renewed.
VK3AIP—E. F. Coate. Not renewed.
VK3AQO—D. T. Bellair. Now VK3QO.
VK3AUQ—F. D. Baarda. Not renewed.
VK3BAE—C. Lindsay. Not renewed.
VK3BCT—R. D. Trickett. Now VK9BT.
VK3YDF—J. E. Falkner. Now VK3BDP.
VK3YEJ—J. E. Rising. Now VK3ZXR.
VK3YEM—J. E. McKenna. Now VK3YBB.
VK3ZDM—R. J. Beames. Not renewed.
VK3ZLO—R. W. Davis. Not renewed.
VK3ZSQ—C. E. Middleton. Now VK3BEK.
VK3ZUM—E. G. Mackay. Now VK3KB.

VK4CY—H. R. Greber. Not renewed.
VK4RC—Brisbane Amateur Radio Club. Not renewed.
VK4TZ—A. E. Taylor. Transferred to S.A.
VK4ZEG—E. F. Gill. Transferred to T.P.N.G.
VK4ZGZ/T—A. W. Reynolds. Transferred to N.S.W.
VK4ZHJ—H. J. Simpson. Now VK4HJ.
VK4ZPM—P. J. Weir-Smith. Now VK4ST.

VK5AD—B. C. Jellett. Not renewed.
VK5GO—F. D. Voight. Transferred to Vic.
VK5OD—Open Door Radio Club. Not renewed.
VK5ZKR—C. M. Hutchesson. Now VK5DK.
VK5ZOK—N. J. Kennedy. Now VK5QY.
VK6DM—D. M. McGlinsey. Not renewed.
VK6ZBB—W. E. Olson. Not renewed.
VK6ZCR—C. C. Stables. Deceased.
VK7IE—I. L. Eadie. Transferred to Vic.
VK7ZBJ—B. J. Riddell. Now VK4ZBJ.
VK7ZCS—A. Szopko. Now VK7CS.
VK8AB—B. C. Jellett. Not renewed.

☆

LICENSED AMATEURS IN VK

SEPTEMBER 1970

	Full	Lim.	Total	
VK0	10	0	10	
VK1	82	31	113	
VK2	1408	461	1869	
VK3	1309	631	1940	
VK4	525	194	719	
VK5	520	235	755	
VK6	359	141	500	
VK7	160	72	232	
VK8	33	11	44	
VK9	91	8	99	
	4497	1784	6281	Grand Total

OCTOBER 1970

	Full	Lim.	Total	
VK0	10	0	10	
VK1	82	31	113	
VK2	1408	461	1869	
VK3	1305	632	1937	
VK4	527	193	720	
VK5	519	234	753	
VK6	362	139	501	
VK7	164	74	234	
VK8	33	12	45	
VK9	91	8	99	
	4501	1780	6281	Grand Total

Modification to the Mute Circuit of the Pye Mk. 2

RODNEY D. CHAMPNESS, VK3UG*

The original muting circuit of the Pye Mk. 2 v.h.f. a.m. transceiver leaves much to be desired in its method of operation as undoubtedly owners of this particular model have found out. The trouble comes about through the use of a relay to switch the speaker on and off. It is a well known fact that a relay requires a much higher current to pull it in than to drop it out. In other words, the relay may require 10 mA. to pull it in, but the current may have to drop to 5 mA. before it drops out again, which actually means in the case of the Pye Reporter that the muting must be much harder than desirable, causing weak signals to be missed, for the convenience of having muting during no-signal times. This used to cause me to miss many of the weaker signals, much to my annoyance.

Having put up with this defect for some time, I decided some form of fully electronic mute was most desirable. I came across the circuit that follows in an American magazine. I have modified it slightly so that it will suit the Pye. The original circuit required no extra valves, but this can only be so when the set has simple a.g.c. or only a slightly delayed a.g.c. system. The original circuit used the variation in the screen voltage of one of the a.g.c. controlled r.f. or i.f. stages, as shown in the second diagram, to operate the muting circuit. I won't describe the original American circuit, just the one suitable for the Mk. 2—it will suit, of course, the Mk. 1 and Mk. 3 with the addition of a small triode such as a 6C4.

To convert the Mk. 2, first of all, get rash and remove all the muting circuit, including the relay, wiring the speaker line direct from the transformer to the speaker. Having done all these drastic alterations, you will now find you have quite a bit of space about the 12AT7 socket. Just wire it as per circuit diagram and away it should go.

The principle of operation is quite simple. With no signal input, V1 will have no bias and will be conducting as much as it is able, the 100K (R6) restricting the total current to a quite reasonable level. As a result of this, the anode of the OA202 will be negative in respect to the cathode and it will be cut off, which means that it is an effective switch between C3 and C4 so the set is effectively muted, providing of course that VR1 is set so that this condition does apply.

Should your valve be a bit different to mine, R4 and R7 can be juggled to get a voltage at the earthy end of VR1, which is slightly less positive than the voltage at the plate of the valve. This will mean that the diode is conducting and the set is unmuted as the diode will act as a small series resistor between C3 and C4. As the slider on VR1 is advanced towards the positive unearthed end, the diode will become reverse biased and the set muted.

When a signal comes in, a negative bias is developed across the detector load and this is applied to the grid of V1 causing it to gradually cut off which means that depending on the setting of VR1 the set will unmute at a set pre-determined signal level. It might be noted that the set can be made to unmute on signals which have not even actuated the d.a.g.c. I can hear signals now that I couldn't previously and the mute closes quickly and positively after every received transmission.

You may think that R1, R2, C1 and C2 are unessential for this job, but I can assure you that this is not so. The 12AT7 will act quite effectively as an audio valve and cause the diode to open and close at an audio rate. Mostly this caused the residual noise to leak through, in fact, all the noise that the noise limiter removes is being amplified by this circuit as it comes before the noise limiter. These four components are used as an audio filter so that only pure d.c. is supplied to the 12AT7.

C5 is optional and is inserted to back up the aforementioned components to suppress audio leakage.

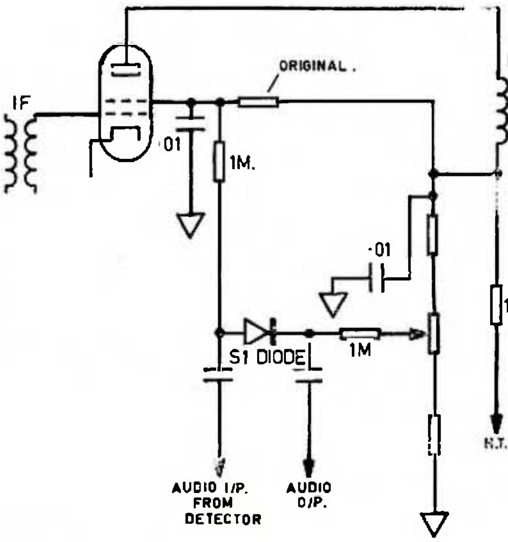
There is only one defect with this circuit that I have noted which should be able to be corrected. This defect is that if there is a quite high noise level, say ignition, etc., the mute will open, giving you a large dose of noise that can be well done without. I have thought of an addition to this circuit which may work. It consists of a small value capacitor of a 100 pF. or thereabouts possibly, followed by a diode and a series resistor as shown on the diagram dotted in. The theory behind this being that the noise pulses are much higher in frequency than the average audio. These are rectified in this circuit and applied to the grid of the 12AT7 to hold it fully conducting to counteract the negative voltage developed by the audio detector. The values of this addition would need to be played with to get the desired effect.

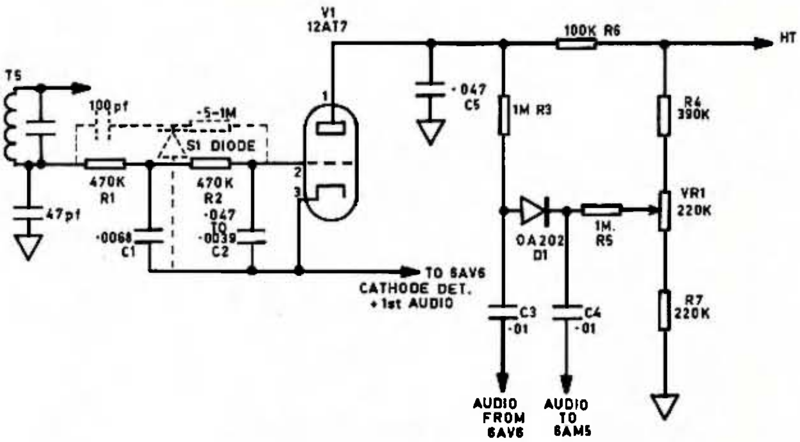
I have used this mute circuit on a couple of sets and in both, the result has been very successful and I feel I can recommend it. It would undoubtedly be quite suitable to use in other valved a.m. equipment, h.f. or v.h.f. This mute does not give an entirely quiet receiver as there is still a small amount of high frequency audio leakage across the capacity of the diode, but this is of such a low amount that it is of no consequence.

The value of C2 can be varied quite a bit to give slower response to incoming signals and particularly noise pulses. A suggested upper value could be about 0.047 μF.

One precaution: With the mute hard on, the back bias on the OA202 must not exceed 150 volts or the diode may break down.

* 24 O'Dowds Road, Warragul, Vic., 3820.





Australis-Oscar 5 Spacecraft Performance*

By JAN A. KING, W3GEY

In the rather brief lifetime of the Australis-Oscar 5 experiment a number of useful experimental and operational results have been achieved. The satellite was launched on 23rd January, 1970. As of this writing, 211 formal reports have been received from 27 countries around the world on both telemetry and propagation results. Many other stations were known to have received the satellite, but did not submit quantative data.

Based on reports received, here is a summary of the performance of each system on the AO-5 spacecraft:

THERMAL BEHAVIOUR OF AO-5

The temperature of AO-5 at ejection from the second stage of the Delta vehicle was 20°C. despite its proximity to the second stage engine and a very cold nitrogen gas jet during launch. The temperature, however, began to rise during orbits 1 through 10 and then stabilised internally at 43°C. ±3°C., where it remained for the duration of the satellite's useful life. This temperature is fairly high, although it is within the design temperature range of 19° to 45°C. The effects of this higher temperature were, unfortunately, all adverse. Battery lifetime was somewhat shortened during the initial phase of discharge; but worse than this, the 144.05 MHz. beacon power dropped off faster with decreasing supply voltage due to the decreased efficiency of the r.f. power output transistor.

External temperature measurements were higher in sunlight and cooler during eclipse periods as observed by many reporting stations. As the spacecraft entered the dark portion of the orbit the skin temperature dropped from its 55°C average to 42°C. ±3°C. The internal temperature, however, remained fairly constant, dropping only two to three degrees during the entire eclipse period. Acknowledgment is due to Bill Armstrong, W0PG, John Fox, W0LER, Nastar, K2SS, and others for their data in this area.

The spin rate about the X-axis in later orbits became quite slow so that the skin sensor located on the +Y surface showed changes in temperature as parts of the satellite rotated in and out of its own shadow. This data was most useful in determining the roll rate about the stabilised axis of the spacecraft. John Goode, W5CAY, reported this data for many orbits between 100 and 250. Skin temperature data indicated a spin period of 7 to 8 minutes about the X-axis after the initial 100 orbits. An example of this data is shown in Fig. 1 for orbits 168, 205 and 206, along with horizon sensor data.[1]

THE AO-5 POWER SYSTEM

The spacecraft battery voltage decreased with time faster than predicted by pre-launch testing of individual cells (see Fig. 2).[2] It is now known that the accelerated battery discharge was caused by two factors. First, the higher satellite temperature accelerated the normal chemical reaction in the alkali-manganese batteries. Secondly, an additional 18 mA. of current was attributed to a failure of the 10 metre modulator that occurred on orbit 3. It was verified that the 18 mA. was independent of the ten metre transmitter itself by commanding the transmitter off and observing that the extra current was still present. The ten metre modulation failure has also been attributed to the higher spacecraft temperature.

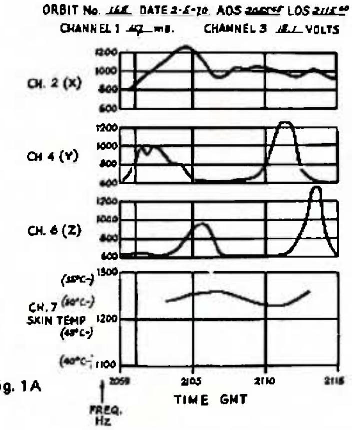


Fig. 1A

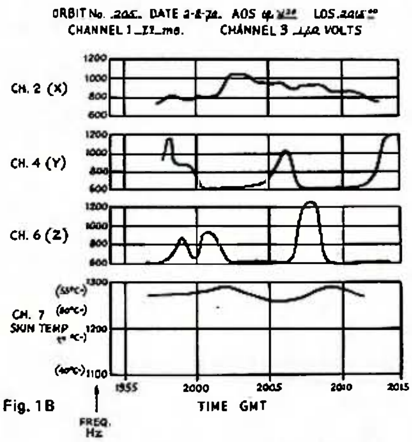


Fig. 1B

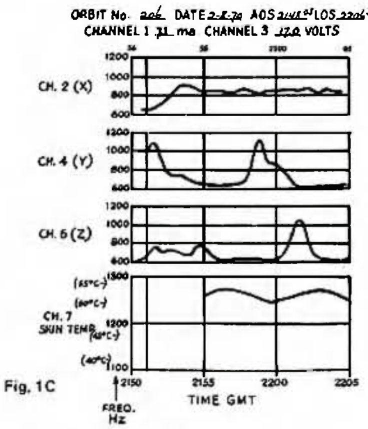


Fig. 1C

MAGNETIC ATTITUDE STABILISATION SYSTEM AND HORIZON SENSORS

One of the best operating systems on board the satellite was not electronic in nature. The Magnetic Attitude Stabilisation System (MASS) functioned more efficiently than some of us had anticipated. Early reports indicated that antenna nulls were occurring on the 144.05 MHz. signal once every 15 seconds, making telemetry decoding very difficult. By orbit 100, signal fades had reduced to one or two per station pass (approximately 20 minutes in duration). To the Amateur using the spacecraft this is a significant improvement over past satellites in the Oscar series and should prove to be a valuable tool in future Amateur spacecraft to achieve the continuous reception of a down-link signal.

The three orthogonal earth or horizon sensors used in the spacecraft were 2N2452 photo-transistors operated in a diode mode, having a spectral response between 5,000 and 10,500 A.[3] Each sensor's field of view had been stopped to 5 degrees by a small columation tube. A photometric calibration of these sensors was, unfortunately, not undertaken due to the shortage of time in the test schedule. While the original design of this part of the telemetry system was to give an on-off indication when looking toward or away from the bright earth, the devices were found to be more sensitive and capable of detecting the decreasing brightness of the earth's atmosphere as the sensors viewed the earth-to-space transition.

When viewing the bright earth the telemetry output indication was approximately 1450 Hz. and during the transition the telemetry frequency gradually decreased to a dark condition of 600 Hz.

Amateurs using a fast discriminator to decode the modulation observed, during periods of good signal strength, small variations in the frequencies of the telemetry tones as the sensors swept across the earth's disc. These were attributed to cloud formations.

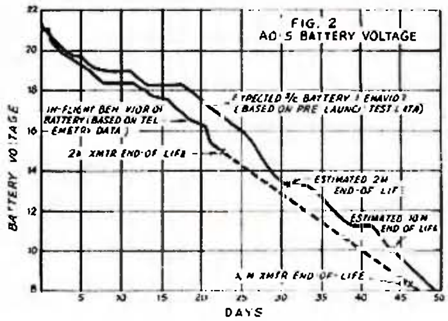


Fig. 2.

* Reprinted from "QST," December 1970.

Two examples of this data are shown in Fig. 3.

With a discriminator of this type, the Goddard Amateur Radio Club, WA-3NAN, decoded telemetry information for all the passes received.[4] Fig. 4 shows horizon sensor information for various passes. Each frame shows the maximum rate of change of brightness observed on any of the sensors during a given pass. During orbit 4 the maximum observed rate of frequency change was found to be 700 Hz. per second, while pass 192 exhibits a maximum rate of change of only 10 Hz. per second. This is indicative of the reduced spin rate of the satellite.

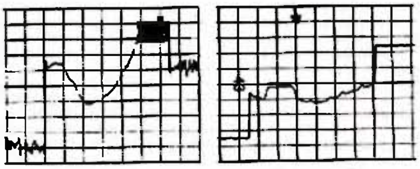


Fig. 3.—Two examples of variations in the plus-Y sensor output due to variations in the earth's brightness. Note the sudden increase and decrease in intensity during the frame from pass 54. This is thought to be due to the sensor sweeping across a bright cloud region. Time divisions are 1 sec.

During daytime ascending nodes, after the spacecraft had stabilised, a regular sensor pattern was observed. W5CAY demonstrated this data most effectively (see again Fig. 1). The X-axis shows no true periodic nature, but rather a gradual transition followed by small variations about an average "light" condition. The Y and Z sensors show a periodic behaviour characteristic of the satellite's roll rate about the stabilised X-axis. The skin temperature shows a cyclic variation as the +Y face rotated in and out of the spacecraft's own shadow. Of particular significance is to observe that the Z sensor always lags behind the Y sensor (approximately two minutes) in detecting the earth. With the +X-axis pointing north as the satellite crossed the equator, the spacecraft spin was thus clockwise as observed from the north pole of the earth.

The maxima in the external temperature curve were (within experimental error) out of phase with the +Y sensor. Since the T_{EXT} thermistor was located on the +Y face, then the temperature was a minimum during times when the +Y face was viewing the earth. This is, in fact, the time when the +Y face should have been in shadow.

As the spacecraft travelled north from the equator the +X-axis should have begun to dip toward the earth as the strong dipole moment of the satellite (11,800 pole-cm) followed the local geomagnetic field vector which caused it to rotate twice per orbit (see Fig. 5).[5] W5CAY's data showed that the +X-axis sensor did begin to gradually come on shortly after his signal acquisition time over a period of several minutes. This is precisely what one would have predicted as the +X sensor looked deeper into the earth's atmosphere which reflected more and more scattered light into the sensor.

Region	Stations Reporting Useful Data	Stations Reporting Telemetry >50% of Passes	Stations Reporting Telemetry <50% of Passes
1	66	52%	48%
2	114	32%	68%
3	31	45%	55%

Table 1.

The average roll period observed in this data is 7.5 min. This is thought to be the degree of stabilisation that persisted until the termination of the satellite's active life. The effectiveness of this system is best evaluated in terms of the very large reduction in the signal fading rate due to antenna nulls. This, in turn, implies an overall reduction in the loss of spacecraft data. For a satellite in the Amateur Radio Service it is apparent that this method of stabilisation is most effective and very easily implemented.

THE AO-5 COMMAND SYSTEM

A telecommand link on two metres was utilised to turn on and off the ten metre beacon transmitter in an effort to conserve the spacecraft's power supply. An a.m. tone modulation technique was employed. The ten metre beacon which consumed 0.6w. of power, was to be commanded on during weekends when a maximum number of users was anticipated.

Prior to launch, considerable difficulty was encountered with the spacecraft command receiver due to in-band interference from the 144.05 MHz. beacon transmitter. It was only possible to eliminate the interference by adding a steep skirted bandpass filter centered at the command frequency. This filter gave 50 dB. of rejection at the beacon frequency, but unfortunately had a relatively high insertion loss when placed in front of the receiver. The result was that the command receiver required a signal of —76 dBm. (35.4 μV.) under ambient (room) conditions to decode a command. This, to be sure, was considered marginal performance.

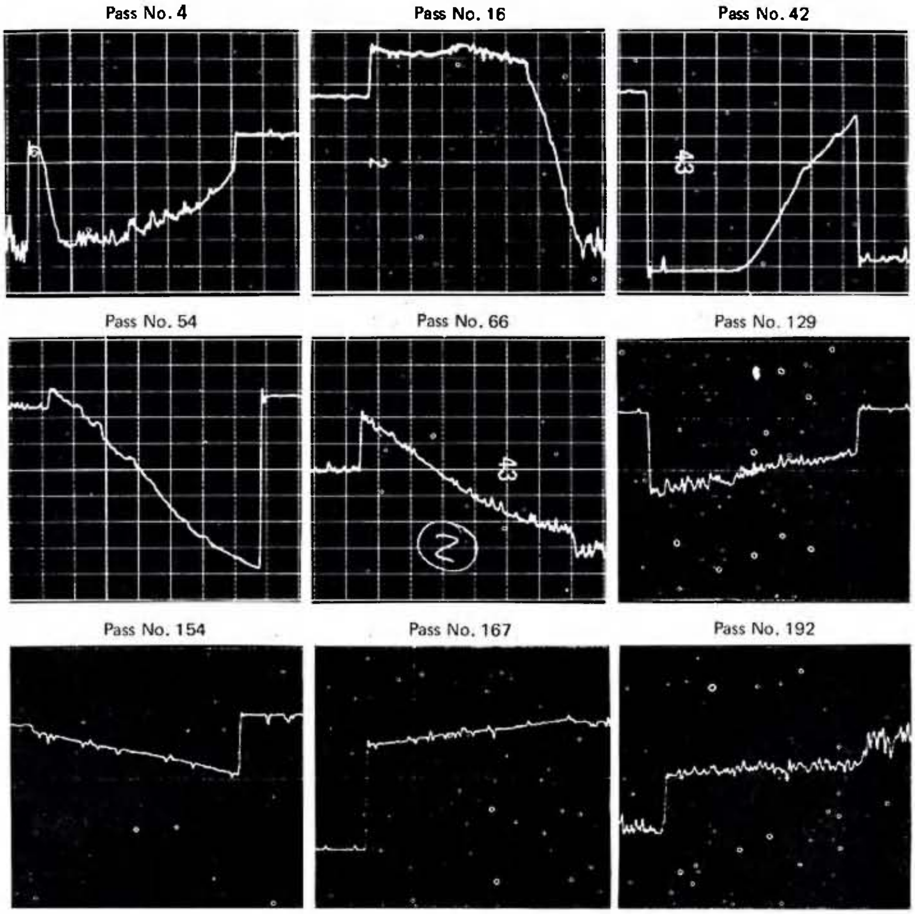


Fig. 4 —The maximum rate of change of the horizon sensors during limb transition for various passes of AO-5. The date shows a despin factor of 70 in only 15 days. This is a particularly graphic demonstration of the effectiveness of the stabilisation system. Time divisions are 1 sec.

The problem was further complicated by a detuning of the second i.f. stage that occurred during tests under vacuum conditions. This problem could not be traced to a single component in a timely fashion so it was decided to peak the receiver for maximum sensitivity under vacuum conditions. When the receiver was again tested under vacuum conditions the sensitivity was observed to be 10 dB. better. Thus, it was expected that the in-flight sensitivity would improve some 10 dB. over its ambient condition, giving a final sensitivity figure required to operate the decoder of —86 dBm. The spacecraft was launched with the receiver in this condition.

Fig. 6 shows a plot of the spacecraft total current during the entire lifetime of the two metre beacon, when telemetry data could be obtained.[6] From this data it is clear when commanding occurred and the status of the ten metre beacon during the lifetime of the satellite.

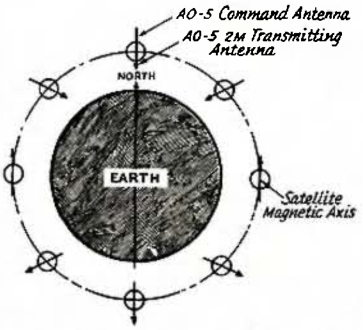


Fig. 5.—Motion of a magnetically oriented satellite in a polar orbit.

Table 3 lists the command transmitter schedule, indicating the successfully transmitted commands and the effective radiated power used to execute the command. Although early command attempts were unsuccessful, after orbit 72 it became increasingly less difficult to achieve a successful command and it became possible to maintain the week-end-only operation schedule for the ten metre beacon as originally planned. It is felt that the increased overall sensitivity of the command system was due to a combination of factors:

(a) Spacecraft command antenna orientation favourability (particularly over Australia, due to the effectiveness of the magnetic attitude stabilisation system).

(b) Reduction of the interfering signal level (144.05 MHz.) as the battery voltage (and hence the power of the beacon) decreased.

(c) Stabilisation of the command receiver temperature and pressure which improved the sensitivity of the receiver.

The effectiveness of the command system, particularly despite the receiver problems, is of particular significance to future Amateur space experiments. It not only demonstrated, for the first time in an Amateur satellite, the effectiveness of ground command as a means of switching various experiments on and off, but of greater significance, it represents an effective means of controlling Amateur spacecraft emissions so as to prevent interference to other services who may share the Amateur bands. This should help assure the continuing usage of Amateur space experiments without the need for power flux limitations imposed on the satellite down-link signal.

SPACECRAFT LIFETIME

As previously indicated, the failure of the ten metre modulator is considered responsible for the increased battery current drain of 18 mA. This additional current drain shortened the lifetime of the satelllite. The two metre beacon could be received through approximately orbit 280 on the 23rd day after launch. The ten metre beacon was turned on by command on orbit 261 and was left on continuously until it reached end of life around orbit 560 on the 46th day after launch. The difference in beacon lifetimes is due to the variation in cut-off voltage for the transmitters. The two metre transmitter power output went to zero very rapidly at a supply voltage of 15v., while a significant output could be obtained from the ten metre transmitter even at voltages as low as ten volts. While the spacecraft lifetime on two metres was shorter than the design lifetime of thirty days, a significant quantity of telemetry data was obtained never the less.

THE NATURE AND RELIABILITY OF AMATEUR REPORTS

An additional feature of the AO-5 experiment was the opportunity to evaluate the performance of Amateurs in reporting scientific-type data. After allowing several months to be certain that all late reports had been received, an effort was made to determine what type of information Amateurs were most interested in reporting and approximately how much variation in measurement occurred from station to station.

It was decided to report on the results by I.T.U. regions since different satellite passes were common to these regions, i.e. Region 1 (Europe and Africa) could generally not hear the same passes as Region 2 (North and South America) and so forth. Table 1 lists the number of useful reports received from each region and those which did and did not contain telemetry information. We may infer that stations not reporting telemetry results were primarily interested in other aspects of the experiment or in phenomena such as Doppler measurement. (Only the telemetry results are covered in this report since they were the primary indicator of the spacecraft performance. Another report prepared by Raphael Soifer, K2QBW, gives a detailed presentation of the ionospheric propagation results of AO-5.[8])

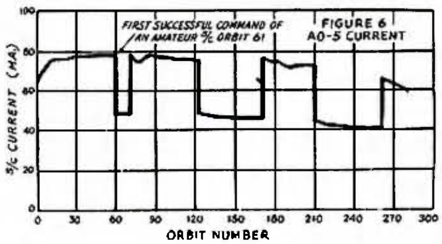


Fig. 6.

Call Sign	Channel 1 I(mA)	Channel 3 V(volts)	Channel 5 Tint (C°)	Channel 7 Text (C°)
Region I Pass 51				
G2AOX	72	19.4	38	49
F2DC	80	20	43	55
HB9WB	73	19.6	43.5	47
Δ Values	8	0.6	5.5	8.0
Max.% Error from median	5.3%	1.5%	6.8%	7.9%
Insufficient data from Region I. Telemetry reports have not yet been received.				
Region II Pass 17				
WA1IOX	78	20.2	44.5	51
K2SS	78	20.1	45	54
WA3NAN	78	19.8	45	54
WØLER	77	20.5	45	52
W5CAY	77	20	44	53
W3GEX	78	20	–	52
W3QYG	74	20	–	51
K4CG	76	20.4	45	53
WA7GCS	76	20	43	47
W2GAX	76	20	46	53
W1AIM	70	20	40	45
K1OYB	76	20	44	52
K3AKR	–	20	–	51
K1HTV	79	20	46	49
W1JSM	82	20	49	60
Δ Values	12	0.7	9	11
Max% Error from median	7.9%	1.7%	9.9%	10%
Region III Pass 21				
VK3ATN	78	20	43	49
ZL1WB	80	20	45	48
VK3AVF	70	20	42	46
ZL3TAU	76	20	42	47
VK8KK	79	20	43	45
ZL2TAR	75	20	41	45
VK7PF	78	20	42	48
VK4ZT	78	20	43	48
Δ Values	10	0	4	4
Max.% Error from median	6.7%	0%	4.7%	4.3%

Table 2.

Table 1 indicates that, on a percentage basis, Region 1 and Region 3 participated more actively in the telemetry decoding activities. This is somewhat surprising, since it was anticipated that U.S. Amateurs would be suitably equipped to make telemetry measurements.

It was of interest to determine the variation in measured values from as many stations as possible during a single pass. Variation in spacecraft parameters for a short period when the satellite passed over a given region, was thought to be quite small (except for skin temperature variation) during daylight passes. The variation in data from reporting stations, then, can be primarily considered as individual station measurement error. In each region a particular pass was chosen for which a maximum number of reports was received.

Table 2 shows data for each station reporting and the range in data as well as the maximum percent. of error from the median value. The error observed for the spacecraft battery voltage shows the lowest error due to the relatively "flat" nature of the voltage-to-frequency conversion curve and the fact that most of those reporting rounded off the reported measurement (as called for by the telemetry reporting form). Certain stations (those underlined) were used as control stations for each region since they were known to have better than average decoding equipment.

All regions show comparable data error. The magnitude of the error (less than 10% max.) was approximately the error estimated prior to the launch. This data does not utilise more powerful statistical methods that could be used to more accurately evaluate the data (i.e. a uniform probability density was assumed for all data). The maximum error figure of 10% does indicate that Amateurs throughout the world are capable of making significant data measurements with considerable accuracy.

SUMMARY

With the exception of a failure in the modulator of the ten metre beacon transmitter, all Australis-Oscar 5 mission objectives were met:

(a) The spacecraft was effectively stabilised to two revolutions per orbit (geometric alignment) within the lifetime of the satellite.

(b) Reliable Amateur spacecraft telecommand was demonstrated.

(c) The effectiveness of the seven channel telemetry system was verified. Amateur data generally showed less than ±10% variation from median values.

(d) Significant results were obtained on propagation effects over the satellite-to-earth link in the ten metre band.[7]

(e) Partial success was obtained in achieving the design lifetime of several weeks for both spacecraft transmitters using only chemical batteries.

While the response to AO-5 was gratifying (many stations reported it to be the most interesting Amateur space activity to date) it does not compare with the level of excitement that was generated by the repeater satellites such as Oscar III. AMSAT is presently planning a next generation of Oscars. These satellites will carry two repeaters and an r.t.t.y. telemetry system capable of measuring as many as 60 parameters. The design lifetime of these satellites will be one year, using a solar cell power source. Whether you are interested in r.t.t.y., f.m., a.m., s.s.b., DX traffic handling, or even contesting there are activities and special experiments being planned for you with Oscar 6. If you are interested in finding out how you can contribute to this new and exciting chapter in Amateur Radio write: AMSAT, P.O. Box 27, Washington, D.C., 20044, U.S.A.

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2. Data taken from Australis-Oscar 5 (A Summary Report) submitted to AMSAT by John Fox, W0LER.
3. Data taken from Fairchild Semiconductor Specification information on the 2N986/2N2452 NPN Planar Phototransistor, 5/62.
4. Information taken from preliminary data reduced at the Goddard Space Flight Centre, NASA, by the Goddard Amateur Radio Club, 4/70.
5. Fischell, Robert E., "Magnetic and Gravity Attitude Stabilisation of Earth Satellites," Report CM-996, John Hopkins Univ. Applied Physics Labs., May 1961, p. 38.
6. Op. Cit., John Fox, W0LER.
7. Soifer, Raphael, "Ionospheric Propagation from Australis-Oscar 5" (A Survey Report to the Radio Amateur Satellite Corporation), "QST," October 1970, p. 54.
8. Op. Cit., Soifer.

Command Number	Station E.R.P.	Station Commanding	Date	Orbit Number	Purpose of the Command (Other Comments)
1	10 KW.	WA1IOX (U.S.A.)	1/28	61	10M Beacon off (first command of Amateur S/C)
2	20 KW.	VK3ZBJ (Aust.)	1/29	72	10M Beacon on
3	10 KW.	VK3ZBJ (Aust.)	1/31	97	Command Receiver Freq. Check (Beacon off, on; off, on)
4	20 KW.	VK3ZBJ (Aust.)	2/2	123	10M Beacon off (routine)
5	10 KW.	VK3ZBJ (Aust.)	2/6	172	10M Beacon on (routine)
6	10 KW.	VK3ZBJ (Aust.)	2/9	210	10M Beacon off (routine)
6	20 KW.	VK3ZBJ (Aust.)	2/13	260	10M Beacon on (last command during S/C lifetime)

Table 3.

☆

"CQ" W.W. W.P.X. S.S.B. CONTEST, 1971

PRECIS OF RULES

Date: 27th/28th March.

Time: Start 0000GMT Saturday, finsh 2400 GMT Sunday. Only 30 hours out of the 48 hours are permitted for single operator working. The 18 hours of rest may be taken in up to five periods during the contest and such periods must be logged.

Bands: 1.8 to 28 MHz.

Mode: Two-way s.s.b. only.

Exchange: RS report plus three digit contact number commencing with 001.

Scoring: QSO Points—

	1.8 to 7 MHz. inc.	14 to 28 MHz. inc.
Between stations on different continents	6	3
Between stations in the same continent but in different countries	2	1

QSO between stations in the same continent and in the same country are permitted for multiplier purposes only.

Multiplier: Determined by the number of different prefixes worked. A prefix is considered to be the two or three letter/number combination which forms the first part of an Amateur call, e.g. W1, K1, WA1, 4X4, 4Z4. Each prefix may be counted only once during the test.

Total: Single operator, single band—QSO points multiplied by the number of different prefixes worked: single operator, all band—total QSO points from all bands multiplied by total number of different prefixes worked. N.B.—A station may be worked once on each band for QSO point credit. However, prefix credit can be taken only once regardless of the band.

Awards: In each category for each call area of Australia. To be eligible for a single band award the log must contain a minimum of 12 hours of operation.

Log entry: Logs to be postmarked no later than 1st May, 1971, and addressed to "CQ" W.P.X. S.S.B. Contest Committee, 14 Vanderventer Ave., Port Washington, Long Island, N.Y., U.S.A., 11050.

Note: Complete rules are published in recent issues of "CQ" magazine.

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PROVISIONAL SUNSPOT NUMBERS

DECEMBER 1970

Dependent on observations at Zurich Observatory and its stations in Locarno and Arosa.

Day	R	Day	R
1	88	16	65
2	69	17	60
3	75	18	70
4	65	19	88
5	85	20	101
6	79	21	93
7	88	22	90
8	97	23	76
9	87	24	63
10	95	25	68
11	101	26	61
12	95	27	50
13	71	28	47
14	82	29	50
15	81	30	71
		31	65

Mean equals 76.6.

Smoothed Mean for June 1970: 105.1.

Predictions of the Smoothed Monthly Sunspot Numbers

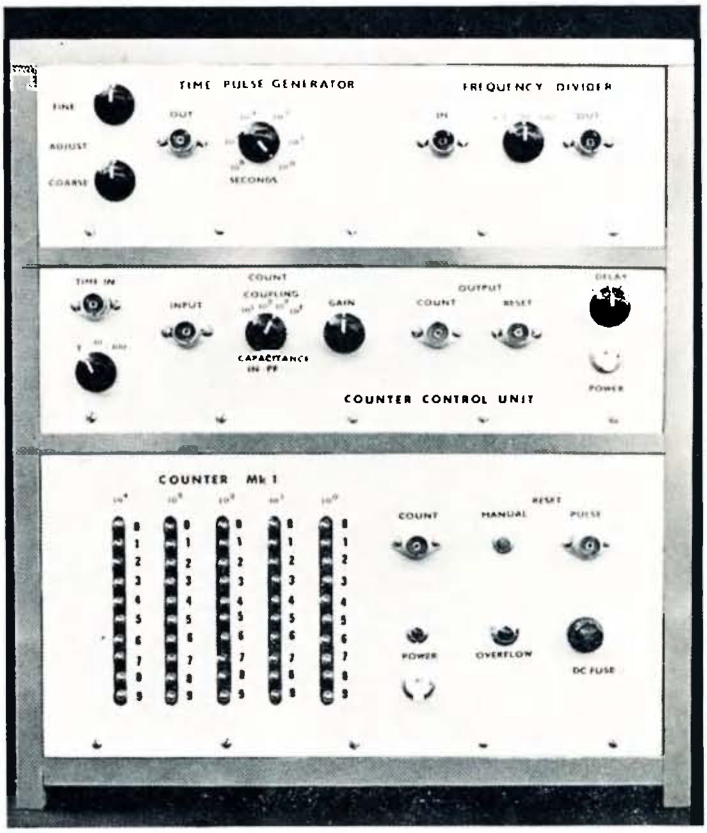
January	85	April	79
February	83	May	77
March	81	June	75

—Swiss Federal Observatory, Zurich.

COUNTER USED FOR FREQUENCY MEASUREMENT

PART TWO—
GATING, DISPLAY TIME, RESET

ROBERT H. BLACK, M.D., VK2QZ*



Completed Frequency Meter. The second regulated power supply is contained in the "Counter Control Unit".

The previous article in this series introduced the element of time as a first step towards measurement of frequency. I'm not sure what time is, especially these days, since the International Committee of Weights and Measures have been playing around with it (see Sheldon and Evans, 1965). However, for our purposes, something related to WWV or VNG was sufficient.

We are concerned with counting pulses over a standard interval of time and displaying the count for sufficient time for it to be read. The counter is reset to zero after each count and the process can be repeated over and over. The display will be apparently continuous if the time intervals are short enough (1/100th second), but shortening the counting time results in the loss of significant digits.

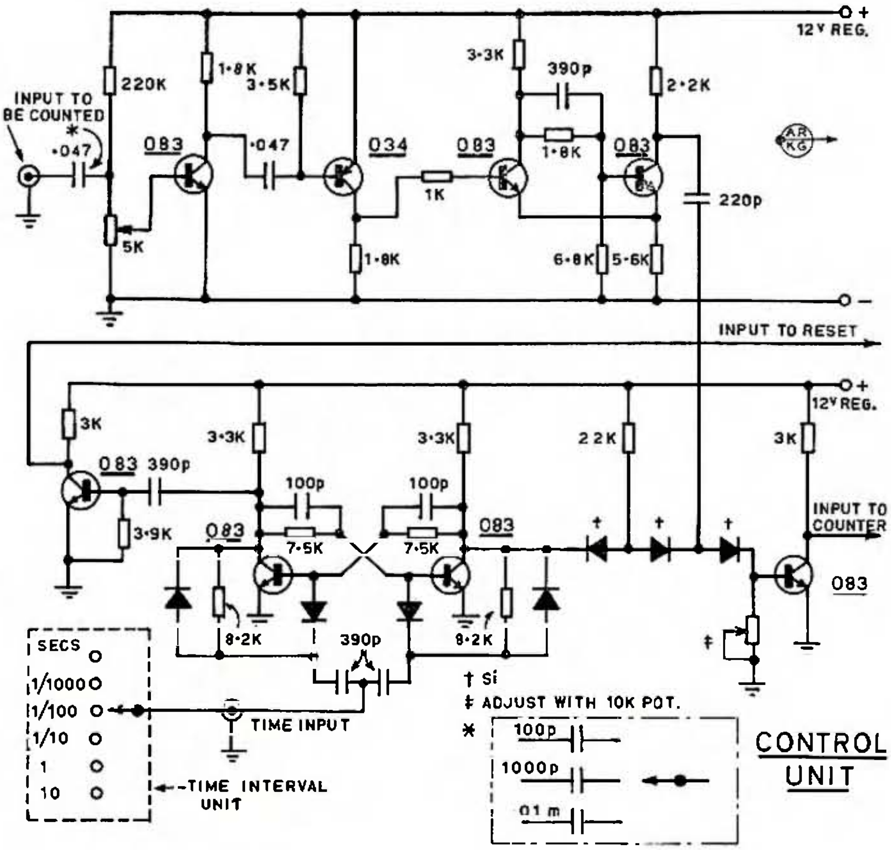
The circuit diagram shows a control unit which, in effect, produces batches of pulses for counting which are separated by time intervals for visual display followed by appropriate reset pulses. The unit also allows some amplification of the input signal which is converted to a series of positive pulses by means of a Schmitt trigger. The input amplifier could readily be elaborated and some overload protection provided. However, it is sufficient for present needs.

The gated amplifier is alternatively opened and closed by the time-pulse operated bistable. The best operating condition is found by adjusting the bias with a potentiometer which is later replaced by an appropriate fixed resistor. The input to the gate from the Schmitt trigger is a little weird and, no doubt, a more orthodox arrangement could be made to work. Note that the diodes in the gate circuit are silicon diodes—these can be differentiated from germanium diodes because they require a slightly higher voltage before they start to conduct.

Equal count and display times are obtained when the reset pulse is taken directly from the time-pulse operated bistable. The version shown in the photograph includes an additional monostable in the reset circuit which sets the counter to zero an appreciable time before counting of the next batch begins. No real advantage was derived when this was included.

The time pulses are derived from the unit already described. Two binary counters, arranged as decade dividers, are actually included in the Control

(Continued on Page 15)



* 2 Yerton Avenue, Hunter's Hill, N.S.W., 2110.

SOLID STATE CONVERSION OF THE G.D.O.*

Circuits for modernising your Grid-Dip Osc. to obtain greater flexibility and sensitivity

PETER A. LOVELOCK, W6AJZ

The grid-dip oscillator is one of the most useful items of test equipment to have around the Amateur station. The main short-coming of most tube-type g.d.o's is their requirement for a.c. power. This is no problem at the work-bench, but it is a definite limitation for portable or mobile work. Anyone who has used a g.d.o. to tune an antenna knows what a chore it can be to run an a.c. power extension line up a tower —not to mention the safety hazard.

Today's catalogues offer a selection of solid state "dippers" in an attractive price range. They have the advantage of being usable anywhere. If you already have an older g.d.o., you may have considered trading it in for one of the contemporary models, or maybe even building a solid state unit from scratch.

A simpler and much cheaper solution is to convert your tube g.d.o. to a solid state circuit. If you are reluctant about tearing into a commercially built unit or kit—don't be. The conversion task is simple, painless, and can be done in an evening. The result will give you the performance and flexibility of the latest models at a fraction of the cost.

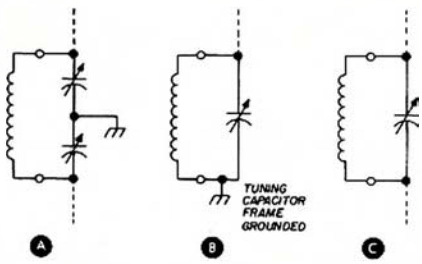


Fig. 1.—Typical tuned circuits used in g.d.o's. Split-stator tank is shown in A; parallel grounded and parallel ungrounded versions in B and C.

THE TUNED CIRCUIT

Before you reach for the soldering iron, inspect your tube-type g.d.o's schematic. The tuned circuit will influence your decision on the solid state circuit to use. You'll want to keep the tuned circuit intact as well as the dial calibration. Thus, you won't have to change your plug-in coils.

The g.d.o. is nothing more than a simple oscillator. In tube types, the rectified grid current is measured on a meter to indicate a "dip" when power is absorbed from a nearby resonant circuit. Solid state devices don't have grids, or course, so an indication on a solid state g.d.o's meter is obtained from the oscillator's rectified output. The basic operating principle is the same in both circuits.

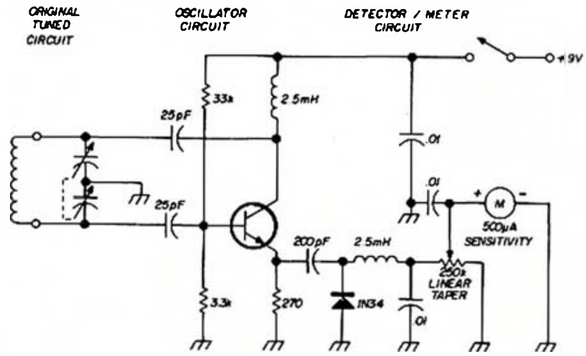
Common tuned tank circuits used in commercially built g.d.o's are shown in Fig. 1. Your schematic will show if your unit has a split-capacitor, parallel-grounded, or parallel-ungrounded tank. This will determine the type of solid state circuit you can use.

For the solid state device, you have a choice of a bipolar transistor, FET, unijunction transistor, or tunnel diode. All give good performance with minor variations. For simplicity, only the first two are considered. However, if you have a favourite unijunction diode circuit you might try it. Your final decision will probably be based on what's on hand.

Advantages over the circuit in Fig. 2 are fewer components and greater sensitivity in obtaining a dip. This circuit requires a higher voltage supply, however. I used two 9-volt transistor batteries in series to obtain full-scale meter deflection over the instrument's range.

Since it is impractical to illustrate all the applicable circuits for g.d.o. conversion, I've included a list of articles in the references that should contain circuits you can use.

Fig. 2.—Solid state g.d.o. with split-stator tank. A PNP transistor could also be used by reversing battery polarity.



NPN OR PNP CIRCUIT

An NPN transistor circuit I used in converting a Heath model GD-1B, which has a split-stator tank, is shown in Fig. 2. This circuit worked well with many transistors, including the 2N2926 and 2N706, up to 200 MHz.

A PNP transistor may be used in the same circuit if you reverse the battery polarity. In both cases oscillator output was more stable than in the original tube circuit. Less frequent adjustment of the sensitivity control was required during measurements.

COMMON-BASE CIRCUIT

If your tube g.d.o. has an ungrounded parallel tank, the common-base circuit shown on page 442 of the R.C.A. Transistor Manual, Series SC-12 (reproduced in Fig. 3) is suitable.

FET OSCILLATOR

The circuit I finally used to convert my Heath GD-1B is shown in Fig. 4.

CONSTRUCTION

After you have selected a suitable circuit, you are ready to start construction. Remove all the original oscillator and power supply components (if any) and their wiring. Don't remove the tuning capacitor, coil socket, meter or sensitivity control. Take care not to disturb the wiring between the tuning capacitor and coil socket.

The logical spot for the transistor is that vacated by the tube. You can mount a transistor socket on an adaptor plate placed over the tube socket hole. If you don't like transistor sockets, cut and drill a small piece of perforated board and mount it over the tube socket hole. Flea clips inserted in the board will allow permanent soldering of the transistor—but don't do this until all other components are mounted.

After assembling and wiring the components, temporarily attach the transistor leads to the flea clips with-

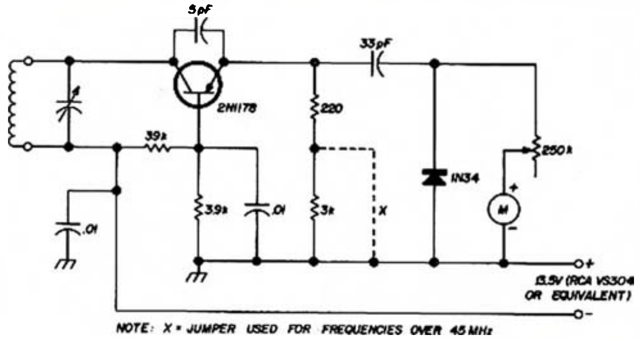


Fig. 3—Common-base g.d.o. circuit reproduced from R.C.A. Transistor Manual.

* Reprinted from "Ham Radio," June 1970.

out soldering. This allows preliminary checkout.

Component leads must be kept short, particularly those connected directly to the transistor and the tuned circuit.

Small-value capacitors should be high grade silver mica. Bypass capacitors should be ceramic, **not** paper, to avoid stray resonances in the oscillator. All resistors are composition type, ¼ or ½ watt.

The battery may be mounted in the space previously occupied by the power supply, using an appropriate bracket for the type of battery suited to your voltage and space requirements. Be sure to wire the battery connector with the **correct** polarity for NPN or PNP transistors.

In the circuits shown in Figs. 2 and 4 the sensitivity control is a 250K, linear-taper potentiometer. If your g.d.o. uses a lower value, I suggest replacing it with a 250K potentiometer and an s.p.s.t. switch to control the battery power.

CALIBRATION

Finally, check the dial calibration by beating the oscillator against a good communications receiver. Calibration may be a bit off if stray capacitances of the new circuit vary from the original. While most dippers are only approximately calibrated, you will want to maintain reasonably accurate calibration. Loosening the dial-locking screw and re-adjusting its position relative to the tuning capacitor will take care of most cases. However, if the calibration error exceeds this method of correction, or if the error occurs only on certain coils, the following tips will help.

Sliding a one-half inch strip of aluminium foil over two or three turns of the coil will lower its frequency. Conversely, a single shorted turn of wire placed around the form will increase the coil's frequency as you slide it toward the coil. Fig. 5 illustrates these methods. After calibration has been adjusted, the shorted turn or foil strip may be permanently cemented in place.

REFERENCES

1. L. G. McCoy, W1ICP, "A Field Effect Transistor Dipper," "QST," Feb. 1968.
2. Calvin Sondergoth, W9ZTK, "Transistor Oscillators," "73" March 1969.
3. J. R. Fisk, W1DTY, "Designing Transistor Oscillators," "73," August 1969.
4. "Transistor Oscillators," The Radio Amateur's Handbook, A.R.R.L. Staff, 1968, chapter 4, p. 87.
5. Rufus P. Turner, "How to Use Grid-Dip Oscillators," John F. Rider, Inc., New York, N.Y., 1960.

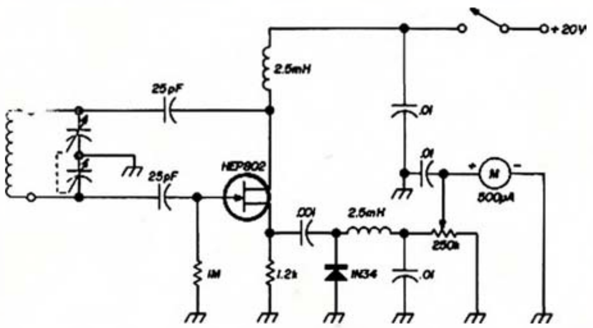


Fig. 4.—Grid-dip oscillator using an FET. This circuit provides greater sensitivity with less coupling because of FET's high input impedance.

CHECKOUT

After wiring and carefully checking the circuit, install the battery and transistor. Plug in a coil, apply power, and turn up the sensitivity control. If you don't get a meter reading, the circuit isn't oscillating or you forgot to use a heat sink when soldering the diode rectifier.

Assuming you obtain a reading, increase the control for full-scale meter indication and tune the capacitor from minimum to maximum to check for full-scale readings over the entire range. Repeat this for each coil. If any false dips are noted without the coil coupled to another circuit, you have a "built-in" resonance. Most likely this will occur on the higher frequency coils (40 to 200 MHz.) if lead lengths are too long or if non-resonant bypass capacitors were used.

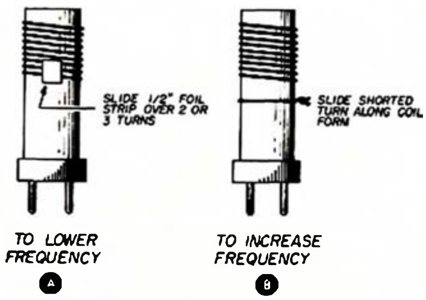


Fig. 5.—Methods for adjusting g.d.o. coils for calibration correction.

TECHNICAL ARTICLES

Readers are requested to submit articles for publication in "A.R.," in particular constructional articles, photographs of stations and gear, together with articles suitable for beginners, are required.

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COUNTER USED FOR FREQUENCY MEASUREMENT

(Continued from Page 13)

Unit to allow counting for 1 second and 10 second intervals. The longer time interval is necessary to count the last column (cycles) when the frequency is 1 MHz. (as the input is divided by ten).

WHAT DOES IT DO?

Well, what does the thing do? It counts the 10 cycles per second output of my unijunction sweep generator. It counts the output from a small transistor oscillator using a 1 MHz. crystal. While counting for 1 second at this frequency the overflow indicator comes on but it is easy to see how many times the 10^4 decade has counted. If you count for 1/10 second you lose a decade, of course, but the blinking display allows rapid calibration of an audio oscillator—you'll never go back to Lissajous figures. The last figure displayed will, of course, vary so that a frequency of 1 MHz. may be displayed as (1)000 00(0) or (1) 00 001(0)—this is the nature of the beast.

COMMENTS

Some comments are necessary. The input as shown is not protected (I don't seem to use valves any more) and resetting 9×10^4 activates the overflow indicator. The amplifier in the Control Unit will act as a receiver if you put an aerial onto the input—put your finger on it and measure your frequency! It will also count 100/second if you feed it with insufficiently filtered d.c. It may be necessary, on occasion, to pay some attention to the input impedance of this amplifier.

It may be appropriate to point out that this was a project for the long winter evenings. Indoor summer temperatures in Sydney occasionally rise to a level at which transistor devices misbehave if there is no temperature compensation.

The three sub-units are mounted in a cabinet as illustrated in the photograph. The second 12 volt regulated supply is identical to the first and is included in the Control Unit.

Thanks are due to Mr. D. Cato for panel decoration of the Counter Unit and Dr. Bruce McMillan for the photographs.

REFERENCES

Sheldon, J. H., and Evans, J., 1965. Frequency and time standards; Application Note 52, Palo Alto, Calif.; Hewlett-Packard.

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POWER IN A.C. CIRCUITS

LECTURE No. 8A

C. A. CULLINAN, VK3AXU*

Lectures 5, 6, 7 and 8 have dealt with some aspects of alternating current and this lecture proposes to carry these further and deal with the power in a.c. circuits.

In Lecture No. 6 we described briefly a perfect a.c. generator and stated that if a purely resistive load was connected to it, then all the power flowing in the resistor would be used. This is because the resistor has unity power factor and no power is returned from the resistor to the generator as all the power in the resistor is converted into heat.

In an alternating current circuit containing only pure resistance the current and voltage are in phase. That is, the voltage and current pass through corresponding parts of their cycle at the same instant.

For instance, if the generator voltage equation is

$$e = E_M \sin \omega t$$
$$= 311 \sin 377\ t$$

then the current through the circuit is

$$i = I_M \sin (\omega t + \theta)$$
$$= I_M \sin (\omega t + 0°)$$
$$= 5.66 \sin 377\ t\ \text{a.}$$

where $_M$ means maximum.

The voltage and current may differ widely in their amplitudes, the frequency factors are equal and the phase angle between current and voltage is 0°.

It should be obvious that Ohms Law says nothing about maximum, average or effective values of current or voltage. Any of these values may be used, i.e. maximum current may be used to find maximum voltage, but maximum current is not used to find, say, the effective voltage unless the proper conversion constant is introduced into the equation.

It is the usual practice to consider all a.c. voltages and currents as "effective" values unless stated otherwise. The term r.m.s is frequently used in place of "effective".

In a direct current circuit the power is equal to the product of the voltage and current, that is

$$\text{Power} = \text{Volts} \times \text{Amperes}$$

This is true, also, for alternating currents for **instantaneous values** of voltage and current, i.e. the **instantaneous** power is

$$p = e\ i.$$

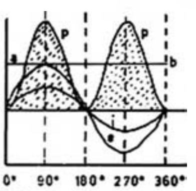


FIG 1

Guidance notes:
e is the voltage curve
i is the current curve
p is the power curve.

* 6 Adrian Street, Colac, Vic., 3250.

● Continuing the series of lectures by C. A. Cullinan, VK3AXU, at Broadcast Station 3CS for students studying for a P.M.G. Radio Operator's Certificate.

When a sine wave of voltage is impressed across a resistance, the relationships of voltage (e), current (i) and power (p) are shown in Fig. 1. For clarity the amplitudes of the voltage and current are different.

The voltage which exists across the resistance is in phase with the current flowing in the resistance. An examination of Fig. 1 shows that at the start of the cycle, both voltage and current commence at 0° and each reaches its maximum at 90°. Both fall to zero at 180°, then rise to maximum in the opposite direction at 270°, then again fall to zero at 360°.

In this case there is no phase difference between the voltage and current and this is the condition for unity power factor, i.e. p.f. = 1.0.

The power delivered to the resistance at any instant is represented by the height of the power curve. This is the product of the **instantaneous** values of voltage and current at that instant.

The shaded areas under the power curve (p) represents the total power delivered to the circuit during one complete cycle of voltage.

It should be noted that the power curve is of sine wave form, having a frequency twice that of the voltage.

Also, it should be noticed that the power curve (p) lies entirely above the X axis, as there are no negative values of power in the proposition under discussion although both the voltage and current are below the X axis for one-half of the cycle.

This may be explained in a simple manner. In Lecture No. 6 reference was made to toaster elements having very little reactance. Now if we connect a toaster, with this type of element, to the a.c. mains it transforms electrical energy into heat. On the positive half-cycle of the a.c. mains (above the X axis) the element gets hot. Now on the other half-cycle (below the X axis) it remains hot; it does not get cold during this half-cycle. For simplicity, we have treated the toaster element as a non-reactive resistor because the reactance is so low. The purist may shudder because there is a little reactance. The artificial aerial described in Lecture No. 6 has a measured resistance of 51 ohms and an inductive reactance of 20 ohms at 1 MHz., so its reactance at 50 Hz. is mighty small.

One other thing will be noticed from Fig. 1, and that is that when the voltage and current both have the same sign (either positive or negative), then the power is positive (above the X axis).

The maximum height of the power curve is the product of the maximum values of voltage and current, thus

$$P_{MAX} = E_{MAX} \times I_{MAX}$$

The **average** power delivered to a purely resistive load is shown by the line a-b in Fig. 1, which is half the maximum height of the power curve. From this we have

$$\text{Average Power} = P = \frac{P_{MAX}}{2}$$

$$\text{and } \frac{P_{MAX}}{2} = \frac{E_{MAX} \times I_{MAX}}{2}$$

$$\therefore P = \frac{E_{MAX}}{\sqrt[2]{2}} \times \frac{I_{MAX}}{\sqrt[2]{2}}$$

$$\therefore P = E \times I$$

Therefore the a.c. power consumed by a resistance load is equal to the product of the effective values of voltage and current, i.e. r.m.s. values.

As in direct current circuits, this power is measured in watts.

REACTIVE LOADS ONLY

Having dealt with power in an a.c. circuit containing only pure resistance, we now turn our attention to an a.c. circuit containing only pure reactance as this will be a logical step towards an a.c. circuit containing both resistance and reactance.

Fig. 2 shows the voltage (e), current (i) and power (p) relationships when a sine wave of voltage is impressed across an inductance which has no resistance. This delightful state of affairs cannot exist in practice, but it is desirable to assume a pure inductance for this part of the lecture.

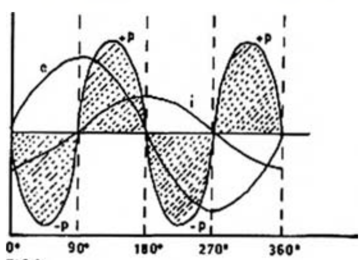


FIG 2.

Guidance notes:
e is voltage,
i is current,
p is power curve,
Power above the axis is plus and below is minus.
The shaded portion is power within the power curve.

It will be seen that the voltage has been drawn so as to start to rise in the positive direction, above the X axis, at 0° and that the current starts to rise positive 90° after the voltage started to rise. This means that the current is lagging behind the voltage by 90°, thus there is a phase displacement between the voltage and the current. Compare this with Fig. 1 where there was no displacement.

Now let us examine Fig. 2 in detail. When current is increasing from zero to maximum positive, during the interval 90° to 180°, power is being taken from the source of electro-motive force (e.m.f.) and is being stored in the magnetic field around the inductance.

As the current through the inductance falls from its maximum positive value at 180° to zero at 270°, the magnetic field is collapsing, thus returning power to the source. This is shown by the shaded portion of the power curve p, below the X axis.

During the excursion of the current from 270° to 360°, although the current is now negative (below the X axis), the power curve is positive (above the X axis).

From 360° to 90° of the next cycle the current drops to zero at 90°, the magnetic field around the coil has been collapsing and power being negative is returned to the source.

Thus we have the situation that positive power is followed by negative power.

The positive power is taken from the power source and the negative power is returned to the source, therefore the circuit does not consume power although power alternately flows from and to the source.

When a source of alternating current is impressed across a pure capacitance power is taken from the source and stored in the capacitance whilst the voltage is rising from zero to maximum in the positive direction, 90° to 180°. As the voltage falls from maximum at 180° to zero at 270°, the capacitance discharges back into the source, but this is negative power. The voltage then becomes negative from 270° to 360° lying below the X axis but the power is again positive, being taken from the source.

At the beginning of the next cycle the voltage starts to fall from 0° to 90° and the power is returned to the source as it is negative power.

The capacitive circuit may be understood by referring to Fig. 2 and transposing e and i. In this case the current leads the voltage by 90°.

An examination of Figs. 1 and 2 show that when the voltage and current are both of the same sign the power is always positive irrespective of whether or not they are positive or negative (above or below the X axis). However, when they are unlike, then the power is negative.

Further examination of Figs. 1 and 2 shows that when the circuit is purely resistive, there is no negative power because the voltage and current, being in phase, have the same sign at all times.

However, when the circuit is purely reactive there is a phase displacement between the voltage and current, at times they are of the same sign and at other times they are of opposite signs, thus there is positive and negative power in the circuit.

In a purely reactive circuit no power is absorbed by the reactance, however power does flow to and from the source.

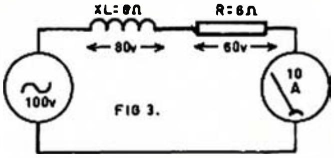
This is known as **reactive** or **apparent** or **wattless** power as it can be determined by voltmeter and ammeter readings and is given by $P = E \times I$ and is measured in **volt-amperes** (VA) or if large in **kilovolt-amperes** (KVA).

RESISTANCE AND INDUCTANCE IN SERIES

So far we have seen that when the load is purely resistive the voltage applied across the resistance and the current flowing through the resistance are in phase, whilst in a circuit where the load is purely reactive the voltage and current are 90° out of phase. The voltage will **lead** or the current **lag** the other when the circuit is inductive and the voltage will **lag** and the current **lead** the other when the circuit contains capacitance only.

However, circuits usually contain both resistance and reactance.

In Fig. 3 is shown a circuit containing resistance and inductance. $R = 6$ ohms and $X_L = 8$ ohms. These values have been chosen for ease in computations.



Using the methods shown in Lecture No. 6, the following results will be obtained:

Current through circuit = 10 amp.
Voltage across resistance = 60v.
Voltage across inductance = 80v.
Phase angle θ between voltage and current = 53.1°

thus the voltage **leads** the current by 53.1°, or the current **lags** behind the voltage by 53.1°.

RESISTANCE AND CAPACITANCE IN SERIES

If a capacitance of 8 farads is substituted for the inductance of Fig. 3, calculations will show that the same answers will be obtained, however in this case the voltage will **lag** the current or the current **leads** the voltage by 53.1°.

RESISTANCE, INDUCTANCE AND CAPACITANCE IN SERIES

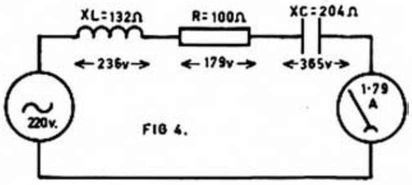
We have shown that inductive reactance causes the current to **lag** behind the voltage and that capacitive reactance causes the current to **lead** the voltage, hence these two reactions are opposite in effect. If the inductive reactance and the capacitive reactance have exactly the same value, then they cancel each other exactly, i.e. taking the two variations for Fig. 3, we have $X_L = 8$ ohms, $X_C = 8$ ohms, and if both are connected in series we have:

$$+ j8 - j8 = 0$$

so the net reactance is zero. This is the condition for series resonance.

At one time in Australia's history there were wide differences in the voltages and frequencies of a.c. power supplied to the public, but nation-wide voltages between 200 and 250 volts at a frequency of 50 cycles per second is becoming standard. Western Australia used 40 c.p.s. for many years.

For Fig. 4 a voltage of 220 has been selected. This figure shows a series circuit containing resistance, inductance and capacitance having different values to those given in the circuit problem of Lecture No. 6 so that the student may gain experience in working out this problem and checking the answers given here.



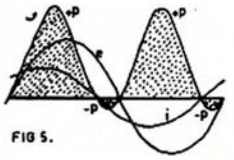
$R = 100$ ohms
$X_L = 132$ ohms
$X_C = 204$ ohms
Impressed voltage = 200 volts
∴ voltage across resistor = 179 volts
voltage across inductance = 236v.
voltage across capacitance = 365v.
current flowing in circuit = 1.79a.

Power factor is 0.8 (to nearest decimal place; 0.812 to three places). The impedance is 123 ohms, and the phase angle is —35.8°, which means that the voltage lags the current by this phase displacement.

The nett reactance of the circuit is:

$$+ j132 \text{ ohms} - j204 \text{ ohms} = - j72 \text{ ohms.}$$

This shows that the nett reactance is capacitive and the circuit resolves itself into a resistance of 100 ohms and a capacitive reactance of 72 ohms in series.



Guidance notes:
Drawn as closely as possible for voltage, current and power for circuit of Fig. 4.
e is voltage curve,
i is current curve,
plus p is positive power,
minus p is negative power.
In this case most of the power is taken by the circuit and only a small amount as shown as the minus p is returned to the source.

Fig. 5 represents the relationship between voltage, current and power for the circuit and values of Fig. 4, and an attempt has been made to draw Fig. 5 to scale.

e is the impressed voltage
i is current flowing in circuit
p is the positive power in circuit
—p is the negative power in circuit
θ is the phase angle.

As has been stated previously, the instantaneous power in the circuit is equal to the product of the impressed voltage and the current through the circuit.

It has been stated, also, that when the voltage and current have the same sign, irrespective of whether they are both positive (above) or negative (below the X axis) they act together and take power from the source. However, when their signs are different, again irrespective of their positions in relation to the X axis, they are operating in opposite directions, the power is negative and is returned to the source.

The **apparent power**, $P_A = EI$, whilst the **true** power, $P = I^2R$ or

$$P = E_R I$$

where E_R is the voltage across the resistance in the circuit.

Apparent power is sometimes called total power, whilst true power is the power which produces work.

The **power factor** is the ratio of the true power to the apparent power.

$$\text{Power Factor (p.f.)} = \frac{\text{P true}}{\text{P apparent}}$$

$$= \frac{P}{P_A}$$

$$\therefore \text{p.f.} = I^2R \div EI$$
$$= IR \div E$$

then because $E = IZ$

$$\text{p.f.} = IR \div IZ$$
$$= R \div Z$$

Thus the power factor of a series circuit may be obtained by dividing the resistance of the circuit by its impedance.

The power factor may be expressed in terms of the angle of lead or lag.

$$R \div Z = \cos\theta$$
$$\therefore \text{power factor} = \cos\theta$$
$$\text{and true power, } P = P_A \cos\theta$$
$$\text{or true power, } P = EI\cos\theta$$

From the data given earlier,

$$P = I^2R = 1.79^2 \times 100$$
$$= 320 \text{ watts (nearest whole number)}$$
$$\text{or } P = E_R I = 179 \times 1.79$$
$$= 320 \text{ watts}$$
$$\text{or } P = EI\cos\theta =$$
$$220 \times 1.79 \times \cos 35.8^\circ =$$
$$320 \text{ watts.}$$

Power factor is usually expressed as a decimal and

$$\cos\theta = \cos 35.8^\circ = 0.812.$$

If expressed as a percentage

$$\text{p.f.} = 100\cos 35.8^\circ = 81.2\%.$$

RATING OF A.C. GENERATORS

Manufacturers of alternating current generators rate their machines as being capable of delivering a certain number of kilovolt-amperes (KVA) and not as being capable of delivering so many kilowatts (KW).

This means that they guarantee that the generator if kept revolving at the correct speed will generate a certain voltage and that it will stand a certain current without overheating.

This is because they cannot guarantee it as being able to generate a specified or certain amount of power under all conditions of use because they do not know the nature of the load that the user will use.

Suppose an a.c. generator was guaranteed to deliver 10 KW at 200 volts and that it was connected by the user to a load having a power factor of 0.7.

Then it would have to supply an apparent power of $10{,}000 \div 0.7 =$ 14,285.7 watts or 14,286 watts to nearest whole figure. So that the true power should be equal to the apparent power,

$$14{,}286 \times \cos\theta \ (0.7).$$

This means that the generator would have to supply a current of $14{,}286 \div 200 = 71$ amps. (to nearest whole number) instead of $10{,}000 \div 200 = 50$ amps.

The additional current that the machine has to produce would cause additional heating and could damage the machine.

From this it can be seen that the rating of a.c. generators is dependent on the amount of heat that the windings can stand.

Thus a.c. generators are rated in kilovolt-amperes which is a direct measure of the heating factors in the windings and a true measure of the capacity of the machine to do work.

Large transformers are rated in the same manner and for the same reasons. Sometimes small transformers are rated in volt-amperes (VA). Some of the transformers detailed in Radio Parts Pty. Ltd. catalogue have their power ratings shown in VA because the manufacturers do not know the types of loads that users will employ, as it is one thing for a manufacturer to specify that a transformer is to be used for a particular purpose, then to ensure that the purchaser will use it for that purpose.

RECAPITULATION

In this lecture we have assumed that the resistances were pure resistances, that is non-reactive. It is fairly easy to make resistances having little if any inductance, and with very little distributed capacitance. However, it is virtually impossible to make an inductance which does not have some resistance and capacitance, also it is impossible to make a capacitor which does not have some resistance, although it may be very small, also the capacitor may have a small amount of inductance, but it was desirable to make the assumptions that were made.

In an a.c. circuit containing only resistance the power factor is unity and in a circuit containing only reactance the power factor is zero.

In a well designed reactance the power factor will approach zero and the current will either lead or lag the voltage by nearly 90°. If the reactance is not well designed, then the power factor will lie between zero and 1.0 and the angle of lead or lag may be far less than 90° and losses in the reactance will be large.

Finally, in Lecture No. 5 there was shown the effective value of an alternating current. The effective value of an alternating current is the equivalent value of a d.c. current which would give the same power dissipation in a resistance R as an alternating current amplitude I. effective.

The power dissipation in the d.c. case is:

$$P = I^2R,$$
$$P = VI, \text{ or } V^2 \div R$$

where P is the power, I is the d.c. current, and V is the d.c. voltage.

The power dissipation in an a.c. case of pure resistance is:

$$P = I^2R,$$
$$P = VI, \text{ or } V^2 \div R$$

where P is the power, I is the effective a.c. current, and V is the effective a.c. voltage. The term root-mean-square (r.m.s.) means the same as effective. The term r.m.s. is derived from the fact that it is the square root of the average (or mean) value of the squares of all the different values the current can take during one complete cycle.

r.m.s. effective and virtual all mean the same thing when dealing with a.c. circuits.

Overseas Magazine Review

Compiled by Syd Clark, VK3ASC
and R. L. Gunther, VK7RG

"THE AUSTRALIAN E.E.B.

October 1970—

Good SCR CD Ignition System, VK1ZVG. A work mate says his "Jag," goes better with one. My Holden is fast enough without! Your choice, friend.

Feedback in Complementary Symmetry Amplifiers, VK7ZDF. Self explanatory.

Third Party Traffic, VK7RG. Seems to me now, and has for years, that the government operated commercial communications system would not be damaged by granting Amateurs the right to communicate for others. Much good could come from such a right because more Amateurs would become trained communicators.

Review copy by courtesy of E.E.B., P.O. Box 177, Sandy Bay, Tas., 7005. One year $A1.05; three years $A2.95, to R. A. Walton, 115 Wilmot St., Huonville, Tas., 7109.

"HAM RADIO MAGAZINE"

September 1970—

Editorial: Jim Fisk continues his series of non-political interesting discussions of new technical developments. This time on microwave acoustics, but "micro" sound waves on piezo-electric resonators. The result is an improved filter, delay line, resonator, or amplifier in the region below 50 MHz.

An Integrated Circuit Balanced Modulator.—The Motorola MC1596G can be used as balanced modulator, a.m. modulator, a.m. detector, product detector, mixer, or frequency doubler. Consists of a dual differential amplifier driven by a standard differential amplifier; a couple of transistors worth of chip provides constant current drive. (Availability in Australia is probably questionable, at least in 1971, but the whole device could be made for about $1 from computer transistors, using the diagram furnished in this article, it could be well worth doing. There is one likely misprint: For the product detector shown, he claims a dynamic range of 80 dB.; the actual figure is more like 30 dB.)

The Mainline ST-5 R.T.T.Y. Demodulator.—Uses two linear ICs to reduce complexity and cost by an order of magnitude, compared to previous designs.

An F.M. Receiver for Two Metres.—The author discovered that by doing a good job at the workbench it was actually possible to get better results than from a commercial unit. MPF102s in the front end, and double conversion, with ICs as i.f., discriminator and a.m. power. A 10.7 MHz. bandpass i.f. and 455 KHz. second i.f. gives adequate gain.

A Multimode Transmitter for Six and Two Metres.—Addition of 829B valve linear amplifiers to previous designs provide higher power output on a.m. or s.s.b., 2 or 6 metres.

R.F. Impedance Bridge.—Unlike the Antenna Noise Bridge (which has its own signal source) this is an ordinary r.f. bridge which takes its signal from the transmitter. Inductive component is analysed by looking at capacitative component, and transliterating by the use of the Smith Chart, which is described briefly; for more comprehensive treatment of the Smith Chart, see the November 1970 issue.

Neutralising Small Signal Amplifiers.—Valves and FETs which need neutralisation as converters or pre-amplifiers can display annoying instabilities. This author shows how to overcome them, thus giving the higher gain and lower noise provided by optimum neutralisation.

Electronic Counter Dials.—A readout of frequency for the v.f.o. of his receiver. Instead of the now more conventional cycle-counting method, he employs a trick useful for restricted frequency ranges: the v.f.o. is heterodyned with a crystal standard and the beat note is divided by a decade counter which reads out on simple gas-filled glow lamps.

Solid State Audio Oscillator-Modulator.—Another sine wave phase shift transistorised a.f. oscillator that works at 4.5v. and uses no lumped inductance.

Reactance Nomograph.—Very useful, but only if you tear it out and paste on the wall so that it is readily available when needed.

Parasitic Oscillations in High Power Transistor R.F. Amplifiers.—Transistors present unique problems not enjoyed by valves in class C amplifier service and some of these are explored here. Must-reading for all semi-conductors-at-any-price enthusiasts.

Direct Conversion C.W. Transceiver Operation.—C.w. operation of transceivers is much facilitated by slight frequency offset between the stations involved. Rather than being the disadvantage popularly believed, it facilitates operation and improves c.w. selectivity. It is best achieved by standardisation of peaked resonant filters in all relevant c.w. transceivers.

The Repair Bench.—Finding faults in r.f. and i.f. amplifiers, semicons. and valves. Very useful, but of considerable importance in catching possible wild geese is the author's caution: "A trouble in the stage may be caused somewhere else"! The a.g.c. system is a favourite culprit, including the S meter circuit.

October 1970—

The S.W.R. Meter.—You can trust the reading of this s.w.r. meter, which you cannot do with "s.w.r. bridges, antennascopes, or other gadgets that base their calibration accuracy on the characteristics of their semiconductor diodes." The technique described is borrowed from standard microwave procedures.

The Sideband (or C.W.) Minituner.—A pocket sized direct conversion receiver for 80 and 40 metres, using FET product detector in the common base mode. Audio is fed through a low-pass RC filter, FET-amplified, and then into a commercial a.f. power module.

Voltage-Probe Receiving Antenna.—"A new two-inch-high electronic device that out-performs a 3 ft. whip below 40 MHz." And furthermore, its gain is flat from 30 KHz. to over 50 MHz.

Designing with IC Voltage Regulators.—Inherent device constraints are analysed and design examples are given to obtain optimum regulator performance.

Lunar-Path Nomograph.—An aid for determining signal attenuation due to variance in earth-moon distance.

Converted BC1206 for 7 MHz.—Conversion to FETs and thus retaining the advantage of l.t. operation and the other obvious benefits as well. MOSFETs and JFETs are used at r.f. To obtain operation at h.f., semicon broadband converters are added.

Low Noise Converter for 432 MHz.—A circuit using inexpensive FETs that gives a good account of itself. Easier and better than valves in this instance.

Precise Frequency Tuning with S.S.B. Equipment.—Hints on pinpointing operating frequency in the s.s.b., c.w. and r.t.t.y. modes.

Ideas for an Electronics Workbench.—A well designed workbench is essential for experimenters.

Introduction to Thyristors.—How to use these silicon controlled rectifiers and triacs. Very good, and detailed.

Modular Two Metre Converter.—A modular approach to u.h.f. front end designs, with special emphasis on constructional details. Use of glass-epoxy board with large areas of copper to reduce lead inductance.

Improving the Voice Commander F.M. Sets.—Rather obscure, from an Australian point of view.

"OHM"—The Oriental Ham Magazine

September 1970—

The Intruders, K6KA.—Discusses signals close to 14260 and 7130 and others which the author states should not be where they are.

Your S.W.R. Meter and You, VS6AD.—How to get the most out of this device which can give misleading results or at least results which are capable of misinterpretation.

Codes Explained, VS6DD.—The author explains the various systems which are commonly used on radio circuits.

Bridge Rectifiers, Andy Patrick.—Modern circuits for modern solid state units.

"RADIO ZS"

November 1970—

Using Old Motors, ZS1NU.—Sets out to tell you how an old washing machine motor can be used to rotate a beam. Have you ever thought of using a long belt or rope between the rollers of an old washing machine wringer?

A.M.-S.S.B. Reception, ZS1NU.—Circuit of a 12AU7 used as a product detector in the older type receiver.

Modifications to KW Viceroy Mk. I. S.S.B. Transmitter, ZS1NU.—Changing the 7 MHz. band from u.s.b. to l.s.b.

How To Use R.F. Power Transistors, by WA7KRE.—Reprinted from "Amateur Radio," May 1970.

"SPECTRUM"

September 1970—

This little magazine is a quarto-duplicated effort by the Auckland V.h.f. Group Inc. About half of its more than 30 pages per month is taken up with interesting Radio Amateur activities on v.h.f. all over New Zealand, and the rest with technical articles in the best experimenters' tradition. As with all magazines, some issues are better than others, but the overall standard is high, and the magazine is well worth the modest subscription price, $1.50. Their address is: Spectrum, P.O. Box 5268, Auckland, New Zealand.

Contact Potentials.—Listing standard potentials of various metals, relative to calomel.

Ferrite Tube Chokes.—Listing of impedances at various frequencies of 1 inch length of ferrite tube with one or with two turns of wire through it.

Corrosive Comment.—More about relative corroding abilities of various metals in contact with each other. In cathodic metals (e.g. brass, copper, nickel) are placed in contact with anodic ones (e.g. magnesium, zinc, iron, solder), the cathodic ones will corrode the anodic ones.

Tait 80.—A complete transmitter-receiver, valved; EL95/6973 in final.

A 2 Metre QQE06/40A Linear Amplifier.—Complete details. Copper-tubing tank, SE7020 h.t. transistor for screen stabilisation.

Fickle FETs.—Methods for avoiding static (and other) overload catastrophes when using MOSFETs. Best of all, he suggests using protected FETs, like the 3N187 up to 300 MHz. or 3N200 up to 500 MHz. U.S. prices are not bad.

½ Watt Audio System for a Receiver or QRP Modulator.—Part 3 in a series of IC projects. The use of the TAA300.

V.H.F. Aerials for the Amateur.—Polar plots from tests run on the five aerials tested and described in the August 1970 issue of "Spectrum".

The Log-Periodic Yagi.—Full constructional details. Very nice.

A Beginner's Project.—Part I. Two JFETs in a cascode r.f. stage.

October 1970—

(Noted in an adv.—There seems to be nothing wrong with the supply situation in N.Z. 1200 MHz. 2SC387 transistors for 55c each, $5 the dozen!)

A Handi-Checker.—A combination field strength meter, marker oscillator and crystal activity checker.

Another Folder.—Design for a metal bender.

Modifications to Tait 80 for use on 146 MHz. Also modifications to Tait 82 and Tait 82F. Full details.

SWR 1:1: Fact or Fiction?—A good article, full of commonsense.

Note on Dual Gate FET Converter.—A number of magazines have unthinkingly propagated the error set by Sept. 1967 "QST": The gate of the second FET should not be grounded directly. And "parallel cascode" is preferable to "series cascode" to allow the highest gain and lowest cross modulation achievable from at least 12-15v. of d.c. supply.

A Protected 12V. Power Supply (Part 4 in a series of IC projects).—

The Ovatimer.—Describing the availability of a commercial unit to time the length of "overs".

C.W. Language.—How to abbreviate and retain intelligibility—it says here. A complete vocabulary decoder is furnished.

More C.W. Sending Aids.—More of same, more sophisticated version.

"V.H.F. COMMUNICATIONS"

November 1970—

A S.S.B. Transceiver with Silicon Transistor Complement, Part 4.—Power supply and a.f. amplifier. By DL6HA.

Printed Circuit Board for the Two Crystal Oscillators of the 145 MHz. MOSFET Converter used in the DL6HA s.s.b. transceiver, by DL-3YK.

Synthesis V.F.O. for 24 MHz., DL3WR.

Steep Skirted Active Audio Filters, DJ4BG. The output begins to fall at 3 KHz. and is down 10 dB. at about 4.5 KHz. and then falls at the rate of about 25 dB./octave. Different circuits and characteristics are shown.

Speech Processing, DJ4BG.—Various types are discussed.

Stripline Transverter for 70 Cm., DC6HY.—Solid state except for an EC8020 valve.

A Simple V.H.F.-U.H.F. Calibration Spectrum Generator, DC6HY.—Signals are audible up to about 500 MHz. 5 dB. above noise in a receiver with a noise figure of 7 dB. With a 1 MHz. crystal signals are approximately 20 dB. stronger.

Neutralisation of the DL3XW/DJ4BG Calibration Spectrum Generator, DJ4BG.

Two Circuits for Automatic Band Scanning, DL9FX.—The lazy man's way of watching the band.

VHF

Sub-Editor: ERIC JAMIESON, VK5LP
Forreston, South Australia, 5233.

Closing date for copy 30th of month.
All Times in E.S.T.

AMATEUR BAND BEACONS

VK0	53.544	VK0GR	Antarctica.
VK3	144.700	VK3VE	Kilsyth, 20m. E. of Melb.
VK4	144.390	VK4VV	107m. W. of Brisbane.
VK5	53.000	VK5VF	Mt. Lofty.
	144.800	VK5VF	Mt. Lofty.
VK6	52.006	VK6VF	Tuart Hill.
	52.900	VK6TS	Carnarvon.
	144.500	VK6VE	Mt. Barker.
	145.000	VK6VF	Tuart Hill.
	435.000	VK6VF	(on by arrangement).
VK7	144.300	VK7VF	Devonport.
VK9	144.600	VK9XI	Christmas Island.
ZL3	145.000	ZL3VHF	Christchurch.
JA	51.995	JA1IGY	Japan.
W	50.091	WB6KAP	U.S.A.
HL	50.100	HL9WI	South Korea.

A further addition to the beacon list can be made again this month with Roger VK0GR, stationed at Casey base, operating a continuous beacon on 53.544 MHz., sending the call sign at 2 words per minute for 55 seconds, followed by a 5-second break. Beam heading from Melbourne about 60 degrees West. (About S.W. for VK5.) As well as watching 6 metres, Roger operates between 14130 and 14200 KHz. s.s.b. most evenings.

While dealing with the frozen south, mention should be made of two other v.h.f. operators going down that way. Phil ex-VK3FF, now VK0PF, expects to be operational on 6 and 2 metres from Casey, and will be looking to establish some v.h.f. contacts with Australia via auroral scatter. Please send me some news Phil when you get going! Also down there soon will be Keith ex-VK5ZKG, now VK0MX, who will be firstly operational on 14 MHz. s.s.b., later followed by 52.352 MHz. using 4/250A in the final. [Also licensed for operation at Mawson is VK0ZPO.—Ed.] So collectively, with a bit of luck, VK0 may come on to the v.h.f. scene this year, particularly next DX season if the boys down there can keep going that long. Their exploits should make very interesting reading so I will try and get some news from them.

Getting back to beacons for a moment. I am always doing my best to ensure the listings given at the top of this page are accurate. If the locations have been altered, or a variation in frequency has been made, please tell me. There is nothing worse than something as important as a beacon to be off the air, changed frequency or for some other cause not to be as listed. For newcomers to the v.h.f. bands, the television stations scattered around our Continent can be useful indicators of band openings. They have an advantage for those with not the most stable of receivers that monitoring for long periods can be done by the average receiver and knowing that should the strength of the stations build up sufficiently they will be heard because of the large area of band space they cover. The following will probably be found to be the most useful:

Channel 0—51.740 MHz. Western N.S.W.
51.750 MHz. Brisbane.
51.760 MHz. Melbourne.

Further afield but often heard is WNTV on 50.750 MHz. from Wellington, New Zealand. Of limited interest will be Channel 5A from Wollongong, N.S.W., on 143.750 MHz. Other more interesting stations to keep an eye on during the height of DX seasons are those operating on Channel 3 about 92 MHz. These can be pointers towards suitable conditions for 144 MHz. openings. For those living in the southern States the chief stations to watch on Ch. 3 are located mainly in Queensland, in the Darling Downs area, Rockhampton and Townsville. All three were observed at my location many times this year, with excellent signals, sometimes all three at once, at others, one fading out to allow the other in, etc. All three call signs were copied easily from the test patterns in the mornings.

Just a final word while on t.v. stations. It is noted with interest in the January 1971 "E.A." listing of Australian television stations that the use of Channel 0 Translator Stations is becoming quite wide spread, particularly in N.S.W., so I guess there will be a few grumbles from those areas before long! Just take a peer at pages 104 and 105 to see how widespread television has extended now!

REPEATERS

The installation of repeater stations for the Amateur Service is now quite widespread throughout Australia. Probably the latest to go into operation is that in VK5, a very nicely constructed solid state device running 15 watts output on Channel 4. A full description of its working capabilities and possibilities was outlined to the January meeting of the W.I.A. VK5 Division by Garry VK5ZK and Ian VK5ZIP and the completed equipment was on display. Much good thought and excellent engineering practice went into its design and manufacture and the finished article is a credit to those concerned. Rick VK5ZFQ was observed on Sunday, 31st Jan., giving the repeater a good workout from its home at Crafers near Mt. Lofty and good signals were noted over the rather rugged path to my QTH.

The following repeaters are either operational or in a testing condition: Ch. 1, Gold Coast, Qld.; Ch. A, Sydney; Ch. 1 in, Ch. 4 out, Central N.S.W. (may soon operate on Ch. 1 out); and the following on Ch. 4: Bendigo, Geelong, Latrobe Valley, Mildura, North Tasmania and Adelaide. A channel has been allocated to the Albury area—possibly Ch. 1. Thanks to the Geelong Amateur Radio and T.v. Group Newsletter for this information.

DX NEWS

I think it would be fair to say most operators have had quite a good DX season this year. Certainly there seems to have been a greater consistency of good openings to most call areas on 6 metres, some very good high scores in the Ross Hull Contest have been noted. Signals from ZL have shown an increase over last year and with the appearance of C21AA (Bob) from Nauru up near the equator working stations in VK2 and VK4, considerable more interest than usual was shown on 6 metres. C21AA also reported hearing the "Station with the big sound", Bob VK5ZDX, on one occasion, but Bob was too busy talking to someone else to worry about stations on the equator!! Ken VK3ZNJ receives some distinction by working ZL3AAN and ZL4PG on 4th January from Melbourne at S9, thus giving his "Worked all ZL Call Areas" for 6 metres.

Bob VK3AOT, in a lengthy screed for which I thank you, comments on the number of short skip openings from VK3 to VK5 and VK7, with one fantastic opening to VK7 on 4th January with all signals many dBs over S9. Bob remarked also on the large number of times Kerry VK5SU at Ceduna in Western South Australia was received at good strength. He also worked VK6ZAG at Carnarvon on 10th, which is a very long path.

Further notes from Bob's pen shows that he was successful in working Lance VK4ZAZ with signals up to S8 on 2 metres on 12th Jan. The opening lasted only from 1320 to 1325. Lance was a good signal on 6 metres but not over strong, at the same time. VK2s at that time were hearing both VK3s and VK4s, indicating an extensive patch of strong Es. Lance also heard VK3AKR after the contact with Bob had concluded but the band closed before a contact could be made. Alan VK2ZEO, at Deniliquin, was also heard on 2 metres the same day.

It looks as though the efforts of Eddie VK1VP were not in vain when he went portable on Mt. Gingera and worked Ron VK3AKC in Geelong on 2 metres, and Ian VK3ZDW (Mt. Buller) on 432 MHz., a distance of about 180 miles. Ian also worked VK1CG on the same occasion on 432.

Bob VK3AOT concludes his letter by asking the question whether anyone in VK8, particularly in the Alice Springs area, where there is now quite a group of Amateurs, are interested in building 2 metre equipment with a view to attempting contacts with the southern or eastern States? It's a little over 800 miles from Adelaide, and probably nearer 1200 to Melbourne, but no doubt it could be done some time if there are any interested parties. Bob has recently joined that rather select few who now only require a VK8 for W.A.S. on 2 metres, so one can understand his interest. (I hope to take 6 and 2 metre gear to Alice Springs during the winter months—will this help?—VK5LP.)

Another correspondent to write to me this month has been John VK2BHO, at Warilla, 60 miles south of Sydney. John is somewhat restricted in his 6 metre operating as he is at present using a modified Pye Mk. 3, crystal controlled, with the receiver tunable over a limited range of 51.9 to 52.4 MHz., with a ground plane antenna up 25 feet. However, undaunted, he heard C21AA on 20th December, heard plenty of ZLs, and worked ZL3RZ and ZL2AAN, apart from getting amongst the Australian DX. Here is an example where a person with limited equipment has set about making it tunable and thereby extending the range of his contacts. However, limited transmitter power makes itself known when so many stations can be heard but not worked. Good luck John.

MOONBOUNCE NEWS FROM VK3ATN AND ELSEWHERE

Ray VK3ATN hopes to work G3LTF on moonbounce during February, and to this end he has work under way for a new antenna system. He is running 100 watts c.w. on 1296 MHz. using a pair of 3CX100-A5s water cooled —it is possible to get 400 watts output from these tubes. Here are a few details of Ray's dish antenna:

Foundations are 10 feet deep and consist of four holes bulled out to 10-ft. diameter. The tower is 24 feet high. The existing 30-ft. dish gives marginal results, so a 36-38 ft. dish is being installed. Having twice the surface area, an improvement of 3 dB. gain on receive and transmit is expected. (For Sale: One 30-ft. dish—contact Ray VK3ATN!)

Under construction sixty feet south of the main dish is a 25-ft. tower having two-ft. square foundations ten feet deep. A tractor rear axle is used for a polar mount, and a motor drives in opposition to the earth's rotation with a 2,075,000 to 1 reduction from 1400 r.p.m.

The 2 metre array consists of Swan-type yagis, each having 14.5 dB. gain over a dipole, and cross polarised. The total antenna has 32 x 18 ft. long crossed yagis twelve feet apart. The feed impedance is 300 ohms in the middle and the gain in excess of 30 dB.

These facilities are available to any group provided that they bring their own equipment and help Ray with some of the work. Facilities are available for 144, 432 and 1296 MHz. moonbounce. Ray may try meteor-scatter to VK6 shortly.

For moonbounce work, the following sked times have been arranged:

Saturdays and Sundays—W2RRP, 14290 at 1200 GMT.
Sundays—G3LTF, 14120 at 0800 GMT.
Any day (tentative)—K6MYC, 14290 at 0500 GMT; KP4DJN, on 21415; and K0IJN (no details).

KP4DJN has a 100-ft. dish steered by movements of the feed-line, and may soon be constructing a 300-ft. dish. ZL1MO has worked SM7BAE twice on c.w. on 2 metres on Nov. 25-26. ZL1AZR is out of the moonbounce business for awhile due to work commitments on space tracking near Auckland. (Reprinted from W.A. V.h.f. Group News Bulletin, Dec. 1970.)

In a future issue I hope to have a paragraph with some information about a "dyed-in-the-wool" c.w. operator of many years standing who finally saw the light of day and tried v.h.f., and phone at that too! Results: very good. There's a moral to the story, but let's wait for the paragraph.

That's all for this month. Still trying to get someone into "Meet the Other Man" from VK6. Hope all of you anxious to get into print will bear with me a little longer, it takes time to get right around. If any of you think you have a rather outstanding record of performance at v.h.f., no reason why you should not write to me and ask for the detailed form sent to all those invited, if it's okay when returned, then it is just a matter of time before you and your station details appear in these notes. By now, everyone should have a fair idea of what is needed anyway.

Closing with the thought for the month: "The only suitable gift for the man who has everything is your deepest sympathy." And did you know a Volkswagen has been referred to as a "transistorised Rolls Royce". 73, Eric VK5LP, The Voice in the Hills.

MEET THE OTHER MAN

Meet George Francis, VK3ASV/T, ex-VK3ZCG/T, of Morwell, 90 miles east of Melbourne, whose interest in radio started while at Wonthaggi Technical School and becoming an active S.w.l. During his apprenticeship as an electrician he became interested in small ship radio servicing, thus gaining valuable m.f./h.f. experience under a special experimental call sign VJ3B, then in 1954 he turned his interests to v.h.f., building up his own v.h.f. base-mobile network on 163.330 MHz. (VH3EN) which he put in service when he moved to Latrobe Valley at East Newborough, where his interests blossomed into Amateur Radio in 1955, with the call sign of VK3ZCG, a well known call sign for the next 14 years. His first v.h.f. operation was 144 MHz. a.m. and a 3 element yagi, followed by 288 MHz. In March 1956. His first 6 metre QSO was in July 1957 on the new 56 MHz. band, and later on the 50 MHz. band when it changed in November 1957. During January 1958 George experienced his first 50 MHz. Es DX, following later that year on 11th October working his

(Continued on Page 21)

DX

Sub-Editor: DON GRANTLEY
P.O. Box 222, Penrith, N.S.W., 2750
(All times in GMT)

It would appear that most of the overseas news sheets and such like have been delayed by industrial trouble, and my sources of information for this month's issue are almost non-existent. Those which I have are not noted for their reliability, so we shall have to make do with the little which we have.

From Ray Kearney comes a note that Col VK2BCC will be operating from Mawson using an HT32B, Drake 2B rx, and inverted vee antenna. Call sign will be VK0CC, commencement of operation was timed for the end of January, and QSLs for the operation go to Ray, who is VK2BRK.

Two of our regular contributors are missing from the line-up this month. Firstly Jack VK3AXQ has moved down to the city and at time of writing was QRT. S.w.l. Steve Ruediger, our reliable contributor from VK5, has gone out of circulation for some time due to work commitments.

VU5KV and XYL were due to operate from the Lacadives during December, however if you missed them, VU2CK, VU2RK and VU2KM were scheduled for a trip there in mid-February. Later on in the year, date unknown, VU2TP will head in the same direction.

Scotts QSL manager of the month for January is W3HNK. He does the chores for JA6BEE, JA1IVV, YV5CEY, 4X4RD, 4X4UH, PZ1CF, EP2KB, EP2DX, 5A3TX, 5A5TR, PA0COE, PA0HVM, UM8FM, UA3FF, LX1BW, GW3DZJ, SM0BUT, ZS3R, ZS3CJ, VK9BS, CR6LF, CR6KT, ZE4JS, 3Z9PT, SP9DT, KV4EY, VP2VY, EL2BI, CN8BG, KR6HR, CT1MZ, CT1UA, CT1UE, CT1UD, CT1TZ, OX5AP, OY9LV, XP1AA. The December winner was very popular Mary Ann Crider, WA3HUP.

Long Is. DX Association would appreciate any information on an intruder operating every day on 21030 plus or minus a few KHz., and signing VVVV CQ de LVO. Info to David Ferrier, W2GHZ, 43 Cameron Drive, Huntington, N.Y., 11743, U.S.A.

News from the SV0 call areas is that the U.S. ban on SV0 Crete, and SV0 Greece, has been lifted. However, operation to Crete is restricted to contests when the 5B4 prefix will be used. SV0WX and SV0WOO are active from Greece with W3MNE being the latter's QSL manager, whilst SZ0DB is the special call commemorating the 150th anniversary of the Greek Revolution.

UF0OL claims to be in Nova Zimla Is. wherever that may be, however it seems that the U FOOL part of it may be in order, and certain of the U.S. gang place the station in Michigan, and the activity has been called to the attention of the F.C.C.

Late news from East Pakistan is that ON5DO/AP2 has apparently departed from the area and is being replaced by ON5CL, due to take over on Jan. 20. There could be a list going for this one on 14255 at 1215z.

Operation from Barbados by 8P6DQ from Jan. 21 to Feb. 2 was planned as a five-band operation by W2GQN and XYL WA2GSV. They were hoping for the additional call 8P6DX.

5U7 activity from Niger Republic is quite prolific, with 5U7AR, Box 44, Niamey, and 5U7AW, QSL to VE2DCY, being the main operators.

From Monaco, Jean 3A2EE, whose manager is F9RM, is very active and does a lot of cross Atlantic working on 80 metres. There is no trace of 3A2BNB calling himself Frank, and working into JA on 3rd Jan. on 20 c.w., in the news sheets. I heard him here at 1100z or thereabouts with a 599 signal operating at about 18 w.p.m., and at that speed I couldn't have made a mistake in the call. Hi. Has anybody any knowledge of him?

ZD8, Ascension Is., will be the location of W4SFA due to operate as ZD8OE after mid January. Other station active is ZD8CS who QSLs via K1BTD.

The elusive SUs have been about over the last few months, SU1IM using c.w. more often than not, and Moty SU1MA doing most of it. The latter is at Box 840, Cairo, Egypt, and uses Swan equipment with a dipole.

Awards from the "CQ" Magazine are now being checked by Kings County Radio Club, and applicants should send their QSLs, etc., to 1250 Ocean Ave., Brooklyn, New York, 11230, U.S.A.

The following stations can be QSLed via the ISWL, and contacts with them will count towards the Monitor Award, details of which were published in full last year: G3WQH, WB6MUU, 9Y4DS, SM2ERK, G8DZH, SK4DI, SM4DHF and LX1BW. WA3MCP, W6JZU, HK0BKX, G3TUF, DL4UU, DL5BA were earlier additions which had not been listed here. The QSL bureau for the ISWL is our old friend Eric Chilvers, 1 Grove Rd., Lydney Glos, GL15 5JE, England.

The FO0 prefixes which have been used in the latter months are special prefixes for reciprocal licenses issued to non-resident operators in the FO8 call area. FO0TB and FO0TC were two of them, QSL to W6OFF and W9CTY.

Our much respected friend, Jock ZL2GX, noting my remarks in an earlier column re the murderous costs of IRCs in this country, has dropped me a line to let the chaps know that he will accept 25 cent mint Australian stamps in lieu of the IRCs for any of the N.Z. awards. This in anybody's language is a great help.

The N.Z.A.R.T. are to be congratulated on their awards programme, as is Jock as their Award Manager. It is unfortunate in a way that many of the great operators (and ZL2GX is in this category, being the first DXCC 300 in the world) are so taken up with administrative duties that they have not the time to get on the air as much as they would like and as much as we would like to have them. On the other hand, these chaps do a wonderful job as Award Managers, QSL Managers and what have you, that we must not complain.

QSL MANAGERS

AC3PT to W2MMC	ZD8H to K0ETY
C3IDE to EI1AU	ZD8JK to WA3FNK
C3IDG to G3CDK	ZF1ML to K9QFZ
C3IDJ to WB6CAB	ZF1RL to K9QFZ
LX2CQ to DK1YK	5W1AJ to KS6DH
TJ1AX to LA6XJ	9Y4VE to VE3GCO
TY7ATF to K3RLY	VP8LK to G3NOM.

SOME QTHs

CT3AN—C.P. 33, Funchal, Madeira Islands.
EA9EJ—Justo Benedicto P., Calle Madrid 1, Aaiun, Spanish Sahara.
FR7AB—B.P. 793, St. Denis, Reunion Is., Indian Ocean.
FR7AG—B.P. 819, St. Denis, Reunion Is., Indian Ocean.
IT1GAI—C.P. 13, Noto, Sicilia, Italy.
JY2—Box 2101, Amman, Jordan.
SV0WY—T. Apostolos, 2140-15 Comm. Det., A.P.O. New York, 00223, U.S.A.
TG9ER—Apto 288, Guatemala City, Guatemala.
VE3GCO—Garry Hammond, RR4 Main St., Atwood, Ontario, Canada.
3Z0PZJ—Box 106, Koszalin, Poland.
5Z4DW—Box 14272, Nairobi, Kenya.
7Q7BC—Box 41, Zomba, Malawi.

The above list of managers and addresses refer mainly to stations which were active towards the latter part of 1970. It would be a hopeless, and unnecessary task, to try and print all the new DX QSL information which comes to hand, however if anybody is looking for a particular QSL address which has not appeared in print, I have the last twelve months issues of both Geoff Watts News Sheet and the popular Long Is. DX Bulletin here, and will be only too pleased to look up any back information, provided a stamped envelope is enclosed.

I would appreciate any local news which can be passed along, with the overseas situation as it is we never know from one month to another if the news sheets are going to arrive, and if they do, just how much will be missing from them. So the more we can have from here, the better.

That winds it up for this month. Let's hope the situation is better for the news issue. 73 de Don L2022.

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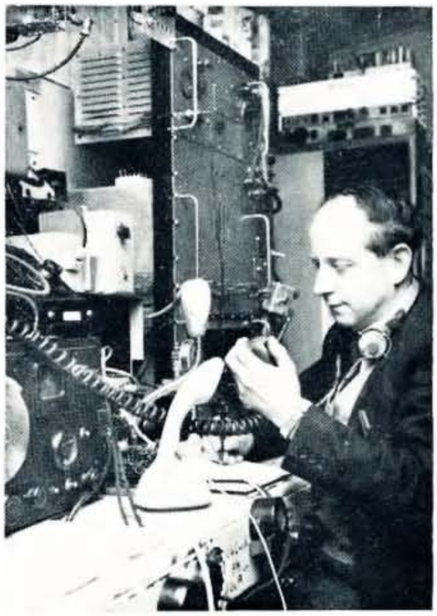
VHF NOTES

(Continued from Page 20)

first JAs using F2. Since then he has worked all VK, ZL and JA districts.

Some of George's 144 MHz. firsts using ground wave DX were: 25/2/58 VK7LZ, 233 miles; 27/4/59, VK5BC, 410 miles; 27/2/66, VK5ZDR, 480 miles; 16/11/66, VK2ZEO, 191 miles; also worked Hobart while out portable during a Field Day, and heard the VK6 beacon. Es 144 MHz. DX: VK4HD, 905 miles. 288 MHz.: 19/7/59, VK3ALZ, 80 miles; 7/1/60, VK7LZ, 233 miles (this being a record for 15 minutes until David VK3ZAT, now VK8AU, worked him, extending the record distance by another 10 miles!), and 23/1/61, VK5AW, 256 miles. George has won several certificates: Winner of 4th VK3 V.h.f. Field Day 1956; Winner Phone and VK3 National Field Day 1958; winner W.I.A. V.h.f.-100 for 144 MHz. and above, dated 21/9/61, and winner N.Z.A.R.T. W.A.D. on 6 metres, 11/1/68, and during 1970 received the AX "Cook" Award and was presented with the Eastern Zone Activities Award for 1969-70, being the most active Amateur in the Gippsland area.

George eventually left the television industry, rejoining the Electricity Commission as an electrical control room operator in the Latrobe Valley power stations, thus working shift work which really suits Amateur Radio and DXing. George received his full call of VK3ASV in 1969. This has not greatly affected his v.h.f. and u.h.f. interests and hopes to build 1296 MHz. gear during 1971. He is currently testing his new 432 MHz. a.m. and 438 MHz. f.m. rigs with some success. He now has his Creed teleprinter operating, using AFSK on the 2 mx f.m. r.t.t.y. net to Melbourne and FSK on the h.f. bands. The h.f. bands are also used to find out the latest trends and overseas interests in v.h.f., and in his spare time studies the Japanese language!



George Francis, VK3ASV.
How many microphones in the picture?

At the moment his shack consists of a FT200 and a FTV650 6 metre transverter. The FT200 has an added 5 KHz. wide K.V.G. crystal filter for a.m. reception. The 2 mx s.s.b. transverter is nearly completed. At the moment an FET converter and a home constructed 150w. high level a.m. transmitter is used with a single QB3/300 in the final, modulated by a pair of 6146s in Class AB1. The 70 cm. gear is still experimental. A Lafayette PF175 tuning 30-50 MHz. (and 150-175 MHz.) is used to monitor ground wave openings, and the MUF and "skip" approaching the 6 metre band, in conjunction with the t.v. DX receiver. A camera is partly constructed and a line/frame generator for a.t.v. For out-of-band reception, several general coverage communications receivers are used, Hallicrafters SX17A 530 KHz. to 65 MHz.; Marconi B28 l.f. 15 KHz. to 540 KHz.; Lafayette Airmaster II., 108-137 MHz.; Lafayette Guardian 3000, 72-95 MHz.; u.h.f. t.v. converter, 400 to 950 MHz.

Outside the shack is an aerial farm of 30 aerials, including a 160 metre top-loaded vertical, 4 el. wide-spaced 6 mx horizontal yagi, 3 el. vertical 6 mx yagi, 6 mx ground planes for 53.032 a.m. and 52.525 f.m. net frequencies. For 2 mx a.m. a 16 el. horizontal phased array and for the 2 mx net transceivers, two 8 el. vertical phased arrays. A 16 el. phased array on 432 MHz.

Because of Channel 0 t.v.i. problems, George has good portable gear for 6 mx, consisting of a Lafayette HA750 solid state transceiver, crystal and tunable with 40w. linear, and 4 el. yagi. The rig can also be carried portable over the shoulder!

Thank you George for all that information. I don't know what time you have for sleeping? However, your call sign is certainly well known throughout the country and we wish you well in the future.

CONTEST CALENDAR

6th/7th March: 37th A.R.R.L. International DX Competition—Phone Section (2nd week-end).
13th/14th March: 34th B.E.R.U.
14th March: W.A.B. H.F. Phone Contest.
20th/21st March: 37th A.R.R.L. International DX Competition—C.w. Section (2nd week-end).
27th/28th March: "CQ" W.W. W.P.X. S.S.B. Contest.
28th March: W.A.B. H.F. C.W. Contest.
4th April: W.A.B. L.F. Phone Contest.
11th April: W.A.B. L.F. C.w. Contest.
16th/17th October: 11th W.A.D.M. Contest (c.w. only).

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WORKED ALL BRITAIN CONTESTS 1971

PRECIS OF RULES

Dates: 14th March, H.F. Phone; 28th March, H.F. C.W.; 4th April, L.F. Phone; 11th April, L.F. C.W.

Bands: For H.F. Contest—14, 21 and 28 MHz. For L.F. Contests—1.8, 3.5 and 7 MHz.

Time: For all contests: 0800 to 2100 GMT.

Exchange: RS(T) number and QSO serial number commencing 001 plus book number if a W.A.B. book-holder.

Scoring: QSO points—5 points for each different station worked. The same station may be worked again on a different band for five points.

Multiplier—Total number of different W.A.B. areas worked in the contest, one multiplier for each area even if worked on three bands.

Total—QSO points multiplied by total multiplier.

Awards: Certificate of Merit to the leader in each country.

Log entry: To be received within 50 days of the contest by W.A.B. Contest Manager, 49 Baggrave St., Leicester, United Kingdom.

CANBERRA RADIO SOCIETY

EASTER CONVENTION—APRIL 9-12, 1971

This is our second notice regarding the forthcoming Easter Amateur Radio Convention and already the energetic committee working for you have taken the planning to an advanced stage. Firstly, may I tell you something about the programme arranged for you?

Friday: The reception centre will be open for most of the day at the Griffin Centre, Bunda St., Canberra Civic. Here you will be welcomed by club members, registered, supplied with a bag of goodies, and directed to your accommodation. Use 146 MHz. Channel B for all on-the-spot directions during the Convention. En route to the reception centre you may participate in an all-band scramble (open to mobileers only) in which you may work anyone, any mode on any band, but you submit any one hour of your log. Most of Friday is left free for sight-seeing and personal shack visits and some suggestions appear later in this programme. 3.5 and 7 MHz. will also be manned.

Saturday: A keen contest committee has organised a programme for those who are competition minded, starting at about 10 a.m. Some of the events listed here will be held on Sunday. 40 metre cryptic c.w.; 2 mx fox hunt (a.m. and f.m.); 40 mx hidden tx hunt; 40 mx fox hunt; YL scramble; 2 mx hidden tx hunt (a.m. and f.m.); a mobile v.h.f. scramble with special rules; 2 and 40 mx receiving tests; and the usual ladies' tx throwing contest. Some excellent trophies have been donated and a special prize will be awarded to the highest aggregate points score.

The Convention Dinner will be held at the Hotel Canberra after a short cocktails session, commencing at 7 p.m.

Sunday: The contest committee will be active from 10 a.m. During the contests on Saturday and Sunday, there will be several conducted coach tours of the national capital for the YLs, the XYLs and the harmonics. At about noon we will commence the launch tours of Lake Burley Griffin and transport to Springbank Island in the lake where a barbecue luncheon is arranged. Here you will find gas operated barbecues, boys' and girls' toilet facilities, and large shady safe-playing areas for the children. If you have a trailable sail-boat, you should bring it. Private power craft are not allowed on the lake. Anglers bring your gear—see footnote.

In the evening there will be a get-together at the reception centre. Here we hope to keep you on your toes with a brief two-man debate on the pros and cons of various foreign transceivers. Also, we present the trophies, draw the raffle, and perhaps screen some movies. There will be a special trophy for the person who travels the greatest distance to the Convention, and some door prizes. There will be a White Elephant Sale, so bring all your unwanted gear. Label it with your name, call sign and, where applicable, the reserve price.

Monday: On Monday morning there will be organised mini-tours to tracking stations and to the Mt. Stromlo Observatory. Private shack visits will be arranged on Sunday night. There will be time to try the Tourist Bureau Golden Arrow Tour before you leave to journey home. This is a "drive-yourself" tour.

Footnote: The lake is stocked with carp, trout and some perch. No licence is required and there is no closed season. The club has a special prize for the son or daughter of any visiting Amateur who catches the longest fish on any day, 9th to 11th.

Other Attractions: Things to see include the Captain Cook Memorial Jet, the Australian War Memorial, the Carillon, Blundell's Farmhouse, Horse Era Museum, Parliament House, Tidbinbilla Fauna Reserve, nine Art Galleries, Royal Mint, etc., etc.

Reception Centre: At the reception centre there will be a continuous display of the latest Amateur Radio equipment, entries in the Best Home-Built Equipment (Open) and ditto (Youth Radio Scheme) will be shown and judged, and items for the White Elephant Sale may be put on the table at will. Cold drinks and tea will be available all day.

A comprehensive programme is to be published later. If you have any queries, please call the club station VK1ACA, on 3690 KHz. most nights at 9 p.m., or write to P.O. Box 1173, Canberra City, 2601.

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WGA 21 AWARD

The Radio Amateur Society of the Island of Gotland (GRK) in the southern part of the Baltic Sea has instituted the Worked Gotland Award 21 (WGA 21) which is available to every licensed Radio Amateur who complies with the following rules:

1. All contacts with SM1 (or SK1 or SL1) stations after 30th June, 1970, 2359 GMT, on all bands are valid for this very attractive award. The contacts shall be two-way (not cross-band) and in any mode which is legally allowed for the band used. WGA 21 cannot be awarded to Amateurs operating from Gotland itself.

2. Each QSO gives the following number of points (for non-Europeans): 80 mx 5, 40 mx 4, 20 mx 3, 15 mx 3, 10 mx 3, 2 mx 6, 0.7 or lower 10 points. The required number of points is 21.

3. Applications should be sent to the Awards Manager, Radio Amateur Society of Gotland (GRK), P.O. Box 461, S-621 04 VISBY 4, Sweden. Please enclose excerpt of your log, certified by two licensed Amateurs. To cover costs also enclose 10 IRC or 7.50 Swedish Kronor or U.S. $1.50. If you would like the award by registered post, please enclose 3 more IRCs or corresponding amount.

Note: On July 1-7 incl. each year most of the active Amateurs of Gotland are participating in a special activity week on all bands. There are almost 40 Amateurs on Gotland and half this number are active. Visitors to Gotland from other parts of Sweden use the epifix/1, as in SM0OY/1. Visitors from other countries with temporary licences in Sweden use the epix/SM1, as in OH0NI/SM1.

For WASM II, Gotland is laen 1, WAZ Zone 14, ITU Zone 18.

HAMADS

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Extra words, 3 cents each.

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EXCHANGE: Geloso G209R Receiver and Geloso G222TR Transmitter for Heathkit DX100B or DX100 with handbook. J. T. Edwards, P.O. Box 33, Moss Vale, N.S.W., 2577. Tel. M.V. 242.

FOR SALE: Crystal Calibrator No. 10, $5.00. Two brand new 6JS6B valves, $3.00 pair. E. L. Blackmore, 30 Breen Ave., Kyabram, Vic., 3620.

FOR SALE: 2 Metre a.m. station including transmitter, receiver, mast, 16 element beam, balun, mike, in-built power supply, perfect order, $100. VK2BSG, Phone (Sydney) 57-8705. 6 Freeman Ave., Oatley, N.S.W., 2223.

RTTY FOR SALE: A number of each of the following units are available at very reasonable prices: Twin duplex converters, two-tone keyers, neon tuning indicators. I will send by road Ipec. Made in U.S.A., some less tubes, all rack mounting. VK6GP, R. G. Price, 144 Robert St., Como, W.A.

SELL: Swan 500C, mint condition, fully updated, new a.g.c., a.l.c., plus Swan's new 16-pole filter. TH6DX Antenna. Two-section crank-up Tower, 42 ft. extended. A. R. Roy, Phone (Melb.): Business 67-4486, Private 20-6135.

WANTED: AR7 Coil Boxes. Prefer Band E or, even better, Amateur bandspread coils. Electrical condition secondary. Must be cheap. Also wanted, v.h.f. transceiver, cheap, a.c. supply preferred but not essential. D. R. Nagle, 2 Crudge Rd., Blacktown, N.S.W. Phone 622-1061.

WANTED: By W6SAI—Plug-in coils for restoration of old National SW3 and FB-7 Receivers. Contact VK3ATN, P.O. Box 80, Birchip, Vic., 3483.

WANTED: Coil Boxes A, B, C and E for R.A.A.F. Receiver Type AR7, and circuit diagram also. Contact David Mann, "Nundaroo," Tumbarumba, N.S.W., 2653.

WANTED: Command Receivers 3-6 and 6-9 MHz., preferably unmodified and in good order. Will pay good price for good units. Send particulars and price to B. J. Clarke, VK6VV/4, P.O. Box 193, Hughenden, Qld., 4821. All letters will be answered.

WANTED: Dynomotor for Collins ART-13 autotune transmitter. Must be operational. VK3TX, phone (Melbourne) 544-7779.

COOK BI-CENTENARY AWARD

The following additional stations have qualified for the Award:

Cert. No.	Call	Cert. No.	Call	Cert. No.	Call
973	DK3PO	1031	AX3KR	1090	ZM1PV
974	WB6IXC	1032	K4RHQ	1091	W5ZWX
975	AX3BDT	1033	KH6EOQ	1092	KX6HW
976	AX5UC	1034	AX9AC	1093	AX9GN
977	AX3UT	1035	ZM2VH	1094	AX2QL
978	JA1VJR	1036	W1KXM	1095	AX7ZD
979	DK1UJ	1037	AX2DI	1096	AX2AZY
980	HK3AVN	1038	G3LGS	1097	AX2UJ
981	VE1AM	1039	W4QAW	1098	VU2IAZ
932	KZ5HA	1040	9V1QH	1099	AX2BGG
983	LA9CE	1041	AX3AQY	1100	G3TRV
984	W3PVZ	1042	VP9GE	1101	JA3TCH
985	GW4NZ	1043	W2ANX	1102	AX2ATT
986	K6PHT	1044	GM3VEY	1103	AX3JF
987	ZM2RP	1045	ZM1PN	1104	F9MS
988	AX8JS	1046	WA6ZSJ	1105	WA6EEF
989	VO1FB	1047	W4RM	1106	KA2AI
990	AX6FT	1048	JA6CRA	1107	9J2WR
991	JA1KXN	1049	W1FJJ	1108	ZM1AMM
992	VO1BD	1050	JH1MTR	1109	AX3AFH
993	WA6TAX	1051	VE3BME	1110	W5RBO
994	SM5BBC	1052	ZL1AAP	1111	ZL1BGC
995	SM6CKS	1053	VE3AYM	1112	CR7GJ
996	K6UNT/	1054	W8ILH/	1113	VP7NO
	KL7		VE6	1114	AX3BAX
997	W9WNB	1055	AX4FD	1115	W7UOI
998	W8OPZ	1056	AX5BX	1116	AX4FK
999	W5RUB	1057	AX3BCL	1117	AX3VX
1000	AX5GM	1058	W3AIZ	1118	AX3GC
1001	AX2AGI	1059	AX5GD	1119	G3SRH
1002	ZS6QK	1060	AX4CP	1120	AX4PV
1003	AX9NI	1061	AX4LB	1121	AX3BBY
1004	W0VPR	1062	ZL1BBM	1122	ZM1AVS
1005	W0NAZ	1063	VE3BNC	1123	WB4FOD
1000	ZM3SX	1064	HB9AHA	1124	I1BCB
1007	I1LPR	1065	I1SSU	1125	ZS6GF
1008	W6JXH	1066	AX9KS	1126	WA6YJJ
1009	AX2HM	1067	XE1DP	1127	9M2AV
1010	K7YWZ	1068	KH6BWT	1128	DL6NP
1011	K4BZF	1069	AX3AGF	1129	AX6VB
1012	YV1KZ	1070	W1OKG	1130	9M2LN
1013	W2PGU	1071	YB0AAE	1131	DL1MD
1014	AX3AJR	1072	UA1IG	1132	AX8CW
1015	AX7JF	1073	UA0MI	1133	W5PXZ
1016	AX2NM	1074	UA3FF	1134	DL3OH
1017	KC6WS	1075	UA9PG	1135	ZM1AZX
1018	HK4TA	1076	UW0IW	1136	W9ICF
1019	KC4USL	1077	UW0IQ	1137	W3PVO
1020	ZM1ABW	1078	UA0DG	1138	AX5UK
1021	K6LIK	1079	UL7JG	1139	AX3AEF
1022	VE3SH	1080	UK5WAZ	1140	JA1SGX
1023	VU2BEZ	1081	UK5UAL	1141	G3CDK
1024	DJ7MI	1082	AX2RX	1142	AX3BAS
1025	YB0AAN	1083	VE1TG	1143	W0BK
1026	AX2WD	1084	ZM2AVY	1144	AX2AWS
1027	AX6PG	1085	W2SUA	1145	YB0AAO
1028	W2HO	1086	EA2HX	1146	JA3REK
1029	JA3TRO	1087	ZL2BDK	1147	WA4WTG
1030	ZS1LJ	1088	ZL2AUP	1148	G3LCS
		1089	VE6ARD		

V.H.F./U.H.F. SECTION

The following additional stations have qualified for the Award:

Cert. No.	Call	Cert. No.	Call	Cert. No.	Call
7	AX3ZYF	11	AX5ZLZ	16	AX5ZNJ
8	AX3ZOP	12	AX2ZTM	17	AX4ZRG
9	AX3IO	13	AX5ZRS	18	AX3PC
10	AX4ZJB	14	AX2ZTQ	19	AX4ZGA
		15	AX2ZWL		

—...—

W.I.A. V.H.F.C.C.

Amendment:

Cert. No.	Call	Confirmations 52 MHz.	144 MHz.
46	VK3ZNJ	250	—
47	VK3ZNJ	—	280

—...—

W.I.A. 52 MHz. W.A.S. AWARD

New Members:

Cert. No.	Call	Additional Countries
90	VK4ZJB	2
91	VK3AUN	1

AMATEUR FREQUENCIES:

ONLY THE STRONG GO ON—SO SHOULD A LOT MORE AMATEURS!

amateur radio

Vol. 39, No. 4

APRIL, 1971

Registered at G.P.O., Melbourne, for transmission by post as a periodical

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MR2P METERS: 0-5, 0-15, 0-30, 30-30 Amps. (Res 50M/V). Price $6.50 nett.

MR2P METERS: 0-15 volt DC, 0-30 volt DC. Price $5.50.

MR2P METERS: 0-50, 0-100, 100-100, 0-500 uA. (Res. 900 ohms). Price $6.75.

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SWR 109 METER: Replacement. Price $9.50. Postage 20c.

P25 "S" METER: Price $6.50 nett.

P25 METERS: New. Face size 2½-in., M/H 2¼-in. Res. 60 ohms. 0-1, 0-5, 0-50, 0-100, 0-500 mA. Price $6.00 nett. Postage 20c.

MR3P METERS: New. Face size 3½-in., M/H 2¾-in. Res 120 ohms. 0-1, 0-10, 0-50, 0-100, 0-500 mA. Price $6.75 nett. Postage 20c.

MR3P METERS: 0-50, 50-50, 0-100, 0-500 uA. Price $9.20 nett. Postage 20c.

MASTER METERS: New. Model S21. Size 2¼-in., M/H 2-in. C/R 50-50 uA. Plain face. Price $4.00 nett. Postage 20c.

MASTER METERS: New. Model S212 24F/498. Face size 3⅛-in., M/H 2¾-in. C/R 1-1 mA. Plain face. Price $3.70 nett. Postage 20c.

MASTER METERS: New. Model 212 24F/502. 0-10 volt AC. Face size 3⅛-in., M/H 2¾-in. Price $4.50 nett. Postage 20c.

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Sizes: 0.001, 0.0022, 0.0033, 0.0047, 0.0056, 0.0068, 0.0082 uF. **Price 12c each.**

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2.5 mm. Plugs, 15c each.
6.6 mm. Plugs, 40c each.
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3-pin Din. Plugs, 58c each.
SO239 Sockets, 95c each.
PL259 Plugs, $1.00 each.
Lapel Crystal Mike, $1.20 each.
TV Plug/Socket, 45c pair.
Jabel Crystal Sets Coil, new, 95c each.
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amateur radio

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COVER STORY

The latest piece of equipment from the Yaesu Musen Co. Ltd. of Japan is their model FT-2F fully solid state 12-channel 144 MHz. FM Transceiver. Of compact dimensions, 6⅝" w. x 2½" h. x 10" d., and light weight of 4 lbs., it is ideally suited to "personal portable" operation as well as mobile or base station use. It can be powered from a 12v. DC source such as car battery, portable battery pack, or from the matching FP-2 AC power supply. Details from the Australian Agent, Bail Electronic Services, Melbourne.

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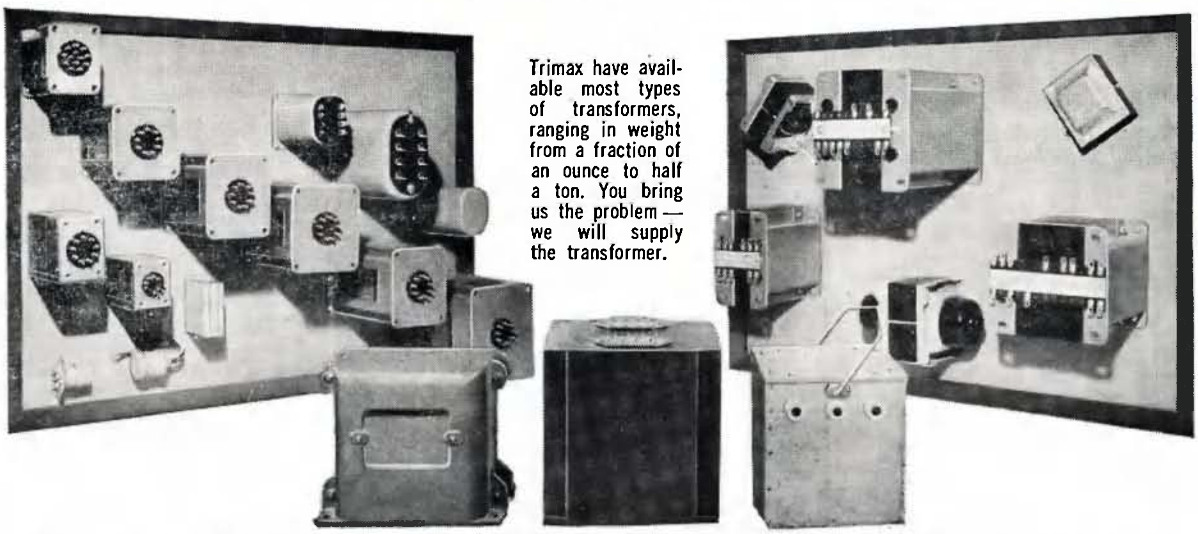

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LM 51

FEDERAL COMMENT

In the January issue I wrote about the Federal Executive's problems revolving round the near impossible situation facing the many honorary officers administering the organisation and this magazine. I gave a brief outline of the facts which brought about the decision to employ a Secretary/Manager. In that same issue there appeared an advertisement for filling this post.

I am very pleased to tell you that the post has now been filled following upon interviews with candidates on a short list selected from all the applications which were received. The successful candidate happened to be in Australia at the time when the post was advertised and it is our good fortune that his services are now available to us.

He is 53-year-old PETER B. DODD, VK6/5/3/1/2CIF, better known perhaps as a past DXer with such call signs as VQ4PBD, VQ5PBD, VQ1PBD, 5H3PBD, 7Q7PBD, G3PBD and many others dating back to 1946 and to pre-war as a listener. He has also operated for a short time as ZL1BDC portable/mobile s.s.b. from a motor caravan in which he and his family travelled overland from Europe. On this safari he operated 4U1ITU and held calls as OE1ZBW and YA1PBD.

In addition to being reasonably well known on the DX bands, he is a Life Vice-President of the Radio Society of East Africa. He served on the Council of that Society, organised Amateur Radio familiarisation exercises for the benefit of local Ministers of at least two African governments, was closely involved with the establishment and progress of the East African Emergency Network allied with communications for the world-renowned annual East African Safari and, when not resident in Mairobi, the Society's headquarters, reminded them that there were such people as country members. I gather from another source that he was awarded a medal by the Belgian Government for work done during the Congo crisis.

On the general administrating side, Peter Dodd had come up through the ranks of Customs and Excise in East Africa, culminating as Head of the Department in Malawi where he was responsible for establishing it in that country. For a period he was a Director of an Amateur equipment manufacturing company in the U.K. The Selection Committee were satisfied that he would bring to the position almost unique experience with impartial detachment, a wealth of administrative ability and a fund of enthusiasm. We wish him well.

It is fortunate too that we will possess someone capable of effecting a smooth transition from the existing to the new Constitution of the W.I.A. which is mentioned in my Report, to be published in "A.R.," to be considered at the Federal Convention in Brisbane this month. No doubt your Federal Councillor will have informed you about the various motions which are to be debated at this Convention.

However, it is thought that the Convention will give more time in considering the precise plans which will be necessary to effect the change-over to the new W.I.A. Constitution, the I.A.R.U. Region 3 Conference in Tokyo and the I.T.U. World Administrative Radio Conference in Geneva later in the year. I ask you to read these references with care and to observe the work being done on behalf of all Amateurs in this part of the globe.

Once again I seek your support by continuing your interest and by each one of you recruiting at least one more member this year.

MICHAEL OWEN, VK3KI,
Federal President, W.I.A.

A Transistorised Carphone

PART TWO—TRANSMITTER

By L. B. JENKINS,† VK3ZBJ, and H. L. HEPBURN,‡ VK3AFQ

The authors continue this second part of the article with a description of the transmitter and associated circuits. From correspondence received, it appears that boards, diagrams and/or kits of this Carphone will be in demand. Accordingly, work is proceeding along these lines.

The transmitter can conveniently be dealt with in three parts—the exciter/modulator, the driver stage, and the final power amplifier. This grouping is chosen since each module represents a physically separate entity with each module on a separate circuit board. The exciter/modulator is on a p.c.b. 7" x 2", while both driver and p.a. stages are each on boards 3½" x 2".

It must be stated right at the outset that the transmitter is a frequency modulated device and not (as are the popular Vintens, A.W.A's and T.C.A's) a phase modulated system. The decision to use f.m. rather than p.m. was based mainly on circuit simplicity and ease of adjustment.

Briefly, the main difference between the two methods is that with f.m. the amount of deviation is proportional only to the level of audio drive and is independent of the modulating frequency. With p.m. on the other hand, the amount of deviation is proportional not only to the audio level, but also the frequency of the modulating signal, the higher the modulating frequency the greater the amount of deviation. Thus in a p.m. system it is necessary in the transmitter to reduce the audio drive as the modulating frequency increases (de-emphasis) and in the associated receiver to increase the audio "highs" to compensate (pre-emphasis). The amounts of pre-emphasis and de-emphasis used in surplus commercial units varies from make to make.

In order that the transmitter now described be compatible with the wide variety of transceivers in Amateur use, it has been necessary to provide some audio shaping in the modulator. Since this shaping has been done with only two fixed resistors and two fixed capacitors and since these can be altered to taste, obtaining audio compatibility presents no problem.

THE EXCITER/MODULATOR

Fig. 6 gives the circuit diagram of the complete exciter. It uses three bipolar transistors in the audio section, a bipolar oscillator and three protected dual gate MOSFETs as multipliers. These latter devices are quite new on the Australian scene and can best be described as higher dissipation, epoxy packaged 3N140s, but without the problems of static destruction associated with the latter device. They can be handled and soldered into place with no more care than the normal run of transistors.

The MPF121s have been used in this design on two grounds. Firstly, they are the same price as the type of bipolar transistor used to date in multiplier service (2N3564, 2N3565, BF115, etc.), but more importantly they are to be preferred in view of the almost perfect waveform purity that can be obtained. Those who have had experience with bipolars as frequency multipliers will be aware of the difficulties of obtaining a sub harmonic and spurious-free waveform from them.

Input from a medium impedance dynamic or rocking armature micro-

† 54 Tennyson Street, Highett, Vic., 3190.
‡ 4 Elizabeth Street, East Brighton, Vic., 3187.

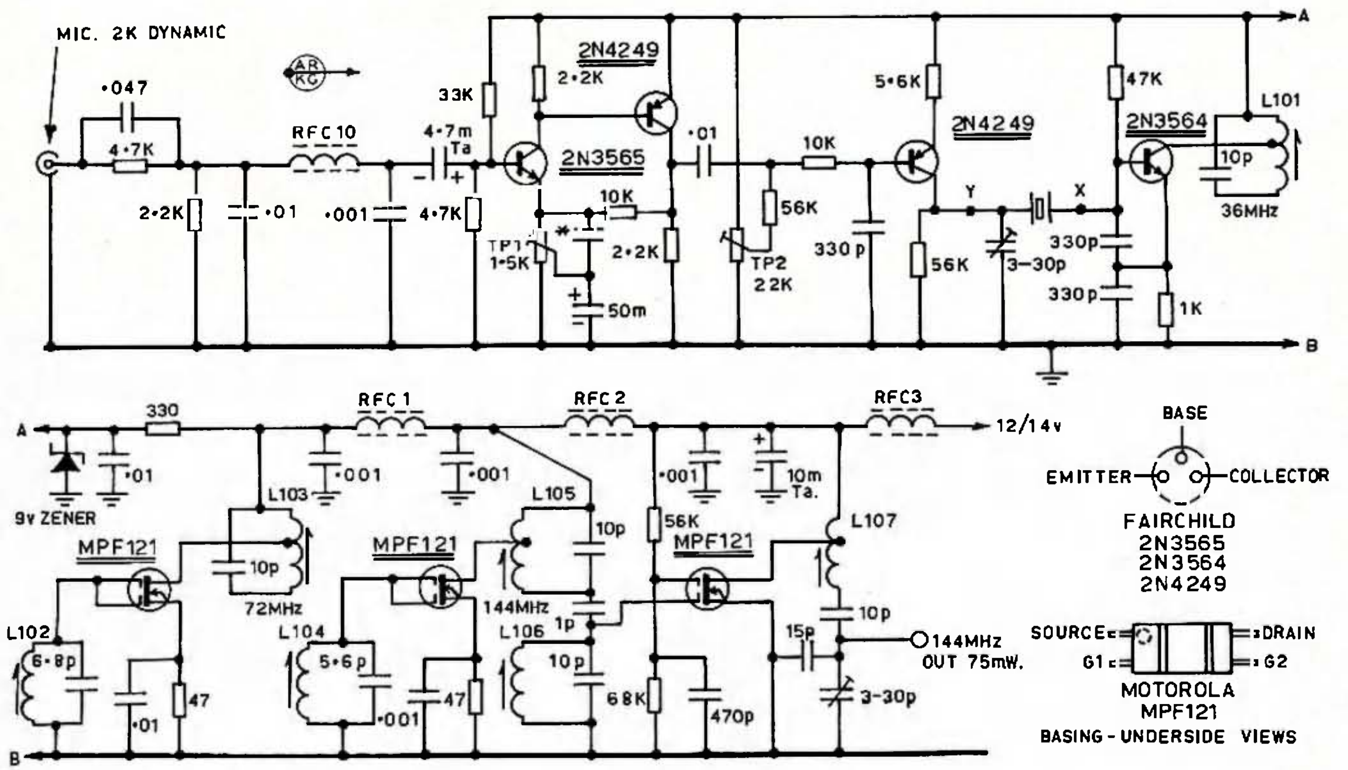


FIG. 6. 2 METRE F.M. EXCITER

* May be needed to adjust frequency response.

phone (a Zephyr 25E 2,000 ohm p.t.t. is standard in both authors' equipment and is thoroughly recommended) is shaped by the 0.047 µF./4.7K ohms and 0.1 µF./2.2K ohms combinations. If any other microphone is used, or if a different audio characteristic is required then some adjustment to these values will be needed. RFC10, which consists of a single wire through a Neosid F29 tuning slug, and the associated 1,000 pF. capacitor decouple the base of the 2N3565 for r.f.

The 2N3565/2N4249 bipolar combination provides ample audio gain, this gain being adjustable through TP1 (1.5K) which acts as a deviation control. Audio is applied to the base of the 2N4249 modulator bipolar whose base d.c. voltage is adjustable by means of TP2 (22K). This variable resistor allows control over both frequency and speech linearity.

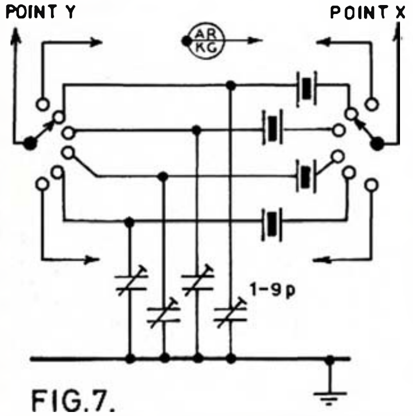


FIG.7.
CRYSTAL SWITCHING

The 2N4249 modulator acts in effect as a variable capacitor which is in series between the crystal and ground. Any variation of the voltage on the base of the modulator (no matter whether it be d.c. or audio) varies the capacity in series with the crystal which, in turn, varies the frequency of oscillation. For accurate setting of centre frequency and reliable operation it is essential that the crystal have a low equivalent series resistance.

It may be worth noting at this point that if the f.m. modulator bipolar is omitted and the crystal grounded through, say, 30 pF., then the r.f. generating side of things can be used to drive an a.m. final while the 2N3565/2N4249 combination can be used as a microphone pre-amplifier.

The oscillator uses crystals in the 12 MHz. range, the exact frequency being obtained by dividing the required output frequency by twelve.

Fig. 7 gives the circuitry used for multi-channel operation, each crystal having its own trimmer for frequency adjustment. The trimmers recommended are the 1 to 9 pF. Shinmei types sold through the VK3 W.I.A. components facility. These trimmers are also used in the driver stage of the transmitter.

Output from the oscillator at 36 MHz. is transferred by means of the mutually coupled pair L101/L102 to the paralleled gates of the first MPF121 doubler. Output from this stage on 72 MHz. goes through the second mutually coupled pair L103/L104 to the paralleled gates of the second MPF121 doubler. Again a pair of coils is used to transfer the 144 MHz. output to the third MPF121. Some capacitive top coupling is used in this case. The third MPF121 is used as an amplifier and has about 7 volts applied to its second gate. A series tuned circuit in the drain uses a capacitive divider to give a 50 ohm output impedance. The trimmer at the bottom of this divider is a standard Philips 3-30 pF. unit.

Setting up of the Unit

This is simple but does require some form of output indicator, a milliammeter, and an absorption wavemeter/g.d.o. covering 30 to 80 MHz. A circuit of a suitable output indicator is given in Fig. 10. It consists of a 47 ohm load resistor, a germanium diode such as an OA91 and a voltmeter. Assuming an output of 100 mW. from the exciter, the rectified d.c. will be about 2¼ volts. If the indicator is used to set up the driver and p.a. stages then voltages of respectively 7-8 and 20-25 will be encountered.

A carbon resistor must be used and not a wire wound one. A one watt resistor is suitable for the exciter (and even possibly for the driver), but the best overall solution is to parallel ten 470 ohm one watt resistors to give a power handling capacity of ten watts. The indicator can then be used for the p.a. as well. Keep all connections as short as possible.

Bear in mind that the above indicator is just that. If a proper measuring power meter is required then a kit of parts for a fully shielded, two range (0-5 and 0-50 watts) power meter put out by Horwood Electronics in Melbourne is recommended. They can also be purchased fully made up and tested from Radio Parts Pty. Ltd. in Melbourne.

The commissioning procedure is as follows. Set the deviation control (TP1) to minimum, i.e. with the slider earthed. Put a dummy load across the output of the exciter. This load may consist simply of a 47 ohm resistor, or the indicator described or a proper 50 ohm power meter. Apply 12 volts through a 0-250 mA. meter. Set TP2 so that the voltage between the collector of the 2N4249 modulator transistor and earth is about 5 volts. TP2 should be about the middle of its range. At this stage the current drawn should be around 20 mA. and the oscillator may or may not be going.

Couple an absorption wavemeter (or g.d.o. in the wavemeter position) to the oscillator collector coil L101 and adjust its core until output on 36 MHz. is obtained. Then set the wavemeter to 72 MHz., couple it to L103 and adjust the cores of L102 and L103 for maximum output. Note that as each of the cores is adjusted, and as output comes up, the total current drawn will increase, each of the MPF121 stages pulling some 20-25 mA. as it comes on to resonance.

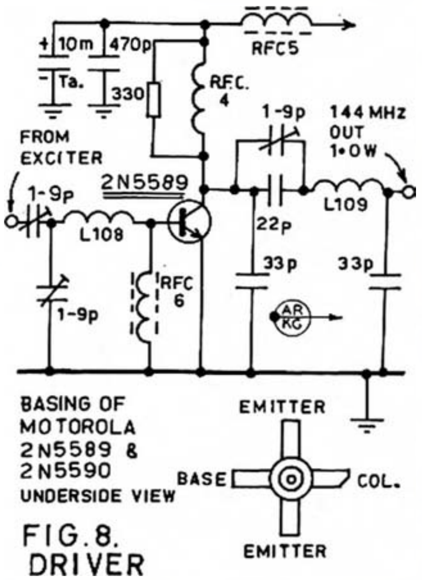


FIG.8.
DRIVER

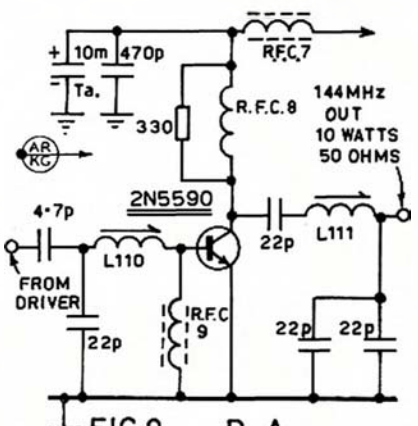


FIG.9. P.A.

Now set the 3-30 pF. output trimmer to about ¼" mesh and adjust the cores of L105, L106, L107 and the output trimmer until some indication of output from the exciter is seen. At this stage go back over all the coils and adjust their cores for maximum indicated output. When on tune, at least 75 mW. at 146 MHz. should be available.

Using a receiver on the appropriate channel as a monitor, the modulator may now be adjusted. Set TP1 to full open (slider at the emitter end), connect the appropriate microphone and, while speaking into the microphone, adjust TP2 for the most intelligible speech in the monitor. Frequency can then be set using the crystal trimmer by zero beating against a station known to be on the correct frequency. The unit may then be put to air for final adjustments to TP1 for deviation, TP2 for speech linearity and the crystal trimmer for frequency, bearing in mind that the last two adjustments interact.

THE DRIVER STAGE

The driver stage uses a Motorola 2N5589 (MM1601) to raise the power level to 1-1½ watts. Fig. 8 gives the appropriate circuit diagram.

Input from the exciter at 50 ohms is matched to the transistor base by the two 1-9 pF. trimmers and L108, while the output impedance is brought up to 50 ohms by means of L109 and its associated capacitors.

A low value resistor is used across the collector choke to reduce Q and inhibit parasitic oscillation. The h.t. supply is decoupled by means of RFC5 and the 470 pF./10 μF. combination.

RFC6 at the base of the transistor consists of a single wire running through a half-inch length of ferrite rod which has high losses at the frequency of operation. Use of high frequency material such as the Neosid F29 slugs used as decoupling devices elsewhere in the design is to be avoided. In the absence of suitable ferrite, a ¼ watt 47 ohm resistor can be substituted with only a small drop in overall efficiency.

The 470 pF. h.t. decoupling capacitor is a normal disc ceramic and the 10 μF. a tantalum, but all other capacitors in the signal circuits are Philips ceramic beads. The trimmers are the Shinmei type previously mentioned.

Setting up is relatively simple. A 50 ohm dummy load is connected to the output and all variable capacitors set to full capacity. Drive is applied from the exciter together with an initial h.t. of 3-4 volts fed in through a 0-500 mA. meter. The input (series) trimmer is reduced in capacity until the current drain begins to rise and output is indicated. All three capacitors are then adjusted for maximum output. The h.t. is then raised to, say, 9 volts and the trimmers adjusted for maximum output. Finally, full h.t. is applied and again the three trimmers adjusted for maximum output.

Note that at full h.t. the 1-9 pF. trimmer between L108 and earth should be between half and full capacity, while the series trimmer should be between half and zero capacity. The current drawn by the driver stage alone should be about 250 mA. Currents grossly in excess of this are an indication either of mistuning or of parasitic oscillation. Power output should be at least 1½ watts.

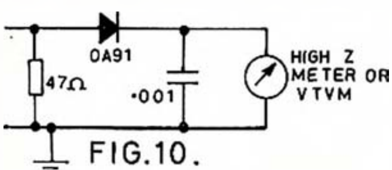


FIG.10.
OUTPUT INDICATOR

THE OUTPUT STAGE

A Motorola 2N5590 (MM1602) is used to raise the output power to the 10 watt level. Note that this is r.f. power output and not d.c. power input.

In most respects the p.a. stage is a copy of the driver stage except that it uses fixed capacities and variable inductance rather than the other way round. All the capacitors except the 470 pF./10 μF. tantalum are Philips beads and two are paralleled at the output to increase the power handling capacity. Note that the normal disc ceramics are not intended to carry large r.f. currents and, if used, will run hot or blow. The "lossy" ferrite RFC technique is again used in the base of the transistor.

Tune up follows the same lines as the driver. The cores of L110 and L111 are set full in, a 50 ohm load connected, drive is applied and a low level of h.t. fed in through a 0-2 amp. meter. The cores of the two coils are adjusted for maximum output. H.t. is then raised in two or three steps to maximum, at each step the coil slugs being adjusted for maximum output consistent with the lowest collector current drain. If, at any time, the collector current rises at a more rapid rate than the r.f. output is rising, then it is possible that the stage is breaking into oscillation or is being mistuned. As a guide, at 10 watts r.f. output and a 13.5 volt rail, the p.a. should draw no more than 1 amp.

COIL DATA

L101—20 turns 26 B. & S. enam., tapped 6 turns, close wound on Neosid 722/1 former, F29 slug.

L102—20 turns 26 B. & S. enam., close wound on Neosid 722/1 former, F29 slug.

L103—10 turns 23 B. & S. enam., tapped 3 turns, close wound on Neosid 722/1 former, F29 slug.

L104—10 turns 23 B. & S. enam., close wound on Neosid 722/1 former, F29 slug.

L105—4¾ turns 18 B. & S. tinned copper, spaced ⅜", tapped 2 turns, on Neosid 722/1 former, F29 slug.

L106—4¾ turns, 18 B. & S. tinned copper, spaced ⅜", on Neosid 722/1 former, F29 slug.

L107—5¼ turns 18 B. & S. tinned copper, spaced ⅜", tapped 2½ turns, on Neosid 722/1 former, F29 slug.

L108 (driver)—4 turns 18 B. & S. tinned copper, air cored, 5/16" i.d., spaced ⅜".

L109 (driver)—5 turns 18 B. & S. tinned copper, air cored, 5/16" i.d., spaced ½".

L110 (p.a.)—1¾ turns 18 B. & S. tinned copper, spaced ⅜", on Neosid 722/1 former, F29 slug.

L111 (p.a.)—3¾ turns 18 B. & S. tinned copper, spaced ⅜", on Neosid 722/1 former, F29 slug.

RFC1, 2, 3, 5, 7, 10—Single wire through F29 slug.

RFC4—6 turns 23 B. & S. enam., close wound on ⅛" i.d., air cored, ¼" long.

RFC6—Single wire through ferrite rod ½" long (or 47 ohm resistor).

RFC8—3 turns 18 B. & S. tinned copper, ⅛" i.d., spaced to occupy ¼" length.

RFC9—Single wire through ferrite rod ½" long (or 33 ohm resistor).

GENERAL

While the designs presented for both the receiver and transmitter are well up with the current state of the art, they are not so far "out" that they are impractical to build because the key components are unobtainable. The two key components in this case are the Toyo 10M-2A-1 filter which is marketed in Australia by Arbor Pty. Ltd., of 282 Bell Street, Coburg, Vic., and the AWM1272 and 1306 which can be obtained from A.W.V. in Sydney. The 455 KHz. i.f. transformers used are "Rapar 6" replacement transformers from Radio Parts Pty. Ltd. in Melbourne (who also stock the Fairchild transistors), while all the Motorola devices (MPF121, 2N5589/90, and the MC1454) are from Total Electronics of 239 Bay Street, Brighton, Vic., 3186. All other "bits" are normal components held by the VK3 W.I.A. new components service at P.O. Box 65, Mt. Waverley, Vic.

At the end of Part One it was stated that boards, diagrams and/or kits would be made available if required. From subsequent correspondence it appears that such requirement exists and, accordingly, work is proceeding to do this. Further details can be obtained from either of the authors.

In conclusion there are a couple of points that may be of interest. It was stated earlier in this article that the MPF121s had been used because of their ability to give excellent waveform. The complete transmitter, running 10 watts into a dummy load, when checked with a Philips v.h.f. sampling c.r.o. showed no sign of sub harmonic content and an excellent waveform, indicating minimal higher order harmonics. Secondly, it should be noted that the driver and p.a. transistors are rated for infinite s.w.r., i.e. they should work into an open circuit or a short circuit. Whilst most definitely not recommended as normal operating procedure, such a specification does much to reduce fears of catastrophic failure of relatively expensive devices due to accidental short or open output conditions.

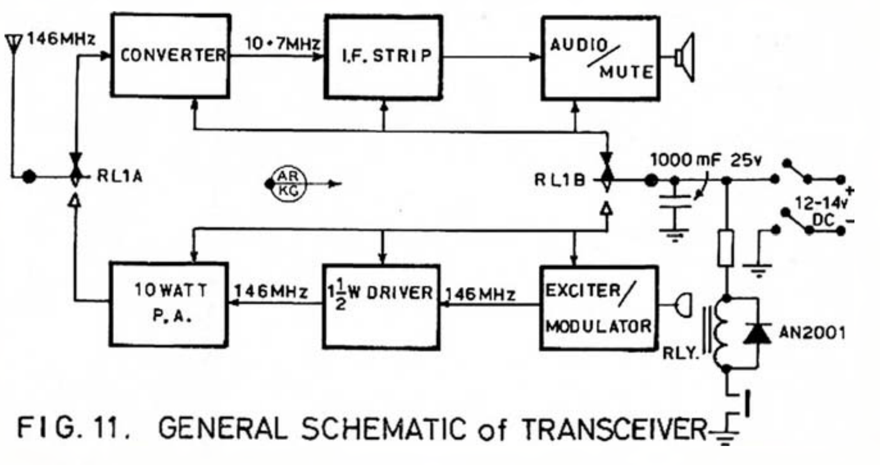


FIG. 11. GENERAL SCHEMATIC of TRANSCEIVER

THE DECIBEL AND DECIBELS V. % DISTORTION

LECTURE NO. 11

C. A. CULLINAN, VK3AXU*

THE DECIBEL

In communications systems it is convenient when making measurements or calculations to express the RATIO between any two amounts of electric or acoustic power in units on a logarithmetic scale.

The DECIBEL (1/10th of the BEL) on the Briggs (Base 10) scale is in almost universal use, although sometimes the NEPER on the Naperian base-e-scale is used.

Because voltage and current are related to power by impedance, both the decibel and the neper can be used to express voltage and current ratios, provided care is taken to account for the impedances associated with them.

In a similar manner, corresponding acoustical powers may be compared.

It must be understood, thoroughly, that both the decibel and the neper are RATIOS and have no meaning unless a reference is stated. For instance, it makes sense if we state that the ratio of one thing to another is 10 to 1, but it is meaningless if we simply state that the ratio is 10, because we no longer have a reference.

In radio work the decibel is used almost exclusively to express ratios and in dealing with Audio Frequency power it is almost universal to use a reference level of 1 milliwatt power in 600 ohms, known as 0 dbm. or zero dbm. In this context 0, or zero, does not mean nothing or nil but the transition between powers less than or greater than 1 milliwatt in 600 ohms (0 dbm.).

The number of decibels (Ndb) corresponding to the ratio between two amounts of power P_1 and P_2 is

$$\text{Ndb} = 10 \log_{10} \frac{P_1}{P_2}$$

when two voltages E_1 and E_2, or two currents I_1 and I_2, operate in the same or equal impedances,

$$\text{Ndb} = 20 \log_{10} \frac{E_1}{E_2}$$

$$\text{and Ndb} = 20 \log_{10} \frac{I_1}{I_2}$$

If E_1 and E_2, or I_1 and I_2, operate in unequal impedances,

Ndb =

$$20 \log_{10} \frac{E_1}{E_2} \pm 10 \log_{10} \frac{Z_1}{Z_2} \pm 10 \log_{10} \frac{K_1}{K_2}$$

and Ndb =

$$20 \log_{10} \frac{I_1}{I_2} + 10 \log_{10} \frac{Z_1}{Z_2} + 10 \log_{10} \frac{K_1}{K_2}$$

where Z_1 and Z_2 are the absolute magnitude of the corresponding impedances and K_1 and K_2 are the values of power factor for the respective impedances.

* 6 Adrian Street, Colac, Vic., 3250.

● Continuing the series of lectures by C. A. Cullinan, VK3AXU, at Broadcast Station 3CS for students studying for a P.M.G. Radio Operator's Certificate.

It will be seen from the above formulae that power, voltage and current ratios may be expressed logarithmically in decibels irrespective of whether the impedances are equal or unequal.

It is possible to convert decibels to nepers and vice-versa.

Multiply decibels by 0.1151 to find nepers.

Multiply nepers by 8.686 to find decibels.

DECIBELS V. % DISTORTION

In its Standards for the Technical Equipment and Operation of Medium Frequency Broadcasting Stations, second edition, 18th June, 1968, the Australian Broadcasting Control Board requires that the harmonic distortion in equipment be expressed in a percentage of the effective value of the fundamental audio frequency voltage and the harmonic voltages present in the output.

However, in recent times there has been a tendency for some authorities and manufacturers of equipment to express harmonic distortion in decibels instead of in percentage, and until one becomes familiar with this it can be very inconvenient.

Therefore a conversion table has been prepared showing the equivalent distortion for a given db. ratio covering 10% to 0.1% distortion.

The full output voltage is the reference of 0 db. = 100%.

Decibels	Distortion %	Decibels	Distortion %
—20	10.000	—41	0.8913
—21	8.913	—42	0.7943
—22	7.943	—43	0.7079
—23	7.079	—44	0.6310
—24	6.310	—45	0.5623
—25	5.623	—46	0.5012
—26	5.012	—47	0.4467
—27	4.467	—48	0.3981
—28	3.981	—49	0.3548
—29	3.548	—50	0.3162
—30	3.162	—51	0.2818
—31	2.818	—52	0.2512
—32	2.512	—53	0.2239
—33	2.239	—54	0.1995
—34	1.995	—55	0.1778
—35	1.778	—56	0.1585
—36	1.585	—57	0.1413
—37	1.413	—58	0.1259
—38	1.259	—59	0.1222
—39	1.222	—60	0.1000
—40	1.000		

A 20W. 576 MHz. VARACTOR MULTIPLIER TRANSMITTER

R. J. HALLIGAN, VK3AOT/T*

After an examination of the theory of varactor frequency multiplication, two practical frequency quadruplers are presented. The first will deliver 10 watts FM/CW at an efficiency of 33%, while the second will deliver 20 watts FM/CW at an efficiency of 50%. Operation with amplitude modulated signals is also possible.

Varactor diodes are a class of semiconductor device intended for power-frequency multiplication at v.h.f. and above. Circuits are characterised by the absence of any d.c. power input, high r.f. output to r.f. input efficiencies, and simple construction. Using varactor techniques powers in excess of 300w. at 100 MHz. and 25w. at 1,000 MHz. have been obtained.

The response of varactor multiplier circuits to amplitude modulated inputs is dependent on the power level, modulation percentage and type of diode. Most designs are capable of providing results acceptable to the Amateur. Some of the more recently developed diodes have been used commercially for the frequency multiplication of television signals, an application requiring a high degree of linearity.

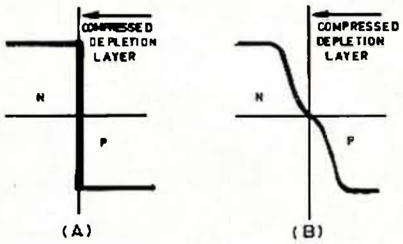


FIG.1. IMPURITY PROFILES FOR—
(A) ABRUPT JUNCTION DIODE
(B) STEP RECOVERY DIODE

Fig. 1.—Comparison of impurity profiles for abrupt junction and step recovery diodes.

* 41 Windsor Avenue, Mt. Waverley, Vic., 3149.

THEORY OF OPERATION

Abrupt Junction Varactors. — Early varactor diodes relied on the capacitance-voltage non-linearity characteristic of an abrupt P-N junction. Such a junction is the result of a constant resistivity profile in both the P and N regions. See Fig. 1. The dependence of capacitance on voltage is given by equation 1.

$$C_J = \frac{C_0}{(1 + V/\phi)^{1/2}} \quad \dots \quad (1)$$

where C_J is the voltage dependent junction capacitance.
C_0 is the capacitance at zero bias.
V is the reverse bias voltage across the varactor.
ϕ is the contact potential, approx. 0.5 for silicon.

In order to ensure high diode 'Q' and therefore good efficiency, series resistance and therefore resistivity must be kept low. However, low resistivity results in low breakdown voltage, giving rise to significant power limitations.

There are also limitations in the response of abrupt junction varactors to amplitude modulated signals. The harmonic generation mechanism as given by equation 1 is voltage dependent, therefore the abrupt junction varactor cannot react to both high and low level signals with the same efficiency. Of greater importance is the variation of varactor capacitance with changes in signal level, leading to circuit detuning during the amplitude modulated cycle. This undesirable level mechanism causes the "switching" commonly seen with varactor multipliers. In some cases the varactor will even act as the active element of a parametric oscillator, with the input signal acting as pump source. When this occurs an unwanted discontinuity or oscillation appears on the amplitude modulated waveform.

Step-Recovery Varactors. — More modern devices are not subject to these power and linearity limitations. These devices are constructed so that the resistivity of the material peaks sharply in the vicinity of the junction (depletion region), but is low elsewhere. A typical impurity profile for this type is also shown in Fig. 1.

The effect of this construction is to reduce the dependence of junction capacitance on voltage so that this is no longer the dominant mechanism for the generation of harmonics. Instead, harmonics are generated by a pulse of reverse current resulting from the return of stored carriers. This is known as the step-recovery effect.

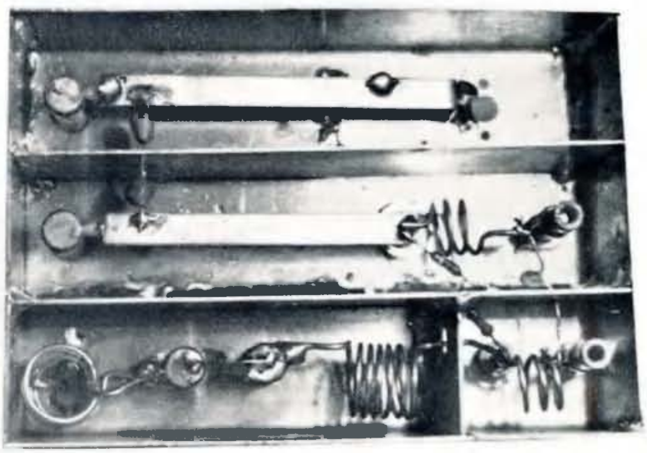
AVAILABLE DIODES

The table lists the characteristics of some varactor diodes which are available. Also listed are some transistors, the collector-base junctions of which can be used for varactor multiplication.

A PRACTICAL 576 MHz. QUADRUPLER

The circuit of a practical quadrupler is shown in Fig. 2. L1-C1 and L2-C2 form a simple double tuned circuit matching network at 144 MHz. Currents at that frequency are caused to flow in D1, which is effectively a capacitor. However, since this capacitance is non-linear, harmonics of 144 MHz. are produced. As is common with

Top view of improved doubler-doubler circuit.



Bottom view of improved doubler-doubler circuit.

harmonic generators, the second harmonic is strongest, with subsequent harmonics progressively diminishing in amplitude. It is quite feasable to simply couple the diode to a tuned circuit at 576 MHz. and extract energy at this frequency. However, because of the small amplitude of the fourth harmonic efficiency would be low.

Efficiency can be improved by the addition of series resonant idler circuits at 288 MHz. (L3-C3) and 432 MHz. (L4-C4). These idlers re-circulate the harmonics, which are mixed with other components or multiplied within the diode, so enhancing 576 MHz. output.

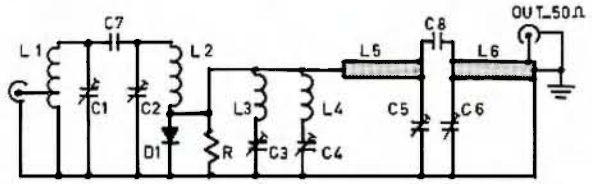


FIG. 2. 144-576 VARACTOR QUADRUPLER

L1—8 turns 18 s.w.g., ½-inch I.d., tapped 1½ turns from cold end, spaced ¾-inch.
L2—6 turns 18 s.w.g., ½-inch I.d., spaced ½-inch.
L3—3 turns 18 s.w.g., 5/16-inch I.d.
L4—1 turn 18 s.w.g., 5/16-inch I.d.
L5—3-inch x 3/16-inch 22 s.w.g. brass strip, ¾-inch above box.
L6—3⅜-inch x 3/16-inch 22 s.w.g. brass strip, ¾-inch above box.

C1 to C6—1 - 6 pF. glass piston or ceramic trimmers (see text).
C7—3.3 pF. ceramic (low voltage adequate).
C8—0.5 pF. ceramic (may be two 1 pF. in series).
D1—See text.
R—33K ohm ½w. (composition or carbon film) for abrupt junction diodes.

Resistor R serves to develop self-bias for the diode. While the varactor is primarily a variable capacitor for harmonic generation, it does conduct at one peak of every cycle. The subsequent d.c. current flow through R establishes a bias point for the diode.

L5-C5 and L6-C6 are resonant at 576 MHz. and attenuate undesired products. The load is tapped onto L6 at a point such as to reflect the optimum load impedance to the diode.

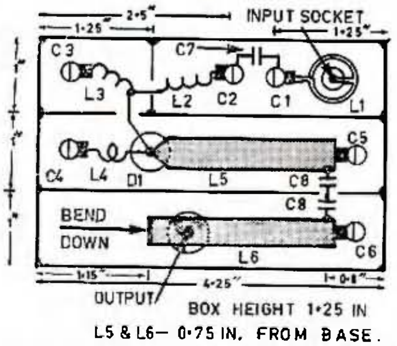


FIG.3. UNDERNEATH LAYOUT—QUADRUPLER

Note: No dimensions are critical, however all joints must be soldered along their full length.

Construction.—The multiplier is constructed in a box of 22 s.w.g. brass, the dimensions of which are given in Fig. 3. The box is first made in the shape of a U and then partitions, coils, tuned lines and finally end plates are soldered on.

Careful consideration must be given to the type of trimmers used. Several types have been evaluated, but the only ones found satisfactory were 6 pF. glass and 8 pF. ceramic tubular types available through a U.S. disposals source.† At 40 watts input, locally available types either caught fire, seized, or shattered.

Alignment.—Connect a 2 metre transmitter of output lower than the rated dissipation of the diode used. It is often unsatisfactory to tune all adjustments for maximum output into a power meter. A better approach is to tune for maximum output at 576 MHz. using a 576 MHz. receiver or a cavity filter and power meter. Best results are achieved using a spectrum analyser.

Performance.—When correctly tuned, the multiplier produced 9w. at 25% efficiency using a 2N3632 transistor collector-base junction as the varactor. Using an MA4060A, 10w. was obtained at 33% efficiency. Diodes similar to the MA4060A are available for US$5.00 from a disposals source.†

† John Meshna, Jnr., P.O. Box 62, E. Lynn., Mass., 01904, U.S.A.

AN IMPROVED 576 MHz. VARACTOR MULTIPLIER

The circuit already described suffers from the disadvantages of difficulty of tuning and poor efficiency. Both of these problems can be overcome by the use of a doubler-doubler arrangement, using two diodes. The circuit is shown in Fig. 4.

This system takes advantage of the increased efficiency of the doubler sections. Each doubler operates at an efficiency of about 70%, giving an overall efficiency of 50%. A further advantage of this design is potentially higher power handling capability, however this could not be realised in the author's multiplier due to voltage breakdown of the piston trimmers above 40 watts input.

Further advantages are simple peak adjustment of all variable capacitors and lower spurious output. On-air tests with 10w. a.m. input revealed no detectable distortion. With 40 watts

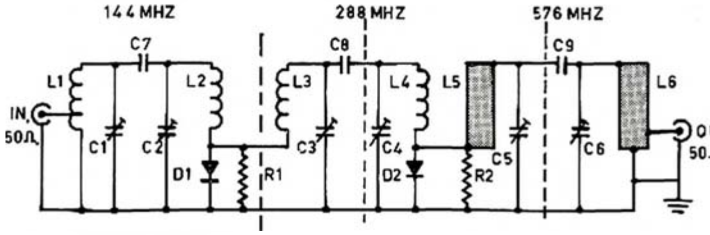


FIG. 4 144—576 MHZ DOUBLER — DOUBLER.

L1—8 turns 18 s.w.g., ½-inch i.d., tapped 1½ turns from cold end, spaced ¾-inch.
L2—6 turns 18 s.w.g., ½-inch i.d., spaced ½-inch.
L3—3 turns 18 s.w.g., 5/16-inch i.d., spaced ⅜-inch.
L4—2¾ turns 18 s.w.g., 5/16-inch i.d., spaced ⅜-inch.
L5—2.15-inch x 3/16-inch 22 s.w.g. brass strip, ¾-inch above box.
L6—2.5-inch x 3/16-inch 22 s.w.g. brass strip, ¾-inch above box.

C1 to C6—1 - 6 pF. glass piston or ceramic trimmers (see text).
C7—3.3 pF. ceramic.
C8—2.2 pF. ceramic.
C9—0.5 pF. ceramic.
D1, D2—MA4060A, BAY96, or similar.
R1—22K ¼w.
R2—56K ¼w.

f.m./c.w. input, 20 watts output was obtained at 576 MHz.

Physical layout of the improved design is given in Fig. 5 and can also be seen from the photographs. Basic dimensions are the same as for the single-diode design.

CONCLUSION

The designs presented provide ready means of generating more c.w. power on 576 MHz. than can be conveniently generated with valves, and with considerably less complexity.

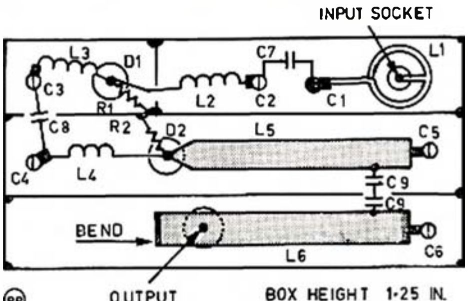


FIG.5 BOTTOM LAYOUT OF DOUBLER- DOUBLER

REFERENCES

(1) Motorola Application Note AN147, "High-Power Varactor Diodes: Theory and Application."

(2) Motorola Application Note AN191, "Varactor Diodes and Circuits for High Power Output and Linear Response."

(3) Turner, R. P., "ABCs of Varactors" (Foulsham-Sams).

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70th ANNIVERSARY OF OLD "CC" TO BE OBSERVED BY W1SS

The year 1971 marks the 70th anniversary of the start of construction of the old "CC"—the original Marconi station on Cape Cod, Massachusetts, where the first wireless messages between England and the United States were exchanged by President Teddy Roosevelt and King Edward VII. of England.

Those stations desiring to work the site of the original Marconi station will find W1SS active on all bands from 160 metres through 2 metres during the DX hours for each band on the last week-end in April. Look for W1SS the Club Station of the Bedford Massachusetts Radio Club on 24th and 25th April, 1971.

Following is a list of the frequencies W1SS will use:—

Band	C.W.	Phone
160 Mx	1.801 MHz.	1.805 MHz.
80 ,,	3.580 ,,	3.935 ,,
40 ,,	7.100 ,,	7.260 ,,
20 ,,	14.050 ,,	14.315 ,,
15 ,,	21.100 ,,	21.375 ,,
10 ,,	28.100 ,,	28.700 ,,
6 ,,		50.200 ,,
2 ,,		145.100 ,,

Type	Source	Input		Output		Efficiency
		Power (Watts)	Frequency (MHz.)	Power (Watts)	Frequency (MHz.)	(Percentage)
BAY66	Mullard	10	500	5	1000	50
BAY96	,,	30	144	20	432	66
MA4060A equiv.*	Surplus	40	144	20	432	50
1N4386	Motorola	147	50	104	100	72
		60	50	39	150	65
1N4387	,,	40	200	22	600	55
1N4388	,,	25	500	15	1000	60
1N5144	,,	5	144	3	432	60
BXY27	Mullard	10	1000	6	2000	60
BXY28	,,	6	2000	3.5	4000	58
2N3632 (C-6)*	Numerous	30	144	10	432	33
PT2163D (C-6)*	T.R.W.	30	144	3.5	432	12
2N4012*	Numerous	25	432	?	1296	?

Table 1.—Some available varactor diodes and transistors which can be used as varactors.

* By measurement.

WINTER V.H.F. AND U.H.F. CONTEST

Editor "A.R.," Dear Sir,

In order to foster an interest in winter time v.h.f. and u.h.f. operating, I am running a Contest for Australian Amateurs on the bands from 52 MHz. and above.

The duration of the Contest is from 0001 hours E.A.S.T., 1st July, 1971, to 2359 hours, 31st July, 1971.

RULES

1. There is only one division—Transmitting, Open.
2. All Australian Amateurs may enter for the Contest whether their stations are fixed, portable or mobile.
3. All Amateur v.h.f. and u.h.f. bands may be used, but cross-band contacts are prohibited. Cross mode contacts will be permitted.
4. Only one contact per band per station is allowed each E.A.S.T. calendar day. Should two or more licensed Amateurs operate any particular station, each will be considered a separate contestant and must submit a separate log under his own call.
5. Entrants must operate within the terms of their licences.
6. **Cyphers.** Before points may be claimed for a contact, serial numbers must be exchanged. The serial numbers of five or six figures will be made up of RS (telephony) or RST (c.w.) report plus three figures, commencing at 001 for the first contact and increasing by one for each successive contact.
7. **Ineligible Contacts:** (a) On the 52 MHz. band, contacts using the mode usually referred to as Sporadic E will be disallowed. The sponsor reserves the right to make decisions in doubtful cases.

(b) Contacts over distances below 50 miles on the bands 52 to 585 MHz. will be disallowed as will contacts below 25 miles on bands 1215 MHz. and above.

(c) Contacts on net frequencies or through repeaters will be disallowed.

8. **Scoring** for all contacts will be based on mileage multiplied by a factor dependent on the band being used, as follows:

Band	Factor
50 MHz.	1
144 ,,	2
432 ,,	3
576 ,,	4
1215 ,, and above	6

Each log entry must show the claimed mileage and score. In the event of two stations disagreeing on the mileage, the average of the two estimates will normally be taken.

9. **Logs.** All logs must contain the following information: Date and Time (E.A.S.T.), Band, Emission and Power, Call Sign, RST/No. Sent, RST/No. Received, Distance, Points Claimed.
10. A trophy will be awarded to the winner, and consolation prizes may be awarded if the number of entries is sufficient or if any contact results in an Australian record being broken.

ADDITIONAL NOTES

Contestants will observe that the scoring table is wholly based on mileage, including 6 metres. This has been made possible by the disqualification of "Sporadic E" contacts which only occur infrequently at this time of the year. It was felt that this type of contact does not reflect the operator's use of "state of the art" equipment and that it was not fair to those Amateurs working with meteor scatter techniques to also allow "Sporadic E" contacts.

The multipliers are based on the capabilities of Australian stations using "state of the art" equipment or techniques and are in roughly inverse proportion to the distances which can currently be expected at that time of the year on each band.

The minimum distances are based on the normal maximum range of beginner type stations running 10 watts output to relatively small (by today's standards) antennas, except on 1215 MHz. where 2 watts output is considered more realistic.

References:—

(1) D. W. Bray, K2LMG, "A Method for Determining V.H.F. Station Capabilities," "QST," Nov. 1961, pp. 36-41.

(2) W. Smith, W1DVE, "'Closed' Band DX on 50 Mc.," "QST," May 1967, pp. 74-78.

(3) E. Jamieson, VK5LP, "Meteor Scatter Operations," "A.R.," Oct. 1970, p. 24.

Entries to the above Contest should be sent to:—

D. D. TANNER,
LYE & DIXON ROAD,
RIPPLEBROOK, VIC., 3818.

to be posted not later than 31st August, 1971.

Yours faithfully,
D. D. Tanner, VK8AU.

PRACTICAL VXO DESIGN*

An Interesting Approach to Frequency Stability in Oscillator Circuits

GUS GERKE, K6BIJ

You're on the air having an enjoyable conversation. You switch over to the other station and the fellow says, "Sorry, missed most of that. Someone drifted onto your frequency." Sound familiar? The "someone" is usually a combination of unstable v.f.o.'s and receiver drift.

The drifting signals one hears today suggest that v.f.o. stability is not really as good as claimed by equipment manufacturers and authors of v.f.o. articles in the Amateur magazines. The best answer I've found to this problem is the variable-frequency crystal oscillator, or vxo.

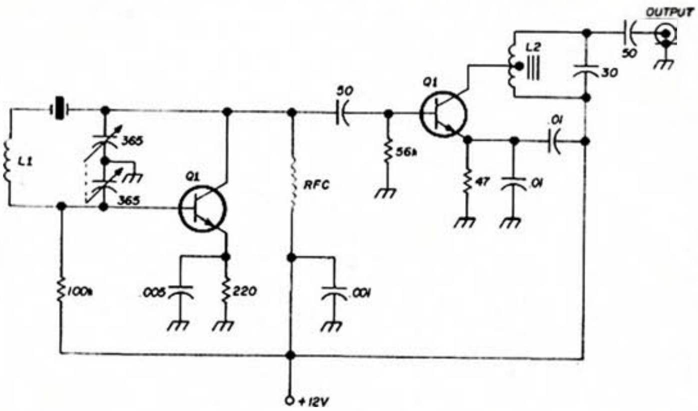


Fig. 1.

Circuit described in Reference 1. An excursion of 4-5 KHz. is claimed for an 8 MHz. crystal.

L1—16-24 uH. for 8-9 MHz. crystal.

L2—40 turns of No. 36 gauge wire, tapped at 16 turns.

Q1—2N706, 2N2219, 2N3662 or R.C.A. 40237.

The vxo circuits described in this article combine the flexibility (within limits) of a v.f.o. with the inherent stability of crystal frequency control. Frequency can be varied between 2 to 720 KHz., depending on the crystal frequency and other considerations, which I'll discuss. Many Amateurs I have talked to never heard of varying a crystal's frequency over such a wide range.

Very little information has been written about the vxo. One article[1] describes a circuit that can pull down the frequency of an 8 MHz. crystal about 4-5 KHz. before the circuit becomes "a rather inferior v.f.o.". With this circuit (Fig. 1) as a starting point, I designed the circuits of Figs. 2 and 3, using FT-241 crystals in the 450 KHz. region and the circuit of Fig. 4 using 3.5 - 8.5 MHz. crystals.

CIRCUIT DEVELOPMENT

The vxo shown in Fig. 2 is a modification I made to a BC604 f.m. tank transmitter. The vxo output goes through a stage of amplification and several frequency multipliers to obtain output on 21 MHz. I have used this vxo on 7 and 21 MHz. c.w. with excellent results. The circuit has also been used to operate a 2 metre transmitter. Eight crystals were needed to cover the entire 2 metre band.

The only addition to the BC604 was L1, C1. Capacitor C1 is used to pad the crystal frequency over a certain range, in this case 2 KHz. With an increase in padding range, the effects of temperature, vibration, and hand capacitance become more pronounced; and the same precautions in building v.f.o's must be used. These effects are small, however, and the crystal is still the frequency-controlling element. If you don't exceed the padding range, the vxo won't become an "inferior v.f.o."

The circuit of Fig. 3 seems to work well with the same low-frequency crystals used in the vxo of Fig. 2. The solid state version shown was also used with the BC604. Since the crystals furnished with the BC604 are less than 2 KHz. apart, continuous coverage to the next lower-frequency crystal is possible. Stable 2 KHz. padding was obtained with the circuit of Fig. 3.

A transistor vxo that produces stable 50 KHz. padding is shown in Fig. 4. This vxo can also be used with a crystal in the 8 MHz. region for 6 or 2 metre operation. Doubling will produce a padding range of 100 KHz. on 14 MHz., 150 KHz. on 21 MHz., with tripling, and 200 KHz. on 28 MHz. with quadrupling. To cover the entire 2 metre band, you'll need eight crystals (500 KHz. padding range).

Fig. 2.—Oscillator modification made to a BC604 transmitter using low-frequency crystal.

C1—Broadcast radio variable with both sections in parallel.

L1—Broadcast variloopstick antenna or similar.

Table 1 gives recommended padding ranges for the FT-241 crystals when used in the circuits of Figs. 1 through 3. If you are interested in a particular frequency range (as for net operation), try to use a crystal that will cover the first 25 per cent. of the padding range —then you'll have crystal stability.

The transistor circuits will start oscillating with 2.4v.; for more output, up to 12v. can be used. Unless followed by a frequency-multiplier, a buffer amplifier will be needed, as in Fig. 1.

FT-241 Crystal (MHz.)	Fig. 1 (MHz.)	Figs. 2 and 3 (MHz.)
0.45 (fundamental)	0.20	2.00
4.00 (9th harmonic)	2.00	20.00
8.00 (18th harmonic)	4.00	40.00
144.00 (324th harmonic)	72.00	720.00

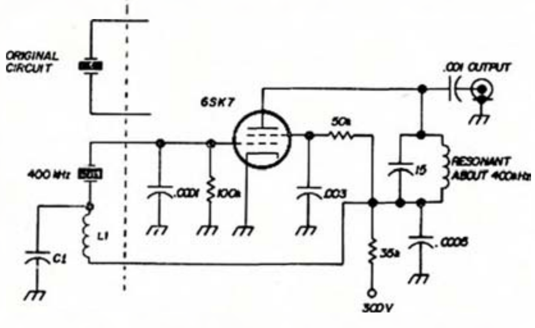
Table 1.—Padding ranges.

A VXO FOR EXCITER USE

Suppose you want to design a vxo covering the entire 40 metre band and you have an exciter such as the Central Eletctronics 20A using a 9 MHz. crystal.

Higher than 9 MHz. injection frequency is preferred to avoid unwanted mixer products. Therefore the injection frequency will be from 7 + 9 = 16 MHz. to 7.3 + 9 = 16.3 MHz. Crystals in this range are overtone types and won't operate in these circuits. The solution is to use an 8.150 MHz. crystal and operate it on its second harmonic, 16.3 MHz. Padding 50 KHz. on the crystal fundamental frequency will produce 100 KHz. shift in the output. This will give you full coverage of the 7 MHz. phone band. An 8.1 MHz. crystal will cover the next 100 KHz., and another crystal at 8.05 MHz. will extend coverage to 7 MHz.

Crystals with frequencies of 8.125 and 8.075 MHz. will be useful if you want extra stability and don't wish to pad more than 50 KHz. on harmonics



* Reprinted from "Ham Radio," August 1970.

(25 KHz. on the fundamental). These crystals are also useful for 2 metre work.

TUNING CAPACITOR CONSIDERATIONS

Referring to Fig. 5, capacitor C1 is used to bring the crystal frequency within the range of C2. Both capacitors should have a straight-line frequency response as a function of angle of rotation of the rotor plates. This capacitor characteristic is important for vxo calibration and tuning. For example, the tuning capacitors shown in the circuits of Figs. 1 through 4 are common broadcast-band variables. When these are used, frequency decreases slowly at first as the capacitor rotor is turned. Then the frequency change becomes faster, until finally a hairline change in rotor position will produce a 1 KHz. jump. This, of course, is very inconvenient at the lower frequencies. The sketch of Fig. 6 illustrates the geometrical relationship of the stator plates in these two versions of variable capacitors.

In the circuit of Fig. 5, capacitor C2 should be of good quality, otherwise contact-scraping noise will be heard in the receiver; small jumps in frequency may also occur. A capacitor with an insulated rotor is recommended for C2.

CIRCUIT DESCRIPTION

The purpose of R1 in Fig. 5 is to lower the Q of L1. This allows a larger padding range and more stable operation near the low end of the range. If the frequency changes when touching the r.f. choke, the choke is too small. Resistor R2 prevents oscillation at the r.f.-choke resonant frequency.

Use a two-section b.c. variable capacitor to find the exact value of C3 and C4. Then replace the b.c. capacitor with two silver micas. A value of 200 pF. seems right for the circuit.

Battery voltage may be 2.4-12 volts. Higher voltage may result in drift due to heating. I use 6 volts in my vxo.

As far I know, the vxo designs described in this article have never been published before. The circuit for the 20A exciter has been used on 40 and 15 metres in both the c.w. and s.s.b. mode. All reports were crystal quality, and all operators asked for the circuit diagrams; so I've presented them here to share with others. My old v.f.o. has since drifted into the junk box.

REFERENCE

1. J. R. Fisk, W1DTY, "73 Useful Transistor Circuits," "73," March 1967.

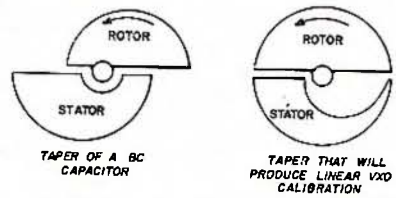


Fig. 6.—Mechanical configuration of straight-line wavelength capacitor used for b.c. band and a straight-line frequency capacitor.

☆

DX NEWS

It will be noticed that there are no DX notes in this issue. The following letter was received from the DX Editor and it is regretted that NO items of news were received from VK AMATEURS. If this DX page is wanted by readers, more co-operation will be necessary.—Editor.

Editor "A.R.," Dear Sir,

I am afraid we shall have to give the DX page a miss this month. The absence of news from England due to the mail strike has upset the work and only one bulletin has arrived from the U.S.

There has NOT been one item of news from VK this month, and with nil coming in, I guess I can't get anything out.

I hope to have a full page for the following month as I have arranged a fresh source from the States. 73,

—Don Grantley.

☆

EXPEDITION TO LACCADIVE GROUP OF ISLANDS

The Amateur Radio Society of India has sponsored a team headed by Lt. General K. Umrao Singh, VU2US, to visit the Laccadive group of Islands and operate an Amateur station for ten days covering two consecutive week-ends in April 1971. Details are given below:

Operation is expected to start on Saturday, 10th April, 1971, ending on Monday, 19th April, 1971.

Frequencies: 14 MHz. consistently, optional 21 and 28 MHz., both on c.w. and s.s.b.

The rig to be used: 150 watts p.e.p. The call sign will be VU7US.

Operators in the party will include VU2CK, VU2QM, VU2HV, VU2KM and VU2RK.

QSL address: Strictly via A.R.S.I., P.O. Box 534, New Delhi-1, India.

Note.—All QSL cards will be posted to the I.A.R.U. QSL Bureaus by the A.R.S.I. and no string is attached in any shape whatsoever. QSL cards accompanied by IRCs will be mailed accordingly from the A.R.S.I. Enclosing cash currency in envelope is illegal and forbidden according to the country's regulations.

CHANGE OF ADDRESS

W.I.A. members are requested to promptly notify any change of address to their Divisional Secretary —not direct to "Amateur Radio".

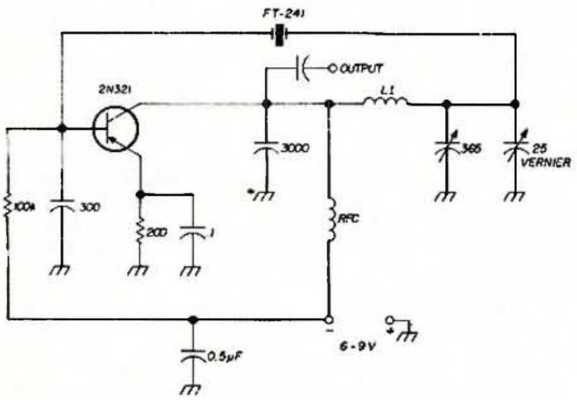


Fig. 3.

Solid state version of the vxo in Fig. 2.

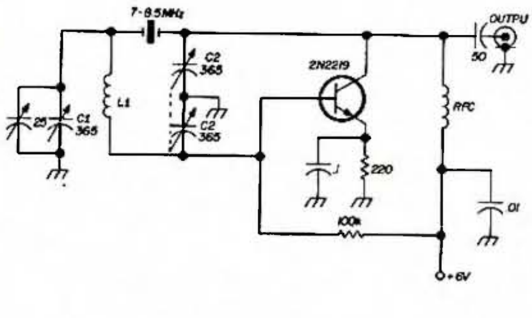


Fig. 4.—Solid state vxo that produces stable 50 KHz. padding on 7 MHz. It can be used for 6 or 2 metres also.

L1—40 turns of No. 32 gauge wire close-wound on ⅜-inch slug-tuned coil former.

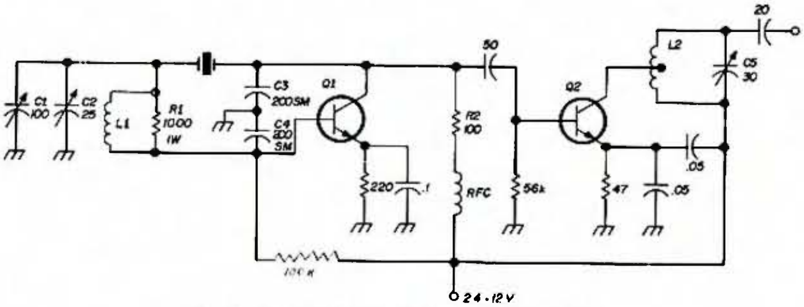


Fig. 5.—Vxo-doubler circuit for a typical exciter. Three crystals are required for full coverage of the U.S. 40 metre band.

Overseas Magazine Review

Compiled by Syd Clark, VK3ASC and R. L. Gunther, VK7RG

"HAM RADIO MAGAZINE"

November 1970—

Editorial.—Concerning the new IC, the Signetics N565 monolithic phase-locked loop, a truly remarkable device which can be used for synchronous detection, frequency multiplication or division, f.m. demodulation, and much else; six pages of data and applications (from the manufacturer).

Solid State 1296 MHz. Converter, by VK4ZT. Appeared originally in "A.R."

How to use the Smith Chart, by Jim Fisk.—This is the first time this odd device has made sense to me. Must-reading for any serious Amateur.

Injection Laser Experiments.—Lovely for modulated-light enthusiasts.

Frequency Spotter for General Coverage Receivers.—Simply a transistor crystal oscillator for a 1 MHz. crystal.

Radio Teletype using S.S.B. Transceivers.

Auxiliary Receiver for 160 Metres.—Raise the maximum frequency of an ordinary b.c. or car receiver.

A Counter Gating Source.—Using the mains frequency as a gate for frequency counters.

Voltage Regulation using the R.C.A. CA-3055 IC.—Very versatile and impressive.

Linear V.H.F. Tank Circuits.—The design of linear single ended v.h.f. tanks using quarter wave transmission lines on 2 metres.

Printed Circuit Boards without Printing.—The old trick of removing copper from a board by use of an engraving or dentist's drill. (Ferric chloride is much easier! If you find it difficult to apply "resist", simply use black felt-tip pen ["Texta-color" or equivalent], wash off with acetone after etching.) But his idea is good, of removing only the copper in insulating paths, leaving most of it on the board for low inductance and shielding.

A Simple Test Set for Transistors and Diodes.—Uses a couple of diodes and lamps. Not very good. You can accomplish as much by judicious use of an ohmmeter (but not on its lowest ohm scale).

December 1970—

As usual the decimal points in the diagrams are becoming vanishingly small, and can cause real (and dangerous) confusion. One hopes that this problem will be solved by the Editor at an early opportunity.

A Filter-Type S.S.B. Generator, W9KIT. Another one, transistorised. The balanced modulator and filter certainly seems a simple way to do it. The concluding statement is impeccable: "Why not try a little construction? There's nothing to compare with the satisfaction gained in creating something worthwhile"!

Noise, Radio Frequency Interference, W1DTY. The usual noise sources and their cures (at the source), with a special word about fluorescent lights: chokes as big as 2.5 mH are needed. In general, a good earth is essential—generally not the one provided by the mains, at least in Australia.

The R.F. Bridge, WB2EGZ. Very good. Same as the "Antenna Noise Bridge" described in "H.R." in 2/70, and in "QST" of 12/67, and put to good use by E. Noll (W3FQJ) in his interesting series on antenna construction, published by Sams. People still persist in using simple v.s.w.r. bridges even though they solve little and can mislead greatly. The balanced r.f. noise bridge is much the superior, is not much more complicated, and is well described in this, the most useful constructional article in this issue of "H.R."

Avalanche Transistor Circuits, W4NVK. Quite ordinary transistors can be made to show astounding frequency response and peak power when operated in the avalanche mode (though this will not work with some of the older types having low avalanche voltages). Example, a 50 mW. unit can produce 100 W. peaks with a 1-2 nsec. rise time! To produce avalanche, merely apply some 200 V. to a transistor in common-emitter mode through a large resistor and drive the base over the conduction threshold at say 10 MHz.; if the driving signal is tuned to WWV it will determine the accuracy of all of the harmonics to some 1000 MHz., obtained from the avalanche unit. A 5 KHz. drive gives S9 signals to 30 MHz.! Avalanche can be generated at low voltages simply by turning the transistor upside down. Most interesting.

Low-Power Transmitter and Indicating Wavemeter, W6NIF. A keyed one-transistor oscillator plus diode detector with amp.

A Synchronous-Phase AFSK Oscillator for RTTY, W6FOO. The generation of pure sines to encode s.s.b. transceivers for r.t.t.y.

Identifying Unknown Transistors, W2FPP. The usual ohmmeter tests, but don't use the ohmmeter on the lowest range if it passes substantial current. Amplification and Beta are tested by substitution into an R/C oscillator or an amplifier, but in my opinion it's easier to use the ordinary bias-shift method (e.g. "A.R." 12/66, "HR" 3/68, 8/68). The most useful suggestion he gives is to test r.f. performance in a crystal oscillator; see also "Break-In" 3/68.

Harmonics, Distortion and Splatter, K5LLI. See the better series being run currently in "A.R." (Or at least recently, if it has terminated when this appears.)

Improved Super-regenerative Receiver, by JA1BHG. Not surprisingly, transistor action in this oscillator is improved by suitable impedance matching, e.g. tapping collector and emitter on the tank coil. A diode across the emitter tap reduces hangover (see "H.R." 11/68), but in my opinion you still need an r.f. amp. to reduce the radiation. And selectivity is still very broad. Scope for application of the simple super-regen. is, alas, becoming ever more restricted on the fecund amateur spectra.

A Flexible Voltage-Regulated Power Supply, W9SEK. Uses an IC with ten connections. The current-limiting resistor is on the wrong side; should be on the supply side, not in the feedback loop on the load side! This article is needlessly uninformative.

The Ham Notebook (Letters): Resistors can be frequency sensitive above 10 MHz. or so; also good piece about this in late 1970 issue of "Spectrum" (N.Z.) Beware.

A WWV (or Lyndhurst) converter can be made to cover Amateur bands by beating WWV against a suitable crystal.

Vackar (and other) oscillators will oscillate better on low d.c. voltages if the load resistor is replaced by a choke (but beware of spurious resonances).

A pi-net can be used to match indoor antennas to commercial rigs; what won't they think of next!

An f.m. deviation-indicator can be made simply by tuning one receiver 15 KHz. (etc.) away from another, and feeding both into a discriminator feeding a c.r.o.; ingenious.

An argument over whether an inverted vee has a higher or lower resonant frequency compared to a dipole. It appears to depend on the height of the ends of the vee above the ground, the electrical length decreasing as the antenna becomes lower.

Another correspondent (as well as an author) has triumphantly discovered that shorting out a portion of a tuner coil will absorb r.f. power. One wonders whether people bother to learn basic circuit theory nowadays before obtaining an Amateur licence; the phenomenon is hardly restricted to the Yankee nation.

January 1971—

Editorial: An American group plans to send "Moonray" up with some manned Apollo flight to the moon. This packet will contain a sensitive low-noise rx tuned to 439.9 MHz., a signal processor, and identifier, six to eight channels of telemetry, and transmitter output on 430.1 MHz., as well as a laser receiver. Power by nuclear thermoelectric generator, and expectation is that the unit can work continuously for over a year. All you will need to work through this unusual repeater is an antenna of greater than 15 dB. gain capable of tracking the moon, a transmitter of 50w. for c.w. (more for other modes) on 439.9 MHz., and so forth.

The Mainline ST-6 RTTY Demodulator, W6FFC. An ultra-modern r.t.t.y. tuning unit that has the latest in circuit design, virtually the ultimate for radio teletype. Seventeen pages long.

Intermittent Voice Operation of Power Tubes, W6SAI. Eimac have a reputation for publishing sensible literature for Amateurs, and now this authority on such things states in plain language the first really realistic evaluation of valve performance I have seen stated by the electron tube industry. We all know that valves are capable of considerably more performance than appears from their "ratings" and we tend to think that there is really no limit if we can keep the bottle cool enough. But there is, as users of speech compressors have sometimes found to their dismay. W6SAI says it out loud, says why, and what can be done about it. It depends on the Duty Factor, and can be summed up in a new "Intermittent Voice Service" rating. It is essentially defined as maximum voltage and current rating for a signal having a Duty Factor of 0.5 (or less). Eimac, and presumably the other manufacturers too, will be applying the IVS rating to material designed for Amateur use, but there is no reason why we couldn't also establish our own values for IVS rating on other valves used in Amateur practice, such as t.v. line output items, etc.

Modifying the Heath SB-200 Amplifier for the New 8873 Zero-Bias Triode, W6UOV (also of Eimac). This is one of the valves for which Eimac has prepared IVS ratings, and these were discussed in the abovementioned article.

Two Metre F.M. Frequency Meter, WA4JAZ. A highly accurate heterodyne frequency meter giving crystal-controlled frequency markers on 2 metres.

An R.F. Power Amplifier for 200 MHz., WB6DJV. Uses a 7854 valve with very simple construction and high performance. Possible substitute is the 5894, but it could require neutralisation, which it appears the 7854 does not, if good geometry is employed. D.c. input about 50w.

Inexpensive S.W.R. Indicator, WB2GQY. Wind about 9 turns of wire to ¾-inch diam., connect to diode, condenser, and meter in the usual detector circuit. Slip the coil over the transmission line or co-ax., run back and forth to determine strengths of loops and nulls. Is somewhat better than the usual in-line v.s.w.r bridge in that it can also indicate match of the antenna to the line as well as match of the transmitter to the line, etc. But an r.f. noise bridge and explicit antenna coupler are better; see last month's "H.R." And I do disagree strongly with this author who says "(a matching device at the transmitter) involves added expense, so the average ham [sic] uses the cut-and-try approach until the transmission line electrical length is close to a half-wavelength or multiple . . . When this condition is met, the transmitter will load properly." Aside from the fact that this will only apply if the antenna is matched by the line, it ought be now to be common knowledge that a suitable matching coupler is desirable to effect good tx-line matching with minimum difficulty and with inherent harmonic reduction. How the use of a coupler could be harder than cutting lengths of line, is a mystery; that it is more "expensive" is a stupid argument for patently obvious reasons. And on top of all of this, Carl Drumeller, W5JJ, has published ample material in "Ham Radio," "73" and "E.E.B." to show that on one hand a coupler is virtually necessary for the commercial transmitters now in such common use, and on the other hand, that v.s.w.r. up to about 4:1 is relatively harmless at ordinary h.f. Isn't it time that Amateurs woke up to the more obvious aspects of v.s.w.r. matching, and coupling?

Fire Protection in the Ham [sic] Shack, Darr and James. Use fuses of the right size: both current and voltage rating. Mains sockets (and plugs) should have clean contacts, particularly a problem in old houses; house wiring should be adequate. His suggestion is excellent that a special mains line should be run to the radio room, and provide plenty of outlets. This is a vitally important subject, often overlooked.

MOSFET Converter for Receiver Instrumentation, WA9ZMT. Uses a 3N159, feeds a c.r.o. to monitor the i.f. passband of a receiver.

A Simple C.W. Monitor, WA9OHR. Two transistors of opposite polarity connected in the regenerative feedback mode, powered from the keyer. Simple indeed.

The Ham Notebook (Letters): An ohmmeter can be used to find the sensitivity of an unknown meter. Only practical with v.t.v.m. For the calculations involved, it is just as simple to use a handy dry cell and a few resistors.

A wire coat hanger can be made into a long screwdriver, when needed for adjustments in difficult places.

Sensitvity and stability of the 75A-4 receiver can be improved. Mostly by replacing leaky condensers; in any old receiver it is a good idea to replace all condensers on principle.

"RADIO COMMUNICATION"

October 1970—

The G8ARV Two Metre Portable Receiver. All solid state FET front-end into a tunable 22.5-24.5 MHz. i.f. and thence into a 10.7 MHz. i.f. filter, etc.

Loft Aerials. GM4QK describes means of being an active Amateur without shouting it to the neighbours.

An Automatic Rotator, G8CXV. Some "junk" and lots of ingenuity and now set and forget.

A Simple Transistor Tester. G3NUQ describes a simple test set we could all make and use.

Technical Topics. G3VA continues his review of the happenings in Radio. "Solid State Receiver Design" by W0IYH and many more. A warning is sounded against the constant use of disc ceramic capacitors as "decouplers" without checking that they are doing the desired job. Seems some of them resonate as low as 23 MHz.

November 1970—

Current Comment concerns itself with the need of the R.S.G.B. to increase subs to £4 ($A8.60). Inflation is no respecter of countries.

Parasitic Oscillations in V.h.f. Power Amplifiers. G. S. M. Teale. Reprinted from "Mullard Technical Publications". Solid state circuits are under discussion.

An R.F. Indicator for the Blind. G2TA. An aid for those without sight.

A Compact 150W. Amplifier for 144 MHz., G6JP. A 4CX250B in a grounded cathode circuit.

A Simple 3 CM. Polaplexer. G3EEZ. The klystron used is a 2K25 or 723A/B.

The G3XGP Vackar Oscillator. Various circuit configurations are discussed. The author claims there is little to choose between them.

A Portable C.W. Transceiver for 3.5 MHz., G3EJF. 2N708, 2N708, ECF82, 5763 in the tx, and 2N3819 diode ring modulator, BC169, BC-169, BC169, 2N708 is the receiver line-up.

Technical Topics. G3VA. Pat Hawker discusses the latest information to appear in the various journals which are available to him. His "TT" is much lengthier than this review and is virtually a precis of the technical articles Pat considers worthy of his attention. This month is devoted to Direct Conversion, d.c./d.c. converters and co-axial reed relays amongst others.

December 1970—

A 1-10-100 KHz. Calibrator. G3UCM. The article enlightens the reader somewhat more than the title for what the author really means is that this calibrator provides signals at intervals of 1, 10, and 100 KHz. to 30 MHz. at least.

Obtaining Deviation. G3EDD. F.m. or p.m., valve or transistor.

Flare Spot. Part 1, Crime Wave. G3BGL tells a radio-detective story in three parts.

Technical Topics. G3VA. K2QBW multi-band aerial, base-fed verticals, loft loop aerial, sites—how much do they differ, solid state superhet. ideas, two-stub notch filters for t.v.i., how do you tune a toroid? (see p.835), r.f. power transistors and broadband amplifiers, audio filters, simple linear time base.

Modifications to the HW-100, SB-100 and the SB101.

"SHORTWAVE MAGAZINE"

October 1970—

Getting on VFO for the VHF/UHF. G2JF. A valve type v.f.o./driver system beginning with a v.f.o. on 3.42-4.422 MHz., using the familiar Clapp oscillator circuit. A system of heterodyning the v.f.o. second harmonic on about 7 MHz. with a signal of 152 MHz. from a multiplier chain is used to provide output on 145 MHz.

Good or Bad Reflections. G3TMG. A critique of the article by VK1AU which was published in "S.W. Mag.," August 1970.

Varactor Diode Circuits. G3TNX. Theoretical considerations and some practical circuitry.

VFO TX for Twenty. G3HHV. Describes an experimental QRP rig which can be duplicated at low cost. Final is two BFY51 transistors into a pi network which cost the author 30/- (in U.K.) and gave 160 QSOs in 42 countries over a few weeks.

Design of Linear Amplifiers. G6HL. A discussion of the use of 4CX/250 and 4CX/350 types for h.f. and v.h.f. work.

"73 MAGAZINE"

November 1970—

Differential JFET Pre-amplifier.—A highly commendable endeavour to use discrete components to achieve superior results by borrowing from IC technology.

Remote Quad Tuning.—An ingenious arrangement is employed to allow reflector stub tuning directly at the operator's position, by bringing the reflector termination down to a tuning capacitor via a feed line.

2 Watt 6 Metre Transmitter using the Heterodyne V.F.O.—Instead of the crystal-heterodyne-v.f.o. (which appeared in a previous "73") you can feed any source of 120 mW. 50 MHz. to drive this simple but effective common-emitter class C r.f. amplifier to 1 watt output.

Semiautomatic F.M. Channel Scanning.—Oscillator frequency is switched automatically between two channels, by use of a "flasher" module, a simple multivibrator which drives transistors at the oscillator cathodes.

Low Cost Automatic Keyer.—Another one, using only five transistors.

A.C. Switching with Self-Powered ICs.—R.C.A's CA3059 allows turning a Triac on and off by switching only when the a.c. voltage passes through zero.

Pioneer Radio on the Prairie.—Rather interesting tale of the activities of E. E. Krebsbach, 45 years ago.

The SST-1: Solid State Transceiver for 40 Metres.—The receiver follows the May 1969 "QST" design of a direct conversion design using an R.C.A. IC.

A Low-Cost R.F. Wattmeter.—The usual diode probe r.f. voltmeter.

Calibrate That Calibrator.—Beat the calibrator against WWV (or Lyndhurst), and adjust "crystal tune" until the S meter stops pulsing. Allows sub-sonic zeroing, with b.f.o. off.

Study Guide; General Class Licence, Part IV.

A $1.40 Noise Generator.—Back bias a u.h.f. diode to the conduction point through a large resistor. Zeners also work, at lower freq.

(Note.—This magazine commonly contains a large amount of editorialising by various parties, and numerous controversial letters. Although a lot of rubbish is exposed, some cogent points are raised, and if you have a spare hour or two, it can make interesting reading.)

December 1970—

Solid State Exciter. W6YUY. S.s.b. for the home-brewer with plenty of test equipment.

Delta F Solid State Control of S.S.B. Exciters. W4NVK. A varicap vernier frequency control.

A 2 Metre Minimitter for Repeaters. WB6BIH. One watt output, 18 MHz. xtal, 22.5 volt supply.

Receiver Offset Tuning for HW100. WA8EAW. A link coupled remote tuning system for v.f.o.'s.

The Little Gate Dipper. W5ETT. Another simple 1.7 to 225 MHz. g.d.o. with MPF102.

Your Second Linear. W4AYI. Uses 3-500Z.

General Class Study Guide. Part 5. Valves.

Yipes It Talks. W2FEZ. Make your own electrostatic loudspeaker out of a newspaper.

Transistor Test. WB6QQP. A very simple Beta, leakage, shorts tester.

Two-Terminal Current Limiter. Gerald Beene. A two-legged fuse to protect the three-legged variety.

January, 1971—

The usual editorial tirades, and some interesting notes on how Japanese industry is undermining the manufacturers of commercial amateur equipment. R.I.P. And a number of interesting letters from readers.

LX for Leisure. G3BID. "If you would like a leisurely vacation with a bit of amusing radio operation thrown in, you might consider Luxemburg."

Try DXing the World . . . the Hard Way. K6KA. A magnificent world tour costing "thirteen thousand kilobucks" in which the new and unusual sights included numerous antennas and operating positions.

Split Phones. A DX Operating Aid. GW8PG. GW8PG discovers dual diversity, with headphones. Good idea.

A Special Report; Ham Radio Manufacturing: A Struggle for Survival. W2NSD. The question is: will Amateur Radio survive? "U.S. ham-equipment manufacturers could meet foreign makers head-on in their own territory. . . . V.h.f. f.m. is proving to be a vitally needed shot in the arm for ham [sic] radio."

Heath Tener Modification. K8JLK. A major engineering project; the correct size fuse is obtained automatically when the Heath Tener is installed in the automobile.

Duty Cycle Duty Factor. W2OLU. Good introduction to the concept of duty cycle (percent. of time the key is held down). But unsatisfying. The real implications for the choice of valves or transistors are left unsaid; see "Intermittent Voice Operation of Power Tubes," by W6SAI, in "Ham Radio," 1/71, for the real oil.

Repeater Zero Beater. W1IRH. Monitors the repeater receiver's discriminator voltage during a transmission and stores a voltage in a condenser. When the transmission is completed this voltage is converted to a tone which is transmitted during the repeater's tail period. Interesting idea.

Getting HEP to ICs. Staff. Tips on wiring, soldering, cross references, and simple projects using the Motorola HEP Integrated Circuits.

Voices from the Past. Staff. Quotes from Amateur Radio 50 years ago, Radio 30 years ago, and "73 Amateur Radio" 10 years ago. The goode olde days?

Basics of Surplus F.M., WB2AEB. How to buy your own.

A Parabolic Beam for 10, 15, 20 Metres, by WA2SJZ. Very good. Works on the same principle as the corner reflector, but it's three-dimensional. Uses aluminium tubing and No. 12 wire as support for aluminium sheet metal strips. Works on all three bands, with forward gain from 14 to 25 dB., depending, and 40 dB. F/B. The driven element is any good quality vertical mounted at the centre, and of course the author recommends a commercial unit. But he does not mention the effect of wind in a good blow. I'd use bonded brass flyscreen.

The Galaxy FM210. K2ULR. A 2 mx f.m. transceiver described to be as good as a Jap. unit (my how times have changed!), but costing even less. "And, mind you, the FM210 is all-American, parts and labor." Unless they have a magician in the engineering section, something will have been compromised in this wondrous feat. But it does look quite attractive.

Lightning as it Affects Ham Radio, Patzsch. Very good. Install a suitable safe lightning arrestor on the mains and also run **stranded** down wires (4 gauge!) from the antenna tower on your house, down to a good earth connection on either side of the house. See also "Fire Protection" in Jan. 1971 "Ham Radio."

IC Receiver Accessory, W2EEY. Plugs into a headphone jack, runs a loudspeaker, a.g.c., and tunable a.f. filter. Slight adjustment of the a.g.c. feedback resistors may be necessary, but subsequent models will probably include this inside the IC. A do-it-yourself project.

Inverted Attic Antennas, W2SF. Inverted vee in an attic, uses electrical conduit for elements. Okay with lots of American output power, but house wiring can absorb energy when efficiency matters.

Double-Balanced Mixers, K3PUR. A survey of different types. The transistor double-balanced mixer looks interesting and requires no balanced transformers.

Quick and Permanent Tool Marker, K5JKX. 24v. through the tip of a draughtsman's pencil. But it's easier if you connect to the lead at the other end of the pencil—as long as current doesn't flow too long at a time! Also works if you use any piece of sharp metal as electrified scribe, but control is a bit harder.

A New Start from Washington, W8GI. A bitter attack on A.R.R.L. and its Establishment. We can be truly grateful that the problems of the W.I.A. are as tractable as they are!

Amateur Radio Licence Study Guide, Staff. With such a comprehensive list of requisite technical subjects as are presented here, it does seem rather a pity that so many of the licensees are destined to apply their knowledge to assembling commercial plugs, IC and antennas.

FEEDBACK

I am indebted to Ron VK3OM for pointing out that my remark in the review published in "A.R." Jan. 1971 in relation to an article in the Oct. 1970 issue of "QST" titled, "An External VFO for the SB100 Transceiver" was incorrect. I was thinking of the Sideband Electronics Raytheon solid state transceivers SB-33 and SB-34. These transceivers were designed to cover quite a small segment of the Amateur bands as "standard".—VK3ASC.

☆

HY-Q ELECTRONICS EXPAND

Hy-Q Electronics Pty. Ltd., Australia's leading quartz crystal manufacturers, have announced that, as a result of ever increasing demands for their products from Australian and overseas users, a major expansion of their production has been necessary.

Hy-Q have recently completed the construction of a modern, fully air conditioned plant located at 1 Rosella St., Frankston, Vic., devoted entirely to the production of quartz crystals and related frequency control products which has tripled the company's previous production capacity.

The new plant has been equipped throughout with the most modern crystal production and testing apparatus including equipment for full scale production of cold weld crystals.

The new facility includes a separate, fully equipped, rush order production unit to provide emergency service without disrupting normal production.

The company's original factory at 10-12 Rosella Street is being converted to provide fully air conditioned development laboratories, engineering shops and office facilities.

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W.I.A. V.H.F.C.C.

New Member:

Cert. No.	Call	Confirmations 52 MHz.	Confirmations 144 MHz.
78	VK4ZJB	120	—

SOME N.Z.A.R.T. AWARDS

AUCKLAND BRANCH CERTIFICATE

Send list of 15 members of Auckland Branch worked since 1st January, 1957, to ZL1TB—no charge.

MANAWATU AWARD

Send list of five stations contacted in the Manawatu area (city of Palmerston North) to ZL2AFT, 431 Albert St., Palmerston North.

CHRISTCHURCH AWARD

Send certified list as follows: ZL 15 stations; VK 10 stations; rest of world 5 stations, with equivalent of U.S. $1 to Awards Custodian, Box 1733, Christchurch, N.Z.

AUCKLAND REGIONAL AWARD

For contacts with the A.R.A. area—viz. Rodney, Franklin, Waitemata counties and all cities and boroughs within these as follows: 1, working 25 areas (stations outside N.Z. 15 areas); 2, working 45 areas (30 areas); 3, working 60 areas (45 areas); with Special Classes as follows: Auckland City and Central Boroughs, 30 areas; Northern and Western Districts, 15; Southern Districts, 15. A special checking list is obligatory (3 for 5 cents), available from ZL1QW, New North Rd., Mt. Albert, Auckland, to whom all enquiries should be addressed.

W.A.P.—WORKED ALL PACIFIC

Available in "Phone/C.w." and "Phone only" catagories. Requires thirty confirmations from:

CR8/10—Port. Timor	VK0—Macquarie Is.
DU—Philippines	VK9—New Guinea
FB8—Adelie Land	VK9—Norfolk Is.
FK8—New Caledonia	VK9—Papua
FO8—Fr. Oceania	VK9—Christmas Is.
FW8—Wallis Is.	VK9—Cocos Is.
FU8/YJ—New Hebr.	VR1—Gilbert Is.
KB6—Baker, Howland	VR1—Ellice Is.
KC6—Carolines	VR1—Br. Phoenix Is.
KC6—Palau (W. Car.)	VR2—Fiji
KG6—Marianas	VR3—Fanning Is.
KG6I—Iwo Jima	VR4—Solomon Is.
KG6—Marcus	VR5—Tonga
KH6—Hawaiian Is.	VR6—Pitcairn Is.
KJ6—Johnston Is.	VS4—Sarawak
KM6—Midway Is.	VS5—Brunei
KP6—Palmyra Is.	ZC5—Br. N. Borneo
KS6—Samoa	ZK1—North Cook Is.
KW6—Wake Is.	ZK1—South Cook Is.
KX6—Marshall Is.	ZK2—Niue
PK1, 2, 3—Java	ZL—New Zealand
PK4—Sumatra	ZL1—Kermadec Is.
PK5—Borneo	ZL3—Chatham Is.
PK6—Celebes, etc.	ZL4—Campbell Is.
JZ0—"Neth." N.G.	ZL5—N.Z. Antarctica
VK—Australia	5W1—Samoa
VK2—Lord Howe Is.	ZM7—Tokelau Is.
VK4—Willis Is.	VK9 (C2)—Nauru Is.

Different prefixes are acceptable as long as the countries are as listed.

W.A.Z.L.—WORKED ALL NEW ZEALAND

Requires 35 different Branches of N.Z.A.R.T. from the following:

01	Ashburton	35	South Otago
02	Auckland	36	South Westland
03	West Suburbs	37	Southland
04	Cambridge	38	Taumaranui
05	Christchurch	39	Tauranga
06	Dannevirke	40	Te Awamutu
07	Dunedin West	41	Thames Valley
08	East Southland	42	Titahi Bay
09	Egmont	43	Waihi
10	Franklin	44	Waikato East
11	Gisborne	45	Waimarino
12	Hamilton	46	Wairarapa
13	Hastings	47	Waitara
14	Hawera	48	Wanganui
15	Central H.B.	49	Westland
16	Horowhenua	50	Wellington
17	Huntly	51	Whakatane
18	Hutt Valley	52	Wairoa
19	Inglewood	53	Te Puke
20	Manawatu	54	Patea
21	Manukau	55	Waitomo
22	Marlborough	56	Hornby
23	Marton	57	Tokoroa
24	Motueka	58	Helensville
25	Napier	59	Mangakino
26	Nelson	60	Taupo
27	New Plymouth	61	Central Otago
28	Northland	62	Reefton
29	North Shore	63	Upper Hutt
30	Otago	64	North Otago
31	Pahiatua	65	Papakura
32	Rahotu Coastal	66	Auckland V.H.F.
33	Rotorua	67	Kawerau
34	South Canterbury	68	Nth. Canterbury

GISBORNE AWARD

Send certified list of Gisborne contacts made after 1st January, 1968. ZL requires 4 stations; rest of world 2 stations, with three IRCs or 25 cents in stamps of any country to ZL2GX.

W.A.D.—WORKED ALL DISTRICTS

A V.h.f. Award requiring confirmation of QSO with ZL1, ZL2, ZL3, ZL4 on a v.h.f. band. Four confirmations required.

N.Z.A.—NEW ZEALAND AWARD

Requires a total of 101 confirmations as follows: 35 from ZL1, plus 35 from ZL2, plus 20 from ZL3, plus 10 from ZL4, plus 1 from a ZL Territory (N.Z. Antarctica or Chatham Is. or Kermadec Is. or Campbell Is.). N.B.—This one Territory may be substituted by 20 extra ordinary ZL confirmations if desired.

Applications should be posted to ZL2GX, 152 Lytton Rd., Gisborne, N.Z. Note.—G.C.R. list may be sent—most overseas Societies will check QSLs, etc. Please ensure that full information is given on submitted list.

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THE BRISBANE DX CLUB AWARD

The Brisbane DX Club has been in existence for many years and now has been extended to 25 active Amateurs in the Brisbane area.

The award is issued to DX (overseas) stations only, and to qualify it is necessary to work five members of the Club and send your QSLs for the five contacts to the Secretary of the Club, whose address will be given by the fifth station worked. Immediately the cards are received by the Secretary, the award will be issued and sent free by surface mail. IRCs are not required unless air mail return is required.

Call signs of member stations are not publicised, you must challenge the Queensland station, asking him if he is a member of the Brisbane DX Club. When you get five replies in the affirmative, the award is yours.

Please note. You do not wait for the VK4 cards, it is the five cards YOU issue for the Brisbane stations that are required by the Secretary for the award issue.

The Brisbane DX Club Rules

1. The club membership is limited to twenty-five members.

2. To be eligible for membership, members may operate on any band, 10 to 80 metres.

3. The majority of members of the Club must be financial members of the Wireless Institute of Australia.

4. The majority of office-bearers must be financial members of the W.I.A.

5. All members MUST QSL all DX stations.

6. DX stations, to be eligible to compete for the DX Club Certificate, must ask the question "Are you a member of the Brisbane DX Club?"

7. The call signs of the member stations of the Club must not be mentioned over the air, but there is no objection to the christian names of members being mentioned.

8. After five contacts have been made, the DX station must apply to the Club Secretary for the Certificate, giving the details and forwarding five cards. Members may (or should) advise DX stations of these requirements.

It is requested that members advertise the Club over the air on all occasions possible. Give the qualifications necessary but do not mention the call signs of the member stations. Tell the DX station that they must ask any Brisbane station the question as set out in rule 6.

9. A QSL card MUST be received from the DX station for all five members before the Club Certificate can be issued. These will be checked by the Club Secretary.

10. All members must deposit one blank QSL card with the Club Secretary.

11. DX contacts may be either phone or c.w.

12. All members must reside within the Greater Brisbane area.

13. New members can only be elected on the resignation of a member, and the ballot must show a two-thirds majority after absent members have been advised by post so that they may vote.

14. A general meeting must be held at least once a year, and all members must be given at least one month's notice.

15. Office-bearers to be elected annually.

16. The quorum for a meeting shall be fourteen (14) members.

17. An entry fee of $2 per member, and an annual fee of $1 shall be payable.

18. A member whose subscription is not paid at the annual general meeting, or within ninety days thereof, automatically ceases to be a member.

19. The office-bearers shall be President, Vice-President and Secretary/Treasurer.

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THE PRETORIA AWARD

The Pretoria Award will be issued to any Amateur station or Listener who can provide confirmation of five contacts or reports applicable to ZS6 stations listed below. A log extract certified by two licensed Amateurs, or an official of a recognised Radio Society, who has sighted the QSLs should be sent to:

The Award Custodian,
S.A.R.L. Pretoria Branch,
P.O. Box 1259,
Pretoria,
Republic of South Africa.

The claim should be accompanied by a fee of 7 IRCs for VK claimants. QSL cards should not be submitted. Any profits accruing will be applied to further the aims and interests of Amateur Radio.

Eligible contacts:

(1) Any member of the Pretoria Branch of the S.A.R.L. (this includes country members at several locations in the Transvaal).

(2) Any ZS6 Amateur station with a QTH in Pretoria or the adjoining towns of Lyttelton, Verwoerdburg, Irene, Silverton, Bapsfontein, Bronkhorstsprint.

Eligible calls include: ZSs 6AES, 6AJM, 6AJO, 6AKO, 6AMP, 6AVC, 6BLY, 6BLZ, 6KO, 6NG, 6PA, 6PB, 6PTA.

—From "Watts," the journal of the Pretoria Branch of the S.A.R.L.

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ERRATA

Please note the following amendments to "A Transistorised Carphone—Part One, The Receiver," March 1971 issue:

(1) The coupling capacitor into pin 8 of the AWM1306 should be 0.01 μF. and not 22 pF. as shown in Fig. 3A.

(2) In Fig. 3B there should be a 10 μF. tantalum capacitor between pin 4 of the MC1454 and earth.

TECHNICAL ARTICLES

Readers are requested to submit articles for publication in "A.R.," in particular constructional articles, photographs of stations and gear, together with articles suitable for beginners, are required.

Manuscripts should preferably be typewritten but if handwritten please double space the writing. Drawings will be done by "A.R." staff.

Please address all articles to:
EDITOR "A.R.,"
P.O. BOX 36,
EAST MELBOURNE,
VICTORIA, 3002

New Equipment

YAESU FT-101 SOLID STATE TRANSCEIVER

Some time has elapsed since the Yaesu Musen Co. Ltd. of Japan produced their first solid state transceiver, model FT-100. The present model, FT-101, basically similar, incorporates the latest advances featuring 10 FETs, 3 integrated circuits, plug-in modules, noise blanker, as well as 31 silicon transistors and 38 silicon diodes. The transmitting section employs 3 tubes only, a 12BY7A driver and 2 x 6JS6A final amplifier with an output on s.s.b. of approx. 160 w. p.e.p.

The built-in dual power supply provides for operation from alternative power sources, 12v. d.c. or 234v. a.c. Selection of the appropriate power cord, from the two provided, is the only adjustment for a change-over.

A desirable feature in a set such as this is the built-in speaker. A matching external speaker, external v.f.o., c.w. filter and mobile mounting hardware are available as optional extras. It covers the usual Amateur bands of 80-10 metres, plus the 11 metre band, and includes reception of WWV on 10 MHz. Modes of operation are s.s.b., c.w. and a.m. C.w. input power is adjustable. Panel meter indicates p.a. cathode current, r.f. output, and a.l.c. On receive, the meter functions to read "S" units.

Taking into account the advantage of low current drain, the FT-101 is the perfect choice for use in a car, caravan, boat, aircraft, and field day activity. It also excells as a primary base station.

Of special interest to brass pounders, c.w. operation is a real pleasure with near perfect keying characteristics, absence of chirp, stability, high selectivity, and "break-in" with side tone monitoring.

A photo appears elsewhere in this issue, and full details are available from the Australian agent, Bail Electronic Services of 60 Shannon St., Box Hill North, Vic., 3129.

Book Review

SINGLE SIDEBAND FOR THE RADIO AMATEUR

Over the last twenty years the A.R.R.L. has done a great deal to popularise s.s.b. amongst the Amateur fraternity; nowadays one hears more s.s.b. than c.w. or a.m. signals, especially on the DX bands and some a.m'ers have been heard to complain that the s.s.b. operators will not talk to them.

We live in a rapidly changing world, exciting things are happening somewhere in the world every day of the week and the rate at which science is advancing is said to double itself every ten years.

The fifth edition of Single Sideband for the Radio Amateur will assist the newcomer to our hobby in becoming acquainted with the mode and bring the old-timer up to date on the more modern techniques. Sixty per cent. of the material is new and heavy emphasis has been accorded solid state devices.

This issue contains thirty-one practical constructional projects from easy-to-build station acessories through simple receivers to the more sophisticated crystal filter and phasing type exciters, transmitters and complete transceivers.

This new edition contains 256 pages and is 9½ x 6½ inches. Price is $3.30 post paid from the W.I.A. Federal Executive Publications Department or Divisional Secretaries.—VK3LC.

☆

FROM THE W.I.A. NOVICE INVESTIGATION COMMITTEE

The following extracts are taken from a letter on the subject of Novice Licensing, received from Mr. William I. Orr, W6SAI, a prominent technical writer in the field of Electronics and Amateur Radio. His opinion, as an on-the-spot observer of Novice Licensing, should offer some valid arguments to those who are in favour of such a licence on the Australian scene.

"Generally speaking, the Novice programme has been a healthy one in the U.S.A. No general opposition exists to it. Most new Amateurs (particularly teenagers) follow the Novice route. It gives them a 'taste' of Amateur Radio and encourages them to carry on. . . . Many of today's prominent Amateurs were Novices at one time, and quite likely many of them would never have taken the General examination unless their confidence had been built-up by actual on-the-air contacts and expertise they had gained during their Novice period.

"The Novice concept was introduced by the Federal Communications Comission over the reluctant acquiescence of the A.R.R.L. My personal opinion was that the A.R.R.L. was afraid that this 'sub-standard' licence would degrade Amateur Radio. Fortunately, this did not happen, and I am positive today that the A.R.R.L. supports and encourages this programme.

"Change is always difficult and hard to accept, especially in organisations which tend to reduce all to the lowest common denominator. The Novice segments in the U.S.A. tend to become a ghetto, much QRM, poor operating techniques, etc. Most General class Amateurs avoid the segments, which is a pity. Even so, the Novice learns to tune a transmitter and receiver and gains a bit of experience. Some of them do quite well.

"The great danger to Amateur Radio is not the Novice class, but the unfortunate monster created by Citizens Radio—2,000,000 licensees and many pirate operators. This has drained Amateur Radio of growth, as many would-be Amateurs take the easy road to comunicate by radio via the C.B. route, rather than by the more demanding road to Amateur Radio. Thus, anyone who has real interest in Amateur Radio should be encouraged in every way possible.

"So many interests are available to the young —t.v., motor bikes, autos, travel, marijuana, that those in authority having interest in electronics should jump for joy when a youngster evidences interest in Amateur Radio. Tomorrow's comunicators and electronic engineers are coming from this pool of manpower. It is in the interest of your country to foster this interesting and constructive hobby and advocation. I know of no better way of doing this than to appeal to the timid newcomer by means of a Novice class licence—the first rung on the ladder of Amateur Radio."

—R. C. Black, VK2YA, Chairman.

[We publish the foregoing as a matter of interest. We do not necessarily agree with all Mr. Orr's observations.—Ed.]

FEDERAL REPEATER SECRETARIAT

This month we are pleased to be able to include a report from the Gold Coast Radio Club on the first fully operational Channel 1 system in Australia. We invite the technical officers of other repeater groups to submit a report along similar lines about their own system, both for our own records and publication in "A.R."

The first report for 1971 from the F.R.S. has been produced and has been sent out. If we have missed any groups and you would like a copy, write to the F.R.S. c/o. P.O. Box 342, Crows Nest, N.S.W., 2065.

CHANNEL ONE SYSTEM ON QUEENSLAND GOLD COAST

The Gold Coast Radio Club, as a club project, has established an f.m. repeater station to service the South Eastern Qld. and North Eastern N.S.W. areas. The repeater has been P.M.G. licensed and fully operational since April 1970. Details of the repeater are as follows:

Call Sign: VK4EI/R2.

Frequency: Repeater Channel 1 (146.1 MHz. in and 145.6 MHz. out).

Location: Mt. Tamborine. Approx. 18 miles west of Southport and 40 miles south-west of Brisbane. Site elevation is approx. 2000 ft. a.s.l.

Tx: Complete valve design, multiplying from 4 MHz. xtal. 25 watts carrier output from QQE06/40 p.a. valve. The power output is soon to be boosted to 50 watts when construction of a new tx is complete.

Rx: Solid state throughout, realising 20 dB. signal to noise ratio for 0.5 microvolt p.d. input with the tx carrier on. 1st i.f. is 10.7 MHz. and incorporates a Pye 10-7C xtal filter. 2nd i.f. is 455 KHz.

Aerials: Both tx and rx use identical aerial types comprising five half-wave colinear elements, fed in phase, vertically polarised, omni-directional and realising 8 dB. power gain. Both aerial systems are mounted 40 ft. above ground level and are horizontally separated by 250 yards. This spacing and the insertion of cavity resonators in both the tx and rx feed-lines has reduced rx desensitisation to almost nil.

Availability: The repeater is available on a 24-hour basis. The rx runs continuously and when the squelch is opened the tx fils. are keyed on. Eight minutes after the squelch has closed, the tx fils. are keyed off. Following the initial squelch opening, each successive squelch operation returns the tx fils. shut-down time delay to zero.

Identification: Automatic station identification after a five-minute "carrier on" duration. Solid state keyers for morse code identification are presently being experimented with.

Coverage: Good service is available within a 200 mile diam. circle, centred on the repeater site. Good mobile to mobile QSOs have been conducted between the following areas: Lismore, Byron Bay, Brunswick Heads, Toowoomba, Brisbane, Gold Coast, North Coast resorts, Murwillumbah, Boonah and many other places.

Well that is roughly the story regarding the Gold Coast repeater. A repeater for Brisbane is still being considered by the VK4 V.h.f. Group, but as yet no sign of air testing. Channel 4 will be used for the Brisbane unit and will be known as "R1" until an official call sign is allocated.

The Gold Coast Radio Club will be only too happy to pass on information regarding the project to inform other groups of the pitfalls and their cures in establishing a repeater. A note to M. D. Adams, VK4ZDA, of Gold Coast Radio Club, P.O. Box 588, Southport, Qld., 4215, will ensure full technical details, etc., by return mail.

Recently a copy of Ken Sessions, Jnr., K6MVH's "Radio Amateur's F-M Repeater Handbook" arrived in Australia. This is an excellent publication on the subject, but much of the contents applies only to the American scene, where many Amateurs set up remote control of their stations—usually on a suitable hill-top. Other chapters are devoted to the "tone" control and access to repeaters, a system which does not apply in this country. 73, Tim VK2ZTM, Chairman F.R.S.

AMATEUR FREQUENCIES:

ONLY THE STRONG GO ON—SO SHOULD A LOT MORE AMATEURS!

VHF

Sub-Editor: ERIC JAMIESON, VK5LP
Forreston, South Australia, 5233.
Closing date for copy 30th of month.
All Times in E.S.T.

AMATEUR BAND BEACONS

VK0	53.544	VK0GR Antarctica.
VK3	144.700	VK3VE Vermont.
VK4	144.390	VK4VV 107m. W. of Brisbane.
VK5	53.000	VK5VF Mt. Lofty.
	144.800	VK5VF Mt. Lofty.
VK6	52.006	VK6VF Tuart Hill.
	52.900	VK6TS Carnarvon.
	144.500	VK6VE Mt. Barker.
	145.000	VK6VF Tuart Hill.
	435.000	VK6VF (on by arrangement).
VK7	144.900	VK7VF Devonport.
VK9	144.600	VK9XI Christmas Island.
ZL3	145.000	ZL3VHF Christchurch.
JA	51.995	JA1IGY Japan.
W	50.091	WB6KAP U.S.A.
HL	50.100	HL9WI South Korea.

Only change to the beacon list this month is the corrected location of the VK3 beacon to Vermont, not Kilsyth, as I was previously informed. March and April will be months to keep a look out on 6 metres for long distance contacts, particularly to JA and other northern areas, so the beacons listed here in those areas may be frequencies to monitor when in the shack over a week-end and doing some constructional work.

Six metres appears to have been comparatively quiet during the past month, a few signals from VK4 being around, also VK6. A letter from David VK8AU in Tennant Creek advises he and Doug VK8KK in Darwin now have their equipment operating well enough on 52.010 MHz. to allow themselves always being able to hear one another on early morning skeds. Copy is generally about 2 x 1 on s.s.b. with occasional 5 x 2 periods which allow a reasonable exchange of information. Just around local sunrise seems to be the best time. David has now started running Saturday and Sunday morning skeds with Wally VK5ZWW from 0630 to 0700, calling each alternative five minutes, David starting his transmission first. Signals have been quite good some of the time and successful exchanges were made three out of the last four attempts.

David worked JA1MRS on 2nd Feb. and on 24th Feb. JAs, HL9WI and KR6CR. Similar situation of signals being heard from same areas on 17th Feb. (So it seems some DX might be just around the corner.—VK5LP.)

I note David is interested in promoting v.h.f. winter activity and it appears he has sent details for publication in "A.R." of a winter v.h.f.-u.h.f. contest, probably during the month of July. I certainly hope it will be a successful venture, but will leave further comment until I know more about the proposed contest. Thank you for your letter, David, always pleased to hear of activities in the north. Long time since I heard from Doug VK8KK, or anyone in North Queensland!

Well, the John Moyle National Field Day Contest has been and gone. A number of stations in VK5 went out portable, but extended range contacts, particularly 2 metres, were very few and far between. My own effort was confined to 2 metres this year, for a few hours on Sunday morning. However, I was pleased to be able to include the boys manning the portable station on Mt. Arapiles (Swinbourne College Radio Society) by working VK3BES, VK3ZYT and VK3YBM, and seem to have been the only VK5 to have done so from this area. I was rather staggered to find no stations available from the south-east of VK5, and none of the usual VK3s, namely Bob 3ARM, Herb 3NN, Roy 3AXV, Roy 3AOS, Eric 3ZKN, Jim 3AEF and so I could go on. It did not seem like a v.h.f. field day without these chaps. I know conditions were not real good, looks like the call of the h.f. bands is too strong!

Fortunately, temperatures in VK5 were much lower than the Adelaide peak of 105 last year, but strong south-east winds tended to slow one down a bit. Looking eastwards from here, it appears the best contact to be made during the N.F.D. was probably that between Norm VK3ZQC portable on Mt. Tassie near Traralgon and Eddie VK1VP portable on Mt. Gingera, near Canberra, a distance of about 300 miles over a rather mountainous path. Good work chaps, shows the effort was worthwhile for a 2 metre contact.

My faithful scribe from VK3, Bob VK3AOT, sends some further useful information this month. He advises that John VK3AJM and David VK3ANP (?)—the pen's not too sharp Bob!—are fully operational on 432 MHz. and are set up to take part in the Australis Oscar 6 Balloon test. These chaps are in Wangaratta and another from the same area currently constructing 432 MHz. gear is Peter VK3APF.

1296 MHz. RECORD

Bob VK3AOT passes on the news that the 1296 MHz. record has been broken again, on 17th Feb., when Ron VK3AKC in Geelong and Kevin VK7ZAH in Launceston established contact over a path of 274.3 miles, bettering the previous record by more than 20 miles. Both stations used a.m. for the contact, with signal reports around S5. The equipment at VK7ZAH comprises a 2C39 tripler producing about half a watt output and a 5 feet by 2 feet parabolic section antenna. After the initial contact, a test signal from VK3AKC was heard for 90 minutes by VK7ZAH and VK7JV. Congratulations go to both for a great effort, and particularly to Ron, who previously only held the record for six hours! A late report indicates that both stations again made contact on 1296 at 1755 on 27th Feb., VK7ZAH being received at S4 and VK3AKC at S6. Ron will soon be running out of suitable territory in Tasmania if he continues to push his signals south, next we may hear he has moved to Lakes Entrance and concentrating signals on the path to New Zealand!

Bob continues his writing with some excerpts from the latest release from the P.M.G. Dept. showing the growth rate of various radio services for the 1969-70 financial year. Amateur full licences increased by 6.1% and limited licences by 6.3%. The overall growth rate of radio communication stations was 16.1%, while the population growth for the same period was 2.08%. Some sobering thoughts come out of those figures if you care to reflect for a moment. Many thanks again Bob for your continued support of these columns.

A further reminder of the Geelong Amateur Radio and TV Club Hamfest scheduled for 1st and 2nd May. No further news of this event has arrived but no doubt separate information will be made available through "A.R."

From the pages of the West Australian V.h.f. Group News Bulletin comes news that VK6VF went portable for the N.F.D. at the Eagle Hill Forestry Lookout. Activity was definitely multiband, c.w. on 3.5 and 7 MHz., s.s.b. on 3.5, 7, 14, 21 and 28 MHz., a.m. on 27, 28 and 52 MHz., f.m. on 52 and 144 MHz. And while on the subject of the beacon, noted also in the same publication advice to the effect that the 2 metre beacon has been recently modified and now at 18 watts has more than trebled its previous power. The 6 metre beacon has also been strengthened up somewhat since its old 6/40, which was half-dead, has been buried!

HL9WI WORKED IN VK0

News has just trickled through for this Stop Press item that HL9WI in South Korea was worked over a wide area on 1st March. It appears a total of five VK6s were worked, the only one mentioned by name so far being Peter VK6ZDY, while contacts were also made to Doug VK8KK, David VK8AU and VK9BB. The band was still open to the north at 1830 and there is an unconfirmed report of a VS6 working into VK6. David VK8AU reported hearing the HL9WI beacon at S3 at 2219, which is getting rather late for contacts or hearings of this nature. So it looks as though March and April could be interesting months for 6 metres, as mentioned earlier.

A brief note to hand mentioned Wally VK-5ZWW and David VK8AU were successful in having a 20-minute contact via meteor scatter on 28th Feb. So it looks as though the Saturday and Sunday morning skeds are paying off. Bob VK5ZDX is now operational on 52 MHz. s.s.b. with an FT200 feeding a transverter with a QQE06/40 in the final. This is designed to run into a high powered linear and when finished he hopes too to join in the M/S experiments. Wally VK5ZWW, by the way, would be pleased to hear from anyone prepared to run some skeds with him using M/S. He is rather interested in finding someone in the Eastern States with s.s.b. gear preferably, who will turn the beam in his direction.

No news has come to hand about any portable operation during Easter, so various areas will need to rely on their weekly broadcasts for such information. But I do suggest if you are in the shack over Easter, keep a wary eye on 6 metres with the beam north, particularly during the afternoon and early evening periods—you may well hear something worthwhile, as the Easter period will probably bring more stations on the air than usual. For the sake of something to monitor, try JA1IGY on 51.995 or the Russian t.v. sound channel on 59.750 MHz.

News has been somewhat scarce this month, only two letters received, but there may be more next time. In closing here is the thought for the month: "A church is a hospital for sinners, not a museum for saints." Until next month, 73, Eric VK5LP. The Voice in the Hills.

MEET THE OTHER MAN

Meet Wally Watkins, VK5ZWW, of Bellevue Heights, a suburb of Adelaide on the slopes of the Mt. Lofty Ranges, at an elevation of 750 feet, living amongst the elite and able to look down on most of the population of Adelaide.

Wally formerly was ZL2TCW, living at Lower Hutt, New Zealand, and several years ago came to Australia with his wife Dorothy and family; there seems no evidence of any of them arriving in chains! Wally was first licensed in 1963 and while in New Zealand was a keen DX enthusiast, particularly on 144 MHz., from where he worked ZL1, 2 and 3, and VK2 and VK5, the latter including the contact with Hughie VK5BC, a distance of 1950 miles, running 30 watts a.m. From his present location on 52 MHz. he has worked VK1, 2, 3, 4, 5, 6, 7 and 8, JA1, 2, 3, 4 and 5. On 144 MHz. areas worked are VK3, 5, 6 and 7 and contacts have been made within VK5 on 432 MHz.

Equipment in use at present on 52 MHz. uses a QQE06/40 in the final, running 150 watts d.c. input s.s.b. to a 9 element yagi up 30 feet. He uses a VK3 FET converter. The system changes to a.m. for 144 MHz. and runs 100 watts to a 829B, modulated by a pair of 2N174s, and coupled to a 6/6 slot antenna up 30 feet, with a home-brew converter using 6CW4 front-end. Back to s.s.b. for 432 MHz., running 15 watts to a 6939, 16 element collinear up 30 feet, VK5 FET converter. The tunable i.f. in each case is an FTDX100.

Wally is a member of the W.I.A., was a member of the Amateur Advisory Committee for 1970, and supplies the v.h.f. notes for the VK5 Journal. He operates portable from time to time on 52 MHz. when his work as a surveyor with the Commonwealth Government takes him to suitable areas, and ocasionally tries 144 MHz. At present is actively interested in 52 MHz. scatter, and has successfully worked David VK8AU in Tennant Creek on a number of occasions using this method. His future plans include attempts to work all States on 52 MHz. meteor scatter and with this in mind is planning to increase power on 52 MHz. to the legal limit. He also is planning equipment for 144 MHz. s.s.b.

VK5 finds in Wally a worthwhile asset for Amateur Radio, one who likes to see things done, and is not afraid to speak his mind at meetings, treading on a few corns in the process no doubt, but his words are meant well. Pleased to have you living with us, Wally.

John VK2ZJQ adjusts a 10 el. 2 metre yagi. Top antenna is a 15 el. 432 MHz. yagi. Beneath John are a pair of 146 MHz. vertical 10 el. yagis and a 4 el. 6 metre yagi. The tent in the background housed a 2 kva. motor-generator set. These aerials were in use by VK3AOT/P at Mt. Cowley from 18/12/70 to 2/1/71.

NEW CALL SIGNS

NOVEMBER 1970

VK1ZT—H. N. Sandford, Station: 4 Woodgate St., Farrer, 2607; Postal: P.O. Box 468, Manuka, 2603.
VK2CI—A. C. Counsell, 11 Allendale St., Beresfield, 2322.
VK2BBZ—J. D. Holt, 19 Dorset St., Northbridge, 2063.
VK2BKG—K. J. Graham, 31 Rangers Retreat Rd., Frenchs Forest, 2086.
VK2BMH—M. F. Potts, 23 Stapleton St., Wentworthville, 2145.
VK2BMX—W. S. Munn, 19 Kenibea Ave., Kahibah, 2290.
VK2BNW—N. G. Wallage, 23 Sylvia Pl., Frenchs Forest, 2086.
VK2ZBR—B. H. Ridley, 21A Nepean Ave., Normanhurst, 2076.
VK2ZEB—E. F. Breen, 24 Azalea Ave., Coffs Harbour, 2450.
VK2ZQL—P. J. Brown, 56 Joslin St., Kotara South, 2288.
VK3BH—B. W. Horan, 35 Ropley Ave., Balwyn, 3103.
VK3EB—J. E. Falkner, 17 Burgess St., Hawthorn, 3122.
VK3HX—T. D. Hogan, "Madang," King Lake Rd., Cottles Bridge, 3099.
VK3ALI—The Austin Electronics Society, Rehabilitation Workshop, Austin Hospital, Heidelberg, 3084.
VK3AUV—K. A. Palliser, 3/30 Cootamundra Cres., Blackburn, 3130.
VK3AWS—Western Suburbs Radio Club, Station: 265 Elizabeth St., East Coburg, 3058; Postal: 115 Mitchell St., Maidstone, 3012.
VK3BEF—N. J. Daye, Yooralla Rd., Rye, 3941.
VK3BEI—I. L. Eadie, 9/1 Dun Craig Ave., Armadale, 3143.
VK3BEJ—R. C. Lile, 1/192 The Avenue, Parkville, 3052.
VK3BEL—H. N. Cooper, 48 Bond St., Ringwood, 3134.
VK3BEN—J. M. Ban Demark, 1 Oak St., Beaumaris, 3193.
VK3BEO—Y. E. Mak, 65 Dwyer St., Clifton Hill, 3068.
VK3BEQ—J. W. McCulloch, 5/1A Clifton St., Clifton Hill, 3068.
VK3BSA—Blackburn District Boy Scouts' Assn. Radio Club, 74 Springvale Rd., Nunawading, 3131.
VK3CCR—B. M. Richardson, 31 Jennings St., Laverton, 3028.
VK3YEE—E. R. Russell, 164 Kangaroo Rd., Oakleigh, 3166.
VK3YEJ—G. W. Lock, Deakin Ave., Mildura South, 3500.
VK3YEK—J. E. Beevers, Station: 11th St., Mildura West, 3500; Postal: P.O. Box 32, Mildura, 3500.
VK3YEL—E. W. Ross, 27 Carween Ave., Mitcham, 3132.
VK3YEM—J. A. Gilmour, 1A Milton St., Canterbury, 3126.
VK3YEN—D. Moore, 181 Faraday Rd., South Croydon, 3136.
VK3YEO—A. H. McKibbin, 27 Beverley St., East Doncaster, 3109.
VK3YEW—P. W. Carigg, 2 Hemingford Rd., East Bentleigh, 3165.
VK3YEX—A. E. Fisher, 9 Birdwood St., Box Hill, 3128.
VK3YEZ—R. P. Dyson, Tannery Lane, Mandurang, via Bendigo, 3551.
VK3YFS—N. Spano, 3 Seaholme Ave., Seaholme, 3018.
VK4VY—P. R. Cox, 245 Stanley Tce., Taringa, 4068.
VK4WG—W. G. G. Clayton, 18 Boundary St., Railway Estate, Townsville, 4810.
VK4ZJW—W. J. Mather, 9 Ilkinia Ave., Florida Gardens, 4217.
VK4ZLC—R. G. Melton, 39 Woodlea St., Moorooka, 4105.
VK4ZRE—S. R. Chappel, Archer St., Woodford, 4514.
VK5MC—C. E. Skeer, Hatherleigh, via Millicent, 5280.
VK5OD—J. L. Guthberlet, Station: Davidson Ave., Crafers, 5152; Postal: P.O. Box 22, Crafers, 5152.
VK5UD—L. L. Schumacher, Station: C/o. Woomera Amateur Radio Club; Postal: Flat 360, Block 3V, Dewrang Ave., Woomera, 5720.
VK5YH—C. Hagoort, 1 Larkdale Ave., Paradise, 5075.
VK5CGB—L. Pace, C/o. G.P.O., Perth, 6001.
VK5ZIN—I. F. Bull, Station: Section 910, Hundred of Wallaroo; Postal: P.O. Box 50, Kadina, 5554.
VK6PO—J. C. Smyser, C/o. 9 The Grove, Wembley, 6014.
VK6ZBM—A. J. Vingerhoets, 206 Newborough St., Karrinyup, 6018.
VK8AD—A. M. Miers, 7 Grady Cres., Alice Springs, 5750.
VK8LG—G. L. Gordon, 24 Milner Rd., Alice Springs, 5750.

CANCELLATIONS

VK2NW/T—D. W. Bridge. Transferred to W.A.
VK2ABG—G. R. Hughes. Now VK9GH.
VK2AYR—W. A. Rowse. Not renewed.
VK2BLZ—L. L. G. Meek. Now VK9LM.
VK2BPO—J. C. Smyser. Now VK6PO.
VK2BRG—R. G. Gibson. Transferred to S.A.
VK2ZMP—M. F. Potts. Now VK2BMH.
VK3EB—J. M. Endacott. Not renewed.
VK3AAQ—N. S. Maddern. Transferred to Qld.
VK3AWY—L. T. White. Not renewed.
VK3BDH—T. D. Hogan. Now VK3HX.
VK3BDP—J. E. Falkner. Now VK3EB.
VK3ZOU—J. C. Spence. Not renewed.
VK4OH—H. Overend. Transferred to T.P.N.G.
VK4QN—D. R. Ham. Transferred to T.P.N.G.
VK4WQ—Wireless Institute of Australia (Wide Bay and Burnett Branch). Not renewed.
VK4ZLA—L. A. Hughes. Not renewed.
VK4ZLR—A. R. Langmead. Not renewed.
VK5AG—A. M. Miers. Now VK8AD.
VK5FS—J. L. Guthberlet. Now VK5OD.
VK5HJ—H. J. Town. Transferred to N.S.W.
VK5VU—V. W. Stallan. Transferred to Qld.
VK5ZFA—C. E. Skeer. Now VK5MC.
VK6KB—K. E. Buskirk. Returned to U.S.A.
VK6AM—J. A. Moran. Transferred to Vic.
VK6ZFK—R. J. Pether (Rev.). Not renewed.
VK6ZGE—G. A. Koziol. Not renewed.
VK7JM—J. W. McCulloch. Now VK3BEQ.
VK7ZJM—J. M. G. Vout. Not renewed.

☆

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VK4	526	194	720
VK5	520	234	754
VK6	361	138	499
VK7	163	69	232
VK8	35	12	47
VK9	91	8	99
Grand Total	4512	1791	6303

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WANTED: Small Communication Rx, used AR7 or similar. Phone (Melb.) A.H. 359-1039.

WANTED: Swan Cygnet or similar. Please state condition, price required, be reasonable. A. Cundy, 34 Winchester Rd., Clovelly, N.S.W., 2031.

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1152	AX2ACZ	1190	AX2KM	1229	9M8OEA
1153	WA5UHR	1191	W8BDO	1230	AX6HE
1154	EA8GK	1192	JA1IKA	1231	W8UMR
1155	ZM2BW	1193	AX2AXJ	1232	WB4LFV
1156	PA0QT	1194	JA1DVN	1233	W4ELB
1157	AX2VN	1195	DK2BL	1234	W6HX
1158	ZK2AG	1196	DK2WY	1235	JA6JBR
1159	ZS6VC	1197	JA6KZ	1236	AX2ARV
1160	ZS6QC	1198	ZM1HV	1237	9G1FF
1161	AX2AW	1199	W2FCR	1236	FR7ZG
1162	JH1BLX	1200	W5RO	1239	ZE6JL
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1164	W5KYD	1202	AX2ABC	1241	AX3HK
1165	DL9EM	1203	AX3AMU	1242	AX3NJ
1166	I1ACY	1204	AX2ANZ	1243	VE3FFM
1167	JA3FD	1205	AX2AGV	1244	AX2ATA
1168	G3WGF	1206	DL6KB	1245	W3WGH
1169	AX1AG	1207	WB2NYM	1246	W0JMB
1170	W3AZD	1208	W6AAK	1247	W8AJW
1171	W4ATP	1209	MP4BHH	1248	UA0DG
1172	AX2BDC	1210	AX2BFA	1249	TI8PE
1173	G3ZDI	1211	WB2JYM	1250	W6DKQ
1174	W9AG	1212	VE1AIH	1251	SM0CER
1175	W7AIW	1213	W4EWR	1252	YU3ZV
1176	WA6HOM	1214	ZM4AW	1253	HL9KN
1177	W5DOE	1215	ZM2AJQ	1254	W2LEJ
1178	JA1OTE	1216	AX2GV	1255	AX3AKS
1179	VS6CW	1217	OZ4EZ	1256	ZS1MH
1180	DJ8JY	1218	JR1BEK	1257	W6CWK
1181	OE3RHA	1219	JH1JGX	1258	EA3NI
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1185	WB6BKD	1224	WA5ZXO	1263	JA2NDQ
1186	GM5NW	1225	F5LK	1264	HS3ADW

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Cert. No.	Call
20	AX3AOT
21	AX7ZRO

W.I.A. D.X.C.C.

Listed below are the highest twelve members in each section. Position in the list is determined by the first number shown. The first number represents the participant's total countries less any credits given for deleted countries. The second number shown represents the total D.X.C.C. credits given, including deleted countries. Where totals are the same, listings will be alphabetical by call sign.

Credits for new members and those whose totals have been amended are also shown.

PHONE

VK5MS	319/343	VK4FJ	287/307
VK6RU	317/342	VK4TY	284/288
VK3AHO	311/326	VK2APK	281/287
VK6MK	304/324	VK2AAK	274/279
VK4KS	302/317	VK3TL	271/277
VK5AB	297/314	VK3ZE	265/268

New Members:

Cert. No.	Call	Total
115	VK7DK	231/231
116	VK3ADO	102/102

Amendments:

VK2SG	258/260	VK4RF	199/199
VK4UC	253/253	VK2AHH	196/206
VK3VK	238/238	VK3TG	175/179

C.W.

VK2QL	303/326	VK3NC	274/300
VK3AHQ	301/315	VK3XB	270/287
VK4FJ	290/315	VK3ARX	270/279
VK2AGH	282/296	VK6RU	266/289
VK2APK	280/288	VK4TY	259/272
VK3YL	280/297	VK3TL	255/260

Amendments:

VK4RF	175/187	VK2AHH	135/144
VK2SG	141/145		

OPEN

VK6RU	318/343	VK4KS	303/322
VK2AGH	314/334	VK2EO	302/325
VK2VN	310/328	VK3ARX	299/308
VK4SD	308/321	VK2APK	298/309
VK4TY	306/321	VK4EJ	298/323
VK6MK	304/324	VK2SG	294/300

Amendments:

VK4UC	282/283	VK2AHH	214/228
VK4RF	240/252		

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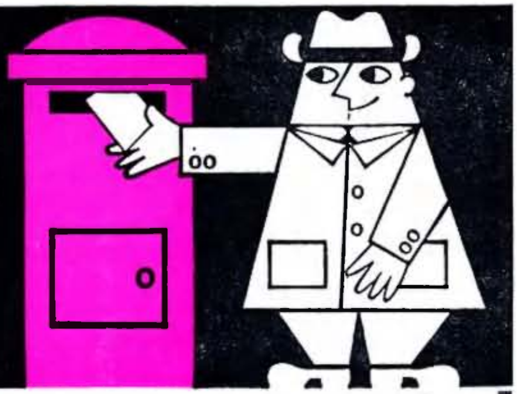

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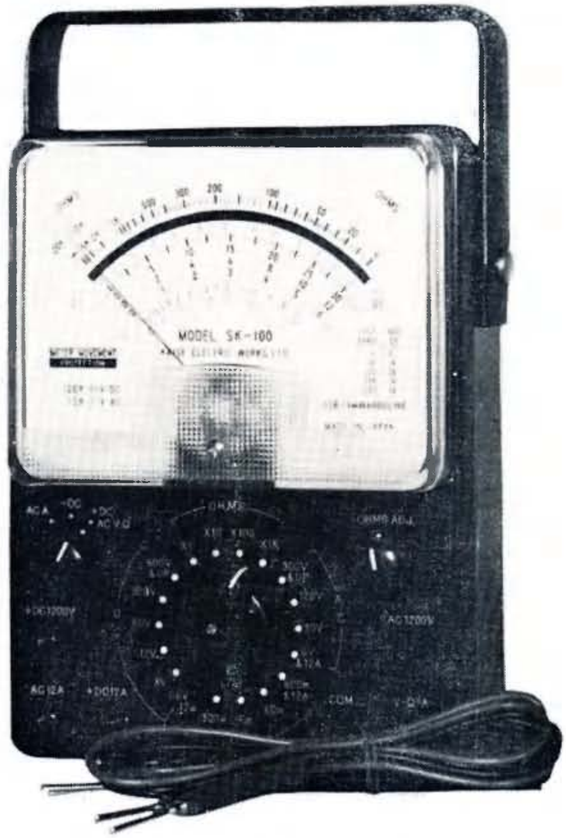

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amateur radio

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MAY, 1971
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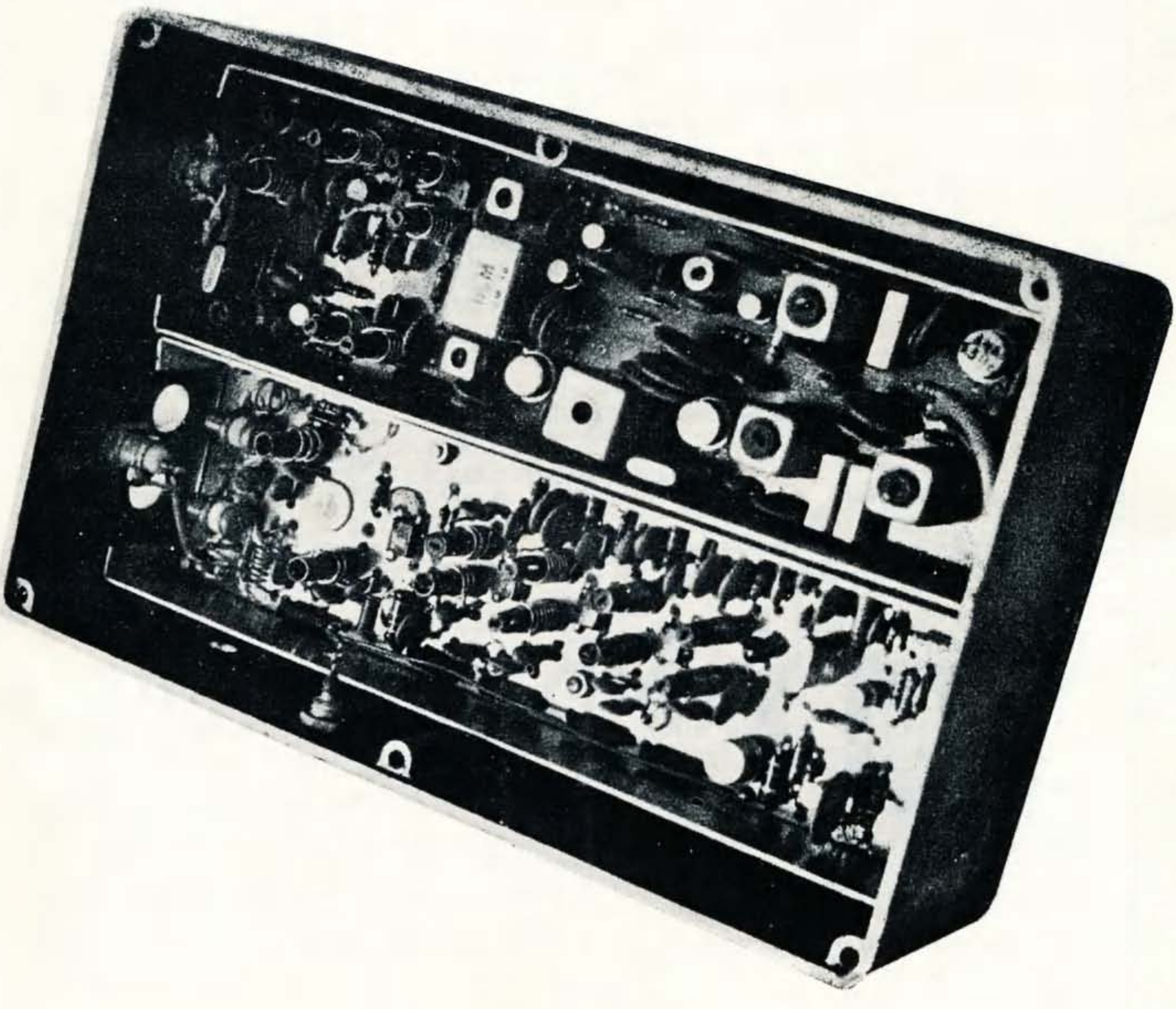

amateur radio

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"AMATEUR RADIO,"
P.O. BOX 36,
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CONTENTS

COVER STORY

One channel of the VK Repeater, four of which will be carried on AO6. The receiver accepts signals on 146 MHz. and the transmitter gives 1 watt out on 432 MHz.

FEDERAL COMMENT

Barely a day passes but what there is a report of some form of pollution to be found in the mass news media, and as a result there is a growing public awareness of the problem and loud cries for action to have the problem abated. Generally the pollution is only too obvious, being offensive to one or more of the senses. Unfortunately various forms of pollution have been with us for so long that their eradication is going to be a long and costly process, but at least the methods are known. In the meantime, as prevention is better than cure, many industries which have been responsible for pollution have either installed or are in the process of installing the equipment necessary to remove what they have contributed to the overall problem. In many cases this action has been undertaken voluntarily, but by the same token, all too many waited until action was forced on them by legislation.

There is still one form of pollution which has received little or no public attention, indeed I doubt that more than five per cent. of the population is aware of it. I refer to electrical noise with which we, as Amateurs, are only too familiar. The sources of origin are legion, and well known to most of us, although due to our localities we suffer to varying degrees. Those near tram or train routes have their special problems, those on main roads have more trouble with auto ignition than those in quite back streets. If you live near an industrial area, no doubt you are plagued by electric welders and other industrial equipment, or you may live somewhere near high tension lines. Are you plagued by dirty insulators?

How much of this noise are you contributing to the total or have you suppressed your household electrical equipment such as the vacuum cleaner and food mixer? How much is radiated from your electric drill? True, these items should all be suppressed when manufactured, but how well has it been done? Probably it leaves much to be desired, and you have overcome your noise problem by yelling at the XYL to "turn that damned thing off". Not good engineering practice, nor is it conducive to domestic harmony!

How many of us are troubled by spots from t.v. oscillators, and why do they invariably fall on our favourite operating frequency.

To remove all the foregoing offenders is a formidable task and will certainly call for strict legislation to achieve the maximum results.

What, if anything, can we do towards achieving such a massive clean-up? We can at least make a start by cleaning up our own bands. Intruders to our small share of the spectrum are a form of pollution—report them to your Intruder Watch Co-ordinator. With sufficient suitable reports there is every chance of having them moved, but no reports—no action.

There are further forms of pollution on our bands which can be easily and cheaply eradicated. To be specific, I refer to the unmodulated carriers and carriers modulated only by whistles, or the sounds of tools being thrown around the work bench. These transmissions are neither necessary nor legal, so why not remove them. The regulations cover such transmissions and you are supposed to know the regulations. At least you have a certificate to say you do. If your memory has failed you, now is a good time to do some revision. The handbook costs only a few cents.

There was a time when the v.h.f. bands were the preserve of the more serious Amateur, and much useful work was done there. With the advent of large quantities of surplus v.h.f. equipment and the subsequent formation of the many "nets" the lower v.h.f. bands have become contaminated by large amounts of inane chatter, frequently of extremely dubious character, punctuated with language which would have automatically brought a "bluey" a few years ago. This pollution does nothing to improve the public image of the Amateur Service, and the sooner it disappears from the bands the better for everybody.

As is the case with most forms of pollution, a great amount is created by very few, but all suffer equally. Let us all, therefore, resolve to do our share towards getting our own house in order. Perhaps we can then legitimately complain about what others are doing to us.

—K. E. PINCOTT, VK3AFJ

HOME STATION ANTENNA FOR 160 METRES

PART ONE—INTRODUCTION

J. A. ADCOCK, M.I.E. (Aust.) VK3ACA*

The basic difference between a 160 metre antenna and an antenna for any other band is that the 160 metre antenna is usually much shorter than a resonant length and much lower than that desirable for maximum efficiency. For these reasons special precautions have to be taken in the design of the antenna

SUMMARY

The methods, results and conclusions given in this article are based on several years of experience on 160 metres. The main aim is to examine the basic medium frequency antennas shorter than resonant length ("T", "inverted L", sloping antenna and centre-fed horizontal). Graphs are given which have been derived from standard formulae and a number of conclusions from assumptions have been made. These conclusions have been made so that interested persons may examine them and assess their value in practice.

The article is aimed particularly at showing where horizontal and vertical polarisation is advantageous in either transmitting or receiving. Many of the curves shown could be usefully applied to 80 metre antennas. (It should be pointed out that the author is not engaged in this type of work professionally. It is an Amateur article with an electrical engineering slant.)

DEFINITIONS

The following are definitions of the terms used in this article:

A Short Antenna: In general, an antenna with each leg shorter than one-eighth wavelength, but in some cases shorter than one-quarter wavelength.

A Low Antenna: Height less than one-eighth wavelength.

Radiation Resistance (R_R): In this article radiation resistance is taken as the part of the effective series resistance of the load of the antenna at the feed point which produces radiated power.

$$\text{Radiated power} = R_R \times I^2$$

This is not the only way of taking it and in some treatments it may be the effective resistance at the current point or virtual current point of the antenna. Also, it could be the effective parallel resistance part of the load which produces radiated power.

$$\text{Radiated power} = \frac{E^2}{R_R \text{ parallel}}$$

Loss Resistance (R_L): Is the effective series resistance part of the load which produces loss.

$$\text{Power lost} = R_L \times I^2$$

Total Resistance: Is the effective series resistance of the load.

$$R = W \div I^2$$

where W = power delivered to the antenna.

$$R = R_L + R_R.$$

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Effective Length of the Antenna (Ref. 1): The effective length of the antenna, used for the purpose of calculating radiation resistance, is the length of an antenna which, if carrying a constant current along its whole length equal to the current at the feed point, would radiate the same power. Where the direction of the effective antenna is not the same as the actual antenna, the component of the actual antenna is considered.

Form Factor of the Current Distribution (Ref. 1): Is the ratio of effective length to actual length of the radiating section being considered.

Surface Wave: Ground wave. The term surface wave was adopted in preference to ground wave as recommended in the A.R.R.L. "Antenna Book". In general, it refers to any part of the wave which follows the earth's surface. Dividing the wave up into direct, indirect and beyond line-of-sight are not of great importance.

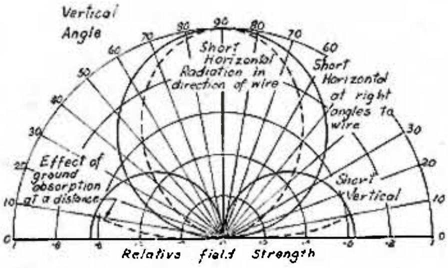


Fig. 1.—Illustrating the vertical radiation patterns of a short low horizontal and a short grounded vertical. The patterns shown are for antennas of equal radiated power. Although the pattern for the short horizontal may look attractive, in practice its efficiency is very much reduced.

HORIZONTAL AND VERTICAL POLARISATION—GENERAL

One characteristic of 160 metres is that of improved surface wave propagation. A vertical antenna will produce surface waves whereas a horizontal will produce practically no surface wave.

Vertically polarised radiation will produce good surface wave coverage during the day, whereas at night there exists a primary and secondary service area with a zone of poor reception in between, as described in standard texts on broadcast band propagation.

The horizontal antenna is rarely used commercially on medium frequencies, but it can produce useful results for the Amateur and provide coverage in the poor reception zone.

Radiation patterns in the vertical plane of a short vertical and a low short horizontal antenna are shown in Fig. 1.

As can be seen from the diagram, the radiation from the vertical is zero straight up and rises to maximum horizontally, whereas the radiation from the horizontal is zero horizontally and maximum straight up.

For a vertical antenna, as far as distant radiation is concerned, the very low angle radiation is largely absorbed by the ground, as shown by the dotted line. The shape of the radiation patterns are brought about by the interaction between the direct wave and the reflected wave from the ground. This can be considered as an antenna and a virtual image of the antenna an equal distance below the ground.

Fig. 2 shows three standard antenna arrangements and the well known phenomena of how the current in the image of the vertical is in phase with the current in the antenna, but the current in the horizontal is in anti-phase with that of the image. This fact is most significant.

The power radiated by a particular antenna depends on the effective current and the length of the antenna. If the antenna is short, a large current must flow in the wire in order to be effective and, by $R = W \div I^2$, the resistance must necessarily be low. Similarly, if a short antenna is close to an antenna with current in the opposite phase, still more current must flow to radiate the same power and its radiation resistance will be lower still. The lower the radiation resistance, the greater the proportion of loss.

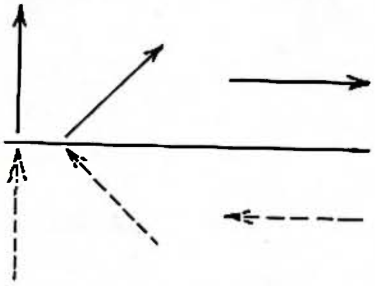


Fig. 2.—Antenna with ground image.

The resistance of a vertical antenna depends upon the radiation resistance obtained from calculation plus the series loss resistance. The resistance of a horizontal antenna depends upon the series loss resistance, the induced loss from the ground, and the radiation resistance, the latter two being greatly influenced by the height above the ground. For these reasons a low horizontal antenna is much more influenced by the ground proximity than a vertical.

(Continued on Page 13)

Circuits for All—A Simple Method of Drafting*

KENNETH L. GILLESPIE,† VK3GK

Farmers, clerks, shopkeepers and anyone else you care to name are Amateur Radio operators, but the converse is not true. Amateurs, in addition to being farmers, etc., are Electronic and Mechanical Design Engineers, Repair Servicemen, Mechanics, Radio Operators and manufacturers of all types of equipment with the ability to meet and overcome a variety of problems associated with their hobby. Normally they are not Draftsmen, but why not? Isn't this just another of the various trades an Amateur should have?

Anything home constructed should have a circuit diagram for reference for future servicing or to supply a copy to another chap in need of just that particular piece of apparatus. Additionally, and this is the point of this screed, a well drawn diagram supplied separately from the text is a great help to the editor of this magazine who is always in need of articles.

NECESSARY TOOLS

What has to be done to acquire a modicum of skill in this direction, and what tools are necessary to do the job? Obviously anything from a ball point pen to a proper Indian ink pen and stencils will do.

I would suggest that each Amateur should have as part of his shack a foolscap pad of ¼" squared paper and tracing paper for a start (although a parchment type lunch wrap paper will do for the latter) plus ruler or a piece of perspex with a straight edge for drawing straight lines.

Suppose that something has been built and modified until it works properly, there are most likely working sketches scribbled on scraps of paper with the appropriate amendments found desirable also shown. These have to be made presentable. To provide the first diagram, sketch by hand the complete circuit with soft pencil on the lines of the squared paper, leaving plenty of room between components for written identification of values. No need for a ruler or square, the paper takes care of spacing, parallel and right angle lines.

While there are people for and against showing a loop where one wire crosses another, it is simpler and standard practice not to use it but draw the line straight through. The thing to remember with this, is to see that all wires that are connected to one particular wire, connect at different points so that all junctions show as a "T". This is good drawing practice anyway. These junctions are shown with a dot and this method of junctioning is valid even if the dot is accidentally omitted.

Having sketched the circuit, **check** carefully to see that it is the same as the original—if one has, or can get, someone else to check, so much the better because it is so easy to overlook something that has been missed in the first place.

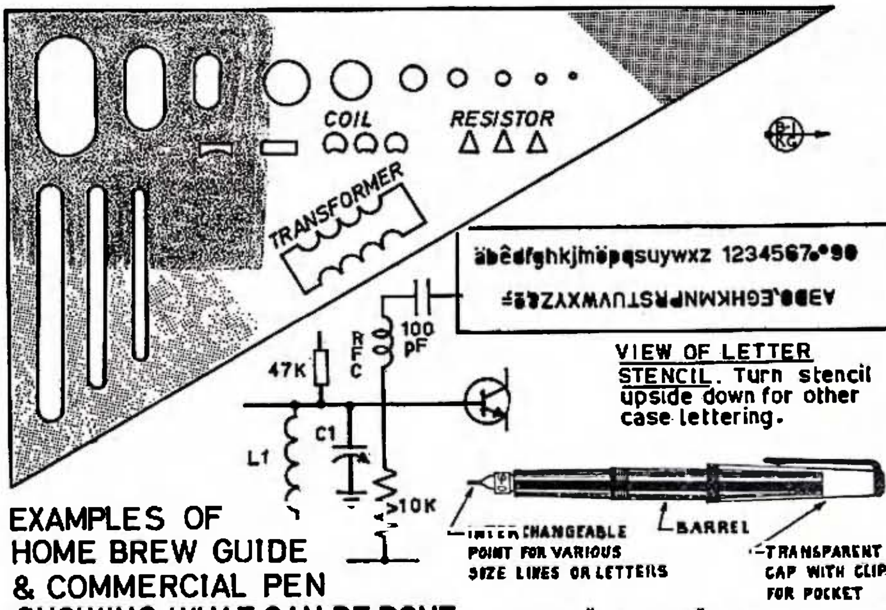
Now the next part of the job, whether it is for an article or for your permanent record, is to make an ink tracing (by putting the transparent paper over the pencil drawing and tracing in ink everything that has been sketched). This time a straight edge is used to rule the lines.

To make the job easier I would suggest investing in a solid clear plastic setsquare and drilling or reaming a series of different size holes along one edge. With a ball point pen and these, circles of different diameters can be easily drawn. Make the smallest diameter suitable for junction dots, the next for switch contacts. Both in conjunction will produce a co-ax connector. Larges ones would take care of the outline of a valve or transistor.

the pen cannot move further than the limits of the slot. Two or more slots will give a choice of letter size.

For reproduction, whether a dyeline, blueprint, electrostatic, photo copy or line block for printing, use a **broad** red ball point pen as this produces good contrast. **Never** use blue—it does not print. Black ball point is such a mixture of colours that it does not work as well as red.

Of course the ultimate for all drawing and lettering is Indian ink and here I suggest the Indian ink fountain pen, a drawing and writing instrument which has a hollow steel tube as its writing point. There are about four makes of these with a variety of diameters for different thickness lines. A good all round size is 0.6 mm in dia-



EXAMPLES OF HOME BREW GUIDE & COMMERCIAL PEN SHOWING WHAT CAN BE DONE

PELIKAN "TECHNOS" PEN

By careful use, drawing only part of a circle at a time and sliding the square, a coil can be drawn. If a little more work is undertaken a stencil of a simplified coil, as in modern practice, can be filed out or cut with a jeweller's saw.

Resistors can be a problem, but the simple rectangle (which will also double for a condenser) is easily made or if a zig-zag type is wanted, I suggest one or two triangles be cut and the square moved longitudinally until the resistor is formed.

LETTERING

Lettering is another bugbear of the non-draftsman, but quite reasonable uppercase lettering can be done if a long slot is sawn in the square and the pen worked so that it makes contact with the bottom and top of the slot for each letter. This keeps all lettering even and of the same height because

meter. Use in place of ball point in the home brew stencil and be astounded at the professional result.

If one is prepared to spend more money, the same pen will fit 3.5 mm. and 4.00 mm. high letter stencils. One cheap make, "Technos," gives upper case, lower case and numerals on the one stencil. There is a secondary use (or perhaps primary) of this pen and stencil. It will make good radio panel labels, dial calibrations and goodness knows what all to the ingenious Amateur.

THE DRAWING

Coming back to "Amateur Radio" drawings, trace all of them on tracing paper to a larger size than you expect to see finished in the magazine. Look at a copy and see the width of a column or two columns and draw roughly two or three times the size. Remember

(Continued on Page 17)

* Reprinted from "Break-In," October 1970.
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Crystals for Carphones—and Other Things

DAVID RANKIN,* VK3QV

In the last ten years the ready availability of commercially obsolete v.h.f. mobile transceivers has given rise to a new phase of Amateur Radio—the use of the a.m. and f.m. net frequencies with the subsequent development of v.h.f./u.h.f. Repeaters within the 52, 144 and 432 MHz. Amateur bands.

One of the elementary requirements for the successful operation of this type of equipment was that all the transmitters and receivers be tuned to the same frequency within close limits. Simple as it sounds, this was something alien to the methods of the v.h.f. Amateur of the 50s and early 1960s. Operators usually picked a crystal in the 8 MHz. range, and whatever frequency it multiplied out to within the 6 or 2 metre band became "their frequency" something to be guarded jealously. There was seldom any real thought given to achieving operation on a predetermined frequency to say within 0.005%.

CARPHONES

The appearance of cheap v.h.f. mobile transceivers—now usually known as "Carphones" after the name used commercially by one of the leading manufacturers—changed Amateur techniques because of the necessity for all units to be on the same frequency. With these Carphones, the receiver as well as the transmitter was crystal locked and no trimming controls were provided for the operator. Early thoughts were that if the same frequencies were required at the antenna, then use the same crystal frequencies in all the receivers and also the same in all the transmitters — surely the frequency marked on the crystal holder must be right. However, this philosophy was not borne out in practice, particularly where different model sets were involved. Some other factors must then be considered to explain these differences.

CRYSTAL FREQUENCY

The simplified equivalent circuit of a crystal is easily found in such well known texts as the R.S.G.B. Handbook[1] or the A.R.R.L. Handbook.[2] Suffice to say here that for the case of parallel resonance, the frequency of operation is dependent upon the total value of capacitance appearing across the terminals of the crystal whilst it is operating. In other words, the operating frequency depends upon the effective dynamic capacitance presented to the crystal.

Table 1 shows the variations in frequency obtained for different values of load (effective dynamic) capacitance and the corresponding series resonant frequency. These figures were taken on standard HC6/U plated crystals at 4 MHz., 10 MHz. and 45 MHz. The first two crystals were fundamental types —the 45 MHz. was a third overtone. The variations measured can only be taken as a guide, as the differences may be different for crystal units produced by other manufacturers.

Two points worth comment arise from consideration of the figures in Table 1:

1. The fundamental crystals measured were manufactured to suit a load capacitance of 30 pF. Refer to the third column of Table 2. The overtone crystal measured was manufactured for use at series resonance. Whilst none of the crystals oscillated precisely at nominal frequency (i.e. the required frequency on 30 pF.) they are closest to nominal with this 30 pF. load condition and series resonance, respectively. The degree by which they vary from nominal frequency when terminated into the correct circuit condition is part of the adjustment tolerance and the total amount of this permitted variation is usually quoted as a plus or minus so much percentage. Alternatively, a "parts per million" or a "Hz. per MHz." figure can be used. The "parts per million" phrase is frequently abbreviated to p.p.m. Table 3 gives some commonly accepted figures used for adjustment tolerances and states the fairly simple relationship between the three methods of quoting tolerance.

2. The variation in frequency between extreme values of load capacitance is so great that in the usual oscillator circuit, it becomes impractical to accommodate the changes required in load. Table 2 shows the frequency deviation from nominal for a typical 4 MHz. HC6/U plated crystal, and since the unit has been calibrated for a 30 pF. load, it could not be made to operate on correct frequency in a series resonant circuit unless that circuit was modified away from the series resonant condition. Again, in the case of small values of load capacity, the strays in the circuit, particularly if switching is involved, may be greater than the load capacity for which the crystal is designed. In this case, also, the crystal could not be made to oscillate on nominal frequency. Thus, in some multi-channel transceivers there are smaller values of fixed capacitance associated with the crystal oscillator than in the corresponding single channel model—the rest of the capacitance is made up of wiring capacity in the leads to the switch, and capacity in the switch itself. This approach of reduced fixed capacitors ensures that the crystals suitable for operation in the multichannel models are also satisfactory in the single-channel versions.

Circuit Loading	Measured Frequency — KHz.		
	Nominal 4055.556 KHz.	Nominal 10,285.71 KHz.	Nominal 45,228.0 KHz.
10 pF.	4056.976 KHz.	10,289.31 KHz.	45,231.12 KHz.
20 „	4056.094 „	10,287.10 „	45,229.73 „
29.3 „	4055.556 „	not measured	not measured
29.8 „	not measured	10,285.71 KHz.	not measured
30 „	4055.526 KHz.	10,285.69 „	45,229.28 KHz.
40 „	4055.199 „	10,284.90 „	45,229.02 „
50 „	4054.988 „	10,284.38 „	45,228.90 „
60 „	4054.838 „	10,284.02 „	45,228.74 „
100 „	4054.518 „	10,283.25 „	not measured
Series Resonance	4053.960 „	10,281.91 „	45,228.22 „

Table 1.—Variations in frequency of HC-6/U style crystal units (plated) due to changes in circuit loading.

Notes.—1. At 30 pF. circuit load, the 4 MHz. crystal is 30 Hz. low of nominal frequency. Thus, the crystal has an adjustment tolerance of better than 0.0008% (8 p.p.m.).
2. The 10 MHz. crystal is 20 Hz. low of nominal frequency with a 30 pF. load and thus has an adjustment tolerance of better than 0.0002% (2 p.p.m.).
3. The measured series resonant frequency of the 45 MHz. crystal is 220 Hz. above the nominal, and thus has an adjustment tolerance of better than 5 p.p.m.

ADJUSTMENT TOLERANCE

In effect, the adjustment tolerance is an allowance given to a manufacturer who cannot be expected to produce devices that are "spot on". Resistors, capacitors, coils, etc., all have tolerances associated with their nominal values, and so also must crystals. However, in the case of a crystal unit, the user can do something about the situation. The nominal frequency can be produced by an appropriate value of load capacitance. Some thought given to the figures in Table 1 should make this clear. At some value of capacitance between 29 and 30 pF., both the 4 MHz. and 10 MHz. crystals oscillate on nominal frequency. In practice,

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then if a small trimmer is wired into the oscilaltor circuit, the load can be varied up or down, so that output on the precise nominal frequency can be achieved.

LOAD CAPACITANCE

Experience has shown that the best compromise for load capacitance for fundamental crystals is 30 pF. for frequencies up to 10 or 12 MHz. Initially, the U.S.A. adopted a value of 32 pF. which is somewhat academic, but the latest issues of the U.S. MIL specifications have changed to the 30 pF. value.

Thus, it is reasonable to expect that most Carphones with **unmodified** crystal oscillators require fundamental crystals calibrated for 30 pF. operation. This is true for equipment such as the A.W.A. MR6 and MR10 series and early Vinten equipment, but is not true for the Pye "Victor", "Premier" or "Overland" series. In these latter equipments, even the transmitter crystals need to be calibrated for series resonant operation; the receiver crystals are of the overtone type and require series resonance calibration, which is the recommended condition for overtone units.

3. Reference to Tables 1 and 2 will show that "30 pF." crystals will be nowhere near the required frequency if operated at series resonance in a "Victor," for example, and particularly after an 18 or 36 times multiplication, the aerial frequency can be tens of kilohertz away from the proper channel.

Other manufacturers have used load capacitance values of 20 pF., 25 pF. and even 40 pF., and here the situation may not be so serious. "30 pF. crystals" won't be quite so far off frequency and it may even be possible to pad them to frequency by modifying the oscillator—a most unrewarding and frustrating task in most instances, however. The main point, then, is that it behoves the user to make sure that he has crystals to suit his equipment. If, however, the crystals don't come out on the required frequency, then before mentally or otherwise abusing the manufacturer, the user should check out his specifications and see that he has ordered the correct capacitive load.

OTHER THINGS

Another area where the need to be precise about crystal load conditions is the oscillator crystals for modern s.s.b. receivers of the Collins, Yaesu or Drake class where frequency readout to 1 KHz. is available. A third case where precision in specification is required is where v.h.f./u.h.f. crystal-locked converters are used in conjunction with such receivers.

S.S.B. Receivers

To achieve 1 KHz. readout economically on a number of Amateur bands, modern s.s.b. receivers are of the double (at least) conversion superhet. design, where the first local oscillator is crystal locked and the second local oscillator is tunable. If the various crystals used for the different bands in the first oscillator are not specified precisely, the dial calibration will not hold from band to band.

These receivers usually have movable pointers—fidicuaries—or some similar scheme to take up small differences of the order of 1 or 2 KHz. that will occur from band to band because of the adjustment tolerances on the individual crystals. If the crystals are not specified precisely, the differences from band to band may be beyond the corrective range of the fidicuary, in which case one of the main assets of the receiver is lost. On the other hand, if trimming facilities are provided, the adjustment tolerances may be tuned out, and then the dial calibration can be made to hold from band to band within 100 or 200 Hz. at least.

For the real enthusiast, there is nothing like switching on the 100 KHz. calibrator and the b.f.o. and tuning zero beat on one of the 100 KHz. marker signals, and then "clunking" the band switch from one band to another, and finding zero beat being maintained on all bands. What joy!

V.H.F./U.H.F. Converters

With the main receiver thus aligned, it should also become a joy to operate it as a v.h.f./u.h.f. tunable i.f. Any modern converter worthy of the name is crystal locked, and thus the frequency of this locking crystal becomes important if the main receiver dial is to become in turn direct reading on the v.h.f. or u.h.f. band concerned. A fairly simple way to check the converter crystal is as follows, and let us take simple examples to illustrate the approach.

Consider a 6 metre converter that has an i.f. of 6 to 8 MHz., i.e. 52.000 MHz. is to come up on 6.000 MHz. on the receiver dial. Choose a marker signal such that a harmonic will appear on both 6.000 and 52.000 MHz. exactly. In the interests of a strong a harmonic as possible at the higher frequency, use the highest possible marker frequency. For the 6 metre converter, 2.000 MHz. is the highest possible figure that will divide evenly into both 6.000 and 52.000 MHz. Ensure that the receiver calibration is correct at 6.000 MHz. in the normal way (WWV, in-built calibrator, etc.), and then zero beat the third harmonic of 2.000 MHz. marker to the corrected 6.000 MHz. calibration. Having ensured that the 2.000 MHz. frequency is correct (within ±100 Hz. should be easily achieved), switch off the receiver calibrator and put the v.h.f./u.h.f. converter into operation and look for the 26th harmonic of 2.000 MHz. marker. Provided that the levels of the third harmonic into the main receiver and the 26th harmonic into the converter are adjusted appropriately, a beat note may be observed between these two signals at 6.000 MHz. on the dial. This, of course, is on the assumption that the converter crystal is oscillating close to its nominal frequency. In some cases this crystal may be so far off frequency that two distinct signals are heard around 6.000 MHz. The difference between the two signals will be caused by the converter crystal being off nominal frequency, and thus trimming it should bring the two signals into zero beat, provided, of course, that the converter crystal has been specified to suit the oscillator circuit in use. Once zero beat has been achieved the 6.000 MHz. dial calibration becomes 52.000 MHz. as far as the overall receiver system is concerned.

Other examples are given in Table 4. Some thought on the subject will show that since all the popular v.h.f./u.h.f.

Circuit Loading	Measured Frequency	Deviation from Nominal Frequency	
		At 4055.556 KHz.	At 146 MHz.
10 pF.	4056.976 KHz.	+ 1420 Hz.	+ 51.1 KHz.
20 ,,	4056.094 ,,	+ 538 ,,	+ 19.4 ,,
29.3 ,,	4055.556 ,,	nil	nil
30 ,,	4055.526 ,,	— 30 Hz.	— 1.1 KHz.
40 ,,	4055.199 ,,	— 357 ,,	— 12.9 ,,
50 ,,	4054.988 ,,	— 568 ,,	— 20.5 ,,
60 ,,	4054.838 ,,	— 718 ,,	— 25.9 ,,
100 ,,	4054.518 ,,	— 1038 ,,	— 37.4 ,,
Series Resonance	4053.960 ,,	— 1596 ,,	— 57.5 ,,

Table 2.—An illustration of the degree of deviation from nominal frequency of HC-6/U style plated crystal with varying load capacitances. The figures are taken for the 4 MHz. crystal given in Table 1.

Note particularly how variations are emphasised at aerial frequency (146.0 MHz.) when any error is multiplied 36 times.

Percentage %	Parts per Million PPM	Hz. per MHz.	Actual Variation at	
			52 MHz.	146 MHz.
± 0.01	± 100	± 100	± 5.2 KHz.	± 14.6 KHz.
± 0.005	± 50	± 50	± 2.6 ,,	± 7.3 ,,
± 0.0015	± 15	± 15	± 780 Hz.	± 2.19 ,,
± 0.001	± 10	± 10	± 520 ,,	± 1.46 ,,
± 0.0005	± 5	± 5	± 260 ,,	± 730 Hz.

Table 3.—A comparison showing the relationship between three ways of quoting tolerances on the frequency of a crystal, and also showing what these mean in terms of Hz. or KHz. at 52 and 144 MHz.

Actual variation (in Hz.) equals actual frequency (in MHz.) multiplied by p.p.m.

Actual variation (in KHz.) equals actual frequency (in MHz.) multiplied by (p.p.m. divided by 1,000).

bands start with even number frequencies, then, provided the chosen i.f. begins with an even number, a 2.000 MHz. marker signal would always provide the correct harmonics.

The principal problem arising with this scheme is the relative strengths of the marker signal at the i.f. and the v.h.f./u.h.f. The widely differing order of harmonics will have widely differing signal strengths—the higher the order of the harmonic, the weaker it will be—and thus, in practice, some method of enhancing a particular harmonic may be required. Otherwise, the weaker harmonic will be swamped by the stronger and any beat note may not be detected aurally. A diode frequency multiplier, followed by appropriate tuned circuits, is one possible solution.

CONCLUSION

Where optimum performance of Carphones is required, or the full potential of direct frequency readout on modern h.f. and v.h.f./u.h.f. receiving systems is to be realised, then careful attention must be paid to the specifications for the frequency determining crystals. Oscillator circuits in such equipment should not be modified unless the user is fully aware of **all** the implications such modifications may have. Where the circuits are standard, reference to the manufacturers' handbook should help the user to fully specify the crystals correctly.

Digital circuitry and techniques are starting to appear in the Amateur literature, and it is probably only a question of time before the "average" receiver comes equipped with digital readout of frequency. The resolution will be mainly limited by the number of readout tubes and gating times used, but fine resolution will be useless without corresponding accuracy—the frequency accuracy of the crystals in the system. Thus, the requirement for care in the specification of the operating conditions for the crystal looks like it is with us to stay, and in fact the degree of precision will increase as more exotic devices become available.

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3. D. H. Rankin, "Overtone Operation of Quartz Crystals", "Amateur Radio", March 1967, page 2, and May 1967, page 5.

VHF Band	Tunable I.F.	Converter Injection Frequency	Suggested Marker Frequency	Remarks
52 to 54 MHz.	14 to 16 MHz.	38 MHz.	2 MHz.	7th harmonic on 14 MHz. 26th ,, ,, 52 ,,
144 to 148 MHz.	6 to 10 MHz.	46 × 3 = 138 MHz.	6 MHz.	Fundamental on 6 MHz. 24th harmonic on 144 MHz.
144 to 148 MHz.	28 to 32 MHz.	38.66 × 3 or 58 × 2 = 116 MHz.	4 MHz.	7th harmonic on 28 MHz. 36th ,, ,, 144 ,,
432 to 436 MHz.	27 to 31 MHz.	101.25 × 4 = 405 MHz.	9 MHz.	3rd harmonic on 27 MHz. 48th ,, ,, 432 ,,

Table 4.—Examples of a marker crystal frequency suitable for zeroing a v.h.f./u.h.f. converter to assure direct frequency readout on the tunable i.f. Note that the examples chosen are to illustrate this point and are not necessarily recommended as good v.h.f./u.h.f. receiver practice.

AMPLITUDE MODULATION

LECTURE No. 12

C. A. CULLINAN,* VK3AXU

When considering material for a lecture on Amplitude Modulation the following article from the "Aerovox Research Worker," Vol. 14, No. 6, was examined and found to be so fluently written that it is reproduced in full with permission of the Aerovox Corporation, U.S.A.

Note should be made that the word "tube" is used in the text for vacuum-tube or valve.

Additional material is by the lecturer.

The three common methods of superimposing an audio-frequency component upon a radio-frequency carrier wave are termed frequency modulation, phase modulation, and amplitude modulation. Radio telephony and some forms of tone telegraphy are made possible by modulation processes.

In amplitude modulation, the carrier frequency is maintained constant while the carrier amplitude is varied at the audio rate. Neither frequency nor phase is more than slightly disturbed in efficiently operated systems.

Amplitude modulation is widely used [in broadcasting]. Each of the standard broadcast stations and a few of the radio telephone communication stations now in operation employ this method. Moreover, amplitude-modulated signal generators are used to align and test several million of the receivers in current use.

The appearance of an amplitude modulated carrier is shown in Fig. 1. This illustration shows the carrier voltage or current wave before and after application of the modulating component.

It is seen that both carrier and audio voltages are alternating components of widely different frequency. When the two are combined in the process of amplitude modulation, the amplitudes

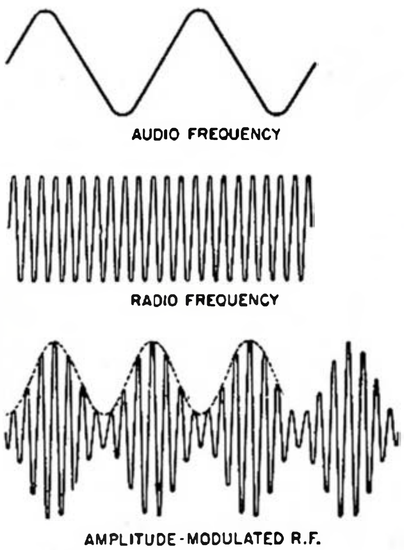

Fig. 1.

* 6 Adrian Street, Colac, Vic., 3250.

● Continuing the series of lectures by C. A. Cullinan, VK3AXU, at Broadcast Station 3CS for students studying for a P.M.G. Radio Operator's Certificate.

of successive positive and negative carrier peaks are altered in accordance, so that the "moulded" carrier traces out an envelope corresponding to the frequency and relative voltage of the audio component. The relationship of carrier and modulating voltages or currents and frequencies of these components is shown in Fig. 2. A radio-frequency carrier before modulation is shown in Fig. 2A, the modulating voltage wave in 2B and the completely modulated carrier in 2C.

In order to combine the audio and carrier components in the modulation process, the alternating a.f. voltage is actually superimposed upon one of the d.c. operating voltages of the r.f. amplifier or oscillator, generally the plate or grid voltage. Accordingly, the a.c. and d.c. voltages add on one half-cycle of audio voltage and buck on the other half-cycle. This results in an increase in the normal d.c. voltage in the first instance and a reduction in the second case.

In consequence of this action, a variable d.c. voltage is applied to one of the r.f. tube electrodes, and the r.f. carrier voltage and current will be varied at the same rate. For complete modulation, as depicted by Fig. 2, the carrier amplitude is increased, throughout the modulation envelope, to a maximum value equal to twice the unmodulated carrier amplitude and reduced to a minimum value of zero. In the conventional system operating ideally, both positive and negative carrier peaks are affected by the same amount, and the carrier frequency and phase remain unaltered.

In Fig. 2C, C is the unmodulated carrier amplitude and M the amplitude of the modulating voltage. The diagram shows the condition of complete modulation, i.e. M = C, and X = 2C. From the relationship shown, it is evident that lower values of M than that shown would fail to raise the carrier amplitude to an instantaneous value of twice its unmodulated value on positive peaks of modulating voltage, or to reduce it entirely to zero on negative peaks of modulating voltage. Similarly, higher values of M would raise amplitude C to a level more than twice its unmodulated value while completely cutting off the carrier for brief intervals during the negative modulation swing. The carrier would disappear completely at the zero line, the negative modulation peaks being lost. Consequently, the dimension D is useful for indicating the extent of the process, or modulation depth.

The degree of modulation is useful information. The effective value of amplitude modulated current increases with modulation depth. In practice, the depth of modulation is determined conveniently from the ratio of modulated to unmodulated carrier amplitudes. This ratio is known as the modulation factor.

From the diagram of Fig. 2, the modulation factor may be expressed as M/C. However, when measurements are made of successive modulated and unmodulated amplitudes, as with an oscilloscope, it is more convenient to measure each of these amplitudes with reference to the zero line rather than with respect to each other. This is because the original carrier amplitude disappears from the screen (or meter scale) during modulation. When measurements are made from zero, M is equal to the difference between the modulated and unmodulated carrier amplitudes, and the equation for modulation factor becomes:

$$\text{Modulation Factor} = \frac{X - C}{C} \qquad (1)$$

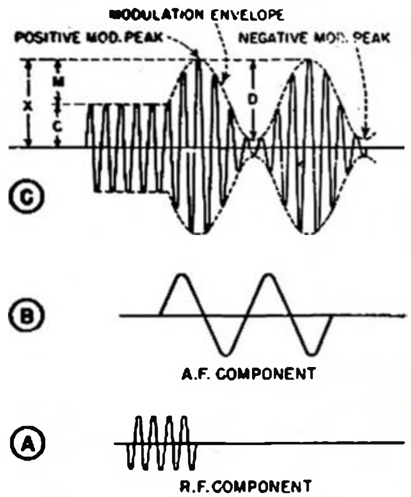

Fig. 2.

These amplitude values are determined by means of a peak-reading vacuum-tube voltmeter connected across an appropriate tuned circuit, resonant to the carrier frequency, or they may be taken directly from an oscilloscope screen in any desirable linear units of measurement.

In complete modulation, the modulation factor is 1.0. This follows from the requirement that the completely modulated carrier amplitude be exactly twice its unmodulated value, its ratio being unity. The percentage of modulation, common term for expressing modulation depth, may be obtained by multiplying the modulation factor by 100:

$$\%\ \text{Modulation} = \frac{X - C}{C} 100 \qquad (2)$$

Several degrees of modulation depth are shown in Fig. 3. Fig. 3A corresponds to complete, or 100% modulation, Fig. 3B to incomplete (approximately 50%) modulation, and Fig. 3C to overmodulation (somewhat greater than 100%). Note from these voltage or current curves that the maximum and minimum modulated amplitudes are equal respectively to twice the unmodulated value and zero for 100% modulation, less than twice carrier and higher than zero for incomplete modulation, and greater than twice carrier for overmodulation. Observe also that by-products of overmodulation are the cut-off periods along the zero line.

In a completely modulated transmitter, the instantaneous antenna current or voltage is raised to twice its normal value by positive modulation peaks and decreased to zero by negative modulation peaks. The antenna resistance remains constant as long as the carrier frequency is not shifted; so the power in the modulated wave is directly proportional to the square of the modulated carrier voltage or current ($P = E^2 \div R = I^2R$). In any carrier that is modulated 100% by the amplitude method, the instantaneous peak power is therefore four times the unmodulated carrier power. The completely modulated amplifier or oscillator must be capable of supplying this increased peak power output.

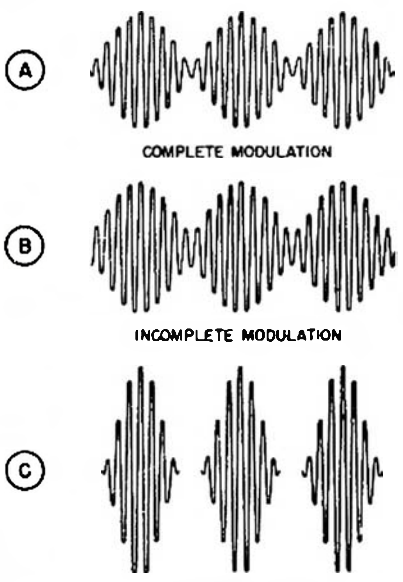

Fig. 3.

ADVANTAGES OF COMPLETE MODULATION

The audio-frequency voltage and power delivered by the detector in a radio receiver is proportional to the amplitude of the modulating voltage. This voltage is equivalent in magnitude and frequency to the modulation envelope. In order to obtain the largest undistorted detector output for a given carrier, the largest permissible a.f. voltage must be employed in the modulation process—which is another way of stating that the highest permissible values of modulation depth, modulation factor, or modulation percentage give the highest undistorted detector output levels.

100% modulation is the maximum permissible depth which may be applied to any carrier wave, since this percentage allows the carrier amplitude to be swung between zero and twice its normal value, the maximum safe limits. Higher percentages of modulation have already been shown to introduce cut-off periods (Fig. 3C), which because of the high damping they introduce, cause broad tuning. Frequency distortion, resulting from loss of the negative modulating voltage peaks and deviation of the carrier frequency during modulation, are also by-products of excessive modulation depth.

Complete modulation of a transmitter reduces heterodyne interference at distant points, improves the signal strength (and signal-to-noise ratio) in receivers in the service area, and affords a better increase in the station's service area than might be gained by reasonable increases in the transmitter carrier power. An audio increase of only 3 db., for example, is equivalent to doubling the carrier power. 100% modulation makes the most effective use of a carrier in the most economical manner.

SIDEBAND GENERATION

One of the by-products of normal amplitude modulation is the heterodyne effect between the a.f. and r.f. components. As is the case when any two frequencies are combined, two beat notes are set up by the modulation process, due to interaction of carrier and modulating voltages. One of these beats is equal to the sum of the two frequencies, and the other to their difference. Consequently, two radio frequencies other than the transmitter or oscillator carrier are generated by the modulation process; one being equal to the carrier plus the modulating frequency—the other to the carrier minus the modulating frequency. These are the well known side frequencies, lying one above and one below the carrier, which set the limits of the side bands. The intelligence is conveyed by these side bands.

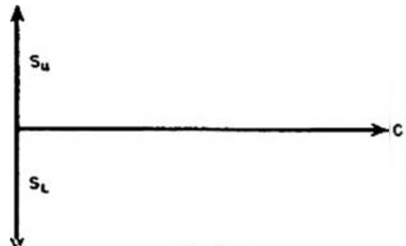

Fig. 4.

The initial phases of carrier, upper side frequency, and lower side frequency are 0, —90, and +90 degrees. These phase relationships are represented vectorially in Fig. 4, where the components are either peak or effective carrier voltage and side-frequency voltages. S_U and S_L are the upper and lower side-frequency voltages, respectively, while C is the carrier voltage. With respect to the carrier vector, C, S_U rotates counter-clockwise, while S_L rotates clockwise. At maximum modulated amplitude, the side-frequency vectors are in phase with the carrier vector; at minimum modulated amplitude, 180° out of phase. With respect to the magnitudes of the side-frequency voltages or currents, the modulation percentage is:

$$\%\ \text{Modulation} = \frac{S_U + S_L}{C} 100 \qquad (3)$$

The channel width of an amplitude modulated emission is fixed by the separation of the upper and lower side frequencies and is the total width of the side bands so delineated. The channel width is thus twice the frequency of the modulating voltage. When the latter contains several frequencies, as in speech or music modulation, the highest modulating frequency in the complex group determines the maximum side band width.

AMPLITUDE MODULATION CIRCUITS

Fig. 5 shows various circuits for amplitude modulation. Fig. 5A and 5B are arranged for plate modulation of the r.f. tube; Fig. 5C for grid-bias modulation; Fig. 5D, cathode modulation; and Fig. 5E, suppressor modulation.

Plate modulation may be constant current or constant voltage in type. In the former case, the modulator delivers audio-frequency power to the r.f. tube. In the constant voltage system, the modulator may be considered equivalent to an audio operated resistor in series with the d.c. plate voltage of the r.f. tube.

Heising Modulation

Fig. 5A is the Heising or constant current circuit. In this arrangement, d.c. power is supplied to both r.f. and modulator tubes through the iron-core reactor L by the common source E_P. The modulator plate current is maintained by the d.c. grid voltage of the modulator at the same value as the r.f. tube plate current.

Variations in the modulator grid voltage (produced by excitation from the audio amplifier) cause corresponding changes in the modulator plate current, an increase in the negative value causing a reduction in plate current, while a reduction in the negative value (or positive grid swing) causes the plate current to rise. These plate current variations give rise to induced voltages in the reactor L, which are in the proper direction with respect to E_P to maintain the supply current steady. When the modulator plate current increases, the amplifier plate current must decrease, and vice versa. The total current thus remains constant through the action of the reactor, while audio-frequency variations in the plate current of the r.f. tube produce corresponding variations in the carrier.

For 100% modulation, the r.f. amplitude is modulated between twice its resting value and zero. In order to accomplish this in the Heising circuit, several modulator tubes would need to be connected in parallel to reduce the modulator plate resistance. (Actually, in order to secure complete modulation, the plate resistance would have to be reduced to zero.) Or the modulator plate must be operated at a higher voltage than that of the r.f. tube. The latter method is most common and is accomplished by the series dropping resistor R which is shunted by the capacitor C, the function of the latter being to pass the audio voltage.

Plate Modulation

Fig. 5B shows plate modulation employing a coupling transformer. The modulator may be a class A, class B or class AB amplifier of sufficient power capability. Here the a.f. power is superimposed upon the d.c. plate power input to the r.f. tube by means of the transformer. The audio voltage is thus effectively in series with the d.c. plate voltage of the r.f. tube. The voltage required for complete modulation depends upon the a.f. voltage in the transformer primary, the turns ratio of the transformer, and the maximum d.c. power input to the plate of the r.f. tube. When the a.f. power output is sufficient, complete modulation with low distortion and good linearity is obtained when the impedances of modulator and r.f. tube plate circuits are matched through the coupling transformer.

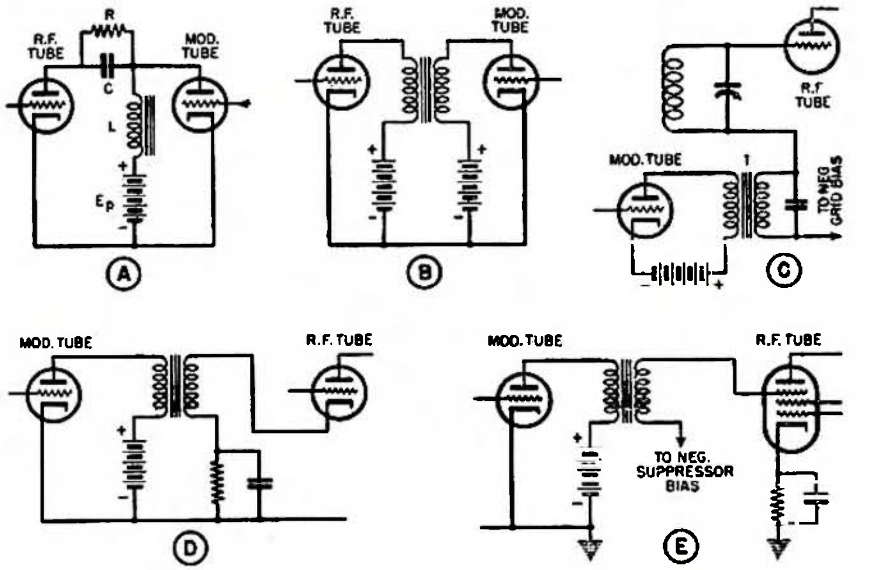

Fig. 5.

In plate-modulated systems, the audio power which must be supplied by the modulator is equal to one-half the d.c. plate power input to the r.f. stage. It is clear from the foregoing explanations that since the instantaneous plate voltage of an r.f. tube under 100% modulation will be increased to twice its normal value, the tube must dissipate a detrimental amount of power unless its "resting" plate voltage is reduced to a safe value. For this reason tube tables indicate a lower value of plate voltage for telephony and modulated telegraphy than for unmodulated services.

Grid Modulation

Fig. 5C shows a grid-bias modulation circuit. Here, audio frequencies are introduced into the grid circuit of the r.f. tube through the coupling transformer T. This system utilises variations in the grid-bias of the r.f. tube to secure amplitude modulation of the carrier. The peak grid voltage is varied by varying the d.c. bias at the audio-frequency rate, and the average power output is increased by the modulation process, although the d.c. plate power input remains constant. Operating voltages and currents must be maintained at specific values in order to obtain good linearity of modulation. Especially important is the location along the grid characteristic at which the tube is operated. These values are such that the plate circuit efficiency of a grid-modulated stage is reduced to approximately one-half that of a plate-modulated stage. 35% is usual with grid modulation. Both excitation and bias voltages are set considerably lower than corresponding characteristics in class C operation.

The carrier efficiency in a grid-bias modulated system is highest at the modulation peak. The carrier must be maintained at a value which is equal to half of its peak voltage, the modulated values being then swung up and down about this particular value. The carrier efficiency is accordingly termed one-half the theoretical possible efficiency. Actually, however, the efficiency of grid-modulated r.f. amplifiers is approximately 35%. An advantage of the system is its low a.f. and r.f. power requirements. Very small audio levels will completely modulate the amplifier, while the actual r.f. excitation power reaching the grid need be sufficient only to overcome the grid losses.

Cathode Modulation

A typical cathode-modulated amplifier is shown in Fig. 5D. In this circuit, the audio voltage is impressed across the cathode circuit. The cathode-modulated circuit may be considered to divide the modulation between plate and grid, the carrier efficiency being, as a result, intermediate between the two and usually 45%. Variations occur in both grid-bias and plate voltage during modulation.

Since the presence of a small amount of grid-bias modulation in this system tends to make the circuit behave somewhat as a grid-bias modulated stage, the output will not be so high as with plate modulation. The percentage of grid modulation is purposely kept small to increase the carrier efficiency. The percentage of grid modulation may be controlled by adjustment of the grid leak resistance and the position of the grid return along the tapped secondary of the cathode modulation transformer.

As the percentage of plate modulation is increased, the required audio power (from the modulator) and r.f. excitation likewise increase, although both of these requirements will be small as compared to those of plate modulation circuits.

Suppressor Modulation

Fig. 5E shows the circuit for suppressor modulation of r.f. pentodes. Here, the audio-frequency component is introduced through the coupling transformer in series with the negative d.c. suppressor bias. An extremely small amount of audio power is required to modulate an amplifier in this fashion, but the carrier efficiency, as in grid-bias modulation, is only about 35%, and distortion increases above 80% modulation.

The preceding material from Aerovox has shown how Amplitude Modulation is accomplished, however, there are several modes of transmission of this type of modulation.

In the above discussion we have seen that there is a radio frequency carrier and two symmetrical sidebands. This is the type of signal which is transmitted by broadcasting stations and many other stations using amplitude modulation. However, it is possible to transmit variations for special purposes.

DOUBLE SIDEBAND SUPPRESSED CARRIER (D.S.B.S.C. or D.S.B.)

During or after the modulation process the carrier is removed and only the sidebands are transmitted. These will be centred on the carrier frequency. The main advantage of this and other suppressed carrier systems is that there is no carrier to produce audible interference beats in receivers. However, there are disadvantages in that an artificial carrier has to be inserted in the receiver. This carrier must be very close in frequency to the original or to the receiver i.f. frequency, if a super heterodyne type, also it must be reasonably accurately phased and must be of the same level or ratio to the sidebands, as existed in the transmitter.

The disadvantages outweigh the advantages for broadcasting, but the system is used in Amateur and some Commercial systems.

SINGLE SIDEBAND SUPPRESSED CARRIER (S.S.B.S.C. or S.S.B.)

There are several methods of doing this, but all start off with amplitude modulation. The two most popular methods of obtaining S.S.B. are the Filter method and the Phasing method.

In the filter method the radio frequency carrier is amplitude modulated, then either during the modulation process, or afterwards, the carrier is removed as in d.s.b. One of the sidebands is then passed through a filter whose selectivity curve has very steep sides and a flat top. The advantages of this type of transmission are that interference is minimised because of the absence of the carrier, also there is a considerable saving in spectrum space as only one sideband is transmitted.

In the phasing system the r.f. carrier and the a.f. signals are split and phased in such a manner that the carrier cancels itself and one of the sidebands is cancelled, leaving a single sideband with suppressed carrier.

The disadvantages are similar to that of d.s.b. It is interesting to note that in the early days of broadcasting in U.S.A. serious consideration was given to standardising all broadcasting stations to use single sideband suppressed carrier transmission. However, this proposal failed because of the difficulty in making satisfactory receivers.

In recent years great advances have been made in receiver design and with a modern receiver the tuning in of an s.s.b. signal is nearly as easy as with tuning a normal receiver to a broadcasting station.

The great savings to be obtained in the use of the shortwave portion of the spectrum, through the use of s.s.b., have resulted in changes to be made in the Australian short wave radio.

Gradually all radio telephony transmissions in Australia, except Amateur and short wave broadcasting, must use s.s.b. in the s.w. and v.h.f. bands in place of existing a.m. systems except where angle modulation is the preferred method.

COMPATIBLE SINGLE SIDEBAND

This is a very intricate method of transmitting high quality speech and music from a medium frequency broadcasting station. One sideband and the carrier are transmitted so that the signal can be received with an ordinary domestic receiver. The system has been used experimentally. Its only advantage is the saving in spectrum space because of the removal of one sideband.

There is a slight disadvantage in that the receiver tuning is a little bit different.

TELEVISION

The vision portion of a television signal is amplitude modulated by one of the methods outlined earlier to produce a double sideband and full carrier signal. Then either by de-tuning methods or the use of a vestigial sideband filter, most of one sideband is removed. The resultant t.v. vision signal then comprises the full carrier, one full sideband and a small amount of the other sideband.

Again spectrum space is saved and receivers are easy to tune.

INDEPENDENT SIDEBAND

Essentially this is a method of transmitting a double sideband signal, but as distinct from d.s.b. described earlier, the individual sidebands contain different intelligence.

As has been shown, there are several methods of obtaining amplitude modulation and the method used will depend on many factors, which in the commercial field may involve patents.

If a very wide-band modulating signal is to be used, such as the vision signals in television, then it is usual to employ grid modulation in an early stage of the transmitter and follow this with one or more linear amplifiers to raise the r.f. output to the desired level.

However, where the bandwidth of the modulating signal is confined to the audio frequencies and high power efficiency is desired, it is usual to employ a plate modulated class C r.f. amplifier which is modulated by an audio-frequency signal supplied by a class B a.f. amplifier, usually known as a class B modulator.

Class B a.f. and class C r.f. amplifiers were defined in Lecture No. 10 dealing with Harmonics.

The class C modulated amplifier of a typical m.f. broadcasting transmitter operates as follows:

D.C. Plate Voltage	3000 V.
D.C. Plate Current	1.0 A.
D.C. Plate Input	3 KW.
R.F. Output	2.220 KW.
Plate Efficiency	72%

In contrast to many services where the maximum licensed power is that taken by the final r.f. amplifier stage in the transmitter, m.f. broadcasting stations in Australia are licensed for a particular power into the actual aerial system under conditions of no modulation.

For the transmitter just mentioned, the licensed aerial power is 2000 watts and the difference between this and the transmitter output (220 watts) is the power lost in the transmission line and the aerial coupling unit.

The Australian Broadcasting Control Board, in its Standards for Technical Operation of Medium Frequency Broadcasting Stations, second edition, requires that the aerial input power measured at the aerial driving point shall not differ at any time by more than ±10% of the authorised power for an omni-directional aerial.

In the case of directional aerials it is virtually impossible to make accurate impedance measurements of each element of the whole aerial system whilst it is in operation because any attempt to make such a measurement will upset the aerial adjustments. The impedance of the elements may vary greatly when energised from that which exists when they are not energised.

For instance, the measured impedance of the 3CS East aerial (not energised) is 107 ohms + J124 at 1130 KHz. with the West aerial open circuited.

If the West aerial is earthed, the East aerial figures become 96 ohms + J120 at 1130 KHz.

However, when the aerial array is energised the impedance of the East mast changes to 50 ohms ± J0 at 1130 KHz. This is a calculated figure, not measured.

Because of these difficulties with a directional aerial system, the A.B.C.B. permits the measured power at the input of the common driving point to be maintained at 1.05 times the authorised power and it must not vary at any time more than +15.5% or —5.5%.

In these circumstances the aerial power is deemed to be ±10% of the authorised power.

ANTENNA FOR 160 METRES

(Continued from Page 3)

In practice little surface wave radiation can be produced by a horizontal antenna on 160 metres [60 dB. down as compared with a vertical has been suggested (Ref. 2)]. A horizontal antenna can be caused to inadvertently produce vertical polarisation as pointed out in the section on "Vertical versus Horizontal for Receiving", which accounts for why some apparently horizontal antenna signals are received locally at good strength. Also, horizontal antennas can produce considerable sky wave propagation at night which can be received locally with some fading.

(Note.—A horizontal antenna can produce satisfactory surface propagation only if both the receiving antenna and transmitting antenna are several wavelengths above the ground—quite impossible on 160 metres—or if the receiving antenna is only several wavelengths from the transmitter. In practical cases horizontal polarisation is unsuitable for surface wave propagation beyond several miles.)

REFERENCES

1. The use of the terms effective length, form factor and some of the symbols were taken from the "Admiralty Handbook of Wireless Telegraphy," 1938, Sections R10, R11 and R22. The term effective length is also referred to as radiation length or radiation height.
2. R.S.G.B. Handbook 1968, diagram, Fig. 12.9.

☆

AWARDS

FIRST INTERNATIONAL ROSE SHOW AWARD—NOVEMBE7R 1971

The Award is sponsored by the Hamilton Radio Club Branch 12 of N.Z.A.R.T. in accordance with the following rules:

Overseas Stations: To QSO 10 Hamilton stations on any band or mode.

Copy of log giving date, time, frequency, your call sign and call sign of station QSOed and certified by two other Amateurs is the only confirmation required.

Award opens 1st May, 1971, and closes 30th November, 1971, both days being inclusive for Award.

Cost of Award: Overseas stations, 8 IRCs.

Requests for Award must be sent to Award Committee, Hamilton Radio Club, P.O. Box 88, Hamilton, New Zealand.

VK SOUTH-WEST CERTIFICATE

Due to the popularity of the South West Certificate, commemorating the Captain Cook Bi-Centenary and the Wagga Wagga Centenary, we are going to re-issue, on a continuous basis, a further series of attractive certificates.

These certificates will be awarded to any Amateur who contacts seven South West Area statons on any band or mode, after the 1st April, 1971.

To receive the Award, please send your logs to the Secretary, South West Area, P.O. Box 551, Wagga Wagga, N.S.W., 2850.

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LICENSED AMATEURS IN VK

DECEMBER 1970

	Full	Lim.	Total
VK0	11	1	12
VK1	83	30	113
VK2	1402	457	1859
VK3	1318	650	1968
VK4	525	196	721
VK5	518	236	754
VK6	361	136	497
VK7	164	68	232
VK8	37	12	49
VK9	89	7	96
Grand Total	4508	1793	6301

FREQUENCY MEASURING EQUIPMENT

The following is a copy of a letter from the Director-General, P.M.G. Radio Branch, to the Federal Secretary, W.I.A.:

Amateur Radio Operators
Requirement to Possess Frequency Measuring Equipment

Dear Mr. Williams,

As you know, Wireless Telegraphy Regulation 59 and Section 54 of the Amateur Handbook state that an Amateur licensee is required to have available at his station frequency measuring equipment capable of verifying that emissions are within authorised Amateur bands.

This requirement was recently reviewed and it has now been decided that the conditions governing the licensing and operation of Amateur radio stations should not make it mandatory for the licensee of any such station, or for an applicant for a licence for any such station, to possess a specific piece of frequency measuring equipment. The view is now held that it is sufficient to provide that the licensee must ensure that emissions from his station are within the limit of the Amateur frequency band in which he is operating.

It is proposed to amend the Wireless Telegraphy Regulations, the Amateur Handbook and other appropriate documents as soon as practicable. The new policy, however, will be adopted forthwith and licensees of Amateur stations may be informed accordingly.

—Director-General,
P.M.G. Radio Branch.

— · · · —

WHEN VISITING AUCKLAND, N.Z.

Federal Secretary, W.I.A.,

Dear OM,

As the Secretary of the Auckland Regional Co-ordinating Committee (a group comprising representatives of the various Branches of N.Z.A.R.T. here in Auckland), I have been requested to write to you on the following matters:

On many occasions overseas Amateurs visiting our two countries do not know how to go about meeting local Amateurs and we should like to have the names and addresses (with telephone numbers) of an Amateur in both Sydney and Melbourne to whom we could direct overseas Amateurs (visiting Auckland and N.Z.) en route to Australia.

At 24 hours' notice recently we were able to arrange a gathering of about 40 Amateurs when Brian Armstrong, G3EDD, Executive Vice-President of R.S.G.B. was in Auckland for a few days and he told us of his meeting with officers of your Institute.

The following information is provided in the event of your knowing of prospective visitors to Auckland:

Mr. W. S. Chester, ZL1OD,
404 Mt. Albert Road,
Mt. Roskill, Auckland.
(Telephone 699-855)

or—

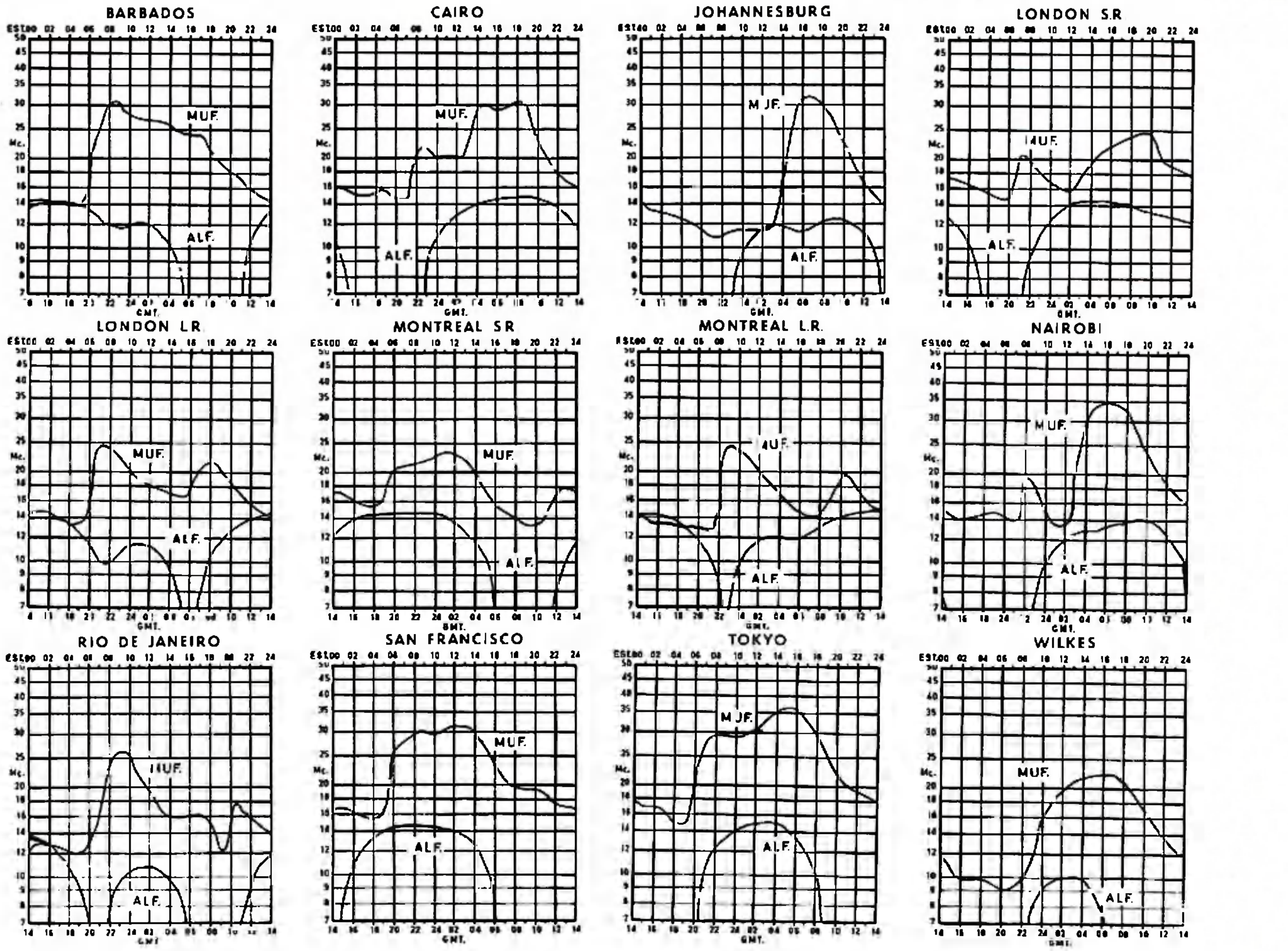
Mr. M. H. Churton, ZL1TB,
15 Grassways Avenue,
Pakuranga, Auckland.
(Telephone 577-939)

Thanking you in anticipation for your attention to this reqeust,

Mark H. Churton, ZL1TB.

PREDICTION CHARTS FOR MAY 1971

(Prediction Charts by courtesy of Ionospheric Prediction Service)



CONTEST RESULTS:

1971 John Moyle Memorial National Field Day

SIX-HOUR DIVISION

Section A:

VK2RJ/P	144 points
VK3ZA/P	773 ,,
3BBC/P	737 ,,
3AGF/P	547 ,,
3EF/P	317 ,,
3ASV/P	236 ,,
3NX/P	208 ,,
3ZQC/P	91 ,,
3NR/P	36 ,,
VK4GT/P	713 ,,
4XV/P	483 ,,
4PJ/P	222 ,,
VK5WC/P	600 ,,
5ZCR/P	170 ,,
5LP/P	135 ,,
5DZ/P	90 ,,
VK6AB/P	693 ,,

Section B:

VK2YB/P	121 points
2JM/P	109 ,,

Section C:

VK3TX/P	237 points

Section D:

VK5ZID/P	212 points

Section E:

VK3XB	605 points
3AUN	305 ,,
3KR	165 ,,
VK4PV	125 ,,
VK6AI	310 ,,
VK9GA	180 ,,

Section F:

L4018—G. Thorpe	395 points
VK4—C. Andrews	190 ,,
L5096—C. Hannaford	675 ,,
L5132—D. Vale	390 ,,
L6218—M. Bosma	395 ,,
L7043—R. Everett	345 ,,

24-HOUR DIVISION

Section A:

VK2ZCT/P	116 points
3BBB/P	1144 ,,
VK4ZQ/P	1803 ,,
4IE/P	1222 ,,
4AL/P	965 ,,
VK6VB/P	655 ,,
6MM/P	24 ,,

Section B:

No entry.

Section C:

VK3ADP/P	1525 points
3EZ/P	660 ,,

Section D:

VK1ACA/P	2276 points
1VP/P	2233 ,,
VK2WG/P	1985 ,,
2ATZ/P	835 ,,
VK3APC/P	6010 ,,
3ATO/P	4456 ,,
3ATL/P	2578 ,,
3ATM/P	2048 ,,
3XK/P	1914 ,,
VK5WV/P	2653 ,,
5LP/P	1575 ,,
VK6VF/P	606 ,,

Section E:

VK3AYL	405 points

Section F:

L3458—G. Latch	850 points
L3042—E. Trebilcock	180 ,,
L4104—K. Cunningham	525 ,,

Ross Hull Memorial V.h.f. Contest, 1970-71

TROPHY WINNER

VK4ZFB—D. F. BLANCH

INDIVIDUAL RESULTS

Section	Call Sign	7-Day Score	48-Hour Score
B	**VK1ZMR**	**1132**	561
B	VK1VP	715	340
B	**VK2ZFB**	**1227**	291
B	VK2BHL	733	326
B	VK2ZQJ	636	240
B	VK2HZ	550	270
B	VK2BMX	492	
B	VK2ZTQ	234	80
B	VK2ZMV	41	
B	**VK3TN**	**1777**	536
B	VK3AKC	1314	348
B	VK3ASV	1087	308
B	VK3ZKN	1023	
B	VK3BDA	983	357
A	VK3AOT	961	571
B	VK3ZYO	625	253
B	VK3YEJ	555	160
B	VK3BBB	529	
B	**VK4ZFB**	2552	**945**
B	**VK4ZAM**	1395	**720**
B	VK4ZTL	901	375
B	VK4ZJB	896	
B	VK4RO	775	360
B	VK4ZTK	501	243
B	VK4ZLC	445	331
B	**VK5ZMJ**	**1380**	460
B	VK5LP	935	615
B	VK5ZLZ	836	379
B	VK5DK	805	
B	VK5ZKJ	724	224
B	VK5ZDU	330	
B	VK5MY	266	70
B	**VK6ZFF**	**703**	206
B	VK6ZCD	651	240
B	**VK7ZBY**	**2475**	647
B	**VK8KK**	**475**	425
B	**ZL3RZ**	**630**	450
B	**C21AA**	**235**	

LISTENERS

Section			Points
C	L2074	J. Hillard	618
C	L2259	B. Vernon	398
C	**L5088**	**S. Ruediger**	**1405**

Correspondence

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers.

NEW TERMINOLOGY

Editor "A.R.," Dear Sir,

Being an old tube man from way back, I find myself becoming ever more deeply imbedded in the quicksands of solid state terminology. There seems to be a conspiracy amongst the solid state boffins to keep us oldies and many of the youngies out of the higher echelons of solid state simply by the production of an entirely new vocabulary for which no comprehensive dictionary exists.

It would appear that any device, be it a simple RC circuit or some more complex device such as a buffered bi-stable, concerned with a computer or similar device becomes a "Logic" element. Fair enough.

I also concede that abbreviations are in order if text and device descriptions are not to become too unwieldly, hence an RC circuit can be called RCL, a device using two diodes can be DDL, mixtures of diodes and transistors DTL, and exclusively transistorised devices TTL. But what, for instance, is the difference between a "Decoder Driver" and a "Decorder Driver"?

I can wend my way through most circuits using discreet devices, but when it comes to ICs, brother! am I in trouble. I find that the information sheets put out by the makers do not help very much either, most of them show an illustration of a little black box with sundry leads projecting therefrom and some, to me, incomprehensible data, relating to temperature rise plus some suggested external connections, but very little information regarding what goes on within said little black box.

So, Sir, how about having some of the knowledgable fellows pitch in and produce some explanations and perhaps a glossary of terms, to help us old bottle merchants.

When it comes to DDL, TTL, DTL, etc., perhaps I should have remained a BCL.

—B. L. McCubbin, VK3SO.

P.S.—Solid-state engineers please note, BCL equals Broadcast Listener.

[Mr. McCubbin is not alone with this problem, so how about it you solid-state engineers. —Ed.]

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IPS-H5 HANDBOOK

FOR USE WITH IONOSPHERIC PREDICTION SERVICES

We have been advised by the Ionospheric Prediction Service that copies of this Handbook have been made available to all Divisions of the Institute, the Darwin Radio Club and the Canberra Radio Society.

The Handbook contains a considerable amount of information on the preparation and use of Prediction Charts and those of our readers who make regular use of the charts which we reproduce will find the book of considerable interest, whilst others will find much to interest them in the descriptions of other atmospheric phenomena which can influence radio propagation.

A number of copies have been supplied to each Division for library use, and you should apply to them for a loan of this publication.

Please DO NOT ask the Prediction Service for a copy as the Assistant Director of I.P.S. has already indicated that it is impossible to send copies to individuals.

☆

GREAT CIRCLE MAPS

Several maps have been returned by the postal authorities because the labels with names and addresses fell off. It is requested that anybody who has not received their map will write a brief note stating the fact to Secretary, W.I.A., P.O. Box 36, East Melbourne, Vic., 3002, and the maps will be re-posted.

Australian Standards for Electro-Magnetic Interference*

(The following article is condensed from a paper prepared by Mr. R. Profitt, officer in charge of S.A.A's Telecommunications and Electronics Industry Standards Committee, for presentation at the 1971 Radio Interference Workshop of the University of New South Wales on 10th March, 1971. Mr. Profitt covered recent work of the Association's Committee on Radio Interference and, in particular, the five draft standards now out for public review.)

E.M.I. Terminology (Doc. 1679)

The need for standard terms, definitions and concepts is obvious. Without such a document standards would be meaningless, since without standard terms, we cannot guarantee understanding of the concepts being discussed. Without mutual understanding of the meaning expressed by a word or phrase there can be no communication. Doc. 1679 represents international thinking on the meaning of electromagnetic terms and concepts.

Limits of E.M.I. for Electrical Appliances and Equipment (Doc. 1693)

This draft is a proposed revision of AS C321. It has not greatly changed the original standard but attempts to be much more specific about the appliances and equipment coming within its scope. The limits are much tighter than the C.I.S.P.R. Recommendations for similar classes of equipment, but the committee believes for good reasons. In Australia it is necessary to protect many essential services at field strengths considerably below those used in Europe or North America. For this reason tighter limits must be placed on equipment likely to produce interfering radiation.

Despite the fact that the limits are much lower than those proposed by C.I.S.P.R., they are in fact similar to many other national limits and are considered to be economically achievable.

Electro-Magnetic Measuring Apparatus for the Frequency Range 0.15 to 1000 MHz. (Doc. 1694)

This draft, if accepted, will replace AS C348 and C349, which are endorsements of Part 1 of C.I.S.P.R. Publications 1 and 2 respectively. These endorsements will then be withdrawn.

The committee is not, however, proposing to place the C.I.S.P.R. concept entirely. The proposed standard is based on BS 727 : 1967, and like it, specifies three basic types of measuring equipment:

(a) A quasi-peak measuring set for the complete range.

(b) A peak measuring set for the complete range.

(c) A measuring set for sine-wave interference.

The quasi-peak measuring set is intended to measure broad band interference to amplitude-modulated telephony. The correlation between measured values and subjective annoyance is less close for other forms of radio communication, but is considered adequate for the assessment of interference to most forms of radio and television broadcasting.

For some more specialised applications, particularly in the military and aeronautical fields, peak measuring sets are preferred. The peak reading specification closely follows the quasi-peak equipment, wherever it is applicable, but the bandwidths are changed in terms of current practice and available measuring equipment.

The sine-wave section has been included particularly for the measurement of interference from industrial, medical and scientific radio frequency equipment. The equipment is much simpler than for the two other forms except where it may be necessary to take precautions to protect the measuring set by improving the rejection of unwanted signals.

Radio Interference Limits and Measurements for Television and Sound Receivers (Doc. 1695)

This draft was produced largely to provide for the protection of sound and vision signals in the range 0.15-1000 MHz. by—

(a) Setting limits for the radiated and conducted radio interferences produced by the receivers;

(b) Specifying a method of measurement for establishing compliance with these limits.

Once again the limits for radiated interference are tighter than those proposed by C.I.S.P.R., for the same reasons as given previously. It is considered that they are economically attainable, based on the results of tests carried out by the Australian Broadcasting Control Board some years ago. In fact they represent some relaxation of the Board's recommendations as given in their handbook on the subject published in 1956 and re-issued in 1961.

It is expected, however, that there will be some concern about these limits and specific comment has been requested on this subject.

Electro-Magnetic Limits of Interference for Semiconductor Control Devices (Doc. 1696)

This draft proposes limits for the amount of radiated interference produced by low-current thyristor controls for such items as light-dimmers, speed controllers, or temperature controllers. The methods of measurement proposed are not suitable for measuring devices controlling currents in excess of 10 amperes and are suspect for units using very fast rise times.

For these reasons two methods of measurement have been suggested and specific comment requested regarding the suitability of one or the other for the purpose proposed.

The limits are again tighter than those proposed overseas, in order to line up with those included in the revision of C321. These limits, too, are considered economically attainable within the framework of current technology. It is claimed that developments in this field will almost eliminate the problem within a few years. The problem of industrial controls, handling thousands of amperes will, however, be with us for many years. Extension of this standard to cover the whole field of semiconductor control will be essential, on the basis of present experience.

Electro-Magnetic Compatibility

The concept of electro-magnetic compatibility (E.M.C.) is now fairly widely understood. The philosophy of basing future Australian standards on this concept has been accepted by the Executive of the Telecommunications Industry Standards Committee. The Committee on Radio Interference will be renamed the Committee on Electro-Magnetic Compatibility and will be given the responsibility of writing proposed Australian standards based on the mutual compatibility of electro-magnetic equipment and systems.

The only standards which approach the problem of interference in this way at present are the U.S. MIL Standards of the 460 series. The relative speed with which these standards have been revised and re-issued since they were first introduced in 1967 indicates that there is a great deal to learn about E.M.C. before we can standardise the concept and techniques associated with this philosophy.

The basis of the E.M.C. concept is the relative immunity of an equipment to electro-magnetic interference, which may be either conducted or radiated, and generated either externally or within the equipment itself. This latter condition is a problem of the newer solid-state circuitry.

Immunity itself is a concept still to be standardised. The British have defined immunity as the ability of the receiver to discriminate in favour of a wanted signal over an unwanted signal at the tuned frequency.

C.I.S.P.R. have not yet defined immunity, as such, but have introduced the term "mains interference immunity factor" to replace "mains interference ratio". Mains interference immunity is defined as the degree of protection of a radio receiver against interference conducted by its supply mains under specified condtions.

The I.E.C. still use the term "susceptibility" in the title of a working group of TC 12A, Susceptibility of Receivers to Interference. However, the working group is reported to be studying such topics as the "susceptibility of broadcast receivers to interference" along with "the measurement of immunity of television receivers with balanced and unbalanced inputs". It is obvious that some rationalisation will be necessary at the sub-committee stage if these documents are to be compatible.

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* Reprinted from Standards Association of Australia "Monthly Information Sheet," Feb. 1971.

METHOD OF DRAFTING

(Continued from Page 5)

wide lines because the thickness is reduced as well as the drawing. Note also not to make things too cramped or else the drawing may become unreadable.

For drawings of printed circuit boards, don't use pencil shading to differentiate between copper and board as this will necessitate a half tone block which is more expensive to produce than a line block. A simple way to produce shading is to find any rough, pebbled surface like vinyl cloth and place black carbon paper face side up on top of it. Place tracing face down to this and rub gently with smooth end of pen or stock, the raised portions of the vinyl will transfer carbon where it is wanted. Having done this, to prevent the carbon smudging a light spray from the XYL's hair lacquer can (colourless variety) will fix it.

Again, for the rich, there is a variety of rub-off tints by "Letraset" and similar makers which give a very nice result. In the drawing of my modified square, both examples are shown, plus a transparent base stick-on shading. This one is good as it is simple to remove any shading that is not necessary simply by scraping with a blade the tint on the surface.

SOANAR CATALOGUE

Soanar Electronics Pty. Ltd. have issued their new 1971 components catalogue containing 20 pages of technical specifications of Elna electronic components, including a range of new lines, slide potentiometers, miniature and trim potentiometers, car radio suppressors, Tc ceramic discs, and an economy range of tantalum capacitors. Further information from Soanar Electronics Pty. Ltd., 30-32 Lexton Rd., Box Hill, Vic., 3128, or their interstate offices.

FINAL SMOOTHED SUNSPOT NUMBERS

July 1969	105.9
August 1969	106.5
September 1969	105.4
October 1969	104.1
November 1969	104.6
December 1969	104.9
January 1970	105.6
February 1970	106.0
March 1970	106.2
April 1970	106.2
May 1970	105.8
June 1970	105.8

—Commonwealth of Australia, Ionospheric Prediction Service

PROVISIONAL SUNSPOT NUMBERS

JANUARY 1971

Dependent on observations at Zurich Observatory and its stations in Locarno and Arosa.

Day	R	Day	R
1	58	16	65
2	62	17	68
3	62	18	86
4	69	19	98
5	52	20	104
6	52	21	106
7	56	22	105
8	66	23	96
9	74	24	99
10	70	25	82
11	68	26	88
12	75	27	111
13	70	28	99
14	67	29	95
15	61	30	74
		31	76

Mean equals 77.9.

Smoothed Mean for July 1971: 102.6.

Predictions of the Smoothed Monthly Sunspot Numbers

February	81	May	75
March	79	June	73
April	77	July	71

—Swiss Federal Observatory, Zurich.

The Wireless Institute of Australia—Federal Executive

REPORT TO FEDERAL COUNCIL (1971)

Gentlemen,

It is my pleasure to present the Report on behalf of the Federal Executive on its activities subsequent to the 1970 Federal Convention. I again follow the practice that I adopted last year of reporting to the time of writing and not to the end of the financial year which ends on the 31st December.

The year under review has been significant in many ways. It was the sixtieth year of the Wireless Institute of Australia and the year that so much of our time has been devoted to preparation for 1971 World Administrative Radio Conference. It is a year that has been marked by considerable activity, significant progress and some real difficulties in relation to our administration. I deal with specific topics under different headings.

● COOK BI-CENTENARY AWARD

This Award has proved to be an outstanding success, far greater than any of us were prepared to hope for. The optional AX call sign was used by practically all Australian Amateur operators, so much so that at least some of us found it hard to get out of the habit at the beginning of 1971. By 8th March, 1971, 1,282 Awards had been issued for the h.f. section and 24 had been issued for the v.h.f. section—a total of 1,306.

Two things made the Award a success. First was the support it received from all those who used the AX prefix and who talked about the Award when on the air. Second was the work of the Federal Awards Manager, Geoff Wilson, VK3AMK. The success of any award is very much dependent on the Certificates being processed and issued as quickly as possible after the application is received. Despite the enormous volume, Geoff has done this magnificently and I cannot speak too highly of what he has done to make this Award one of the most important features of Amateur Radio in recent years.

I think we should all take pride in the fact that nearly every overseas applicant has taken the trouble to enclose a note with his application complimenting the Australian operators for their courtesy and assistance during the Award period.

Nearly a quarter of a million QSL cards—100,000 of which were provided for Australian Amateurs free by the Australian Tourist Commission—have been distributed and have been bedevilling QSL Managers ever since. We were asked to provide even more during the year, but, unfortunately, as only a small number was required this proved to be uneconomic and we were unable to accede to this request.

Quite apart from the Cook Award, many people have expressed a preference for the AX prefix and have suggested that it could be adopted permanently. We certainly were lucky that those particular letters were available in the block allocated to Australia.

● 1971 WORLD ADMINISTRATIVE RADIO CONFERENCE

A very considerable amount of time has been devoted to this very important World Administrative Radio Conference.

A formal submission, published in "Amateur Radio," was presented to the Australian Administration. A second document circulated to all Federal Councillors was subsequently prepared following a lengthy Conference with the Departmental representatives under the Chairmanship of Mr. E. Sandbach, Assistant Director-General, Engineering Services (P.M.G.). The Wireless Institute was represented at these Conferences by the Federal Vice-President (David Rankin), the Federal Secretary (Peter Williams) and myself.

Following discussions with representatives of Amateur Societies within Region III. in the course of my visit overseas last year and my discussions with I.A.R.U. Headquarters and Region I. officials, the following policy was adopted by the Region III. and the Region I. Associations:

"That National Amateur Radio Societies shall seek—

1. That there shall be no curtailment of existing Amateur allocations, and
2. That the Amateur Service shall have the unrestricted right to use its allocations for non-terrestrial purposes and techniques subject to Regulation 115 of the Radio Regulations (I.T.U. 1968) where applicable and the provision where appropriate of Space Telecommand facilities (Regulation 84 AY)."

The U.S.A. document forwarded to I.T.U. proposes deletion of the existing Amateur allocation 21 to 22 GHz. and inclusion of the band 24-24.5 GHz. for Amateurs on a secondary basis to radio location.

The Australian proposals provide for the allocation of an exclusive band 24-24.5 GHz. for the Amateur Service to replace 21-22 GHz. Apart from this amendment, the Australian Administration at this time proposes no alteration to the existing Amateur allocations.

In regard to the use of space techniques in the Amateur Service the Australian Administration proposes unrestricted use of such techniques in the bands 7-7.1, 14-14.35, 21-21.45, 28-29.7 and 144-146 MHz., and its use on a "non-interference to" basis from other services in the bands 420-450, 1215-1300, 2300-2450, 5650-5850, 10,000-10,500 MHz.

In addition, the Australian proposals do not propose a flux density limitation.

The U.S.A. has submitted a paper to the C.C.I.R. Study Group for the period 1970-1971 proposing a draft recommendation in relation to the technical feasibility of frequency sharing in the Amateur Radio Service when using space communication techniques. This document was based on papers prepared by the Radio Amateur Satellite Corporation (A.M.S.A.T.). The Australian Post Office requested that the Wireless Institute prepare similar documents and, accordingly, the Federal Vice-President (David Rankin) and George Pither (a member of the Federal Executive) prepared a draft report and recommendation dealing with the same questions. These documents were adopted without any change by the Australian Administration and will be presented to the special joint meeting by the Commonwealth of Australia.

There is no doubt that to date the Australian Amateur position has been satisfactorily preserved. The area of real difficulty would appear to be in relation to the shared bands where some countries are reluctant to permit the Amateur Service the privilege of using these allocations for space techniques. The Federal Council has been kept informed of developments in relation to these matters and has been given copies of all submissions made to the Postmaster-General's Department as well as copies of the table of proposals, the American report and draft recommendation for the C.C.I.R., and the Australian report and draft recommendation for the C.C.I.R.

The pressures on Amateur frequencies in the v.h.f. area remain intense. Whilst I have reported in some detail on the results to date in relation to the 1971 Space Conference for obvious reasons, I prefer not to offer further comment on this matter. The matter will necessarily be discussed by the Federal Council at the Federal Convention when the Institute's policy will be reviewed in the light of the events which have occurred.

● OVERSEAS VISITS

In June of 1970 I had the opportunity to go to Tokyo for the purposes of my business. I was asked by the Federal Council to extend this journey to a round world ticket. As the additional expense was not all that great, $500 from the I.T.U. fund was, by resolution of the Federal Council, made available for this purpose; $200 was expended by "Amateur Radio" and $300 was provided by the Region III. Association.

It is perhaps appropriate that I should summarise the places I visited.

First, I went to Manilla, Philippines, and saw representatives of P.A.R.A. and P.A.R.S.

Then, in Hong Kong I met representatives of H.A.R.T.S. This Society, an I.A.R.U. Member Society, was invited to become a member of the Region III. Association and its application for membership has recently been circulated to all Directors and accepted.

In Tokyo I met the President of J.A.R.L. as well as its Overseas Liaison Officer, K. Mizoguchi (JA1BK) and J.A.R.L. Third Division officers entertained me when I visited JA3XPO at Expo 70. In San Francisco I met Doc Gmellin, the Pacific Division Director of A.R.R.L., and in Des Moines, Iowa, I spent a couple of days at the home of W0DX, Bob Denniston, A.R.R.L. and I.A.R.U. President. Bob took me to Washington, D.C., where I met Dr. Perry Klein, Jan King, Bob Booth, Prose Walker and many other prominent Amateurs at a meeting of A.M.S.A.T. I expressed the appreciation of W.I.A. for all that A.M.S.A.T. had done in relation to the launch of AO5.

I attended a State Convention at Jackson Mills, West Virginia, and, still accompanied by Bob, I went to A.R.R.L. Headquarters in Newington, Connecticut, where I met and conferred with John Huntoon, Dick Baldwin and other A.R.R.L. officers.

In London, I met Roy Stevens (G2BVN), a member of the R.S.G.B. Council, and the Secretary of the I.A.R.U. Region I. Association. At the Headquarters of R.S.G.B. in Doughty Street I talked with Ron Vaughan, the Manager of R.S.G.B., and I was asked to visit the leader of the United Kingdom Delegation to the 1971 W.A.R.C., Mr. Don Baptiste. This I did, accompanied by Roy Stevens, and we had a most fruitful and enlightening discussion with Mr. Baptiste.

In Copenhagen I met Vogg Jacobsen (OZ-7DX), the Secretary of E.D.R., and in Paris I met and conferred with the President of R.E.F., Andre Jacob (F3FA), and the paid Secretary of R.E.F., Claude Lauderau. During four days in Geneva a great deal of time was spent with the Secretary of the International Amateur Radio Club, Ted Robinson (F8RU). I also asked to see M. M. Milli, the Secretary-General of the I.T.U.

New Delhi came next, where I met representatives of the Amateur Radio Society of India as well as other Amateurs. A.R.S.I. has now applied for and has become a member of the Region III. Association.

In Bangkok I met and conferred with representatives of the Society of Thai Amateur Radio, including Fred Laun and Don Rieboff. This Society has now applied for I.A.R.U. membership and, conditional on that being granted, has applied for membership of the Region III. Association. They gave me the necessary documents and asked me to transmit them to I.A.R.U. Headquarters.

In Kuala Lumpur members of the Council of M.A.R.T.S. met me and in Singapore I was entertained by representatives of S.A.R.T.S. This Society also gave me the documents applying for membership of I.A.R.U. and, conditional upon that membership being granted, it has applied for membership to the Region III. Association.

Throughout my journey I recorded a detailed commentary which I sent back to John Battrick (VK3OR). These were typed up by John and circulated to Federal Council. In all, these reports amounted to twenty-three pages of closely typed foolscap.

I should like to record my deep appreciation of the enormous effort expended by John in ensuring that these reports became available to Federal Councillors and, through them, to Divisional Councils as quickly as possible.

After my return, I submitted a twenty-two page final report to the Federal Councillors for their consideration, making certain recommendations and recording certain observations.

Everywhere I went I was met with courtesy and understanding. I received, and I hope the Federal Council through my reports, has received an enormously valuable insight into the workings of Amateur Radio world-wide. I certainly came away with a far clearer understanding of the problems that beset I.A.R.U., particularly at its Headquarters in America and at the Region I. level in London. I believe also that this liaison with other Societies has contributed greatly to the favourable position that we appear to have achieved in relation to the 1971 W.A.R.C. Naturally, I find it difficult to comment on this journey undertaken on your behalf; however, it is for the Federal Council to decide whether or not this journey and the information acquired was worthwhile and, therefore, justified the expense.

● I.A.R.U. REGION III. ASSOCIATION

During the past year a considerable volume of correspondence has taken place between your Director, John Battrick (VK3OR), the Secretariat and other Societies.

I will leave it to John to report in detail on this aspect of the Institute's activities, but I would like to offer certain comments in this report from the Federal Executive. The adoption of a Regional policy for 1971 Space Conference referred to above was, in my view, highly significant and an illustration of the important need that this Association can fulfil. The Conference of the Association to be held in Tokyo in the middle of March 1971 (in a few days' time, as I write) will mark the turning point in the affairs of this Association.

With great regret the Federal Council noted that John Battrick would not be able to attend this Conference as originally decided because of his work commitments. Accordingly, the Institute will be represented by George Pither (VK3VX), who will be in Tokyo as part of a personal tour of South East Asia, and myself. As George will still be overseas at Easter, it will fall to me to report in detail (I hope in writing) to the Federal Convention.

Unfortunately, this Conference is to some extent overshadowed by a dispute between the two Societies in the Philippines. The Secretariat, in formulating its Interim Constitution, accepted the assurance of one Society that it would replace the existing I.A.R.U. Society as a member of I.A.R.U. This has not occurred and now both Societies claim membership of the Region III. Association. It will, therefore, fall to the Conference to decide as a matter of basic policy whether the Association will look behind the I.A.R.U. membership of any Society.

It would indeed be tragic if this sort of issue—important though it is in terms of basic philosophy—was allowed to divert attention from the more tangible areas to which we must look for progress. I believe that the Institute must look to a clear decision from this Conference as to the future activities of the Region III. Association. From a cautious start in 1968 we must, I believe, now look for a determined, realistic, tangible programme for the future.

In considering the W.I.A.'s role in the Region III. Association, we must face the fact that the Institute has far too many calls on its limited resources. There must be some limit to what 4,500 members can afford. The financial load for the Region III. Association accepted by the Institute over the past three years is, on a per head basis, far higher than any other Society contributing to Region III. funds. I do not believe that this situation should continue. The cost of bringing together representatives from the different Societies in the Region is enormous and can only be justified if the Association is vital and useful in developing and protecting our hobby in the Region. If the Conferences are negative in their approach, if the valuable time of a Conference is devoted to the discussion of form rather than substance, then I believe that the Institute must be more cautious as to the extent of its resource that it is prepared to commit to this area.

I cannot stress too much how important this Conference will be.

● LIAISON—AUSTRALIAN POST OFFICE

I have already referred in some detail to our discussions with the Postmaster-General's Department in relation to the World Administrative Radio Conference. In addition to that matter, the Federal Executive has discussed with the Postmaster-General's Department the contract for the continued publication of the Call Book and numerous other matters which I do not detail.

Two more significant matters do, however, deserve specific reference.

Early in 1970 the Federal Executive made strong representations to the P.M.G. Dept. for the restoration of the segment 7.15-7.3 MHz. on a shared basis. This representation has been sympathetically received by the Department and we believe it is now consulting with adjoining Administrations to determine whether this is feasible. I certainly hope that this application is ultimately successful for it would result, for a change, in the Amateur Service gaining frequencies. The Australian allocation would then match the Region II. allocation and will enable cross-Pacific phone communication with American Amateur stations.

The Federal Executive has also sought the repeal of Regulation 59 (2) and an amendment to Paragraph 54 of the Handbook to recognise this repeal. This Regulation requires the licensee of an Amateur station to have appropriate frequency measuring equipment capable of verifying that his emissions are within authorised Amateur bands. (Note.—This has been achieved.)

The Institute has always taken the view that the requirement that a station operates within a band is absolute and that this further requirement involving a value judgment as to what is appropriate equipment or not merely causes disputes and difficulties.

I understand the Department agrees with this view and will be making the appropriate alterations to its Forms and the Handbook and seeking a repeal of the relevant Regulations.

No discussion of our relationships with the P.M.G. Dept. would be complete without reference to the most courteous and helpful assistance the Federal Executive has received from the officers responsible for the administration of the Amateur Service. These officers, with a multitude of responsibilities, somehow find time to always have their doors open to the W.I.A. In particular, I would wish to acknowledge the assistance the Federal Executive has received from Mr. Jim Wilkinson, the Assistant Director-General, Radio; Mr. H. Young, Controller Licensing and Regulatory Sub-Section; and Mr. Eddie Sandbach, the Chairman of the Committee concerned with the preparation of the Australian Proposals for 1971 Space Conference. To these officers, for their understanding, co-operation and completely fair approach, I express our heartfelt thanks.

● ADMINISTRATION

In my last Report to the Federal Convention I referred to the enormous work-load imposed on the Federal Executive. This has persisted throughout the present year.

The problem of finding people able and willing to undertake tasks of this nature became apparent during 1970 when Ken Pincott, the Editor of "Amateur Radio", indicated his wish to resign. It rapidly became apparent that Ken could not be replaced by a part-time volunteer and, accordingly, the Councils of the New South Wales Division and the Victorian Division met in October to jointly discuss the problem. A representative of the Federal Executive—the Federal Secretary—was present at that joint meeting by invitation of both Divisions. That joint meeting recognised that it was impractical for any one Division to publish "Amateur Radio" by wholly honorary staff and also recognised that it was impractical for Federal Executive to operate effectively with only honorary staff. It acknowledged that there was no alternative to the employment of a paid Manager to undertake these tasks. Both Divisions resolved to support financially a move for the employment of a paid Manager and urged other Divisions to participate.

A Joint Committee was set up, consisting of representatives of the Federal Executive (the Federal Secretary and myself), representatives of the Victorian Division (Dr. Deane Blackman and Keith Roget), and the President of the N.S.W. Division (Don Miller).

Concurrent with the investigation into the employment of a paid Manager, Dr. Deane Blackman continued an examination of the feasibility of committing to an electronic data processing system the mechanical processes presently inherent in the administration of the Institute, particularly with regard to the production of subscription notices, the collection of subscriptions and such matters as address changes.

In early January an advertisement was published in the Melbourne "Age" and the Sydney "Morning Herald" seeking applications for the job of paid Manager of the Institute. The same advertisement was published in the January issue of "Amateur Radio". At the same time, other Divisions were informed of the steps being taken and ultimately all Divisions have now indicated their preparedness to contribute on the basis proposed by the Victorian and N.S.W. Divisions.

I stress that the steps that have been taken have been taken outside the formal framework of the Federal body as the most urgent requirement was for paid assistance to produce the magazine for its present publisher, the Victorian Division. The matter has, however, now been formally referred to the Federal Council by postal vote and, I believe, all Divisions are supporting the moves that have been taken.

Mr. Peter B. Dodd, VK6/5/3/2/1CIF has been appointed as Manager. As such, he will be working from the Victorian Division and for that Division will be assisting with the production of "Amateur Radio". Part of his time will be made available to the Federal Executive and he will also be working as a paid Manager for the Federal body. Mr. Dodd will be attending the Federal Convention and this will provide an opportunity for him to meet representatives of all Divisions. He is an enthusiastic Radio Amateur having been licensed since 1946. He has the administrative experience that qualifies him extremely well for the position.

The total cost of putting the administration of the Federal body and the administration of "Amateur Radio" on a proper basis will be in the region of something approaching $3 per head. For the balance of this year, however, a smaller sum—in all $650 per month—will be borne per capita by all of the Divisions.

The 1971 Federal Convention will discuss in detail the future of the Federal body. It will determine the course the Institute will take following the expiration of the interim arrangements currently in force at the end of the present calendar year.

● NEW FEDERAL COMPANY

It is proposed that the Manager to be employed in the interim by the Victorian Division will be employed by the Federal body after its incorporation and following the transfer of the Institute's publications from the Victorian Division to the Federal body.

All Divisions have now executed the Collateral Agreement that was prepared as part of the incorporation of the Federal body. Unfortunately, whilst the Articles and Memorandum of Association have been executed by the Victorian Division, the originals of these Documents have gone astray in circulation. Intensive enquiries have indicated that only one document—the Collateral Agreement—was received by the Queensland Division though both documents were forwarded to the New South Wales Division. A further copy of the Memorandum and Articles of Association have now been prepared and have been circulated amongst the Divisions for execution.

The Incorporation of the Federal body will solve many of the accounting and other problems that are created by the present interim arrangements.

As I have pointed out above, the pressure on the Federal Executive over the past year has been intense. The 1971 Space Conference has produced a great deal of additional work as has the general review of the Institute's administration—the latter amounting to a continuing crisis lasting over many months.

A great deal of the work has ultimately and necessarily devolved on the Federal Secretary. A series of choices has had to be made as to priorities, some work having to be shelved for some time in favour of more urgent work. An example (small in itself) is that the reply of the Minister to the Federal Executive's submission in relation to licence fees was published (a fortnight after it was received) in "Amateur Radio" without first having been circulated to Federal Council.

Certainly this must be irritating to Federal Council and certainly it is not the way these things should be done. There was a long gap in the production of Minutes of Federal Executive meetings. This has now been rectified. The matter has been further aggravated by the inadequacy of the paid administrative resource available to the Federal Executive to type and duplicate correspondence and memoranda. An example of this is the fact that the very important memorandum relating to the appointment of a paid Manager took no less than fourteen days to type in the office even though it was put on tape during the actual Committee's working time over the long week-end at the end of January. A covering letter, taped at the same time, was not available for a further few days. This is not to imply any criticism of the Victorian Division's paid staff. In the case mentioned, intervening illness was the basic cause for the delay. At other times more urgent work has just had to take priority. Nor do I apologise on behalf of any officer of the Federal Executive. There must be times when work and family commitments must be given, if not priority, at least some attention. The situation illustrates the hopeless inadequacy of our continuing to rely on a total volunteer work-force, supported by an inadequate paid staff to which, in any event, we have limited access because of limited funds. I believe that we have now found the solution in the engagement of Peter Dodd.

In the present context I have simply pointed to the situation that has existed over the past months as I am sure that Federal Councillors will appreciate the situation and will see these matters in their proper perspective.

● I.T.U. FUND

The following amounts were to be contributed by each of the Divisions to estabilsh this Fund—

New South Wales Division	$2,600
Victorian Division	1,600
Queensland Division	850
South Australian Division	1,100
Western Australian Division	450
Tasmanian Division	400
	$7,000

At this time a total of $6,435 is held in the Fund, with all Divisions except the N.S.W. Division having attained their quota. The balance has been depleted by $500 contributed to the cost of my overseas travel referred to above. The N.S.W. Division has paid to the Federal Executive $1,659.

● MEMBERSHIP

In the last Report of Federal Executive a table, based on membership figures to 30th December, 1969, was published. Herewith is a table up-dating those figures to 30th December, 1970—

Membership as at 31st December, 1970
(1969 figures in brackets)

	Total Licen-sees	Full Memb.	% Memb. as against Total Licen-sees	Assoc. Memb.	Total Memb.
VK2	1972 (1933)	1105 (1061)	56% (55%)	430 (460)	1535
VK3	1968 (1838)	1025 (920)	52% (50%)	214 (276)	1239
VK4	817 (694)	395 (350)	48% (51%)	127 (148)	522
VK5	803 (748)	348 (410)	43% (55%)	299 (240)	647
VK6	497 (462)	295 (282)	60% (61%)	91 (88)	386
VK7	232 (229)	154 (146)	66% (64%)	50 (114)	204
Totals	6289	3322	52% (54%)	1211	4533

Notes.—VK1 included with VK2.
VK8 included with VK5.
VK9 included with VK4.
12 VK0s (column 1) excluded.

The movement since last year is interesting. Both the New South Wales and Victorian Divisions have improved their positions, whilst the smaller Divisions appear to have lost ground—apparently failing to keep up with the increasing number of licensees. It is very disappointing that our overall position (licensees as against members) has dropped by 2%.

● "AMATEUR RADIO"

No report of the Federal Executive would be complete without reference to the work of Ken Pincott, the Editor of "Amateur Radio". Ken has retained that position throughout the whole of the period even though under enormous pressure at work and at home. The magazine has continued to maintain a high standard and I am sure that I speak on behalf of all Australian Amateurs when I say to Ken simply and sincerely "thank-you".

● AUSTRALIS

At the 1970 Federal Convention the Federal Council resolved to support the A.O.B. Project.

The total cost of the production of the space hardware involved in this project was envisaged at some $5,000, but current estimates put the figure nearer $3,000 with some two-thirds of this having been expended or committed.

I do not in this report propose to deal in detail with matters relating to Australis for the Group will report separately and fully on its activities. There are, however, two matters upon which I would wish to comment.

The Federal Executive was very conscious of the lack of information circulated to Divisions and members generally as to the progress of the Project during the second half of 1970. The Group faced an almost impossible schedule to prepare its hardware for shipment to the United States of America, and it was impossible for the Group to devote time to any other activity than this.

Richard Tonkin, who previously held the dual post of Oscar Co-ordinator and Chairman of the Project Australis Group, stepped down as Oscar Co-ordinator and the Federal Executive appointed Mr. John Battrick (VK3OR) as Oscar Co-ordinator. These decisions were made at the request of the Group, and John has already been able to lighten the work-load on the other members of the Group and also ensure that more information is circulated to Divisions and to members generally.

● "HAMS WIDE WORLD"

During my visit to the A.R.R.L. Headquarters in Newington, Connecticut, I saw the A.R.R.L. film, "Hams Wide World". This film lasts 27½ minutes and is an attempt to tell those who know nothing about it a little of the hobby of Amateur Radio. It is, of course, orientated very much to the American environment and stress is placed on certain aspects of the hobby—such as third-party traffic—that are foreign to our hobby in this country.

The A.R.R.L. has offered to make available to the W.I.A. a print of the film. It will cost not more than about $200 and is in 16 mm. colour. No doubt the Federal Council will care to consider whether or not they wish to authorise the purchase of the film with a view to its being circulated amongst the Divisions.

● V.H.F./U.H.F. PROGRESS

Once again the past year has seen further improvements in the distances covered in the u.h.f. bands. The 432 MHz. record was increased to 482 miles by AX5ZKR of Yahl, near Mt. Gambier, working into AX7ZRO/7 on Mt. Wellington, near Hobart. Bass Strait was also spanned a number of times on 1296 MHz., with the best contact claimed to date being between VK3AKC at Geelong and VK7ZAH at Launceston. The distance claimed is 274 miles and at the time of writing is subject to check.

No distance records were claimed on the v.h.f. bands, but the propagation conditions made the 52-54 MHz. band particularly interesting with the advent of some International DX such as C21, HL, JA, KH6, KR6 and W6.

● MISCELLANEOUS MATTERS

I deal briefly with a number of miscellaneous matters.

Committee to Assist Federal Executive: Following the 1969 Convention the Federal Executive referred to a Committee from the N.S.W. Division the question of specifications of standards for solid state television receivers sold in Australia with a view to the adoption of standards to determine the minimum susceptibility to cross-modulation. This report has still not yet been received.

Novice: In addition, following the 1970 Convention the N.S.W. Division was asked to provide a committee to formulate a report on Novice Licensing to assist the Federal Council to determine its attitude in relation to this contentious matter. Mr. Rex Black has been appointed Chairman of that Committee and I am aware that he has devoted a considerable amount of time to the matter. It may well be that a report will be available for the Convention.

Custom Duty and Sales Tax: During the year in question, the Customs Department allowed the admission into Australia of a transceiver on a by-law entry basis. Whilst this does not set a precedent for the future, information relating to this matter has been circulated to Federal Councillors and the information has been also placed in the hands of the Australian Agents of the manufacturer of the equipment in question. The Federal Executive does not see this as a relaxation of the long-standing policy of the Customs Department to impose a high tariff in this area. The Federal Executive believes, however, that a strong case can be made for the reduction of these extremely high duties and taxes. The matter will continue to receive the attention of the Federal Executive in the year about to commence.

Ties: Following a decision of the Federal Council at the last Federal Convention, designs for an Institute tie were obtained and they were circulated to the Divisions. Generally speaking, the response to this project has been disappointing, but a limited number of ties will be available in a few months time, though, because of the limited interest, the cost per tie will be considerably higher than originally expected.

"How to Become a Radio Amateur": Proofs of this brochure have been submitted to the Postmaster-General's Department and a number of amendments incorporated. The Divisions were asked to indicate the basis upon which this was to be funded. A considerable delay occurred before replies were obtained. Again a limited number of the publication will be available in the near future.

● FEDERAL EXECUTIVE

Between Easter 1970 and 6th March, 1971, the Federal Executive held twelve meetings. The attendance at meetings was as follows—

M. Owen	10
P. Williams	12
D. Rankin	12
G. Pither	9
D. Wardlaw	10
W. Roper	9
K. Pincott	8

● KNOWING MORE ABOUT AMATEUR RADIO

In the "World of Amateur Radio" column conducted by Pat Hawker (G3VA) published in the November issue of "Wireless World" the following appears—

> "With over half the world's Radio Amateurs in America, trends there play a major role in determining the future of the hobby. Over the past twenty years the total of U.S. Amateurs has more than trebled from 86,662 in 1950 to over 260,000; but recent years has seen a marked slowing down (and even a reversal in some years) of this growth accompanied by a re-distribution of age groups. Many of the more active stations are those belonging to 'senior citizens' and to teenage newcomers with a sharp falling off of the twenty to forty age group—'those young enough to be enthusiastic but old enough to be doing something interesting and productive with it' to quote a recent article by John Frye on the future of Amateur Radio in 'Electronics World'.
>
> "While this trend is far less noticeable in Europe there is some evidence of a weighting towards the upper age groups . . . (Frye) believes that the apparent slackening of interest in the constructional and technical aspects of the hobby could be overcome by placing more emphasis on what Amateur Radio has to offer in the way of challenge to the intelligence and skill, in world-wide comradeship and in the diversity of Amateur activities."

The Federal Executive has discussed this and other comments following a similar line of thought. "What is the future of Amateur Radio" seems to be a question that is now very timely and one that could well be considered by the Federal Council. Of course, the situation in America may not be indicative of the situation world-wide. America has one Amateur per 900 of population, but, for example, there is in Australia one in 2,000 of population. Perhaps all that the American experience shows is that there is "a saturation point" in the number of Amateurs that one can expect in one community. A comparison between the U.S. Call Book for Summer 1970 with that for Spring of 1968 shows a drop in U.S. licensees of 1.9% as against a 12% increase for Australia and a 25% increase in the world figure excluding the United States figures. The fall in American licences is due in part to the introduction of charges for licences and to changes in the system. Licences which were free until about 1967 now cost $5. This means that many inactive Amateurs did not renew their licences.

I would suggest, however, that these figures are not a justification for complacency. They tell us nothing of the quality of the Amateur Service. Making the Amateur Service more attractive, as Mr. Hawker suggests, does in fact achieve two things. It may attract more Amateurs and at the same time it may improve the Amateur Service's case for justifying its own continued existence. The question of age distribution raises a very interesting issue. Our problem in Australia is that we know very little of the patterns that exist. There is in my mind no doubt that we could know a great deal more about our hobby. Given more facts I believe that we could better plan for the future. I commend this matter for the consideration of the Federal Council.

● CONCLUSION

I am conscious that this report is unreasonably long; despite this, it deals only briefly with a number of important topics and does not deal at all with a number of others.

The topics I have dealt with in detail are, I hope, of interest to all our members.

Finally, I would like to pay a tribute to those many people who have made the past year the success that I believe it has been. Firstly, to all the Federal Councillors I express the Federal Executive's sincere thanks. Without their support and understanding we would have been, on many occasions, lost. I would also like to record my deep appreciation of the work of all the co-opted Federal officers, particularly the Awards Manager (Geoff Wilson, VK3AMK) and the Contest Manager (Neil Penfold, VK6ZDK) and the various other officers who have given so unstintingly of their time.

I find it hard to express in words my feelings to the members of the Federal Executive. Once again, I have relied time and time again on the wisdom and good sense of David Rankin, the Federal Vice-President. Peter Williams has devoted an enormous amount of time in carrying out his role of Federal Secretary. It is beyond me to detail the enormous and unremitting workload that this post has involved. Despite very real personal difficulties, Bill Roper has provided almost invaluable assistance as Federal Treasurer, a position of ever-growing importance.

I believe that the Federal Executive is an able and efficient team, bringing together a breadth of experience and knowledge that would be hard to equal in any organisation. I have been privileged to be a member of that team.

As we enter the new year, following the 1971 Federal Convention, I believe we can look to the future with confidence. The almost universal support that we have found—recognising the need to employ top level staff to

guarantee the continued existence of the magazine and of the Federal body, and the consequent need for an increase in fees—has been, if not surprising, at least highly gratifying.

There is, of course, much work to be done but that work will become much easier in the knowledge that our organisation is moving into a new era.

—Michael J. Owen, VK3KI,
6/3/71. Federal President.

W.I.A.—FEDERAL EXECUTIVE

BALANCE SHEET

as at 31st December, 1970

1969			1970
	Accumulated Funds:		
	Balance, 1st January, 1970		$2674
	Less Deficit		279
$2674			$2395
	Represented by:		
	Current Assets:		
$187	Commonwealth Trading Bank Federal Executive		$1632
561	Publications		778
1455	Sundry Debtors		—
528	Stock on hand		—
$2729			$2410
	Fixed Assets:		
1232	Furniture, Fittings and Equipment, at cost less depreciation		1109
$3961			$3519
	Less—		
	Current Liabilities:		
$752	Reserve Fund	$752	
—	Deposits in advance	372	
535	Sundry Creditors	—	
			1124
$2674			$2395

AUDITORS' REPORT

We have examined the books and vouchers of the Wireless Institute of Australia (Federal Executive) for the year ended 31st December, 1970. In our opinion the accompanying Balance Sheet is properly drawn up so as to give a true and fair view of the state of the Affairs of the Federal Executive as at 31st December, 1970, and the attached Statement of Income and Expenditure is properly drawn up so as to give a true and fair view of the results for the year ended 31st December, 1970.

Melbourne, 18th March, 1971.
Hebard & Gunning, Public Accountants.

W.I.A.—FEDERAL EXECUTIVE

STATEMENT OF INCOME & EXPENDITURE

for Year ended 31st December, 1970

1969			1970
	Income:		
$61	Interest received		$34
1223	State Contributions—Per Capita		2414
527	Publications, etc.		360
—	Australis		1239
1641	Cook Bi-Centenary QSL Cards		—
$3452			$4047
	Expenditure:		
$72	Audit & Accountancy Fees	$38	
145	Australis Project	1450	
—	Awards	211	
3	Bank Charges	7	
1689	Cook Bi-Centenary QSL Cards	—	
7	Contest Committee	65	
—	Call Books, P.M.G.	100	
—	Convention Expenses, F.E.	335	
162	Depreciation	149	
330	General Expenses	310	
—	Intruder Watch Expenses	9	
45	Insurance	41	
26	Maintenance Equipment	29	
20	QSL Bureau	33	
	Region III. Expenses	3	
	Secretary's Honorarium	200	
707	Travelling Expenses	206	
1	SWL Awards	2	
12	Subscriptions	15	
381	Stationery, Telephone, Postage	448	
692	Salaries	675	
			4326
$4292			
$840	Deficit for Year		$279

"WIND OF CHANGE"

Brief Report on 25th Federal Convention held in Brisbane, Easter 1971

Yes, there is a wind of change blowing through the W.I.A. This evidenced itself in this Convention in many ways. There were changes in the methods of administration and in the thinking of the Delegates. This is the first Convention with a paid Secretary/Manager. For the first time Delegates had received the Annual Reports and Agenda Items well in advance, thus enabling them to study the numerous documents and discuss the contents from a well informed basis, not only with their Divisions in advance but also round the conference table.

Another innovation was that of the Working Groups concept. This is well known in other fields and materially assisted in the expeditious despatch of contentious business. Furthermore, the Host Division themselves provided observers for each Federal Councillor who could not bring up a member of his own Division. This action greatly eased the work-loads of these Delegates and was the subject of great appreciation. These arrangements enabled the chairman to proceed on a rather less formal basis without dispensing with essential discipline. As a result, far more views were exchanged among Delegates at all levels, both inside and outside the conference hall.

There were eight formal conference sessions totalling 31 hours' work. The Working Groups included in one way or another most of the Delegates, most of the Observers and all of the Federal Executive officers. On each of the four nights of the conference, very few rolled into bed before the early hours of the morning since the Working Groups had no other time available in which to conduct their research, deliberations and recommendations. One of the Observers had even travelled down from far away Townsville and will take back with him a comprehensive knowledge of current W.I.A. affairs at the national level. In total, the conference considered 45 agenda items and 15 reports. As a matter of interest, contests and awards this year occupied a very minor proportion of the time. Notwithstanding the huge volume of work, not every aspect of Amateur Radio required discussion.

Project Australis received the most searching and prolonged debate and discussion in and out of the conference hall. John Battrick, the Federal Oscar Co-ordinator, stood up well to the barrage of questions and recriminations despite having taken this onerous task over only a matter of weeks prior to the conference. He produced the actual demonstrator model which was still "cosmic-ray" filled, having just been recovered after the Hi-Ball balloon flight from Mildura. Much interest was shown in this equipment and it is anticipated that in the next few months all Divisions will have it on short loan for members' examination.

John also displayed the printed board and multi-module chassis which is designed to incorporate multi-channel translators and telemetry. He explained that the designs and construction are in accord with the current state of the art. He went on to say that the recent articles in "A.R." by Les Jenkins, VK3ZBJ, and Harold Hepburn, VK3AFQ, showed the way in which Amateurs can get on this "band waggon". John brought everybody up to date and answered, to the best of his ability, a barrage of questions on all aspects of the Project. One reaction, among many enthusiastic responses, was the immediate donation of a sum of money to aid the Project. Judging by the reactions, there is now every prospect that AO6 will achieve success.

Once again much time was devoted to consideration of measures aimed at the protection of our frequencies and their usage. I.A.R.U. Region III. Association Reports on the conference in Tokyo last month, at which the W.I.A. was represented by the Federal President and Air-Commodore George Pither, VK3VX (at his own expense), highlighted our problems. In July there is the World Radio Administration Conference of the I.T.U. in Geneva, and the Tokyo I.A.R.U. Conference decided it was desirable to send a Region III. Observer to Geneva. This will be paid for out of Region III. funds and the person selected, Tom Clarkson, ZL2AZ, appears to be ideal for this task.

On the question of frequencies, another aspect was deeply discussed, namely, the report on "Novice" licensing by the committee under the chairmanship of Mr. Rex Black, VK2YA, as appointed by Federal Executive. Motions on this matter were debated and adopted. Another aspect is Repeaters which arose from the very interesting report from the Repeater Secretariat.

On contests, the management now moves from VK6 to VK4 and will be under the able direction of keen organisers in Brisbane. Time precludes further comment at this stage, but the "winds of change" are more than a breeze.

☆

RECOVERY OF STOLEN VK2 INSTITUTE PROPERTY

During February 1971, Sydney police recovered the majority of the communications equipment that was stolen during October and November 1969 from the Institute stations VK2WI (Dural) and VK2AWI (Atchison St.). So far none of the publications or store items (resistors, semiconductors, etc.) have been located. It is understood that they also recovered a lot of electronic and other items which had been stolen from around Sydney. The police have charged a person in connection with this offence.

DX

Sub-Editor: DON GRANTLEY
P.O. Box 222, Penrith, N.S.W., 2750
(All times in GMT)

Due to the industrial trouble in the British Post Office, and complete lack of information from the VK chaps, there was no possibility of compiling any news last month. The situation has now returned to normal and the news sheets are flowing once more. I would appreciate some more news from our members, our supply of news from overseas is on a reciprocal basis and if I can't supply them, they won't assist us.

I would like to correct a possible error in the March issue, or at least one VK6 chap considers it an error. I refer to the comment which I made in reference to Jock ZL2GX accepting "a 25c mint stamp in lieu of the IRCs" for awards issued by the N.Z.A.R.T. My correspondent has altered the context and accused me of saying that he will accept a 25c stamp in lieu of AN IRC. I refute this statement, it did not appear in print either directly or by implication, but to clear myself of any adverse comments which may have arisen through what was a grammatically bad sentence, I will re-phrase the statement. Most N.Z.A.R.T. awards cost 3 IRCs, however the Awards Manager of that Society, Mr. Jock White, will accept a 25c mint Australian stamp in full payment for the award. To put this in simple arithmatic, 3 IRCs at 18c each cost 54c, a stamp costs 25 cents, thus the saving per award is 29 cents or over 50 per cent. of the cost.

QSL information for 9G1GT and PJ7JC relating to current operation is required by Noel VK2AHH, at Box 137, Kempsey, if anybody can assist.

Had a note from Ray Kearney back in December in reference to the operation from Mawson by VK0CC, who was due to come on from that locality early this year. I included this in an earlier batch of notes which missed the deadline, so for the benefit of all concerned, please send QSLs for this operation, which is by Col VK2BCC, to Ray Kearney, VK2BRK, 13 Kiora St., Canley Vale, 2166.

Pleased to note that Jack VK3AXQ is back on the air again from new QTH in Hawthorn. Amongst stations worked by him are VK9YR on Cocos, KC4USI on the C.G. Icebreaker "Staten Is", MP4TDU, Kev Straw, Hdq. B.T.S., R.A.F. Sharjah, Trucial, Oman; XW8DO, Box 25 Vientienne, plus many others.

I have in front of me all the 1971 issues of Geoff Watts DX News-sheet, some of which were issued before the strike, but were held up in England. Some of the information given may be a little out of date, but possibly somebody is wanting it as it probably hasn't been seen in print as yet.

A2CAW has been on the air regularly, more often than not on 14230 s.s.b., and usually around 1700z. His address is Private Bag 31, Francistown.

From Nauru we still have Bob Lear pounding in, also C21GB, who is D. G. Stephens, Radio Station MQ1, Nauru Is., Central Pacific. Bob is well known as VK2ASZ, and will be on the island for several years.

CE0AE has been reported here in Sydney quite often of late and is active on 7030, 3530 c.w., and 14332, 21360 and 28550 s.s.b. QSLs to WA3HUP.

DM4WOA, who is Gunther Kochniss, 2344 Glowe/Rg. Ruegen Radio, DDR/German Democratic Rep., is situated on Rugen Is., which counts as EU-57 for IOTA chasers.

W3HNK denies that he is manager for UA9VH/JT1, but if necessary can act as intermediatory for overdue QSLs, as he is in regular contact with the real manager, UA9VB.

King Hussein, who caused many pile-ups last year when signing JY1, was active in January using the call sign G5ATM. In early March, JY1B was operating on 21358 s.s.b.

Activity from Canton Is. by K3QOS/KB6 14225 at 0600z and 1500-1700z, with QSLs going to his home QTH, also K6AZD/KB6 who says he will be there until the end of the year.

Some news from U.S.S.R. UA0TO is in zone 18, UV0EX and UW0IN are in zone 19, whilst UA0YT Vlad Maymiston, Box 60, Kyzyl, Tuvinian, A.S.S.R., U.S.S.R., is in zone 23.

From the Antarctic area we have VP8LN operating from Halley Bay, scheduled to QSY to South Georgia in February, with QSLs to British Antarctic Survey Office, Port Stanley, Falkland Is. 3Y3CC Audun is on from the Antarctic, QSL to LA3CC; 8J1RL from Showa Base, Antarctica, QSL to J.A.R.L., both calls being good for prefix hunters only. VP8KD Frank, QTH not given, QSL to W2FBA, and VP8MC whose QSLs go to WA8EIR.

Two new call sign allocations of interest: 3DA to 3DM, have been allocated to the Kingdom of Swaziland, and 3EA to 3FZ have been allocated by I.T.U. to the Republic of Panama.

VU7US is due to commence from the Laccadives on April 10. There is some confusion here. Geoff Watts states the call will be VU2US, whilst the Long Is. bulletin, which is only a couple of weeks old, says the call is VU7US. Take your pick, but whatever the call, there will be little difficulty in locating him. VU5KV will probably be activated in June, and like the April one, it will be a multi-operator effort.

The operations by VE3EWY to VP2DAJ and VP2MRK earlier this year have been completed, and Bob asks for all QSLs to be sent to his home address.

The SZ0 prefix currently being used by the Greek fraternity, is a special one commemorating the 150th anniversary of the Greek Revolution, and will be available for the full period of 1971. SZ0CB has been active on 28 MHz.

I don't know the reason, but KW6 seems to be a hard island to get a QSL from. KW6AA is putting a tremendous signal in here and says QSL to WB6YCT. Other Pacific Islands currently active include KC6WS, Bill Sedore, Box 185, Yap, West Carolines; W1ARF/KS4 on Swan Is., QSL to WA6MWG; WB6MQV/KJ6 on Johnston Is., QSL to WB6HDG; VK9FH in the Bismark Archipelago for a year has W0KHI as manager; VK9XX on Christmas Is.; VK9LV is Louis Varney, Box 900, Pt. Moresby, Papua.

Further to the activity mentioned from the Laccadives. I neglected to mention that VU5KV was on from there in mid January with operators VU2KV, VU2DI and VU2RM. QSLs at the time were requested to be sent to VU2KV, Box 3031, New Delhi, India, and enclose five IRCs.

Apparently W3HNK was inundated with requests for assistance with JT1 QSLs, for in a later bulletin he is asking the gang to be patient as there will be 10 to 12 weeks delay on a reply. He has to write to the manager of the station.

5T5AD is mentioned in a list of QTHs from VK2AHH, as being Box 100, Nouakachott, Mauratania. Further to this, he skeds JA1KSO 14245 s.s.b. on Sundays at 0730, with the suggestion to check 21250 at 0900z Sundays. He is using a KWM2 and beam.

XV5HH Howard, says he is ex-CP1GN and QSL to George W9JT, but for what it is worth, George says that he has never heard of him, so looks like a query beside this one.

Reunion Is. has quite a bit of interest these past weeks. Michel FR7AF on 14120, Box 207, St. Denis; Francois FR7AG, Box 819, St. Denis; FR7AH, Claude, also Box 819, St. Denis; and FR7AI, Box 4, St. Clotilde, are all fairly active.

KG6SF, KG6SI and KG6SY are all active from the Marianas, with the latter's QSLs going to Box 209, Capitol Hill, Saipan, Mariana Is., 96950.

OA stations can use the prefix OB during 1971 to mark the 150 years of independence. OB8V was most active during the contest week-end, and asks for his QSLs to be sent to W9GFF.

A new list of prefixes for the various PZ call areas has been made available. PZ1 Paramaribo and Surinane, PZ2 Nickerie, PZ3 Coronie, PZ4 Saramacca, PZ5 for reciprocal licences, PZ6 Para, PZ7 Brokopondo, PZ8 Commewijne, PZ9 Marowijne, and PZ0 for special stations.

This concludes the back log of information from Geoff Watts. As well as providing a very fine up to the minute news sheet, Geoff has an arrangement with W6GSV by which he can supply that gentleman's QSL Managers Directory at a very much reduced rate.

For award hunters and the like, here is the current list of Commonwealth countries: A2, AC3, AP, C2, G, GC, GD, GI, GM, GW, MP4B/M/Q and T, VE, VK, and all VK islands, all VPs, VRs, VSs, VUs, YJ, ZB2, ZC4/5B4, ZDs, ZF, ZKs, ZLs, ZM7, 3B6/7/8/9, 4S, 5H, 5N, 5W, 5X, 5Z, 6Y, 7P, 7Q, 8P, 8R, 9G, 9H, 9J, 9L, 9M2/6/8, 9V and 9Y.

The Annual Islands of the Air Contest is well under way for 1971, certificates are awarded to top-scoring station and s.w.l. in each continent, and the world champion station and s.w.l. receive a silver cup and certificate. Full information on this and island numbers from Geoff Watts, 62 Belmore Rd., Norwich, Nor 72-T, enclosing four IRCs for current island directory.

A few more new prefixes are listed in Monitor. Some may have appeared in these pages before, but for what it's worth, here they are. CW is used regularly by CX stations in contest events (as a prefix not necessarily as a mode). CW3BH, CW4CR, CW8CZ were very active in last year's events. FY0 is the prefix issued to reciprocal licensees in French Guiana, FY0ZO being the first. HS0 was a special station in Thailand, but no details are given. OI0SUF was the Scout Jamboree Station in Finland. YO0 was being used as a suffix by YO2 stations in the city of Timisoara, Romania, up to the end of last December to celebrate the 700th anniversary of that city. 4B1AE was a special call sign issued to XE1AE for the CQ Phone Contest last year. 9C9 was used by EP2 stations last year in the same event. During October last year, 9J2 stations were permitted to use the prefix 9I6 to celebrate the 6th anniversary of Zambia.

VE6AP wishes it known that he has QSLs available for the 1968/9 Pacific Expedition for the calls below, so if you failed to receive a card, an IRC to 1933-32nd Ave., S.W., Calgary Alta, Canada, will do the trick: VR2FR, 5W1AE, VR1P, VE6AJT/KB6 and VR5AE. This expedition was held between Sept. 1968 and Feb. 1969.

The following are listed as future operations by the Long Is. DX Association. JD1ABX, ABS and AAZ, who were active at the time of writing, 5H3LV from Zanzibar over the Easter week-end, Spratley Is. late March or April, VU7US and group from the Laccadives April 10-17, St. Martin FS0AB Mar. 6 to 7, Albania by DL7FT last two weeks in June, and Gus AC5 planned for April.

A memo re the PA QSL Bureau. "Due to the co-operative work of the two ham associations in Holland, the QSL Bureau, Box 190, Groningen, has been closed. So all cards for all Dutch Amateurs must now be sent to Netherlands QSL Bureau, Box 400, Rotterdam, Netherlands.

HS3AET "Mercer" is now active, QSL to K0VIF; HS4AEF, usually on 20 s.s.b., says QSL to A.R.R.S., Box 22, A.P.O., San Francisco, 96037, U.S.A., whilst QSL info is not available here for HS3AEP who has been quite active on the same band.

JD1OJE, JD1ABZ and JD1AAZ were active from Bonin Is., now known as Ogasawara Is., until March 14, and for this lot the QSLs again go to the J.A.R.L.

PY0AD has been very active from Fernando de Noronha during the past weeks. He has been heard on 20 during the night and is often on 7 MHz., 7005 c.w. and 7060 s.s.b. in the last stages of that band's morning activity, about 2100z. He is also on 3503, but at 0015z which would be of little use here. His address is Box 2, Fernando de Noronha, Brazil.

TI9J and TI9CF were used by the operation from Cocos Is. earlier this year. QSL to W4VPD.

CT3AS, Madiera Is., who has been quite active on 28 MHz., stipulates that his QSLs go via the R.S.G.B., not the CT Bureau as one would expect. K2QHT sent his card to the R.S.G.B. with two IRCs and got a direct reply within two months.

HV3SJ in the Vatican was to be operated by a group of DLs from March 16 to 23, and for this period only the QSLs should go to DL1CU, Box 585, 7 Stuutgart 1, Germany.

The logs for LI2B, the Kontiki Raft, have not as yet been received by the QSL Manager LA5KG and there is no information as to when they will come to hand. The actual QSL is a beauty, and tells the story of the voyage.

A note here re the current VK0HM, who is listed as being active from Heard Island for a period of six months this year. This is not Hugh Milburn who went QRT late last year, but is in fact Giraud, formerly FB8XX on Kerguelen. QSLs for the current station go to F2MO, and for last year's operation by Hugh Milburn to W7PHO.

AWARDS

Diplome des Ameriques Francaises.—Offered by the Canadian Section of the R.E.F. It's a beauty, application to VE2AFC, B.P. 382, Quebec 4, Canada. Any band and mode., list of QSOs with 10 IRCs or a dollar to the above address. You need two stations from FP8 St. Pierre and Miquelon, two from Guadeloupe FG7, two from French Guyana FY7, and one from either Martinique FM7 or French St. Martin FS7. Contacts after Jan. 1966.

U.R.B.S. Aeterna Award.—The eternal city award, issued to any Amateur or S.w.l. who since Jan. 1, 1968, has heard or made contact with Amateurs as follows: For non-European stations, 10 Rome stations. Cost is 8 IRCs, log data only to A.R.I., Sezione di Roma, "Urba Aeterna Award," C.P. 361, Roma, Italy.

Trieste Award.—Available to Amateurs and S.w.l's, send full log details signed by a Radio Club or two Amateurs with 10 IRCs to Award Manager, I1HL, Luciano Hinze, Box 1342, 34100 Trieste, Italy. You need only two contacts for Plan A, or four contacts for Plan B. If so required, Plan B seal can be obtained later by forwarding log data plus an IRC. The above requirements for non-Europeans only.

(Continued on Page 25)

Overseas Magazine Review

Compiled by Syd Clark, VK3ASC and R. L. Gunther, VK7RG

"BREAK-IN"

December 1970—

Hutt Valley Branch 18 N.Z.A.R.T., ZL2BBT. Historical.

Phone Monitor, ZL2AWF. Untuned device consisting of 2.5 mH. choke, diode, bypass and decoupling capacitors. Stated to be quite effective for phones.

Portable Transistorised Frequency Meter, ZL2NA. Describes a home-made BC221, using six easily obtainable transistors and other commonly available parts. The dial mechanism was taken from a "TU" tuning unit where it was originally used on the v.f.o.

A Franklin Oscillator using FETs, ZL2APC. A tried and true circuit which does not seem to be as popular as it should be. Has the advantage of using an untapped coil.

Complementary Symmetry Transistor Audio Amplifiers, ZL2TBH. Does and don'ts of complementary pair design.

Modifications to Creed Teleprinters Type 7B, ZL2ALW. These modifications make your Creed 7B fully automatic.

"HAM RADIO"

February 1971—

Editorial.—Concerning inductance substitutes in microminiature modules.

Etched-Inductance Bandpass Filters and Filter Pre-amplifiers for 50 and 144 MHz., W5KHT. Easy to build high performance, narrow bandwidth interdigital filters and bandpass pre-amplifiers that feature etched-circuit inductors. Saves much space, where that is important.

Two Kilowatt Linear Amplifier for Six Mx, W6UOV. This high performance six metre linear features the new Eimac 8877 and provides acceptable stability and reliability with minimum harmonic output. The valve itself is not for Australian conditions, but the design criteria are interesting, particularly in view of the fact that the valve is rated according to Eimac's new and much more realistic "IVS" rating described last month by W6SAI.

Speech Clipping in Single Sideband Equipment, K1YZW. Audio speech clipping produces excessive distortion when used with s.s.b. equipment, as ably explained here, together with methods to avoid it. R.f. clipping gives best results, but it is important to keep p.e.p. voice peaks at least 20 dB. above background noise peaks, for psychological intelligibility!

Field Effect Transistor Transmitters, K2BLA. Low-power transmitters for two and ten metres that use field effect transistors in every stage. If you are interested in this subject, be sure also to look in Ed Noll's books (published by Sams): "FET Principles and Practice" and "Solid State QRP Projects".

Improving the Motorola P33 Series, WB2AEB. "Add these modifications and you'll have a truly high performance 2 metre rig".

De Luxe MOSFET Converters for Six and Two Metres, WB2EGZ. High performance u.h.f. converters featuring gate-protected MOSFET devices and simple construction. Very nice.

Trouble Shooting the ST-6 RTTY Demodulator, W6FFC. Complete trouble shooting instructions are given along with voltage measurements and theory of operation. The ST-6 appearing in "H.R." last month appears to be the ultimate in teletype demodulator systems.

The Repair Bench, Larry Allen. "Thinking your way through repairs." Bravo!

Adding Incremental Tuning to your Receiver, VE3GFN. This simple varactor-controlled circuit gives incremental tuning when added to any commercial transceiver.

Ham Notebook. Measurement of electrolytic capacitors, maintaining or adapting blowers, grid dipping transmission lines. But an important error appears in the article showing a simple method for replacing chokes or resistors by diodes in power supply filters: His theory is quite wrong, and the only benefit he obtains is by adding another electrolytic.

New Products: Microwave varactors, All About Cubical Quads (W. I. Orr), 2nd edition; Beam Antenna Handbook, 4th edition.

"SHORT WAVE MAGAZINE"

November 1970—

Using the Joystick, G3DCS. Some say it cannot possibly work. Others get DX. Here is someone who believes that it will give good results if properly tuned.

Small Battery Transmitter, G3OGR. 2 x 1T4 plus 2 x 3V4. 160/80 metre phone.

Better Sideband Reception, G3KHC. Improving standard receiver circuits.

Two Terminal Oscillator, ZL2AMJ. Two FETs and a tuned circuit.

Design of Pi Tank Circuits, G3EJF. Read this and re-design your own.

The Dual Gate Transistor for UHF Applications, The Editor. Recent MOSFETs.

December 1970—

Transistor Tx for Two, G3TDZ. Straightforward QRP job.

Running the Hy-Gain 14AVQ, G3KFE. Multiband trap vertical antenna. A loaded vertical antenna about 20 ft. long which covers 40 to 10 metres. Traps are used to isolate the various sections so that it is about a quarter wavelength on all bands.

Direct Conversion Receiver for Top Band, G3YMP. Using a ECC83 in a self balancing mixer circuit.

What Are Thyristors? Explanation of basic principles.

Cloth Ears, G3RJV. The psychology of c.w. reception.

Transistor Power Supply Unit, G3PKW. With overload protection. Values for two output ratings.

"73 MAGAZINE"

February 1971—

New Approach for the Metal Locator, W6HDM. A clever idea. Two i.f. oscillators produce an audio beat in a transistorised receiver, and the frequency of one of the oscillators is changed by magnetic induction from nearby metal objects.

Practical Circuit Applications using the Varactor, B. Mengel. The simple theory and practical application of voltage variable-capacitance diodes, frequency multiplication, tuning, and a.f.c.

A Clean AFSK Unit, WB4FMP. A frequency shift keyer to plug into the microphone jack of an s.s.b. transceiver. Uses two ICs.

An SSTV Patch Box, W4UMF. Interconnecting various pieces of equipment for subcarrier f.m. slow-scan television.

Easy Amateur TV, K2OJL. The author considers that a basic t.v. set-up can be done simply by converting a suitable disposals device, along with a suitable camera and t.v. set. Important ancillary investments include "(1) Lots of enthusiasm, and (2) Lots of cold beer", particularly the former.

A Tuning Indicator for RTTY and FAX, by W1OER. Tuner filters plus tuning eye.

On Efficiency, Organisation and Magazines, WA3BKC. "Information you cannot find is useless," so the best way to use magazine articles is to tear them out and file them, taking suitable precautions to ensure subject continuity. An excellent idea, amplified in rather more detail in a similar article in "Ham Radio" of Ja. 1970 ("Use Your Magazines!").

220 MHz. for FM Pocket Receivers. A two-transistor converter to use a "police band" f.m. receiver covering 146-180 MHz.

Magnetic Deflection for SSTV, WB2ZIV. Using disposals tubes.

Build an 8-Transistor Code Oscillator with just one IC, K6MVH. The HEP570.

The Beeper, K1ZJH. A QRP pulsed tone-modulated transistorised transmitter for 6 mx, useful for fox hunts, recovery devices, etc.

Study Guide: General Class Licence, Part VI., W2NSD. A remarkably clear description of basic amplifier theory, as part of the continuing series run by this magazine for licensing classes. This particular article should be read by all authors (and editors) who talk about "class B" unbiased final p.a. transistor stages.

Phone Patch Level Adjustments and Manproofing, W4NVK. Not relevant for Australia, alas.

Perf-board Terminal, K5LLI. Making your own terminals for, and using the 0.1 spacing Vector board. An excellent substitute for printed-board construction, particularly if you want to experiment with circuit modifications.

Tuning All-Band Vertical Antennas, W5QKO/AI4QKO. The use of antenna couplers for transceiver owners who have not heard of them.

The Low-Ohm Meter, W3YZC. A clever idea: a transistor set up for constant current feeds a microammeter which is loaded by the unknown resistance, allowing very low resistances to be read.

A Cheap and Easy Gus Watcher, W9SDK. A useful solution for the considerable problem faced by transceiver owners: how to use them for receiving more than one frequency at a time. (All further comments on this kind of "progress" would be unprintable.)

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DX NOTES

(Continued from Page 24)

QSL MANAGERS

C31BD to F9JS	FM7WQ to W4OPM
C3ICY to DL2IK	FP0CA to K2OJD
CE9AT to CE3RR	FP0NQ to W2NQ
CE9AZ to CE3RR	GB2LI to G3TPY
CN8BG to W3HNK	HB0XSB to DJ8KB
CN8HD to W2GHK	HC6MJ to DJ3JR
DU1FH to W6DQE	HS1ABU to W5ZG
EL2CB to W2CTN	HS1ACW to W1HZ
ET3DS to VE3DLC	HS4ADS to WB6RYN
F0HI/FC to G3KFT	JD1ABO to JA1KSO
F0ZF/FC to DL0LA	KB6CZ to K4MQV
FH8CE to W2MZV	KJ6CD to W5TJT

That is about all the room we have for this month, my thanks to Geoff Watts DX Newssheet, I.S.W.L. staff of Monitor, the Long Is. DX Assn., VK2AHH, VK2AXQ, Ernie Luff and Maurie Batt. 73, de Don L2022.

RUSSIAN PREFIXES

The recent changeover in the U.S.S.R. from the familiar U series prefixes to the new UK series may have excited the prefix chasers, but the average Amateur remains baffled as to which country the UK station is in. The following list should help clear up the confusion.

UK1—UA1-6	UK6F—UF6
UK2A—UC2	UK6G—UG6
UK2B—UP2	UK6H, I, J—UA1-6
UK2C—UC2	UK6K—UD6
UK2F—UA1-6	UK6L—UA1-6
UK2G—UQ2	UK6O—UF6
UK2I—UC2	UK6P—UA1-6
UK2L—UC2	UK6U—UA1-6
UK2O—UC2	UK6V—UF6
UK2P—UP2	UK6W, X, Y—UA1-6
UK2Q—UQ2	UK7—UL7
UK2R—UR2	UK8A, C, D, F—UI8
UK2S—UC2	UK8G—UI8
UK2T—UR2	UK8H—UH8
UK2W—UC2	UK8I—UI8
UK3—UA1-6	UK8J—UJ8
UK4—UA1-6	UK8L—UI8
UK5 (except	UK8M, N—UM8
UK5O)—UA1-6	UK8O—UI8
UK5O—UO5	UK8R—UJ8
UK6A—UA1-6	UK8T, U, Z—UI8
UK6C—UD6	UK9—UA9
UK6D—UD6	UK0—UA0
UK6E—UA1-6	

—Peter Nesbit, VK3APN.

VHF

Sub-Editor: ERIC JAMIESON, VK5LP
Forreston, South Australia, 5233.
Closing date for copy 30th of month.
All Times in E.S.T.

AMATEUR BAND BEACONS

VK0	53.544	VK0GR, Antarctica.
VK3	144.700	VK3VE, Vermont.
VK4	144.390	VK4VV, 107m. W. of Brisbane.
VK5	53.000	VK5VF, Mt. Lofty.
	144.800	VK5VF, Mt. Lofty.
VK6	52.006	VK6VF, Tuart Hill.
	52.900	VK6TS, Carnarvon.
	144.500	VK6VE, Mt. Barker.
	145.010	VK6VF, Tuart Hill.
	435.000	VK6VF (on by arrangement).
VK7	144.900	VK7VF, Devonport.
VK9	144.600	VK9XI, Christmas Island.
ZL2	145.200	ZL2VHF, Wellington.
ZL3	145.000	ZL3VHF, Christchurch.
JA	51.985	JA1IGY, Japan.
W	50.091	WB6KAP, U.S.A.
HL	50.100	HL9WI, South Korea

Note the frequency of VK6VF has been corrected to read 145.010 MHz. Our friends in New Zealand are pressing ahead with a plan for beacons in all areas, and the latest one to appear is on 145.200 MHz. with the call sign ZL2VHF. From the V.h.f. Notes of "Break-In" come some further details of the station, viz. Power 20 watts d.c. input, with antenna horizontally polarised, partially directional. Keying FSK 10 Bauds (12½ w.p.m.), call sign twice a minute, carrier off for four seconds each minute. It transmits week days 1600 to 2100 E.S.T. and continuously 1600 Friday to 2100 Sunday. These times are subject to some variation.

News comes to hand that a 6 metre beacon is being constructed for the Mt. Barker/Albany area, possibly operating on 52.500 (freq. to be confirmed). Also reports of 6 and 2 metre beacons either being considered or constructed in VK8 at Darwin, and one in VK4 at Townsville on 6 metres, using a Pye reporter. Welcome news comes from VK2 via Tim VK2ZTM that as part of the VK2WI re-building programme, units have been put aside for 6 and 2 metre beacons. Tim also reports the Sydney repeater transmits its call sign VK2BWI/R1 in m.c.w. every five minutes as a beacon at present. Transmitting time is 23 seconds. VK3 have applied to the P.M.G. Dept. through their Divisional Council for support in gaining a licence for a 432 MHz. manned beacon, so that could be another one for the list in due course. And so the beacon list continues to grow, this is a very healthy sign and indicates an awakening interest in DX and contacts further afield than across town, at least by some of the fraternity. There is no doubt beacons are being used more and more to indicate possible good conditions for other contacts.

144 MHz. DX ACROSS AUSTRALIA

Thanks to that mighty beacon near Albany on 144.500, VK6VE giving advice of suitable conditions prevailing, contacts were once again made right across southern Australia on 19th and 20th March. Bill VK3AMH first noticed the beacon from his Ballarat QTH and telephoned Bernie VK6KJ and got him on the band, and eventually made contact late in the evening. Bill copied Bernie's a.m. signals up to S7, and Bill heard in Albany even better. The following morning on sked, the two stations had a rather scratchy contact. However, conditions improved again on the evening of 20th to allow Bill and Bernie again to contact. By now there were other stations in on the act. Colin VK5DK and Trevor VK5ZTH (from a very poor location shielded from the west by Mt. Gambier), Mick VK5ZDR, Eric VK-3ZKN and Bob VK3AOT. Most signal reports were towards the 5 x 9 mark, so it was certainly a good opening. The path to the west dropped out completely soon after midnight on the Saturday night. However, conditions remained good for shorter distances on the Sunday morning to allow Bill VK3AMH and Bob VK3AOT to work Tony VK5ZDY. During all this rush with Bernie, David VK5ZOO in Mt. Gambier contented himself by working into Adelaide via the Adelaide Channel 4 f.m. repeater!

Reflecting on the conditions which finally ended with the contacts with VK6KJ, it is interesting to note the comments of Bob VK-3AOT who reports as follows: "On Sunday morning (14th March) an extensive duct resulted in contacts as far south as Mt. Wellington near Hobart and as far west as Mt. Gambier. Peter VK3ZPA and VK7ZIF on Mt. Wellington at S7. The VK5 2 metre broadcast from Mt. Gambier was quite readable. On Monday night the VK6 beacon from Albany was audible in Mt. Gambier but no contacts made. Conditions on Tuesday were again very good with stations in Mt. Gambier and N.E. Victoria prominent. The band was also open again to VK6VE by reception reports of VK3ABP and others. No contacts resulted. On Wednesday morning, VK5s were strong and on Wednesday evening conditions to N.E. Victoria were particularly good." These were the sort of conditions the observant DX hound noted, and the reward being trans-continental contacts a day or two later.

Ron VK3AKC, Kevin VK7ZAH and Winston VK7EM work each other almost daily on 432. In VK2, s.s.b. activity on 432 is noted with interest. Those currently operating are Rod VK2ZQJ, Roger VK3ZRH and Tom VK2NN, the latter you DX men should note usually has a c.w. transmission on 432.336 most nights between 1900 and 2230. His beam is horizontally polarised with at least 5 dB. gain in all directions, and the QTH is 3,000 feet a.s.l. in the Blue Mountains. He would certainly welcome reports of reception. Wally VK6ZAA phoned VK5ZDX recently and amongst other things mentioned, he is getting very interested in 432 and planning to use right hand or clockwise polarisation for an antenna. As Wally lives in the Albany area, this could represent an opportunity for transcontinental 432 MHz. DX. Whether the helix type antenna will do justice to the signals unless used at both ends of the contact has yet to be proved. Anyway, someone may be able to lend Wally a beam or phased array for DX work!

On 1296 MHz., Ron VK3AKC and Kevin VK7ZAH continue their tests, with John VK7JV joining in at times. Dale VK5ZER has been conducting experiments on 1296 and now that he has passed his c.w. we hope he will continue with the experiments and not go down on the "easy bands".

A brief message has come to me from John VK5JE (ex-VK5ZJD) that interest is growing in r.t.t.y. in VK5. John carries out fairly regular tests on 144.300 with Lionel VK5ZLA and Peter VK5ZDN. I have asked John for further information on r.t.t.y. for the next issue of "A.R." In VK3 more r.t.t.y. two-way QSOs took place between George VK3ASV at Morwell and Noel VK3NR in Melbourne over a 90-mile path, using F2 on 146.584 MHz.

SIX METRES

This band has been relatively quiet during the past month. A welcome letter from Peter VK6ZDY confirms the Stop Press item of last month that he did in fact work HL9WI s.s.b. both ways on 1st March. Peter goes on to say conditions in VK6 during the past six months have been particularly good, VK1 to VK8 inclusive being worked many times and even ZLs being heard. JAs have made their appearance, and 9 or 10 were worked by three stations VK6ZDY, VK6ZCM and VK6WA on 1st March. There appears to be quite an upsurge in s.s.b. activity in the West and with the results already proven, more stations will be on that mode for next DX season.

To prove the point that you have to be around if you want to grab the DX, this little item comes to me from Wally VK5ZWW and I quote: "21/3/71, 1639 hours. Was sitting in lounge drinking (tea!). Receiver on 52.010 with extension speaker running in kitchen, where wife was sewing. She called out, "I can hear c.w." 1640: Indentified JA1ODA calling CQ and replied to him. 1642: Completed contact with him on s.s.b. Gave 5 x 5, received 5 x 3. Heard no other signal although I called and listened for another hour." As the band appeared to only open for a few minutes, someone always seems to be lucky!

Incidentally, Wally will be operational up to the early part of May on 52.010 MHz. from a location 12 miles north of Tarcoola on the trans-continental railway line, some 300 miles north-west of Adelaide. He will be using s.s.b. and running skeds with Doug VK8KK in Darwin and Kerry VK5SU in Ceduna on the West Coast for meteor scatter contacts. Adelaide has been included in his programme and Wally would welcome reports of his signal or contacts from other areas. It is unfortunate this information comes so late as the operation will probably be concluding by the time you read this.

Looking at 6 metres overall, however, April and May will be the months for trans-equatorial contacts if they are going to come. We have had the contacts made in Perth early in March, VK5ZWW grabbed one on 21st, and Bill VK-3ZWF almost made it two-way with a JA3 on 27th, indicating the signals are extending further south.

VK3 EASTERN ZONE NOTES

From George VK3ASV comes a lengthy letter with lots of news and the following are extracts therefrom. George reports that the 1970-71 6 metres Es season was the best for eight years as observed in Eastern Victoria. The first opening occurred on 3/11/70 and last on 5/2/71. George's records show Sporadic E occurring on 15 days in November, 20 days in December, 15 days in January. QSOs were made with VK1 to VK8 inclusive, and ZL4. He notes increased useage of s.s.b. The current solar cycle No. 20 has been unusual, very little like cycle 19, but somewhat similar to cycle 18 which produced excellent auroras in 1950 and 51. The auroras last year observed in the Northern Hemisphere have caused v.h.f. old-timers to speak optimistically of auroral conditions and F2 DX likely for the next 18 months.

George continues: "We have a well established 2 metre f.m. net using Channel B simplex and recently installed a repeater using channel 4 (VK3BEZ) near Mt. Tassie, 16 miles south of Traralgon. We now have 41 stations using 2 metre f.m. out of 82 in the Zone. A.m. 2 metre activity is also increasing once more, this season saw eight active Amateurs and one on s.s.b. Three more will be on s.s.b. soon. The Eastern Zone V.h.f. Group has made a decision to transmit between 144.406 and 144.496, leaving the bottom section of the band clear to try and minimise the effects of overload, cross-modulation and de-sensitisation to our own locals when they are trying to work weak or DX stations. Each VK3 V.h.f. Field Day plus National Field Day at least two or three portables were in the field, no wins, but some good scores."

George has sent me pages of information regarding 144 MHz. band zoning as discussed by the Eastern Zone at various meetings. I have not had time to study it properly, but will pass on information about this in the next issue. In the meantime, it will give me an opportunity to contact George for further information.

From the pages of the Geelong Amateur Radio and T.v. Newsletter comes advice from George VK3YDB that a new Amateur Satellite is proposed to be launched in November 1971. Further details are being awaited. Also in the same publication, it is interesting to note that during the National Field Day in February the Geelong Club Station worked on v.h.f. 23 stations on 52 MHz. and 80 stations on 144 MHz. Activity was certainly much greater in VK3 than it was in VK5!

The Hi-Ball experiment appears to have gone off with reasonable success, the first flight rising to about 70,000 feet, and the second to 100,000 feet, on 23rd and 25th March respectively. The expected brief report of operations through the Hi-Ball has not come to hand, it seems likely the results will be the subject of a special report to "A.R.," so the matter need not be pursued here.

The 7th Annual Radio Convention is to be held in Mt. Gambier over the Queen's Birthday week-end, 12th and 13th June. This year the programme will include for the first time as an experiment an 80 metre fox hunt, so you h.f. bods will be able to show your paces with your mobile receiver and d.f. loop. There will be plenty of things for v.h.f'ers to interest themselves if the years gone by are any guide.

HISTORY IS MADE!

In March "A.R." I referred to a "dyed-in-the-wool" c.w. operator of many years' standing turning to v.h.f. phone. For those of you who didn't guess who, the reference was to Harry VK5MY who by dint of perserverance has got himself on the v.h.f. bands and is now looked upon with pride by the Amateurs of some years' standing, and with awe by the younger fraternity! However, let's spare enough room to hear Harry's story, it surely should be an inspiration to more h.f. types to take the plunge higher up the frequency scale.

Harry's words: "It was easy to guess that Eric was referring to me in his notes in March 'A.R.' so I can't let him down by not writing something for him. I think it all started when I was helping him with c.w. practice and told him I expected him to use that mode after he got his full licence. He indicated he was prepared to learn c.w. and work both phone and c.w. on h.f. and v.h.f., but the tone of his voice clearly implied that I was too fixed in my c.w. orbit to do likewise.

"I took this as a challenge, and after diving into the junk box and brushing the cobwebs off some old gear in my garage, I came up with a 6 metre converter and an old modulator unit (p.p. 807s) acquired many years ago from W.I.A. Disposals to meet an emergency (!) such as this (PanSy rudely remarked on this in 'A.R.' at the time), two Command transmitters and receivers and enough bits and pieces to make a power supply and a six metre transmitter. Slowly over a period of a few months, the capacitors in the modulator were replaced, the Command units were modified and a power supply and a 6 metre transmitter were built, the latter consisted of a 12AT7 osc./doubler, 6AM6 buffer and QQE06/40 final. (Boy! Is that stretching the friendship with a 6AM6 driving a 6/40 in Class C!!—VK5LP) One Command transmitter was on 80/160 (switchable), the other on 40. The six metre converter operated into a Command receiver at a tunable i.f. of 3 MHz. Provision was also made for the modulator to plug into my trusty old 10 to 40 metre c.w. transmitter. I'm sure the 807s in that final hung their heads in shame when the mod. was applied!

"The 6 metre transmitter was first ready for testing, and I well remember the tone of disbelief of Bob VK5ZDX, when he answered my first CQ, which was c.w. (slow). Other memories—my first a.m. QSO on 40 with Les VK-5NJ wanting to know my name, thought VK5MY was a new call sign—the incredulous voice of Arn VK5XV when I called him on 20 'Is that YOU Harry?'; Pete VK5FM (working s.s.b. on 15) "What the heck are you doing up this end of the band?'; on 6 metres on the W.I.A. call-back (VK5ZDX again), 'We have a stranger in our midst!'

"Anyway, there I was after 40 years, a.m. and c.w., 6 to 160 with my trusty G5RV antenna, and believe it or not, I have recently originated the VK5WI Sunday morning broadcast on 160 with my own transmitter. My c.w. friends, VK2QL, VK5RX, etc., still speak to me, but perhaps they haven't heard this yet!

"I got a real kick out of the Dec.-Jan. DX season on 6 metres by working VK2, 3, 4, 5, 6 and 7, and I'll be there again next Dec. (with a beam I hope). I've also enjoyed many cross-band QSOs duplex 6/160 and I've been on both ends, the last such QSO was with VK5LP and who was on the 6 metre end? . . . VK5MY!

"In conclusion and just to set the record straight, I still prefer c.w., especially contests and chasing the DX on the h.f. bands. S.s.b.? Too expensive and makes working DX too easy, but I'll try it as soon as I can afford it, at least I've been told the transceivers are very good on c.w.! 73, Harry, VK5MY."

"P.S.—Look for my call sign in Ross Hull Contest results—could I ever hope to see the call sign VK5LP in the results of the c.w. section of a contest?"

All things come to those who wait Harry, so the day may appear when your final wish is fulfilled! However, your appearance on v.h.f. is treasured by all of us in VK5 and I know everyone is proud of your achievement. I wonder who will be next to try?

In concluding, I would like to thank the following for their contributions for this issue: Bob VK3AOT, George VK3ASV, Roger VK-2ZRH, Peter VK6ZDY, Colin VK5DK, Bob VK5ZDX, Wally VK5ZWW, Tim VK2ZTM, Harry VK5MY, VK6 V.h.f. Group Newsletter and Geelong Amateur and T.v. Newsletter.

Thought for the month: "Holding public office is like trying to dance in a night club. No matter what you do, you rub somebody the wrong way." That's all for this month. What about some correspondence from VK4 and VK7? Surely you haven't all closed down!

73, Eric VK5LP, The Voice in the Hills.

—. . . —

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A technical leaflet is available on request from R. H. Cunningham Pty. Ltd., 608 Collins St., Melbourne, Vic., 3000.

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Book Review

FLIGHT OF THE KIWI

By Cliff Tait, ZL1AKI

Readers may be familiar with the world flight by Cliff Tait in his Airtourer 115 light aircraft. His flight was extensively reported in "Break In". To quote from the dust cover, "Setting out as a one-man mission to publicise New Zealand to the world, he and his New Zealand-made plane ended by making history. . . . His book recounts every detail of a flight that captured the attention of the whole world".

This reviewer feels that the dust cover was written somewhat with a "tongue in cheek", as no mention of the flight was ever seen in any of the four or five Australian dailies regularly seen. Having now read the book, it is also difficult to reconcile the statement on publicity for New Zealand. Publicity for the aircraft and pilot, yes, but very little for New Zealand. It is hard to imagine the inhabitants of Greenland, Iceland or Arabia being highly excited about the outside world. Most of the stop-overs were too brief and at inconvenient times to do much about publicity, and one gathers the impression that had it not been for the necessity to refuel, the stops would never have been made.

As far as the Amateur Radio aspect is concerned, it is little more than a list of those who gave some help to the journey, so do not look for much in the radio field, as it was not a DX-pedition.

The book was designed and set in Australia, and printed in Hong Kong. It is a pity the proof-reader did not take a little more care to correct the obvious errors. Despite the fact that there are fifty or more plates in the book, there is no index for them.

Despite all the criticism, if you are looking for a couple of evenings light reading, and wish to get away from the usual run of "who done its" you can try Flight of the Kiwi. If nothing else it shows that there are still people in this world with a sense of venture.

Our copy from the publishers, Ure Smith, Sydney.

A GUIDE TO AMATEUR RADIO

Pat Hawker, G3VA, 14th Edition

The Foreword to this edition sets out the aims of the author and publishers, the Radio Society of Great Britain. The approach is quite different from that which comes from the U.S.A. and does not try to cover too much ground.

This book is designed to assist the newcomer to Amateur Radio to learn more about the hobby and to help him become a licensed transmitting Amateur. Much of the information which is necessary for novices before presenting themselves for examination is contained in this publication and it is presented in a clear and concise manner.

A Guide to Amateur Radio is an inexpensive introduction to Amateur Radio which will prove invaluable to any person desirous of entry into Amateur ranks.

Our copy from Wireless Institute of Australia, Federal Executive.—VK3ASC.

RADIO AMATEUR'S HANDBOOK

Published by American Radio Relay League

Careful attention has been given to the matter of maximum readability in this edition. The use of non-gloss paper throughout assures minimum glare. Photographs and drawings are sharp and clear, minimising the chance of incorrect interpretation of construction details.

As was true of the 47th edition, considerable revision has been made in both the theory and construction sections of the Handbook. Emphasis has again been placed on practical state-of-the-art themes. New material has been added throughout the book. The semiconductor, s.s.b., and measurements chapters have been completely rewritten to reflect modern trends and practices. The semiconductor tables have been greatly expanded to provide the latest transistor and diode specifications in simple reference form.

Numerous brand-new construction projects are included in the pages of the 1971 Handbook. Among them are such items as solid-state transceivers, receiving accessories and antennas. Solid-state receivers and transmitters have been added, plus new v.h.f. transmitting equipment.

Many additional changes have been made throughout the book to make it even more up to date than was the 47th edition. The book continues to carry the very interesting catalogue section, featuring the latest equipment, parts and services of a number of leading American companies in the electronics field.

NEW CALL SIGNS

DECEMBER 1970

VK1DZ—H. R. de Zwart, 28 Atherton St., Downer, 2602.
VK2DJ—J. Lovell, Dept. Civil Aviation Bldg., Lord Howe Is., 2898.
VK2JK—W. G. Spencer, 8 Kirkoswald Ave., Mosman, 2088.
VK2ATQ/T—R. A. Cameron, 6 Cottrell Pl., Baulkham Hills, 2153.
VK2BHJ—H. J. Town, Block C7, 2-14 Goulding Rd., Ryde, 2112.
VK2BJE—J. Bijou, 34 Atchison St., St. Leonards, 2065.
VK2BTW—E. D. Weaver, Broigan Rd., Parkes, 2870.
VK2ZDE—M. G. Kane, 4/34 St. Andrew St., Maitland, 2320.
VK2ZEG—P. F. Babik, 115 Felton Rd., Carlingford, 2118.
VK2ZGC—A. W. Reynolds, 1/30 Alexandra St., Drummoyne, 2047.
VK2ZRL—R. A. Mackeller, 1 Johnson Ave., West Ryde, 2114.
VK3VE—Wireless Institute of Australia (Victorian Division), Station: Rooks Rd., Vermont; Postal: 478 Victoria Pde., East Melbourne, 3002.
VK3ABC—F. D. Voight, 113 Pattern St., Sale, 3850.
VK3ABQ—J. A. Moran (Sgt.), "Frognall," 54 Mont Albert Rd., Canterbury, 3126.
VK3BES—Swinburne Electronics Society, Swinburne College of Technology, John St., Hawthorn, 3122.
VK3BEV—J. M. Lipson, 3 Montague St., Highton, 3216.
VK3BEX—M. A. V. Rivenell, 9 Maryborough Rd., Boronia, 3155.
VK3BTS—Blackburn Technical School Radio Club, Koonung Rd., Blackburn, 3130.
VK3YDK—W. J. Fanning, 8 Welwyn Pde., Deer Park, 3023.
VK3YEP—R. D. Gillett, 2 Lade Crt., Ringwood, 3134.
VK3YER—G. N. Robinson, 573 Pascoe Vale Rd., Oak Park, 3046.
VK3YET—P. M. Stewart, 35 Holding St., Beaumaris, 3193.
VK3YEU—M. J. Farrell, 10 Spring St., Belmont, 3216.
VK3YEV—I. R. May, 35 Pollock Ave., Traralgon, 3844.
VK3YEY—S. D. C. Tovey, 10 Clare St., Mordialloc, 3195.
VK3YFA—K. L. Feltham, 161 Wallace St., Bairnsdale, 3875.
VK3YFB—D. J. Atkinson, 53 Woolcock St., Warracknabeal, 3393.
VK3ZOU—J. C. Spence, 585 Drummond St., North Carlton, 3054.
VK4EK—N. S. Maddern, 7 Dajarra St., The Gap, 4161.
VK4ZEM—P. Mead, 71 Coverdale St., Indooroopilly, 4068.
VK4ZJH—B. J. G. Johnston, 10 Dalrymple St., East Mackay, 4740.
VK4ZJN—R. J. D. Hay, 6 Hack St., Zillmere, 4034.
VK5DZ—M. J. Groth, 75 Charles St., Prospect, 5082.
VK5JR—G. D. Smythe, 3 Betula Rd., Mt. Gambier, 5290.
VK5ZPC—P. Clemence, 8 Robins St., Elizabeth Downs, 5113.
VK5ZRI/T—R. N. Soutchcott, Yatala Vale Rd., Yatala Vale, 5126.
VK5ZRK—R. L. Spurrier, 167 Shepards Hill Rd., Eden Hills, 5050.
VK5ZTH—T. R. Hutchesson, 45 Swallow Dr., Mt. Gambier, 5290.
VK6QC—F. N. Schwartz, 9 Norman St., Gosnells, 6110.
VK6SC—J. A. Scanlon, 119 Davis St., Boulder, 6432.
VK6TF—R. A. Taylor, 23 Gordon Rd., Morley, 6062.
VK6ZV—F. X. Lawlor, 8/123 Watkins St., Hilton, 6163.
VK6ZDS—I. A. Sorensen, 15 Redwood Cres., Melville, 6156.
VK7MT—R. M. Trott, 186 Punch Bowl Rd., Launceston, 7250.
VK7TB—T. R. Briggs, 18 Melbourne St., Launceston, 7250.
VK8CH—C. A. Hermiston, 5 Hingston St., Parap, 5790.
VK8EG—E. A. Gribl, Jnr., Station: Mobile; Postal: P.O. Box 4171, Darwin, 5794.
VK0MX—K. W. Gooley, Mawson.
VK0ZPO—C. L. Scally, Mawson.

CANCELLATIONS

VK1BB—B. E. Boller. Not renewed.
VK1ZKQ—D. W. F. King (Cpl.). Not renewed.
VK2AE—L. E. Harris. Deceased.
VK2HS—E. M. Fanker. Deceased.
VK2IO—R. E. Durrant. Transferred to Vic.
VK2JR—J. G. Reed. Deceased.
VK2KJ/T—K. L. Finney. Transferred to Vic.
VK2RC—J. M. Campbell. Deceased.
VK2TR—R. A. Taylor. Transferred to Vic.
VK2AGT—J. K. Langley. Deceased.
VK2ALI—P. G. Dale. Not renewed.
VK2BLR—Lakemba Amateur Radio Club. Not renewed.
VK2ZFH—A. C. Counsell. Now VK2CI.
VK2ZGP—G. E. Millward. Transferred to Qld.
VK2ZGT—D. K. W. Bradbury. Now VK2ASY.
VK2ZJG—J. D. Holt. Now VK2BBZ.
VK2ZJW—J. G. Winter. Not renewed.
VK2ZKD—L. J. McHugh. Not renewed.
VK2ZMP—M. F. Potts. Now VK2BMH.
VK2ZQR—R. C. Quick. Transferred to A.C.T.
VK2ZRY—R. W. Young (Dr.). Transferred to Qld.
VK2ZVP—R. H. Little. Now VK2BVP.
VK2ZWM—W. S. Munn. Now VK2BMX.
VK3CX—A. G. Brown. Deceased.
VK3AOR—R. W. McLean. Not renewed.
VK3YAH—Swinburne Electronics Society. Now VK3BES.
VK3ZUC—R. W. Walker. Transferred to W.A.
VK4DM—R. J. S. Davis. Not renewed.
VK4HE—H. Clayton. Not renewed.
VK4ZHH—A. J. Murphy. Not renewed.
VK5DL—T. P. Drake. Not renewed.
VK5QJ—J. C. Hulse. Transferred to W.A.
VK5VE—W. N. Thomas. Not renewed.
VK5ZBO—B. J. Brice. Not renewed.
VK5ZGR—G. D. Smythe. Now VK5JR.
VK6ER—E. A. Ray. Left country.
VK6HJ—H. M. Smith. Left country.
VK6CIE—F. W. Fletcher. Transferred Interstate.
VK6ZAT—R. A. Taylor. Now VK6TF.
VK6ZFU—L. Janes. Transferred to Vic.
VK7RN/T—R. D. C. Nicholls. Deceased.
VK7ZLX—T. R. Briggs. Now VK7TB.
VK9DZ—M. J. Groth. Now VK5DZ.
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WANTED TO BUY: S.s.b. 5-band Transceiver, Swan 500, 350, FTDX100-400, TR3-TR4, SR150, NCX5, TS510 or similar. Also Linear HA14, SB200, FL2000, etc. Details to J. Forster, VK3CDX, 8 Bristow Drive, Forest Hill, Vic. Phone 877-1135.

WANTED TO BUY: Type "A" Mk. III. Trans/Receiver. Phone Jules, VK7ZD, Hobart 25-2905 (home), or 34-4687 (business hours).

WANTED TO VIEW: A working Fremodyne as published in Electronics Australia, May 1970 (to find out where I went wrong!). Alternatively, to purchase a working copy without audio and power supply sections. Harley Price, 637 Burke Road, Camberwell, Vic. Phone 82-2106 (Melb.).

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JUNE, 1971

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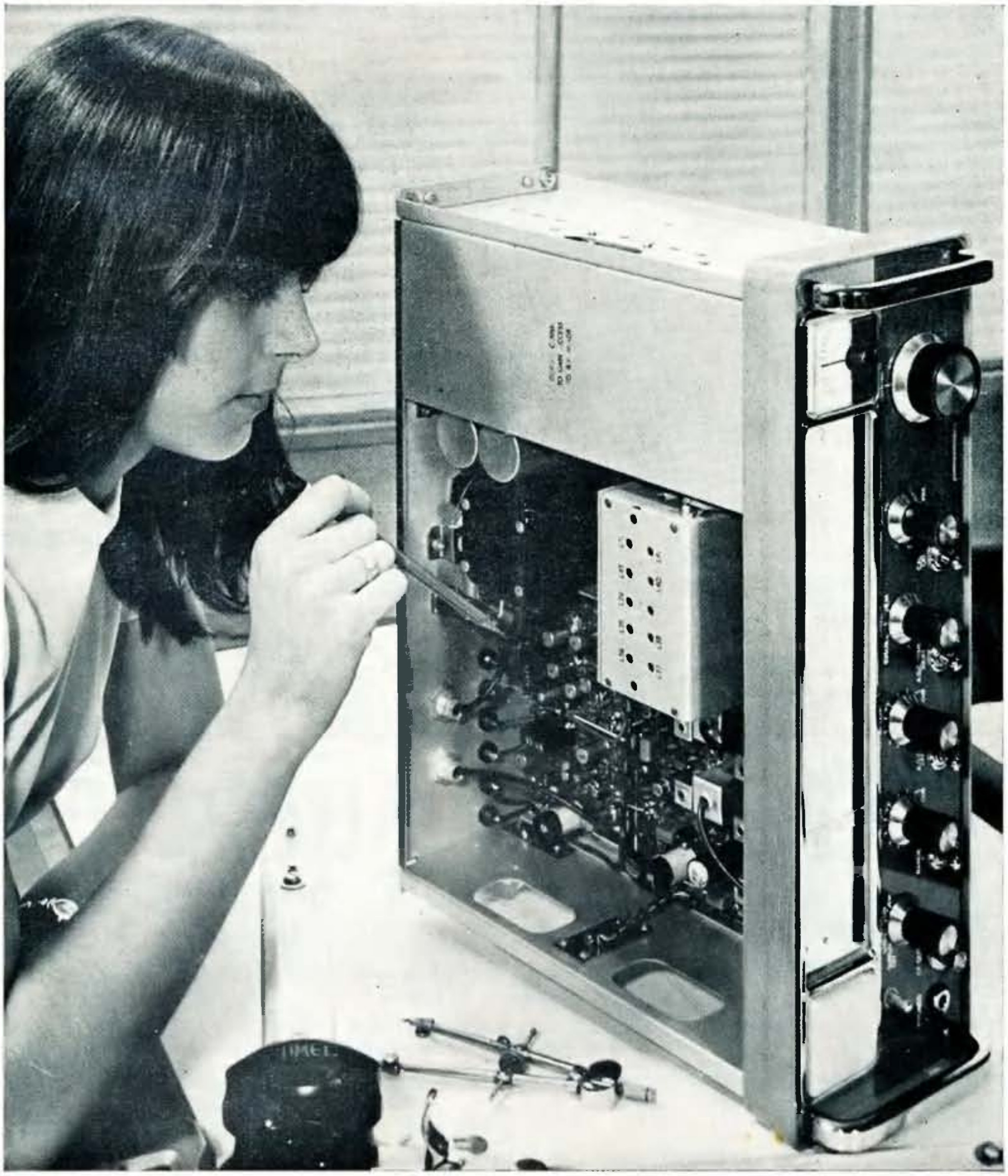

amateur radio

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CONTENTS

COVER STORY

The Eddystone model EC990S is a modern fully transistorised UHF receiver for AM/FM operation in the range 230-870 MHz. Designed for fixed or mobile operation, this unit has applications in meteorological service, radio astronomy, aerial investigation and in radio laboratories. In addition to audio and video outputs, a low impedance output at the I.f. of 36.5 MHz. is provided to drive ancillary equipment. Further information is available from R. H. Cunningham Pty. Ltd.

FEDERAL COMMENT:

NOVICE LICENSING—AGAIN

The Federal Council at the 1970 Federal Convention divided equally on the question of whether or not the Wireless Institute of Australia should press for the introduction of some form of Novice licence in Australia. The Federal Council did, however, direct that the Federal Executive seek further information to be embodied in a report so that the question could be considered further. The Federal Executive sought the assistance of the New South Wales Division and accordingly a committee of that Division, under the chairmanship of Mr. Rex Black, VK-2YA, was formed. The report of the committee was received by the Federal Executive on 1st April, 1971, copied and posted to all Federal Councillors on 2nd April—that is exactly one week before the Federal Council met in Brisbane for the 1971 Federal Convention. The report has received universal praise; indeed the Federal Council formally recorded its deep appreciation of the work of the committee.

Yet, the Federal Council decided to defer decision on the matter. I know that very many people were interested in this question. Perhaps some will regret the decision to make no decision at this time. Perhaps it could be seen by a few as evidence of a thoroughly negative attitude. To draw such inference is, however, to be less than fair. First, let us look at the report. It raises, I believe, all the issues relevant to Novice licensing clearly and succinctly. In requesting such a report, the Federal Council was seeking as much factual evidence as possible upon which a decision could be based. The report provides this information. I have found this report most helpful on one of the most complex and difficult topics that have been considered in recent years.

In brief, the report recommends that the W.I.A. should seek the introduction of a "Novice" type of licence in Australia. This is necessarily a value judgment. There is no single fact that points unequivocally one way or the other. For example, the two countries with the highest ratio of Amateurs per head of population in the world are the United States of America and New Zealand. One has—the other does not have—Novice licensees.

The report suggested, for discussion, that a Novice licence should be sought on the following basis:

1. A lower standard theory examination than that required for A.O.C.P. and A.O.L.C.P.
2. The same standard regulation examination as is required for the A.O.C.P.-A.O.L.C.P.
3. A five words per minute Morse test.
4. That the Novice licensee will use:
   (a) A crystal controlled transmitter.
   (b) Not more than 10 watts d.c. input.
   (c) C.w. only.
5. The same age limit would be imposed as is imposed for A.O.C.P. and A.O.L.C.P.
6. A limited term licence only would be issued.
7. The licence would take with it the right to operate fixed, mobile or portable.
8. Special call signs would be allocated to Novice licensees.
9. A character reference would be required before a Novice licence is issued.
10. The Novice licensee would be permitted to operate on the following bands:—
    1800 - 1860 KHz.
    3505 - 3525 KHz.
    7010 - 7050 KHz.
    21030 - 21150 KHz.
    28040 - 28200 KHz.

In addition, a number of other proposals were suggested. I have no doubt that this report will provoke spirited discussion. **That is exactly what it should do.** The report is printed as Appendix E to the Minutes of the Federal Convention. Your Federal Councillor has a number of copies. Please approach him for further details and please discuss the matter and express your view to your Federal Councillor and Divisional Councillors.

At the outset, I stressed the date the report was received by the Executive and circulated to the Federal Councillors. The committee, under Mr. Black, was appointed towards the end of 1970. It sought the views of many people and engaged in a volume of correspondence described by one Federal Councillor as "fantastic". That the committee achieved its object of producing a report prior to the Federal Convention is no mean feat. Perhaps, however, it is reasonable to ask whether the fact that a decision was deferred means that this effort was wasted. Emphatically, no. Formally, and particularly informally, the Federal Council engaged in a spirited and very deep discussion of the many issues involved. Had that report not been received in time for the Convention one of the most useful discussions that have taken place in recent years would just not have occurred.

The introduction of a Novice licence system raises many issues fundamental to our hobby—the very purpose of the Amateur Service, the relationship of one type of licence with another, the virtues of quality as against the virtues of quantity are all relevant. Then, what do we set out to achieve with a Novice licence? How do we best do it? Do we take any different view of the two types of licence we already have? These are all equally relevant questions before we finally decide—if we do—to seek a Novice type licence and, even if we do so decide, the conditions of issue of such a licence raise question after question. No, the deferring of a decision was not evidence of negative thinking—rather it was a tribute to a magnificent report that deserves the fullest consideration and appreciation of the depth of a problem that, whilst in the past has been contentious, has not before been considered so completely. The deferring of the decision also gives each member the opportunity to re-consider his views and to take part in the formulation of one aspect of the Institute's policy that will undoubtedly and fundamentally affect our hobby for the future—whichever way the decision goes.

Finally, the matter does not have to wait another year. Your Federal Councillors are in regular communication with one another and with the Federal Executive. A decision can be made prior to the next Federal Convention if it appears that the pendulum previously finely balanced between "for" and "against" moves clearly in one direction or the other, thus answering the question "whether". If the answer is "for" then the question "what?" (an equally complex question) must be answered. I believe, too, that given a concensus, that question, should it arise, can also be answered prior to the next Convention.

Mr. Black and his committee have made the way open for our organisation to make an informed decision on a topic that has troubled many people. A snap judgment would have pleased some, displeased others, depending which way it went. A considered judgment will, whichever way it goes, justify the enormous amount of work of the committee. This is a question that must fundamentally affect the future of our hobby. Please make sure that your voice is heard.

—MICHAEL J. OWEN, VK3KI,
Federal President, W.I.A.

HOME STATION ANTENNA FOR 160 METRES

Part Two—Vertical Polarised Antennas

J. A. ADCOCK,* M.I.E. (Aust.) VK3ACA

GENERAL

The basic medium frequency antennas are the quarter wave vertical (or Marconi) and the half wave vertical. An antenna having a better radiation in the horizontal direction is the five-eighth wave vertical, this behaves like half an extended double zepp. Both quarter wave and half wave verticals present a pure resistance load at the base. The quarter wave has a definite resistance of about 40 ohms which can be obtained from the formula. The half wave has a high resistance feed point at the ground. An antenna length other than a quarter wave or half wave has some reactive and some resistive component. The equivalent circuits of the loads of these antennas are shown in Fig. 3. In this article we are mainly considering antennas with a pole or leg length of less than a quarter wave and only verticals which are base fed against ground.

The quarter wave antenna when fed in series with the ground will be resistive only. For a short antenna the load can be looked on as a capacitance in series with a resistance. As the antenna is shortened the resistance will become smaller and the capacitive reactance will become larger (smaller capacitance). Because the effective series reactance becomes higher, the load requires a higher driving voltage, this voltage being largely out of phase with the current. In other words the load has a poor power factor.

This effective series reactance can be tuned with a variable series inductance, and when this is done the resistance of the load is presented to the transmitter, the value of which is equal to the radiation resistance plus the loss resistance. For a short antenna the radiation resistance reduces with the square of the length of the antenna.

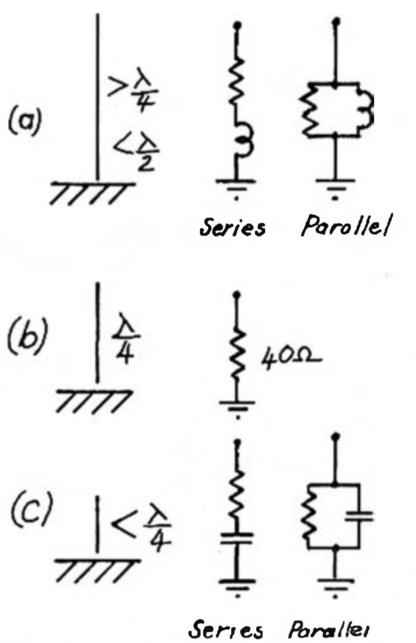

Fig. 3.—Showing the antenna together with the equivalent series and parallel circuit of the load when the antenna is fed in series with the ground.

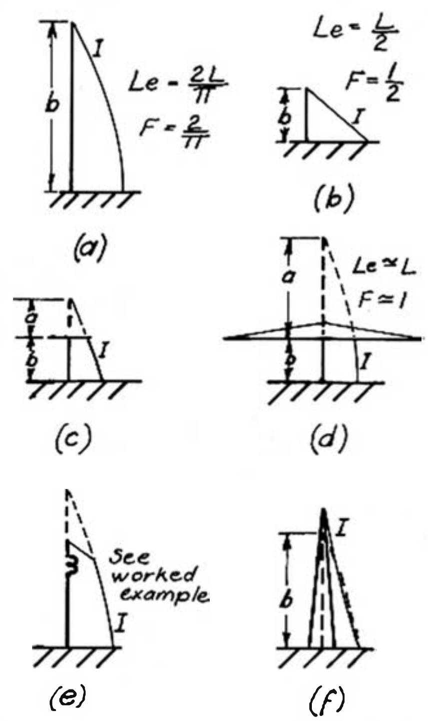

Fig. 4.—Showing the current distribution on some vertical antennas. (a) and (b) are used in the text to indicate electrical lengths of the component parts. L is the actual length of the radiating section. The effective length and the "form factor" are shown for some cases.

In some circumstances it may be desirable to consider the load as an equivalent parallel circuit as shown in Fig. 3. For a short antenna the equivalent parallel circuit will be one with a very high resistance and a high capacitive reactance. The equivalent series circuit is the one most commonly used. The conversion formula for parallel to series circuits is not given to avoid unnecessary complication. It is necessary to know the reactance to make the calculation. Series parallel conversion and reactance have been introduced later with references as an incidental.

As the antenna is made longer and approaches a quarter wave, the series reactance approaches zero or the parallel reactance approaches infinity, and the resistance in both cases approaches 40 ohms. As the antenna is lengthened beyond a quarter wave the series resistance increases and the series reactance becomes inductive. The series inductive reactance again approaches zero as the antenna length approaches a half wave and the resistance becomes a high value.

The distribution of current on a vertical antenna is shown in Fig. 4. The effective lengths of the antenna for the purpose of approximate calculation are also shown. Fig. 4a shows the current distribution for a quarter wave antenna, the distribution being approximately sinusoidal (Ref. 3). Fig. 4b shows the position for a short vertical. It will be noted that this distribution is approximately "triangular".

As pointed out already, a short antenna will necessarily have a low feed point resistance and therefore a large current. The driving voltage will also be high due to the high series reactance. An equivalent series circuit of a complete tuned short antenna is shown in Fig. 5. The constants are considered lumped. From the circuit it is obvious that if the losses are to be minimal the radiation resistance should be high and steps should be taken to reduce losses. In the antenna in Fig. 4b the current will be maximum at the bottom and zero at the top. As a result, current at the feed point is twice the average current and therefore the radiation resistance is low, also a large base loading inductance is required to tune the antenna.

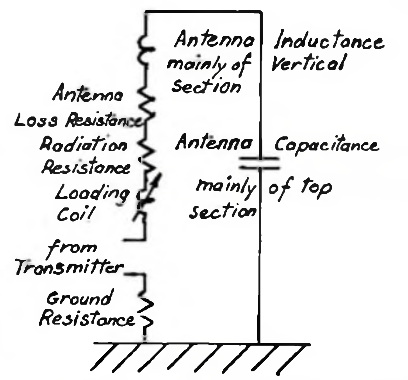

Fig. 5.—Showing a series equivalent circuit of the whole antenna. The main parts are shown lumped.

A much better distribution of current is achieved by "top loading", shown in Figs. 4c, d, and e. The top load can be made large enough so that the current in the vertical section is practically constant over the length considered. In fact the top can be made large enough so that the antenna will resonate.

Large capacitive top loading has the following advantages:

1. The current distribution in the radiating section is optimum, resulting in maximum radiation resistance.
2. Minimum tuning inductance is required.
3. The large capacitive top ensures minimum voltage stress to produce the necessary electrostatic field, hence minimum tendency to corona.

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Initially in this discussion the top is considered to be symmetrical and therefore would radiate very little since currents flow in opposite directions and produce a largely cancelled field.

A symmetrical antenna with a straight wire top is very ancient and goes under the name of "T". The top load, however, can take several other forms, e.g. an umbrella, several horizontal radials, a flat disk, an inductively loaded whip, a cylinder or a sphere. An antenna with a single top wire at right angles is known as an "inverted L". A "sloping antenna" is also a vertical and these will be dealt with in a separate section.

The top loading will have an effect on the antenna like an extra length of wire vertically (non-radiating). This equivalent effective vertical is shown as length "a" in Figs. 4c, d and e, and the vertical radiating section is shown as length "b". The current distribution over the real and virtual part of the antenna in all cases except Fig. 4f is close to sinusoidal (Ref. 3). The shortening effect of a tapering antenna is only illustrated here and is not analysed.

CALCULATIONS FOR VERTICAL ANTENNAS

Radiation resistance of a vertical antenna when fed in series with the ground is given by—

$$R_R = \frac{1580\ L_E^2}{\lambda^2} \quad \ldots\ \ldots\ (1)$$

where L_E = the effective length of the antenna.
λ = wavelength.

Frequency	λ Metres	λ Feet	λ/4 Feet
1.8	166.7	546.8	136.7
1.825	164.4	539.3	134.8
1.85	162.2	532.0	133.0

Since we are considering the vertical component only any horizontal radiation resistance can be considered part of the loss. This value is usually small.

In the graphs given here the electrical length of the antenna is taken as $\lambda/4 = 1$. This was considered to be simpler for calculation than $\lambda/4 = 90°$. If calculations are made from tables, angular lengths would have to be used. In the examples given here no reference is made to velocity factor or end effect as these values should make a small difference only.

The effective length of the antenna and the form factor of the current distribution are as defined earlier.

$$F = L_E \div L$$

$$L_E = F \times L \quad \ldots\ \ldots\ ..\ (2)$$

where F = form factor.
L = actual length over which the current distribution is being considered.

The vertical component of the antenna, the length over which the vertical current distribution is considered, is usually the gap between the top load and the ground.

Also—

$$F = \frac{\text{Average Current}}{\text{Base Current}} \quad \ldots\ (3)$$

Average Current =

$$\frac{\text{Area under Current Distribution Graph}}{L} \quad \ldots\ (4)$$

In the case of a triangular distribution of current (Fig. 4b), the average current must be half that of the base current. Therefore it would radiate the same power as a wire of half the length carrying a constant current equal to the base current ($F = \frac{1}{2}$). In the case of Fig. 4d, the effective length is equal to the actual length ($F = 1$).

The form factor for a quarter wave is $2 \div \pi$, as shown in Fig. 4a. The true form factor for a radiating section of wire is given below.

From equations 3 and 4:

$$F = \frac{\int_{x=0}^{x=L} i\, dx}{L I}$$

where i = current at distance x from the end of the antenna.
L = length of the radiating section being considered.
I = base current.

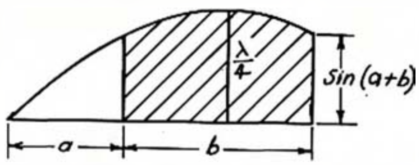


Fig. 6.—Illustrates the method used for equation 5.

Consider Fig. 6. The length "a" is the equivalent electrical length of the top (not necessarily the actual length) and length "b" is the electrical length of the radiating section. The current distribution in the wire is sinusoidal. From the equation the electrical length L must be taken in radians and equals length "b".

$$F = \frac{\int_{x=a}^{x=b} \sin x\, dx}{\text{radian } b \times \sin(a+b)}$$

$$= \frac{\cos a - \cos(a+b)}{\text{radian } b \times \sin(a+b)} \quad \ldots\ \ldots\ \ldots\ (5)$$

a and b can be taken as the angular length $\lambda/4 = 90°$ and the figures taken

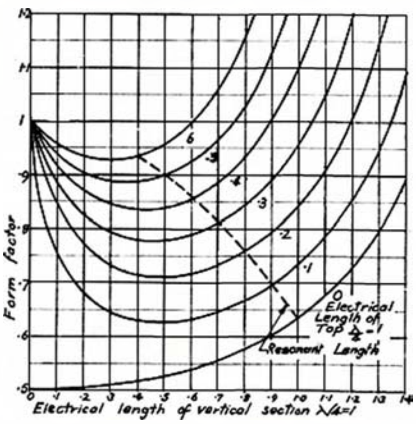


Fig. 7.—Curves of "form factor" against electrical length of the radiating section for various lengths of top load.

from tables. Note that if (a + b) is greater than 90°

$$\cos(a+b) = -\cos[180 - (a+b)].$$

Calculations from equation 5 are shown plotted in Fig. 7, and using equation 6 below, Fig. 8 was plotted.

Taking:

electrical length = $L \div \lambda/4$

and from equations 1 and 2

$$R_R = 98.75\ (\text{elect. length} \times F)^2 \quad ..\ (6)$$

Example for a simple quarter wave vertical:

$$R_R = 98.75 \times (1 \times 0.636)^2$$
$$= 39.9$$

It must be pointed out that this method of calculating radiation resistance is a simplified method and is only correct if the radiating section of the antenna is short. If it is near a quarter wavelength or longer the radiation resistance will be less by a small amount, however the results given by the formulae and graphs shown here should be sufficiently accurate within the range shown.

According to the formula, as the antenna approaches a half wavelength the radiation resistance approaches infinity. This is obviously erronious. If the total electrical length of the antenna is more than 1.4 of a leg length of a quarter wave, the formulae should not be used. The radiation resistance at the base of a half wave vertical cannot be accurately calculated but would be in the order of several thousand ohms.

A choice of methods for determining the form factor of the current distribution on an antenna has been given and these are summarised as follows:

1. If the current distribution conforms nearly to the standard forms shown in Fig. 4, these may be applied. F for a short vertical = 0.5 and F for a heavily loaded vertical = 1, the latter may not be sufficiently accurate on 160 metres.
2. If the current distribution curve is known, equations 3 and 4 can be applied and the areas under the current curve determined graphically or by measuration.
3. By application of the graphs or equation 5.

Effective Electrical Length of Top Load

This matter created some discussion as some authorities state that in the case of a "T" the effective length is equal to half the length of the top, that is, the "inverted L" section only and other authorities seem to leave the matter open.

The following would appear to be correct (Ref. 4):

1. With an "inverted L" the effective electrical length of the top is equal to the actual electrical length.

2. The electrical distance of the point being considered on the antenna from the current or voltage point (virtual or otherwise) is dependent upon the reactance component at that point.

3. The antenna can be considered as a wire with approximately 600 ohms characteristic impedance.

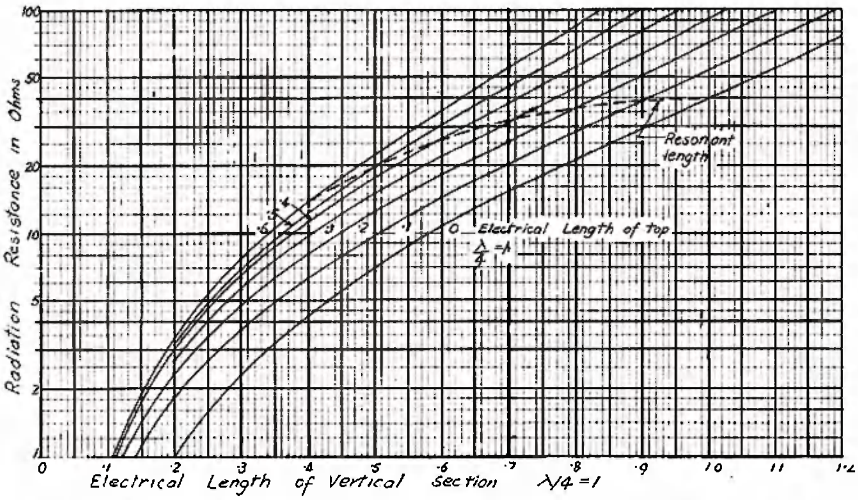


Fig. 8.—Radiation resistance of a vertical against height for various equivalent lengths of top load.

4. The no-load reactance curve for an unloaded 600 ohm line is near enough to correct except close to the voltage loop.

5. At the junction of the "T" the reactance load of each half will add in parallel to produce a reactance of half that of the individual line.

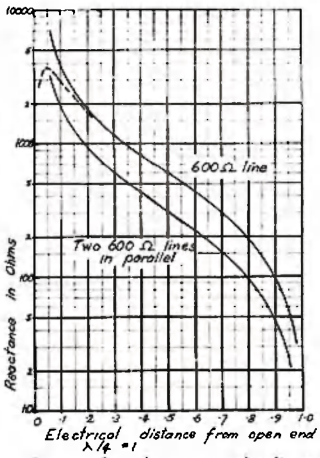


Fig. 9.—Curves for the open circuit capacitive reactance of a 600 ohm line or antenna. The lower curve represents the reactance when two lines are joined in parallel, such as the junction at the top of a "T" antenna. The short dotted curve at the top left shows the deviation in effective series reactance when the line is loaded with an s.w.r. of 12. For higher s.w.r.'s the deviation would be even less.

Fig. 9 has been drawn based on wire and two wires in parallel. (The mutual capacitance and inductance between the wires was not taken into account.) From these graphs, Fig. 10 was plotted to determine the equivalent electrical length of two lengths of wire (a "T" top).

Efficiency of Antenna

The radiation resistance of the antenna is dependent mainly upon the configuration and not on the loss resistance. The actual resistance of the load of the antenna will equal the radiation resistance R_R plus the loss resistance R_L.

Power radiated $= I^2R_R$

$I =$ the current at the feed point.

Power input to the antenna $= I^2R$

$R =$ the total resistance of the load

$$R = R_R + R_L$$

Since R is an unknown quantity

$$R = W \div I^2 \quad \text{.... .... ..} \quad (7)$$

$W =$ power input to antenna.

The power input to the antenna can be estimated from the final input. For a class C amplifier, 70% efficiency is reasonable. For a sideband rig, the manual should give sufficient information to estimate the power output.

Radiation efficiency of antenna

$$= \frac{\text{power radiated}}{\text{power input to antenna}}$$

$$= \frac{I^2 R_R}{I^2 R}$$

$$= \frac{R_R}{R} (\times 100\%) \quad \text{.... ....} \quad (8)$$

R_R is found from graphs or calculation and R is found from equation 7. It is possible to use a Q meter or a bridge to obtain the load resistance but these were found to have certain difficulties as referred to in the discussion. The r.f. ammeter should be of the thermocouple type and should be checked against an ammeter at 50 Hz.

It may be useful to obtain the loss resistance.

$$R_L = R - R_R \quad \text{.... ....} \quad (9)$$

In a grounded vertical antenna, R_L will be mainly ground resistance.

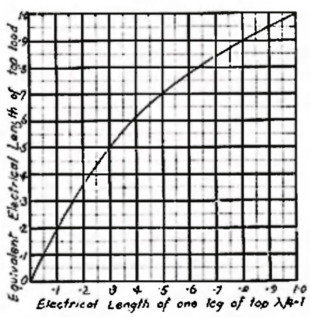


Fig. 10.—The length of one leg of the top of a "T" is plotted against the length of a single wire which would have the same effect.

Worked Example

A "T" antenna is 45 feet high and has a 66 ft. flat top. With 100 watts input to the final the antenna current is 1.8 amps.

Electrical length of half top ($\lambda/4 = 1$) .... $= 0.245$

Equivalent electrical length of top (Fig. 10) .... $= 0.43$

Electrical length of vertical section .... $= 0.332$

Form factor (Fig. 7) .... $= 0.86$

From equation 6

$$R_R = 98.75 \times (0.86 \times 0.332)^2$$
$$= 8.0 \text{ ohms.}$$

From equation 7

$$R = \frac{100 \times 0.7}{1.8^2}$$
$$= 21.2$$

Efficiency of antenna $= 8 \div 21.2$
$= 0.38$ or 38%

$$R_L = 21.2 - 8.0$$
$$= 13.2 \text{ ohms}$$

probably mainly ground resistance.

THE CENTRE LOADED VERTICAL

The effect of an inductance in a vertical is to increase the capacitance loading of the top from the point of view of the bottom, Fig. 4e. In other words, the top is made to look larger. The top carries maximum voltage to provide the electrostatic field whereas the bottom section carries maximum current to provide the magnetic field. As well as a top whip the loading coil can be placed below any other form of top of small dimension.

The method has its main application where space is limited and the top is small. It is not as satisfactory as a large capacitive top load. While it does make the current and voltage distribution on the antenna more satisfactory (resulting in a higher radiation resistance), it does add extra losses into the circuit. The tendency to corona is increased.

The inductance of the coil will be much greater to tune the antenna to resonance at the centre than at the base and therefore the coil will be more lossy. Care should be taken not to tune the antenna over resonance or the coil may become very lossy. The best compromise is some centre loading and some base loading. Modern practice appears to be to keep the centre loading coil long and thin to reduce common mode radiation loss. For idealised cases of current distribution, the radiation resistance can be calculated from equations 3, 4 and 6.

The centre loaded whip as well as the helical whip have their main application to portable and mobile, but these applications are not discussed here.

Worked Example

Example 1.—A centre loaded whip has a total height of 35 ft. The distance from the base to the coil is 25 ft. and from the coil to the tip of the whip is 10 ft. Current was measured at the base of the antenna as 1.5 amps. and at the junction between the lower part and the coil as 1.0 amp. What is the radiation resistance?

From equations 3 and 4

$$F = \frac{\frac{(1 + 1.5)}{2} \times 25 + \frac{1 \times 10}{2}}{35 \times 1.5}$$

$= 0.69$

Total electrical height $= 0.259$.

From equation 6

$R_n = 98.75\ (0.259 \times 0.69)^2$

$= 3.17$ ohms.

In the above the current distribution curves were taken as straight lines. If you don't believe that the ammeter can be inserted between the vertical section and the coil, then consider this problem.

Example 2.—In the antenna in Example 1, it was found impossible to insert the ammeter two-thirds of the way up, but it was observed that 38 micro-henries were required at the base to bring the antenna to resonance. What is the radiation resistance? (Solution at some future date if requested.)

METHODS OF FEEDING

When the antenna is series fed, methods of tuning the antenna depend upon the type of load expected. For efficiency it is desirable to use the minimum tuning circuit possible and this is usually a single variable inductance in series with the antenna capacitance. When the antenna is tuned by a series circuit the effective series resistance of the antenna will be presented as a load to the transmitter.

Circuit Fig. 11a is used where the antenna is shorter than a quarter wavelength. Since a short antenna has a low resistance, the tuning circuit of the transmitter must be adequate to handle this. The coupling capacitor of the pi of the final tuning should be large to prevent overcoupling between the two tuned circuits. Overcoupling could result in harmonic radiation and makes tuning difficult. Circuit Fig. 11c is used where the antenna is over resonant—effectively more than a quarter wavelength. Where the antenna is close to resonant it may be either slightly inductive or capacitive. If the antenna is slightly capacitive, this is simply tuned by only a few turns of inductance, but if the load is slightly inductive a small capacitive reactance is required and hence a very large capacitor. The circuit of Fig. 11b is probably the best to use here. Also, circuit Fig. 11b may be used where no variable inductance is available.

Figs. 11d and 11e are parallel tuned circuits in which the antenna load is effectively in parallel with the tuned circuit. To understand this it is best to consider the effective parallel circuit of the load, Fig. 3. Here the effective parallel resistance is high and the coil behaves as a matching transformer. (It should be realised that there are several ways of looking at these circuits and whether you consider it as a circuit with low series resistance or with a high parallel resistance is a matter of convenience.)

These circuits are particularly applicable where the antenna tuning unit is remote from the transmitter and/or where it is necessary to match into a line. Other arrangements such as pi coupling may also be applicable.

Shunt feeding the lower end of the antenna has some application where the antenna is permanently connected to the ground, Fig. 11f. The antenna is fed with something like a gamma or a half delta match. It is suggested that this method, while satisfactory with a near resonant antenna, could be difficult with a shortened antenna. Large circulating currents would be present in the closed loop of a non resonant antenna which would reduce efficiency and make tuning difficult.

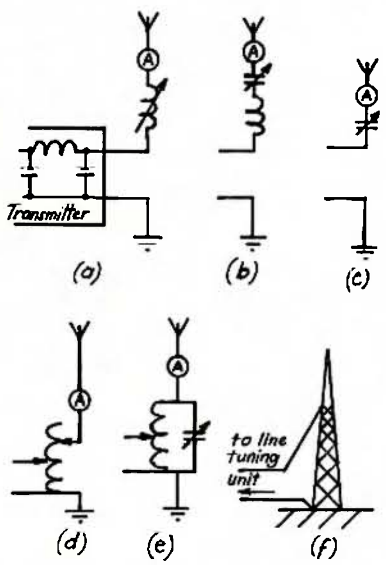


Fig. 11.—Illustrating various methods of feeding and tuning.

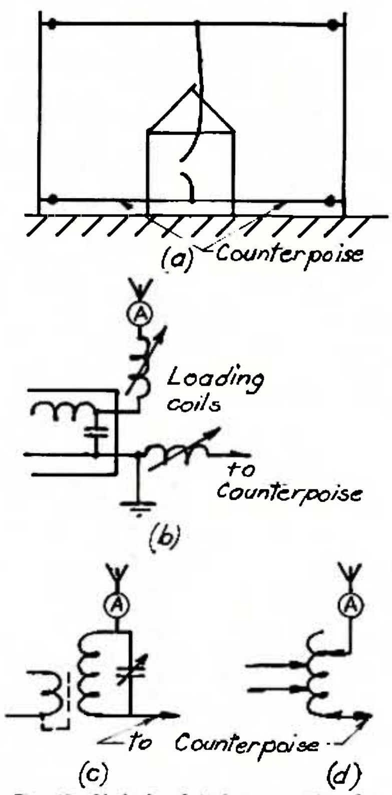


Fig. 12.—Methods of tuning a counterpoise.

EARTHING AND COUNTERPOISING

The most lossy part of a short vertical antenna is the ground. Ground resistance can be reduced by the use of buried earth radials. Unless these are extensive, they are nowhere near as effective as a counterpoise. If we consider the antenna top load as one plate of a capacitor and the ground as another, by using a counterpoise we replace the ground plate with a copper wire.

The counterpoise can be a large web of wire insulated from the ground, but a simple "T" wire directly beneath the top load will produce considerable improvement. If the counterpoise is connected direct to the ground the antenna current will probably drop, indicating a loss rather than an improvement. The counterpoise must be tuned (Figs. 12a and 12b).

A counterpoise can be tuned by a variable inductance or variometer in series with the counterpoise and ground and in this mode it will be parasitic. The loading coils for the aerial and counterpoise must be adjusted alternately to obtain maximum aerial current. When correctly adjusted, the earth current should be small and the aerial current and counterpoise current similar. In practice an ammeter in the ground and counterpoise are unnecessary. Some other methods of tuning are shown in Figs. 12c and 12d which, when tuned correctly, should give zero ground current. These circuits are more difficult to tune than the parasitic counterpoise.

REFERENCES

3. Radio Engineers' Handbook, Terman, p. 773.
4. Radiotron Designers' Handbook (fourth edition). Reactive component of impedance, p. 903.

☆

Correspondence

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers.

MUNICH OLYMPIC DIPLOMA (M.O.D.)

Editor "A.R.," Dear Sir,

I have been asked by Heiner DJ4KU and Maxie DJ4YL Ballinger, of Munich, West Germany, to pass on information about a certificate called the Munich Olympic Diploma (M.O.D.). The rules for which are as follows:

"All contacts with stations in Munich from January 1, 1970, 0000 GMT to 2400 GMT the day of the official closing of the Olympic Games 1972 will count for this award. Munich stations are the members of the DOKs C09, C11, C12, C13, C18, C30. Contacts with Munich Amateurs count:

for	DL/DJ/DK	Europe	DX
phone	2 pts.	4 pts.	6 pts.
cw/rtty	4 pts.	8 pts.	12 pts.

"Class I., 250 points; Class II., 200 points; Class III., 100 points.

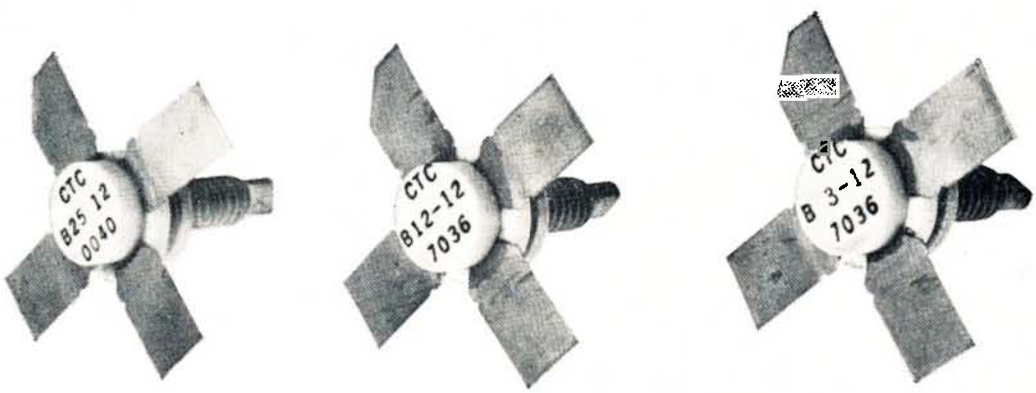
"Mode: cw/phone/mixed. Bands: 160, 80, 40, 20, 15, 10, single band or mixed. The same station may be worked once per band and year. Fees: U.S. $1.00 or 10 IRC. Send a list of the QSO details certified by two licensed Amateurs to: E. Misera, DJ8ZU, 8 Munchen 13, Keuslinstr. 6."

If DX operators who are interested in working for this award pass details of their call signs and anticipated operating times, days or dates and bands to me I will pass it on to my contact in Munich.

Incidentally, DJ4KU is blind, and as a consequence obtains a great deal of fun from Amateur Radio.

—S. T. Clark, VK3ASC.

Get the zip without the zap.



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ETD 1170

A SOLID STATE F.M. TRANSCEIVER—SOME AFTER-THOUGHTS

By G. L. C. JENKINS,† VK3ZBJ, and H. L. HEPBURN,‡ VK3AFQ

Since the publication of an f.m. receiver design in the March 1971 issue of "A.R." and that for a companion transmitter in the April 1971 issue, some developments have taken place which may be of interest to readers.

ALTERNATIVE POWER TRANSISTORS

The transmitter design specified the use of a Motorola 2N5589 in the driver section and a Motorola 2N5590 in the p.a.

Varian P/L. of 679 Springvale Road, North Springvale, Vic., 3171 (and 38 Oxley Street, Crows Nest, N.S.W., 2065) suggested that their range of C.T.C. power devices made by the Eimac division of Vairan in the U.S.A. might operate well in the circuit. Varian kindly provided a set of devices for trial.

A C.T.C. B3/12 was used in the driver section instead of a 2N5589 and gave somewhat better results. No changes were necessary either to board layout or component values. Used as an output stage on its own, the B3/12 gave well over 2 watts of output power for 70 mW. of drive. It would appear that the B3/12 can be used in the circuit as a direct replacement.

A C.T.C. B12/12 was used in place of the 2N5590 in the p.a. proper, but some component values needed changing. These changes are detailed below. After component optimisation, 15 watts of output were obtained from a 13.6 volt supply rail with 2 watts of drive—a considerable improvement over the 2N5590. At 15 watts out the total current drawn by exciter, driver and p.a. was 2.0 amps.

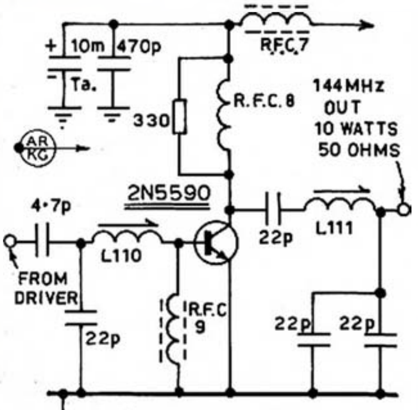

FIG.9. P.A.

Referring to Fig. 9, the following component changes are necessary to use the C.T.C. B12/12 in place of the 2N5590:—

(a) The series input capacitor is increased from 4.7 pF. to 6.8 pF.
(b) The 22 pF. capacitor between the input end of L110 and earth is reduced to 10 pF.
(c) L110 is increased from 1¾ turns to 2¾ turns.
(d) RFC8 is changed to 6 turns of No. 20 tinned copper wire, ⅛" i.d. and ½" long.
(e) L111 is changed to 3¾ turns.
(f) The 330 ohm load resistor across RFC8 is not needed.
(g) The total fixed output capacitance of 44 pF. (2-22 pF. capacitors) to 36 pF. (2-18 pF. capacitors).

The only physical difference between the devices is that the Motorola transistors have a 3/8" diameter case while the C.T.C. transistors have a 5/16" diameter case. Connections are the same.

As a further experiment a C.T.C. B25/12 was driven by the complete transmitter and gave 30 watts of output at 146 MHz. The layout was the same as the existing p.a. but component values were different.

CRYSTAL SPECIFICATIONS

Both transmitter and receiver use crystals in the series mode. With the transmitter especially, it should be noted that the trimming capacitor (and the variations in capacity brought about by the modulating process) are effectively in series with the crystal. When ordering transmitting crystals therefore, the supplier should be advised that they are for use in a series resonant circuit and that they should be calibrated with 25 pF. IN SERIES with the crystal and NOT (as is more normal) in parallel with the crystal.

INCREASING EXCITER D.C. EFFICIENCY

As presented, the current drain of the exciter centres around 70 mA. with perhaps ±10 mA. variation, depending on the spread of characteristics of the devices used.

This d.c. drain can be reduced to a mean value of 45 mA. for a constant r.f. output by some very minor modifications.

Firstly, the oscillator is removed from zener control and given the benefit of full supply voltage. Zener control is retained on the whole modulator section. The effect of this change is to increase the drive from the crystal oscillator. In turn, this increased drive causes the first two MPF121 doublers to saturate and "flat top".

Accordingly, the 47 ohm resistors in the sources of the MPF121 doublers need to be raised to around 330 ohms to bias back the MPF121s into an unsaturated condition. The exact value of source resistors for any individual case must be found by experiment. The simplest indication of arrival at the correct value is when the tuned circuits associated with each device tune sharply, there is a reduction in total current drain, and the output power remains constant. However the centre value of 330 ohms in each source suggested above will achieve a significant decrease in d.c. power requirements even if the maximum decrease is not achieved.

So far as the transmitter circuit board is concerned physical changes necessary are:—

(a) Cut the h.t. line between the crystal oscillator and audio sections and bridge the cut with a 1.0K resistor.
(b) Remove the original 330 ohm zener dropping resistor and replace with an RFC made by threading a single wire through a Neosid F29 slug.
(c) Transfer the zener diode to a position alongside the 22K modulator trimpot.

TRIMPOTS

The 1.5K and 22K trimpots used are the P.M.D. type made by Plessey/Ducon. They are obtainable from Radio Parts in Melbourne.

The mounting method favoured is to put three circuit board pins in the p.c.b. where the presence of the trimpot is required. The "legs" of the trimpot are bent back at an angle of about 45° and then soldered to the three pins in the board. The legs are bent in such a direction that the adjusting screw of the trimpot will face upward when the trimpot is mounted on the circuit board pins.

TRANSMITTER BASE CHOKES

The "lossy" ferrite rod specified for the base chokes of the driver and p.a. are made by modifying 2½ turn RFCs marketed by the Philips organisation and having the type number 43/2020/36700. As supplied, these chokes consist of 2½ turns of thin tinned copper wire wound through holes in a cylindrical bit of ferrite. The choke is modified so that it consists of two single strands of wire, one strand of wire through each of two holes.

Additional holes are drilled in the printed circuit board about 1/8" away from the choke mounting holes already indicated on the p.c.b. The (four) wire ends of the modified chokes are threaded through the p.c.b., the choke body held hard on the board, and the wires pulled tight before soldering into place.

CIRCUIT BOARD PREPARATION

Several instances have come to the notice of the authors where the printed circuit board, after drilling, has not been cleaned and protected against

(Continued on Page 12)

† 54 Tennyson Street, Highett, Vic., 3190.
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THE CLASS C RADIO FREQUENCY AMPLIFIER

LECTURE No. 13 *C. A. CULLINAN,* VK3AXU*

The class C amplifier is used extensively in radio transmission and a good knowledge of its operation is essential.

By definition this is an amplifier in which the grid bias is appreciably greater than the cut-off value so that the valve plate current is zero when no alternating grid voltage is applied, therefore the plate current in a specific valve flows for appreciably less than one half of each cycle when an alternating grid voltage is applied.

The characteristics of a class C amplifier are high plate circuit efficiency and high power output.

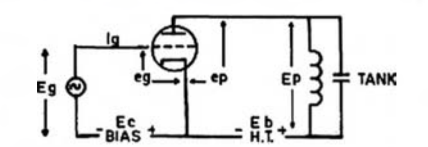
Because the plate current flows only over a portion of each cycle of the exciting grid voltage, the plate current takes the form of pulses and as described in Lecture 10 on Harmonics, the plate output contains considerable distortion.

Class C amplifiers are not used for audio frequency amplification, but when used as radio frequency amplifiers the plate current pulses are converted into sine waves in the amplifier's output circuit if it is properly designed. This action is known as the "fly wheel" effect.

In the discussion which follows, it is assumed that the grid and plate circuits of a class C r.f. amplifier are in resonance and are proportioned so that the radio frequency output of the amplifier will have minimum harmonics.

Also it is assumed that the amplifier has been neutralised if necessary, so that it is stable in operation.

Fig. 1 shows both the various voltage and current relationships which exist within the class C amplifier.



This drawing represents the various voltages and currents which exist within a class C amplifier. Note differences in symbols such as Eg and eg, Ep and ep.

The following nomenclature is used:

- Eb—d.c. plate voltage.
- Ec—grid bias voltage.
- Eg—input grid wave (exciting grid voltage).
- Ig—peak r.f. grid current.
- Ep—voltage across output load circuit (tank circuit).
- Ib—d.c. plate current.
- Ip—peak r.f. plate current.
- ep—output voltage, plate to cathode.
- ep min.—minimum plate voltage (Eb — Ep).
- eg max.—maximum positive grid voltage (Eg — Ec).
- θ—plate operating angle.
- θg—grid operating angle.

* 6 Adrian Street, Colac, Vic., 3250.

> ● Continuing the series of lectures by C. A. Cullinan, VK3AXU, at Broadcast Station 3CS for students studying for a P.M.G. Radio Operator's Certificate.

BIAS

In Fig. 1A Eg is the input voltage, assumed for purposes of simplicity to be a sine wave. This sine wave is impressed on the grid of the valve (between grid and cathode) along with the negative d.c. bias, Ec. This bias will be at least twice the value required for d.c. plate current cut-off. This bias may be obtained from a battery or other constant voltage source, from a grid leak, by the use of a resistor in the cathode of the class C amplifier valve or a combination of these methods.

In a communications continuous wave transmitter it is common to use a constant bias source and to key the transmitter in an earlier stage, thus the class C amplifier valve plate current will be cut-off during key-up conditions of signalling.

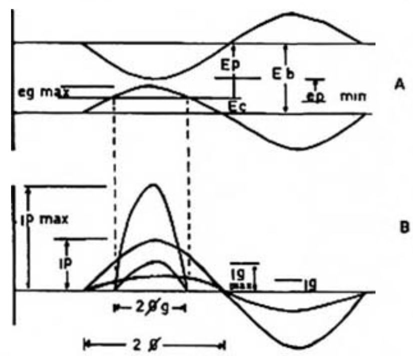


Fig. 1.

In A is shown a graphical representation of the voltages which exist within a class C amplifier. Note that the r.f. plate voltage Ep is 180 degrees out of phase with the grid exciting voltage Eg. In B is shown the relative amplitudes and angles of the flow of currents within a class C amplifier. Particular attention should be made of the plate current pulse which is converted into a sine wave in the "tank" circuit as described in the text.

Theoretically the correct class C bias should be sufficient to reduce the plate current to zero when no excitation is provided at the grid.

Sometimes the keying will be used to add extra bias, beyond the value of the positive grid voltage so that the plate current is reduced to zero. This is known as blocked grid keying. It is frequently used if the oscillator is on the same frequency and may not remain stable in frequency if keyed, i.e. grid excitation is present at all times.

Some types of variable frequency oscillators are very stable and grid-blocked keying of the oscillator may be used. Usually grid blocking voltage is applied to the oscillator and the class C amplifier in such a way that the oscillator starts a fraction of a second ahead of the class C amplifier and stops just after the amplifier ceases to conduct. This sequence keying is done to prevent the transmission of "chirps" due to minute changes in frequency as the oscillator stops and starts.

When the class C amplifier is used in the plate modulated service for telephony it is usual to employ grid-leak bias, with a small amount of cathode bias as well.

Continuing with Fig. 1A, the a.c. voltage on the plate (Ep) is superimposed on the d.c. plate voltage (Eb). This is 180° out of phase with the grid voltage (Eg).

Grid current flows in the grid circuit as soon as the positive portion of the exciting grid voltage equals the grid bias and plate current then starts to flow.

As the positive portion of the exciting grid voltage continues to rise, so does the plate current until the maximum exciting voltage is reached.

Then this voltage starts to fall and the plate current does likewise to the point where it becomes zero again as the positive exciting voltage reaches the same value as the negative grid bias.

During the rest of the exciting voltage cycle and the beginning of the next, no plate current will flow.

Thus for a sine wave input to the grid the signal in the plate circuit will be in the form of pulses.

This is shown in Fig. 1B which illustrates the relative magnitudes and angles of currents flowing in the circuit. This figure should be studied carefully.

As mentioned earlier, the pulses in the plate circuit will produce a considerable number of harmonics.

To convert these pulses to sine waves the output or "tank" circuit of the amplifier must have a large circulating current (r.f.) and to obtain this it is necessary to have a tank circuit with the proper Q or ratio of k.v.a. to k.w., that is the ratio of volt-amperes in the tank circuit to the d.c. plate power input.

For good harmonic reduction this ratio should be at least 12, although some designers might aim for ratios between 15 and 25.

"FLYWHEEL" ACTION

The "flywheel" action of the tank circuit may be explained as follows:

For ease in understanding this, assume that the output "tank" circuit is in the form of a simple parallel tuned circuit.

When the a.c. exciting grid voltage (Eg) goes positive, plate current (Ip) flows in the "tank" circuit, being superimposed on the d.c. plate current, if the d.c. is fed through the inductance of the "tank".

The a.c. plate current (Ip) flowing in the "tank" circuit produces an r.f. voltage across it, which charges the "tank" condenser, because in our discussion we are dealing with radio frequencies, not audio frequencies.

Remember, too, from elementary theory that when current flows in a circuit it will produce a voltage across that circuit.

At the moment that the exciting a.c. voltage (Eg) starts to go negative, the condenser of the "tank" circuit starts to discharge towards the plate or anode end of the "tank" circuit to charge the other side of the "tank" condenser through the "tank" inductance.

When the exciting a.c. voltage (Eg) is negative no a.c. plate current (Ip) flows because the valve is cut off, but the "tank" condenser continues to discharge in the opposite direction through the "tank" inductance to charge the other side of the "tank" condenser.

This completes one cycle of the r.f. output and explains how an r.f. pulse in the anode circuit becomes a sine wave in the "tank" circuit.

This explains why it is possible to use a single valve or paralleled valves as an r.f. amplifier in either class C or class B and obtain a sine wave output.

This cannot be done with audio frequencies.

Fig. 2 shows the wave forms of the voltages and currents in a class C amplifier, both unmodulated and modulated. These have been drawn to approximate the conditions which exist in the class C output stage of a 2 kw. broadcast transmitter, but are typical of all class C amplifiers.

RATINGS OF VALVE

In working with class C amplifiers it is desirable to operate within the conditions set down by the valve manufacturer. Any attempt to exceed the published ratings will usually result in short valve life.

Usually two sets of ratings are published—the first known as C.C.S. means Continuous Commercial Service and is the data used for the design of transmitters which operate more or less continuously. I.C.A.S. is the term used for the second set of ratings and means Intermittent Commercial and Amateur Service. These ratings have been devised on the basis that in I.C.A.S. the users will take a long period of time to obtain the same use or life from a valve that is obtained by a user under the C.C.S. rating and this is the reason that the I.C.A.S. ratings are higher than for C.C.S.

To illustrate this, here is some data taken from an R.C.A. valve data sheet for valve type 833A:—

Service: R.f. power amplifier or oscillator, for class C telegraphy or class C f.m. telephony. Forced air cooling.

Typical Operation:	C.C.S.	I.C.A.S.
D.c. plate voltage	4,000	4,000 V.
D.c. grid voltage	—200	—255 V.
Peak r.f. grid voltage	375	415 V.
D.c. plate current	450	500 mA.
Power output (approx.)	1,440	1,600 W.

If a class C r.f. amplifier is to be modulated then it is necessary to reduce the ratings from those shown above to prevent damage to the valve.

Service: As a plate modulated r.f. amplifier for class C telephony, the data becomes (forced air cooling):

Typical Operation:	C.C.S.	I.C.A.S.
D.c. plate voltage	3,000	4,000 V.
D.c. grid voltage	—300	—325 V.
D.c. plate current	415	450 mA.
Power output (approx.)	1,000	1,500 W.

The ratings for natural air cooling are considerably reduced from those for forced air cooling.

The above data shows that for C.C.S. class C plate modulated telephony the d.c. plate voltage has been reduced from 4,000 volts to 3,000 volts and the approximate power output drops from 1,500 watts to 1,000 watts. Also notice that for frequency modulation the C.C.S. power output is approx. 1,440 watts. This is because for f.m. the carrier power remains constant whereas for a.m. it varies with modulation as explained previously.

Here at 3CS we operate our class C modulated amplifier with four 833A valves in parallel, under C.C.S. ratings.

Examination of the valve life cards, recorded over 15 years, shows that the average life of an 833A valve is 10,000 hours. This includes failures from all causes. The manufacturers guaranteed valve life is 1,500 hours.

In many cases the valves are withdrawn between 10,000 and 12,000 hours use because the harmonic distortion at 3 KHz. to 5 KHz. increases to the allowable limits or because emission of the cathode falls off so that full modulation is not possible on positive peaks (lack of positive peak emission), resulting in asymmetrical modulation.

This falling off of positive peak emission is detected with an amplitude modulation meter and a low distortion audio frequency oscillator, usually long before the modulated amplifier plate current meter shows a reduction of plate current brought about by severe loss of emission.

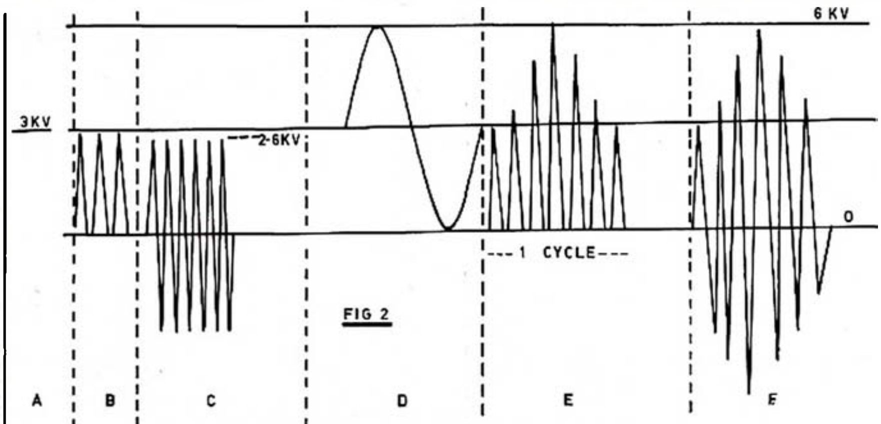


Fig. 2.—Wave forms existing in a class C amplifier in a typical transmitter.

A.—D.c. plate voltage, unmodulated, 3 KV.

B.—R.f. current pulses in the plate circuit, unmodulated (peak 1.0 amp.).

C.—R.f. voltage across the "tank" circuit. The current pulses shown in B have been converted into sine waves in the "tank" circuit because of the "flywheel" action of the "tank", as explained in the text. This drawing is of the voltage that has been produced across the "tank" circuit. By calculation it is 2.6 KV. for this particular transmitter.

D.—Modulated plate voltage. This comprises the audio frequency modulating voltage superimposed on the d.c. plate voltage. That is, above the 3 KV. axis, B plus a.c. modulation voltage, so that peak positive voltage rises to 6 KV. Below the 3 KV. axis, B minus a.c. modulation voltage, so that peak negative voltage drops to zero.

E.—R.f. current pulses in the plate circuit during modulation. The peak positive pulse rises to 2 amps. and on the negative half of the modulating wave the current drops to zero.

F.—The modulated voltage produced across the "tank" circuit because of the "flywheel" action. Because of the small size of the drawings it is not possible to show the r.f. current pulses and resultant sine wave voltages as sine waves, this being the reason that they are drawn in the manner shown.

W.I.A. D.X.C.C.

Listed below are the highest twelve members in each section. Position in the list is determined by the first number shown. The first number represents the participant's total countries less any credits given for deleted countries. The second number shown represents the total D.X.C.C. credits given, including deleted countries. Where totals are the same, listings will be alphabetical by call sign.

Credits for new members and those whose totals have been amended are also shown.

PHONE

VK5MS	319/343	VK4FJ	287/307
VK6RU	317/342	VK4TY	284/288
VK3AHO	311/326	VK2APK	281/287
VK6MK	304/324	VK2AAK	274/279
VK4KS	302/317	VK3TL	271/277
VK5AB	297/314	VK4UC	270/270

New Members:

Cert. No.	Call	Total
117	VK3XM	200/201
118	VK3APU	114/114

Amendments:

VK3ZE	268/271	VK3AMK	230/230
VK4PX	259/260	VK4XJ	159/163

C.W.

VK2QL	303/326	VK3NC	274/300
VK3AHQ	301/315	VK3XB	270/287
VK4FJ	290/315	VK3ARX	270/279
VK2AGH	282/290	VK6RU	266/289
VK3YL	281/298	VK4TY	259/272
VK2APK	280/288	VK3TL	255/260

New Member:

Cert. No.	Call	Total
96	VK4KX	178/178

Amendments:

VK4UC	176/177	VK4XJ	139/145

OPEN

VK6RU	318/343	VK4KS	303/322
VK2AGH	314/334	VK2EO	302/325
VK2VN	310/328	VK3ARX	299/308
VK4SD	306/321	VK2APK	298/309
VK4TY	306/321	VK4EJ	298/323
VK6MK	304/324	VK2SG	294/300

New Member:

Cert. No.	Call	Total
133	VK3APU	116/116

Amendments:

VK4UC	293/294	VK4XJ	194/201
VK4PX	270/273	VK2AXK	122/125

F.M. TRANSCEIVER

(Continued from Page 9)

oxidation. The effect of these omissions has been to lead to suspect soldered joints and the near impossibility at any later stage to change components, or in any way carry out modifications or repair work.

It is strongly urged therefore that any printed circuit board be cleaned and protected before any soldering work is carried out. This comment does not, of course, apply to boards which have been solder rolled during manufacture.

The simplest way to clean copper circuits boards after drilling is to polish with fine steel wool such as "Jex". Immediately after polishing the clean copper should be given a light coating of clear lacquer. The one recommended is the "metal finish clear" "Spray Pak" put out by Balm Paints under the "Dulux" trade mark.

It is quick drying and (provided a heavy application has not been given) the thin film of lacquer can be soldered through with impunity. Boards treated in this way by the writers are still clean and unoxidised after two years' service and still accept solder as well as the original clean copper.

TUNING UP THE EXCITER

As an alternative to the procedure set out in the April 1971 "A.R." for tuning up the oscillator and doubler stages of the exciter, the following simplified procedure is offered.

It is based on the fact that as the crystal comes into oscillation drive will be applied to the first MPF121 doubler, causing its operating current to rise. As the first doubler starts to put drive into the second doubler, it, in turn, will draw more current. In both doublers there is a by-passed source resistor, the voltage drop across which will rise as drive increases.

Thus the alternative tuning procedure consists simply of putting a high resistance voltmeter or v.t.v.m. on, say, the 5-volt range, across the source resistor of the first MPF121 and adjusting the slugs of L101 and L102 for maximum voltage indication.

The process is repeated with the voltmeter across the source resistor of the second MPF121 doubler, this time adjusting the slugs of L103 and L104 for maximum indication.

It is still necessary to use some form of power meter or r.f. indicator to tune up the MPF121 amplifier.

SIGNAL SOURCE FOR RECEIVER LINE UP

The performance of the receiver is such that to obtain best results the signal level used for final lining up must be very low. Large signals (i.e. 2-3 microvolts or more) cannot successfully be used for final lining up since they cause the whole receiver to saturate.

In the absence of a signal generator with an accurate low level attenuator capable of going down to 0.2/0.3 microvolts, then the simple signal source described by Ron Higginbotham, VK-3RN in the December 1970 issue of "A.R." is recommended. Several people in the Melbourne area have made up this device using transmit crystals from existing carphones to provide the correct frequency.

If the coupling capacitor between the "High" and "Low" outputs is removed the amount of signal available from the "Low" output terminal appears to be suitable for final lining up of the receiver described.

NEW NEW

CALLING, EMERGENCY or SKED-MAKING FREQUENCY

7050 KHz.

Whenever you are in the shack and not operating, keep the receiver running on 7050 KHz.

NEW NEW

PROVISIONAL SUNSPOT NUMBERS

FEBRUARY 1971

Dependent on observations at Zurich Observatory and its stations in Locarno and Arosa.

Day	R	Day	R
1	77	15	69
2	78	16	66
3	68	17	62
4	80	18	68
5	65	19	87
6	73	20	91
7	75	21	91
8	60	22	100
9	37	23	87
10	37	24	98
11	62	25	93
12	50	26	69
13	63	27	66
14	60	28	71

Mean equals 71.5.

Amended Smoothed Mean for July 1970: 103.3.

AUSTRALIAN 2 METRE F.M. REPEATER DIRECTORY

The Australian development of f.m. repeaters has been along the agreed two-channel principle on Channel 1 (146.1 in and 145.6 out) and Channel 4 (146.4 in and 145.9 out). The simplex operation is National Channel B (146.0), Channel A (145.854) and Channel C (146.146). The system is based upon a 60 KHz. channel spacing with ±15 KHz. deviation.

OPERATIONAL REPEATERS

New South Wales:

Sydney—Channel 4, VK2BWI/R1, at Dural. Tx STC base, 40 watts to ground plane at 57 feet. Rx AWA MR20B, ground plane at 57 feet. Separation 250 feet. Coverage approx. 50 miles.

Central West (Orange) — Channel 1, VK2AOA/R1, at Mt. Canoblas. Note: Output is currently on 145.854 but this will be changed to 145.6 later this year. Tx AWA base 50 watts to ground plane. Rx AWA, ground plane, both 20 feet high. 400 yards separation. Coverage 100 miles.

Victoria

Melbourne—Channel 1, VK3WI/R1, at Carlton. Tx STC 128 base, 50 watts output. Rx is solid state STC 131 with equipment to prevent tx lock-up in event of rx failure. Both antennas are 45° ground planes, 250 feet high with a separation of 600 feet. Coverage approx. 25 m.

Geelong — Channel 4, VK3BGL/R2 located at Gnarwarre. Solid state home-brew equipment. Power output 25 watts. Tx antenna is a folded dipole (temporary) 50 feet up, and receiving is four stacked dipoles 100 feet high. Coverage approx. 60 m.

Gippsland—Channel 4, VK3WI/R3, temporary location at Mt. Bess (near Moe), future permanent location at Mt. Tassie. Solid state I.G.L. equipment, power output 4 to 6 watts. Both antennas are half wave dipoles, receiving 50 feet high, transmitting 35 feet high.

Queensland

Gold Coast—Channel 1, VK4EI/R2, at Mt. Tamborine. Solid state rx, tx home-brew, 25 watts. Antenna 5 x half wave collinear at 40 feet for tx and rx, 250 yards separation. Coverage 50 miles.

South Australia

Adelaide—Channel 4, VK5WI/R1, at Crafers. Tx TCA 1680 solid state 15 watts, rx TCA 1675/77 solid state. Antennas ground plane with small vertical separation. Coverage appears good.

REPEATER APPLICATIONS PENDING

VK2—Newcastle, Mt. Sugarloaf, Ch. 4.

VK6—South Eastern (Albany), Mt. Barker, Ch. 4.

VK7—Northern Tas., Mt. Barrow, Ch. 4. Hobart, Mt. Wellington, Ch. 1 or Ch. 3.

PLANNING STAGES

VK2—Central Coast, Gosford, Ch. 1. South Coast, Wollongong, Ch. 1. Murrumbidgee, Wagga, Ch. 1. Murray, Albury, Ch. 4.

VK3—North West, Mildura, Ch. 4. Central—Bendigo, Ch. 4.

VK4—Brisbane, Mt. Cootha, Ch. 4.

VK6—Perth, Tuart Hill, Ch. 4.

CHANNEL ALLOCATIONS FOR POSSIBLE FUTURE DEVELOPMENT

VK1—Canberra, Ch. 4.

VK2—North West, Mt. Kaputar/Narrabri, Ch. 1.
Far West, Cobar, Ch. 1.
Warrumbungle, Coonabarabran, Ch. 4.
Riverina, Griffith, Ch. 4.
Snowy Mts., Far South Coast, Ch. 1 or 4.
Mid North Coast, Port Macquarie, Ch. 1.
Far North Coast, Grafton, Ch. 4.

VK3—Western, Hamilton/Horsham, Ch. 1.
Northern — Shepparton/Wangaratta, Ch. 1.

VK4--No details known, Ch. 1.

VK5—No further plans at the moment.

VK6—At this stage all possible sites will use Ch. 4, e.g. Narrogin/Wagin; Bunbury/Busselton.

VK7—North West, Burnie/Devonport, same channel as finally used by Hobart.

PROJECT AUSTRALIS EXPERIMENTAL REPEATERS

The Australis experimental systems which have the blessing of the P.M.G. Department are designed as a service to enable Amateurs to adjust their equipment in preparation for AO6. It is emphasised that this is not part of the overall repeater plan.

It is possible that similar equipment will be constructed and forwarded to Divisions for use by Amateurs in other States.

One experimental repeater is located at Mt. Dandenong (Vic.). The input frequency is 145.76 MHz. and the output frequency is 432.3 MHz. I.G.L. equipment is used. The transmitter output power is 10 watts. Both antennas are quarter wave dipoles about 20 feet high with vertical polarisation in, and, temporarily, vertical polarisation out (this may be horizontal by the time this goes to press).

The other experimental repeater (also I.G.L. equipment) is located at Mt. Bess (near Moe, Vic.). The input frequency is 147.76 MHz. and the output frequency is 432.2 MHz. The transmitter output power is 4 to 6 watts. Both antennas are about 15 feet high. The receiver uses a 5/8 co-ax. dipole (vertical polarisation), and the transmitter a 42 element collinear (horizontal polarisation).

NEW CALL SIGNS

JANUARY 1971

VK2ZJF—J. C. Foster, 26 Avenue Rd., Mosman, 2088.
VK2ZUD—G. O. King, 15 Darnley St., East Gordon, 2072.
VK2ZUE—N. Fiora, 6 Pamela Pde., Emu Plains, 2750.
VK2ZUG—P. G. Walz, 48 Arthur St., Randwick, 2031.
VK2ZUH—J. E. Lukey, 1 Blenheim Pl., Glenfield, 2107.
VK2ZUI—R. C. Ecclestone, 2 Valerie St., Mt. Pritchard, 2170.
VK2ZUJ—R. Carr, 275 Main Rd., Toukley, 2263.
VK2ZUK—D. J. Turner, 52 Amor St., Hornsby, 2077.
VK2ZUL—R. G. Swadling, 3 Grafton St., Lawrence, 2460.
VK2ZUM—G. H. Wilson, 99 River St., Kempsey, 2440.
VK2ZUN—E. S. Turner, 52 Amor St., Hornsby, 2077.
VK2ZUR—E. M. van de Weyer, 101 Francis St., Bondi, 2026.
VK2ZVH/T—W. E. C. Bennett, 5 Hurn St., New Lambton, 2305.
VK3ASY—O. W. Guy, 34 Peter St., Box Hill North, 3192.
VK3BER—E. R. Russell, 164 Kangaroo Rd., Oakleigh, 3166.
VK3YFC—P. E. Lamb, 28 Panoramic Gr., Glen Waverley, 3150.
VK3YFD—F. M. Wrobel, 38 Hilton St., Glenroy, 3046.
VK3YFE—S. G. Bushell, 36 Church St., Beaumaris, 3193.
VK3YFF—J. C. Buckley, 1/6 Carmichael St., West Footscray, 3012.
VK3YGN—J. W. Tomlinson, 98 Doncaster Rd., North Balwyn, 3104.
VK3ZUR—L. Janes, 50 Combermere St., Essendon, 3040.
VK4EI/R2—Gold Coast Radio Club, P.O. Box 588, Southport, 4215.
VK4II—F. J. Miller, 35 Gladstone St., Coorparoo, 4151.
VK4ZF/T—D. G. Hopkins, 11 Stephen St., Morningside, 4170.
VK4ZDJ—D. J. McWilliam, 2 Rosemary Ave., Mt. Isa, 4825.
VK4ZGE—G. E. Millward, 4 Mourilyan Rd., Mourilyan, 4858.
VK4ZHE—J. W. Heares, 233 Chapel Hill Rd., Kenmore, 4069.
VK5BW—A. F. Raftery, 22 Princess St., Croydon, 5008.
VK5UI—R. M. Morris, Flat 20, Hartman Ave., Modbury, 5092.
VK5WI/R1—W.I.A., S.A. Division Inc., Station: Hillcrest Rd., Crafers, 5152; Postal: G.P.O. Box 1234K, Adelaide, 5001.
VK5WS—W. D. Moulton, 18 Stanley St., Plympton, 5038.
VK5ZJI—C. J. Merry, 26 Davidson Rd., Elizabeth Vale, 5112.
VK5ZJQ—B. D. Norman, Station: Yahl, via Mt. Gambier, 5290; Postal: P.O. Box 177, Mt. Gambier, 5290.
VK6CV—R. W. Walker, 8/278 Scarborough Beach Rd., Doubleview, 6018.
VK6EM—S. E. Harrison, Flat 7, Mitchell Court, 15-17 Mary St., Highgate, 6000.
VK6ND—N. D. Stephen, 19 Leila St., Cannington, 6107.
VK6NW—D. W. Bridge, 109 Sig. Sqn., Vincent St., Leederville, 6007.
VK6ZCK—P. Canavan, 55 Grand Promenade, Bayswater, 6053.
VK6ZDN—M. W. Dunning, 46 Holmesdale Rd., West Midland, 6056.
VK6ZJW—T. J. Wade, Station: O.T.C. (A), Carnarvon; Postal: P.O. Box 98, Carnarvon, 6701.
VK7ZBR—G. M. Ranft, 10 Lansdown Cres., West Hobart, 7000.
VK8JH—J. L. Hester, 84 Stanley Cres., Alice Springs, 5750.
VK8ZSW—R. H. Whellum, Esplanade Hostel, Esplanade, Darwin, 5780.

CANCELLATIONS

VK1JR—J. R. Watson. Not renewed.
VK1ZAB—G. W. Fletcher. Not renewed.
VK1ZEB—E. J. Barnes. Not renewed.
VK2AFI—P. E. Stayte. Not renewed.
VK2AIP—J. M. Burton. Not renewed.
VK2BSP—S. R. Pedemont. Deceased.
VK2ZIS—I. S. McKeachie. Not renewed.
VK2ZHI—G. A. Puckett. Not renewed.
VK2ZNG—A. R. Marjoram. Not renewed.
VK2ZTC—Sydney Teachers' College Radio Club, Not renewed.
VK3QZ—J. G. Colley. Not renewed.
VK3SV—J. F. Howarth. Deceased.
VK3ABW—M. L. Weeks. Not renewed.
VK3AEP—E. K. O. Phillips. Not renewed.
VK3AWD—W. D. Mather. Transferred to Qld.

(Continued on Page 27)

VK-ZL-OCEANIA DX CONTEST, 1970 RESULTS

AUSTRALIA

Phone Section

Call Sign	80	40	20	15	10	Total
AX1GD	—	475	11160	8175	4435	24245
AX1BC	460	110	5665	2670	1150	10055
AX1AOP	—	—	2315	1340	1385	5040
AX2KM	425	2625	10390	7220	6040	26700
AX2APK	375	2985	10035	6275	5885	25555
AX2XT	—	—	11745	4815	3895	20455
AX2WC	—	—	5745	4655	2015	12415
AX2EB	—	—	6845	—	—	6845
AX2RX	270	—	2575	625	260	3730
AX2AOU	—	—	3700	—	—	3700
AX2BAZ	—	—	3420	—	—	3420
AX2BDN	—	—	2015	320	570	2905
AX2BNK	565	—	2315	—	—	2880
AX2AHH	—	—	—	—	2770	2770
AX2ABC	—	—	1495	—	—	1495
AX2UJ	575	—	—	—	—	575
AX3KM	—	—	11645	2875	2270	16790
AX3QV	445	—	3560	—	6405	10410
AX3ASU	—	—	9380	—	—	9380
AX3KS	—	—	3035	—	4785	7820
AX3ASV	575	110	1620	2285	1620	6210
VK3BBA	—	—	5585	—	—	5585
AX3SM	—	—	—	5285	—	5285
AX3ABA	—	—	—	5155	—	5155
AX3ARV	—	—	2535	—	—	2535
VK3BCL	855	—	—	—	—	855
AX4LT	—	—	7270	3185	6010	16465
AX4FH	365	55	1675	5380	4895	12370
AX4VX	—	—	—	—	11615	11615
AX5SF	—	—	10720	—	—	10720
VK4EZ	—	—	7285	—	—	7285
AX4PJ	210	—	1628	1860	2950	6700
AX4LZ	185	—	3330	1745	525	5785
AX4XJ	—	—	—	—	3800	3800
VK4NQ	—	—	3575	—	—	3575
AX4UA	—	—	1190	1500	—	2690
AX4QA	—	—	800	155	—	955
AX5WP	—	—	4105	5030	5275	14410
AX5FO	480	495	6075	2735	2320	12105
AX5ZZ	—	—	5650	—	—	5650
VK5ZX	—	—	1295	75	—	2045
AX6CT	165	2415	5545	6630	9640	24395
AX6RU	335	215	4020	2985	8260	15815
AX6HD	—	—	—	—	13625	13625
AX6LK	—	—	3330	2215	6320	11865
AX7GK	245	805	11340	6480	4275	23145
AX7JV	—	1500	—	—	—	1500
AX8AZ	—	—	1590	985	635	3210
AX9GN	—	355	10405	6915	7665	25340
AX9JL	—	—	2415	215	765	3395
AX9XI	—	—	1900	1865	3025	6790
AX9KS	—	—	6130	—	—	6130

C.w. Section

Call Sign	80	40	20	15	10	Total
AX2APK	385	1815	9415	6240	3090	20945
AX2GW	—	1550	8180	2460	2850	15040
AX2GR	210	960	8355	1525	2535	13585
AX2VN	935	1985	2840	3715	1060	10535
VK2QL	—	—	—	—	4855	4855
AX2RA	—	—	2925	245	—	3170
AX2BMB	—	—	2240	850	190	2480
AX2JY	—	—	790	—	—	790
AX2ABC	—	—	620	—	—	620
AX3OP	—	1935	6110	4415	—	12460
AX3AXK	—	—	—	9246	—	9246
AX3APN	1140	1960	6495	—	—	10026
(includes 425 pts. on 160 mx)						
AX3XB	810	—	—	—	5605	6415
VK3MR	—	5550	—	—	—	5550
AX3MJ	—	—	—	4655	—	4655
AX3ARV	—	—	4195	—	—	4195
AX3ABA	—	—	—	2285	—	2285
AX3RJ	—	—	—	—	—	515
(515 pts. on 160 mx)						
AX4VX	—	—	—	9915	—	9915
AX4UA	—	—	4175	2130	—	6305
VK4EZ	—	—	3330	—	—	3330
VK4KX	—	1260	2410	1160	395	5225
AX4XJ	—	—	—	—	4895	4895
AX5FO	—	860	8285	3450	—	12595
AX5FH	615	1760	7565	—	—	9940
AX5FM	—	—	—	4805	1985	6790
AX5BS	100	—	545	610	285	1640
(includes 100 pts. on 160 mx)						
AX6HD	1370	3415	10115	6405	6820	28125
AX6PL	110	110	3330	2585	1975	8110
AX7GK	1380	2030	8575	4875	2895	19755
AX8HA	—	—	1940	1580	3115	6875
AX9GN	—	—	—	—	9960	9960
VK9XI	—	—	5320	3310	345	8975

VK S.w.l. Section

	Phone	C.w.	Total
P. Vernon, L2259	10330	4500	14830
K. Nad, L2849			8368
C. Fergusson	410		410
R. Tremayne, L3286	12285	8510	20795
E. Trebilcock, L3042		4310	4310
K. Cunningham, L4104	5370		5370
P. Drew, L6021	8195		8195
R. Mutton (VK7)	16330		16330
R. Everett, L7043	10570		10570

NEW ZEALAND

Phone Section

Call Sign	80	40	20	15	10	Total
ZM1AKY	—	385	4170	8190	5150	17895
ZL1AGO	1350	1305	7935	2865	2330	15885
(includes 100 pts. on 160 mx)						
ZM1AIZ	580	705	5290	2855	2700	12130
ZM1AWF	520	—	2505	8715	—	11740
ZM1AAS	—	—	—	10630	—	10630
ZM1AVO	—	—	—	8425	—	8425
ZM1AMM	—	—	4270	1410	—	5680
ZM1ARO	—	—	1740	—	2650	4390
ZM1ACW	—	3970	—	—	—	3970
ZM1TB	—	—	—	1305	825	2130
ZM2AVY	—	—	9425	1320	—	10745
ZM2QK	—	—	6296	1315	—	7611
ZM2CD	—	—	—	—	6600	6600
ZM2BCX	—	—	6090	—	—	6090
ZM2AWH	1860	—	—	—	—	1860
ZM3US	—	—	7670	375	—	8045
ZL3QN	—	—	4655	—	—	4655
ZM4FX	580	—	7975	6100	3200	17855
ZM4DS	505	—	8780	5270	—	14555
ZL4NH	—	—	8425	—	—	8425
ZL4MY	625	—	2225	—	—	2850

C.w. Section

Call Sign	80	40	20	15	10	Total
ZM1HV	100	220	5775	5515	2245	13255
ZM1AMO	—	—	11265	—	—	11265
ZL1DV	—	—	10715	—	—	10715
ZL1MQ	55	165	5345	3435	1690	10690
ZM1AIZ	210	1700	3790	3080	1765	10545
ZM1GX	—	—	2580	1895	3930	8405
ZM1AMM	275	630	5415	2040	—	8380
ZM1IL	—	—	—	6185	2610	8195
ZM1AFW	185	160	3205	675	1335	6020
ZM1BDN	—	—	5585	—	—	5885
ZM1ARV	—	—	1335	—	—	1335
ZM1BHQ	1090	—	—	—	—	1090
ZL2BCO	—	3085	7585	2710	—	13380
ZL2AUP	—	—	3905	6145	—	10050
ZM2CD	—	—	—	—	5355	5355
ZM2AH	—	—	1485	1335	—	2820
ZM2AWH	950	—	—	—	—	950
ZM3US	—	—	3755	—	—	3755
ZM4CA	155	—	8725	—	—	8880
ZM4GA	—	—	6840	—	—	6840
ZM4BO	—	2095	—	—	—	2095
ZM4AT	—	—	4950	—	—	4950

OVERSEAS

Phone Section

Oceania

DU1FH	48657	YB1BM	700
KH6GMP	36680	W3CHH/KG6	663
KH6IJ	31400	FK8AH	660
KR6JX	18330		

Europe

CT1LN	231	OH2LU	8
DL6TV	10819	OK1AGO	728
DJ4LK	9664	ON5MG	3708
DL7AA	7130	OZ7KB	742
DL8PC	5920	OZ3PO	550
DJ4UF	1581	PA0OI	806
DM2AUF	1552	PA0DEC	234
DL9YC	156	PA0JML	78
EA3RF	1104	SM3CXS	4584
EA8GK	192	SM0CER	2940
EA6BN	168	SM7ANB	2156
EA2CW	32	SM0BYG	1428
F9RM	2550	SM6CWK	1210
G3PHO	1980	SM0MC	928
G6XN	1456	SM3BUS	660
HA6KNB	91	SM0OY	266
HA3MB	30	SM7ABL	238
HB9AHA	3366	SM3VE	196
HB9UD	1040	SP9ABE	1260
I1AA	5684	SP6RT	810
I1AMU	1500	SP5CKM	108
I1AT	1040	SP8HR	108
I1AJ	803	SP1AGE	68
LA9OI	780	SP1BHX	40
LA5QK	528	SP9BLF	24
LZ1KAA	144	SP1CTN	12
OH6RH	352	SP9KR	2
OH2FS	30		

Asia (excluding Japan)

EP2BQ	5488	OD5BA	24
EP2DX	50	ZC4MT	812
MP4BHL	4590		

Japan

JA0ADT	680	JA3AAW	2408
JA0HXH	442	JA3HTT	2185
JA0IAM	306	JA3BRB	1159
JA0EZP	30	JA3FD	1014
JA1OCA	9831	JA3HZT	936
JA1HVS	2912	JA3NDS	792
JA1AAT	2567	JA3ELU	405
JA1UOC	1846	JA3FL	340
JA1KRU	1620	JA4BJO	10008
JH1MTR	1484	JA4XW	5180
JH1MNF	1300	JA4FM	3588
JA1VJR	988	JA4BEX	2793
JH1BLX	968	JA4FHE	1632
JA1AS	420	JA4FVP	432
JH1DMR	330	JA4DDM	184
JH1GOZ	200	JA4DZ	96
JR1EEU	147	JA5IU	2976
JA1UQA	147	JA4AQR/5	1120
JH1ECW	90	JA5MG	506
JA1RZN	27	JA6AD	16000
JA1OYB	18	JA6BSM	1023
JA2IY	8015	JA6PY	220
JA2HNP	5082	JA6KDP	119
JA2NNF	1612	JA7MA	11952
JA2GTI	936	JA7KBR	1152
JA2PAA	913	JA7TJ	320
JA2DNA	850	JA8ARA	8874
JA2AGT	288	JA8EVL	670
JA2NOQ	280	JA8DTD	217
JA2WK	192	JA9AG	18404
JA2UJS	56	JA9YBA	17262

North and South America

W1OKG	3128	K8AQS	1378
K1VTM	1666	W9ITD	168
W2FCR	8602	W0GNX	10471
W2LEJ	1125	W0ZXO	1552
W2WNW	675	WA0EPG	36
W3TLN	10335	CE8AA	572
WA3HGV	217	HP1JC	2184
W3KE	176	HP1AC	120
K4MG	1391	KZ5NW	784
W4WSF	504	LU4ECO	460
W4WRY	228	OA8V	3672
K4OVE	92	PJ9JR	5913
WA5WMK	9975	PY3APH	975
WA5ALB	1300	PY4KL	320
WA5UCT	968	PY4AP	126
W5OB	770	PZ1AII	1660
W5RSZ	96	VE3EWY	8064
WA6EPQ	21600	VE3GCO	5696
K6SVL	10260	VE1TG	2484
K6HPZ	9801	VE2NV	1248
W6DGH	5952	VE5TO	288
VE7BNE/W6	2442	VE1AIH	132
WA6FIT	1330	XE1LLS	7030
WB6JOD	720	YV4IQ	6528
W6RQZ	120	YV1YC	4692
WA8QIY	2784		

Africa

CR7IC	4806	CR7IZ	1870

U.S.S.R.

UA0DG	2954	UK9OAW	2128
UA0LZ	536	UA9BE	9146
UW0IX	414	UA9MT	6
RA0LEH	560	UW9CR	112
UA1CS	2067	UK5IBM	2440
UA1FA	1110	UT5DF	150
UA1IG	1260	UK5EAQ	550
UW1LW	8	UB5SJ	1045
UK2FAC	396	UK5MAF	8224
UW3FD	4509	UK5IAZ	358
UA3HO	1682	UC2WE	1218
UK3ABO	819	UK2AAB	340
UK3YAB	132	UC2DN	24
UA3JD	232	UK6DAD	324
UV3FD	1890	UD6BD	168
UV3MM	70	UG6JJ	78
UW3AX	120	UH8BO	176
UW3EH	1780	UI8CD	280
UK3SAB	3048	UK8HAA	174
UW3IN	3297	UO5BZ	32
UW4NH	2139	UK2BBB	2543
UA4CZ	1534	UP2PA	1216
UA4PW	276	UP2ER	192
UW6LC	3444	UK2GAT	2
UA6PG	126	UK2RAA	216
UA6RB	69		

C.w. Section

Europe

DL6TV	5404	DM2AUF	1312
DL7AA	4205	DM4YEL	1300
DL9PT	2205	DL1GN	442
DJ4UF	1496	DM6WAO	224
DJ4KD	1482	DM2AWI	126

C.w. Section—Europe (continued)

DM4EL	98	OK2QX	2058
DM2ATL	60	OK1ASJ	50
DM3BE	32	OK2BEU	32
F8TC	1972	OK2BPE	27
F9YZ	1020	ON4XG	1552
G5RP	2424	OZ1W	748
GM3CFS	1512	OZ4FF	250
G6XL	1332	OZ3PO	132
G2DC	828	OZ4HW	40
G3VW	396	PA0JR	432
LA1OA	91	PA0VB	216
LA6U	84	PA0BRA	108
LA8CE	70	SM7ANB	2760
LZ2DC	1368	SM3CXS	2486
LZ1KWF	48	SM0BYG	1660
LZ2RF	32	SM5EXE	1404
OH2FS	3276	SM3VE	750
OH5SE	2775	SM3BUS	304
OH3TY	1008	SP3DOI	1640
OH9RJ	600	SP8ARY	910
OH3MK	243	SP6TQ	126
OH7NW	140	SP8HR	108
OH2XM	40	SP5AFL	2
OH2LU	32	YU4EBL	1628
OK2RZ	6120	YU4BYZ	200
OK2BOB	3410	YU1SF	4

Japan

JA0AJH	387	JA2WK	616
JA0DJE	360	JA2EIV	610
JA0AC	144	JA2EEY	95
JA0FFL	147	JA2RZF	8
JH1AWI	5216	JA3HTT	2425
JA1SR	4620	JA3AAW	1476
JA1JKG	3692	JA3SMA	288
JA1FGB	3198	JA3CS	126
JA1KRU	2525	JA4XW	7409
JA1AFF	2236	JA4BEX	4202
JH1LKH	2208	JA4DDM	33
JA1LRE	828	JA5MG	1365
JR1EFG	784	JA4AQR/5	620
JA1WVK	708	JA6DD	98
JH1MTR	670	JA7JI	3080
JA1IZZ	649	JA7FUJ	1700
JA1UOC	320	JA7MJ	1340
JA1NHM	320	JA1XYO/7	1100
JA1ACA	144	JA7TJ	112
JR1WC	126	JA7YFA	84
JH1GOZ	80	JA7AD	50
JA1AS	68	JA8GR	216
JH1ECW	50	JA8DTD	150
JA1UTC	32	JA8GBT	60
JA2HNP	2300	JA8GSX	12
JA2IYJ	1748	JA9YBA	10506
JA2DNA	1551	JA9BKU	1062
JA2CPD	1067	JA9ENB	369

North and South America

WA0KDI	4698	W6RGG	15345
W0AIH	3768	K6QZ	10440
WA0EPG	370	K6EKR	7328
W4UDS/0	154	W6DGH	6482
W1EVT	13244	W6TZD	6150
W1PL	6058	K6AHV	2464
W1EZD	912	W6CLM	1120
W1SWX	40	W6KHS	720
W2MEL	10168	K5MHG/6	546
W2LWI	3304	W6ISQ	70
W2IVP	3192	W7IR	17820
W2HL	880	W9IHN	10086
WA2LDX	144	W9QWN	2000
W2DF	246	HP1AC	306
W3NU	15698	KZ5NW	520
W3AZD	3240	PY7SR	72
W3KE	234	VE3EWY	5856
W4WSF	3750	VE1TG	1792
K4OD	2002	VE3GCO	507
W5OB	4030	VE1AIH	441
W5RUB	1600		

Oceania

FK8AH	552	W3CHH/KG6	319
KH6IJ	17802	KG6JAC	1008

World-Wide

CR7IZ	918	ZS2A	860
VS6AF	1160	ZS6D	168

U.S.S.R.

UA0FR	3699	UA1SW	168
UK0ZAD	2068	UA1XI	75
UA0JO	1764	UK2FAM	858
UW0IX	1653	UK3AAO	5394
UK0CAA	1008	UW3EH	1188
UA0ML	735	UA3DAK	1020
UA0ZS	610	UA3NP	612
UK0IAA	570	UK3YAB	505
UK0CAO	561	UK3TAA	248
UA0GU	528	UW3NE	126
UA0ZAO	512	UA3JD	84
UA0LJ	468	UA3YR	60
UK0ZAA	350	UV3EM	60
UA0ZZ	252	UA3ST	8
UA0ZAM	132	UK4WAB	680
UA0LAF	8	UK4WAC	40
UA1DZ	6500	UA4WAE	378
UA1ZW	2775	UW6LC	528
UK1AAA	1560	UW9PT	3692
UK1AAG	598	UK9HAD	2070
UK1ZAB	180	UW9WB	1740

U.S.S.R. (continued)

UA9JL	1600	UF6LA	339
UW9AI	833	UF6DM	231
UA9HM	567	UF6DA	32
UW9WL	384	UK6FAA	8
UK9OAW	288	UF6FAL	2
UW9AT	234	UG6JJ	138
UW0LR	770	UH8BO	144
UW0LT	555	UK8HAA	98
UW0LI	510	UK8AAA	140
UC2WG	32	UI8AI	20
UC2BP	21	UK8IAA	18
UK5JAA	3924	UI8AAF	2
UK5UAL	2806	UJ8AB	50
UK5MAA	2223	UL7BG	1440
UK5IAZ	1372	UK7GAA	1266
UB5QR	1350	UL7GW	986
UK5VAA	1188	UL7JG	742
UT5WW	504	UO5AP	574
UB5OE	288	UO5GS	410
UB5VY	270	UK2PAA	3380
UT5BW	4	UK2BBB	1807
RB5VAS	4	UP2OX	1166
UY5OO	324	UP2ZBV	280
UY5ZM	196	UP2AY	15
UY5XR	192	UQ2GW	960
UY5AO	120	UQ2CC	864
UY5AP	32	UK2GAT	320
UD6AM	772	UQ2AQ	50
UD6BW	455	UK2RAN	900

Overseas S.w.l. Section

BRS-26431	7412	UA2-12557	1296
BRS-31976	7186	UA3-1271	720
BRS-32525	2772	UA3-170-56	276
A5032	1800	UA3-127230	140
BRS-26870	1560	UA3-127217	48
BRS-27880	1216	UA3-12711	40
DM2703/A	2280	UC2-009108	1080
DM4722/M	1748	UC2-0091	196
DM-EA-4939/B	280	UA4-0957	1786
DM4574/G	162	UA4-09543	404
HE9HIU	3744	UA6-10160	130
I1-13395	2835	UA6-150-0502	612
I1-14073	2394	UB5-07325	1402
I1-12387	1034	UB5-073389	1202
JA0-1893/1	12460	UB5-0683	1010
JA0-1320/JA	7592	UB5-077092	846
JA0-1918	738	UD6-001-62	720
JA1-4876	11088	UF6-01278	40
JA1-10669	8448	UP2OE/SWL	2668
JA1-9821	2982	UQ2-037-83	1420
JH1-JFR	1998	UQ2-037-80	88
JA2RFH	1012	UA0-10316	884
JA4-2708	2668	UA1-14322	1428
JA4-1410	1200	UA2-16912	3434
JA6-1697	3388	UA2-12557	3400
JA7-2227	3648	UA3-12711	61
JA8-2108	1386	UA3-170-56	1534
JA8-1997	1036	UA3-151-18	814
JA8-SI	1012	UA4-0957	1764
LA-M5605	266	UA4-09543	726
LZ-1A312	70	UA6-101-60	3274
NL-990	62	UA6-150-0502	510
ONL-383	3888	UA9-146-95	122
SM5-2735	1600	UB5-073389	4204
SP8-1079	5876	UB5-07325	2404
SP9-6668	2145	UB5-0683	400
SP1-8189	235	UD6-001-62	720
SP2-1157	216	UP2OE/SWL	896
SP1-1164	208	UQ2-037-83	1860
UA0LH (SWL)	3993	UQ2-037-80	780
UA0-10771	1890	WPE-2QKU	808
UA1-14322	2310	9M2-13189	11700
UA1-169125	366		

CHECK LOGS

AX3JI	K2DT	UA3DD	UO5AP
AX4RF	K6ALH	UA3DL	UO5AW
CE2CR	LA2B	UA3FF	UV9PI
DM2AYK	LA8OM	UA3GO	UW3BI
DM2BJD	OH6AA	UA4WK	UW3FW
DM2CHM	OH6NH	UA6BV	UW6AO
DM2CYO	OZ2EU	UA9GC	W3MDJ
DM2DQN	OZ3KE	UA9IQ	W4JUK
DM2EDL	OZ4PM	UA0FD	ZM2VH
DM3TF	OZ7XG	UA0GF	ZM2AFH
DM3WSO	OZ8BN	UA0LD	DM1986/N
DM4CF	RC2WAQ	UA0PJ	DM2542/L
F6ATE	SM2ALU	UA0YT	DM3133/G
HA0KHP	SM3BUS	UB5NS	DM4681/A
JA1NMW	SM7TV	UB5UU	DM4843/L
JA2WAA	SM7ACB	UK5QAU	DM5173/G
JA7AD	SM0BDS	UK6GAE	DM5177/F
JA0BH	SP2BMM	UK0NH	DM5302/G
JA0YJA	UA1CK	UL7TA	OZZX

AUSTRALIS BALLOON FLIGHTS—A PRELIMINARY REPORT

*By RICHARD TONKIN**

This article represents a preliminary report on the results of the recent flights of the Australis translator system on balloon packages. Because all of the tapes and other data from the flights has not yet been analysed, a complete list of the Amateurs who worked through the package, and further details on the results of the flights will be held over until the next issue of "A.R."

The main reasons for conducting the balloon flights with the Australis translator were to demonstrate its operation over relatively long distances and to experiment with antenna systems which could be used on any future flights. The translator used was a prototype of one of the four channels which, if all goes well, will fly on the A-O-B satellite next year. The translator was built by Les Jenkins, VK3ZBJ. Its input was 146.00 MHz. (Channel B, f.m.), with the output on 432.30 MHz. The power output was approximately 500 milliwatts. Prior to the balloon flights, the translator had been operated for several weeks on top of Mt. Dandenong, near Melbourne, and a considerable amount of interest was shown by Amateurs in this test.

Permission was obtained from the Department of Supply to fly the translator as a "piggyback" experiment on the March-April series of scientific research balloon flights from Mildura, about 350 miles north-west of Melbourne. The balloon series, called HIBAL, consisted, so far as the Australis translator package was concerned, of four flights, to 70,000 (70K), 90,000 (90K), 105,000 (105K) and 120,000 (120K) feet.

The balloons are several hundred feet high when launched and they gradually assume a spherical shape as they rise into the upper atmosphere. The payload, or gondola, consists of a tubular steel frame inside which the equipment is located. The gondola is about the size of a small car, and weighs an average of about 500 lbs.—so HIBAL is no mean balloon!

After launch from Mildura airport, the helium-filled balloon rises at a rate of about 1,000 feet per minute until it reaches its float altitude. The length of time that the balloon and its payload float depends on the type of experiment being flown, but two to three hours was the average float time for the four flights on which the Australis package was hitching a ride. At the end of the float period, a radio command transmitted to the gondola from the HIBAL control station at Mildura airport separates the balloon from the gondola. As the gondola drops into the denser layers of the atmosphere, a parachute opens and lowers the payload to the ground. A chase aircraft follows the gondola's descent and radios its landing position to HIBAL Land-Rovers which travel to the landing site and recover the payload.

* Chairman, Project Australis, 13 Nestan Dr., Ringwood, Vic., 3134.

George Long, VK3YDB, who prepared the translator for the flights, and I travelled to Mildura before the first flight to test the translator with the HIBAL packages, settle the final flight details with the HIBAL personnel and meet the Amateurs at Mildura who had previously offered their help with the flights. The Amateurs who assisted the project at Mildura included Mike VK3CCX, who was a real tower of strength and who, being a member of the HIBAL crew, was able to give invaluable technical assistance on the four flights; Noel VK3AGF, who did a fine job in communicating with the anxious project members in Melbourne; Graham VK3YEJ, Joan VK3YEK and her OM, Ray VK3ZBN. Without the seemingly tireless help of these people, it would not have been possible to fly the Australis translator on the HIBAL flights.

The four flights were launched at about dawn on 23rd March (70K), 25th March (105K), 2nd April (90K) and 5th April (120K). All flights rose to their planned altitudes and the translator worked well on the four trips it took into the stratosphere. The same translator unit was used on each flight and it was recovered undamaged after each flight. Before the flights began, it had been calculated that the Mildura launch site and the planned float altitudes would allow Amateurs in Adelaide and Melbourne (and points in between) to maintain contact during the ascent and float phases of the flights. We were a little more optimistic about the 120K flight and we hoped, because of the greater altitude it would reach, that we may be able to get signals into it from further afield than Melbourne.

In the event, Adelaide-Melbourne (and vice versa) QSOs were achieved on all four flights. The copy varied from unreadable to numerous dBs over S9, depending on the power that the transmitting station was putting into the translator, how many people were trying to get into it at the same time, and the orientation of the antenna system on the gondola. The 2 metre receive aerial was a vertical ground plane and the 432 MHz. transmitting antenna was an omni-directional turnstile. For the 70K and 120K flights, the antenna system was mounted on the top of the HIBAL gondola and on the 105K and 90K flights it was located on the bottom of the gondola. These were the two most convenient positions to put the antennas, having regard to the need to keep the Australis aerials away from the HIBAL equipment and taking into account the shadowing effect which the gondola frame and the HIBAL experiments had on the Australis antenna radiation patterns.

The results from the four flights was very interesting and it appears, from initial data that have been looked at, as though the top-located antennas (70K and 120K flights) operated better than the bottom-mounted ones (105K and 90K flights), at least so far as Melbourne Amateurs were concerned. It is possible that atmospheric temperature inversions played a part in some of the long signal fades which occurred during the flights. It is hoped that a more complete report on these aspects of the flights can be included in a later issue of "A.R."

The following is a preliminary list of Amateurs who worked through one or more of the translator flights. As mentioned above, this is not a complete list and represents only the call signs heard on some of the tapes of the flights. The complete list and more details of each flight will be in July "A.R."

VKs 5ZDR, 5NZ, 5QZ, 5ZK.

VKs 3ZCE, 3YFI, 3FW, 3YBO, 3ZBJ, 3YDB, 3AGF, 3YEJ, 3ASV, 3AKC.

VKs 1VP and 2ZHM.

There are probably at least another six VK5 calls who worked through the translator and a couple of other VK3 ones as well. It would be a great help if the people who worked through it would drop me a line and give me the date, power output used, antenna used, stations heard, etc. As is usual with projects of this kind, we tend to be enthusiastic about it while the action is there, but a little remiss when it comes to looking back through the log book and putting pen to paper. An appeal on the VK3 and VK5 Divisional broadcasts yielded only one written report, so please sharpen up the pencils and send in your report, plus any comments, good or bad, that you have about the flights. After all, the Amateurs of Australia, through the Institute, are paying for the Australis project and they should be making the best use of the balloon flights and of the satellite to follow.

It was particularly pleasing, on the 120K flight, to hear Eddie VK1VP in Canberra and John VK2ZHM at Cootamundra, coming through the translator. The sort of distances covered in that flight give some idea of the coverage which will be possible with the A-O-B satellite, when VK-JA contacts should become commonplace on v.h.f.

The co-operation given to the Australis balloon project by Mr. John Hillier and his team at the balloon launching station at Mildura deserves special mention. The Australis translator was flown on a space, weight and power-available basis. While it was originally planned that there would be only one translator flight in the March-April series of balloon launchings, George VK3YDB, by going to Mildura and talking with the HIBAL people, was able to arrange that the package flew on four, rather than one, flight. The active assistance given by John Hillier and his team in arranging the flights is greatly appreciated by the W.I.A.-Australis group.

(Continued on Page 27)

KEY SECTION

During the 1930s an active element of Institute affairs was a group known as the Key Section. It appears to have dropped into limbo (with so many other things) in the early 40s, and did not re-appear after the war.

The 1971 Federal Convention in Brisbane agreed to revive the Key Section, and the rules for its operation which were accepted were these:—

1. That the Key Section be open to all members who have worked at least 50 different stations by two-way radio contact using A1 or A2 mode. To qualify as a contact significant text should be exchanged, say, 30 words apart from RST; operations during contests are excluded.

2. That the Federal President's Cup, awarded to the Key Section of the W.I.A. in 1930, be revived and mounted and awarded annually with inscription to the member of the section who claims the greatest number of contacts using A1 or A2 mode in that year. No member may hold the cup for more than two successive years.

3. That the W.I.A. make available to overseas Amateurs a certificate or other token for working 20 or more members of the Key Section of the W.I.A.

4. That the W.I.A., through its Key Section, make available certificates of proficiency to members of the Section for successfully receiving and sending using A1 or A2 mode at speeds of 15, 20, 25 and 30 plus words per minute.

5. That the Federal Contest Manager be approached to alter the rules of W.I.A. contests to remove the bias against the use of A1 in contests (because of the lower scoring rates which can be achieved using this mode under contest conditions in Australia), such as by offering a multiplying factor for all contacts using A1 or A2 mode.

6. That every method be used to introduce more A1 or A2 to the v.h.f. bands even to the extent of making operation of v.h.f. part of the requirement for some of the awards associated with the Key Section.

7. That the Key Section be managed by a group consisting of an officer appointed by the Federal Executive and a nominee of each Divisional Council.

8. The nominee of Federal Executive will act as nominal head of the group and report the activities of the Key Section to the Federal Council.

9. The Divisional nominees will be appointed by Divisional Councils and will be known as Divisional Co-ordinators. Appointment will normally be for a period of three years.

10. In the event of a Divisional Co-ordinator resigning, or being replaced as nominee by the Divisional Council, a new nominee will be appointed by the Divisional Council, the tenure dating from the time of the new appointment.

11. The Divisional Co-ordinator may call upon the services of not more than three other persons, whose appointment must be ratified by the Divisional Council, to assist him.

The Federal Executive have appointed Deane Blackman, VK3TX, as Key Section Manager. The appointment of Divisional Co-ordinators, which is the next task in setting up the Section, is in hand.

ANNOUNCING A SPECIAL CALL AND PREFIX

KC0KC will be heard on all bands for the period 1st July, 1971, through to 5th July, 1971. Members of the Mobile Amateur Radio Awards Club Inc. (M.A.R.A.C.) and the Independent County Hunters' Nets meeting in Kansas City through those dates will man the station around the clock.

KC0KC will be on 10, 15 and 20 metres, beginning when the band opens in Kansas City around 1300 GMT until the band closes late in the evening. Activity on 40 and 80 metres will probably begin around 2200 hours GMT until 1300 GMT the following day. However, activity will generally be on any band at any time that band is open.

Activity is planned around the following frequencies:—

	CW	Phone(1)	Phone(2)
80 Metres	3550	3880	3910
40 „	7050	7205	7260
20 „	14050	14205	14285
15 „	21050	21280	21360
10 „	28050	28600	

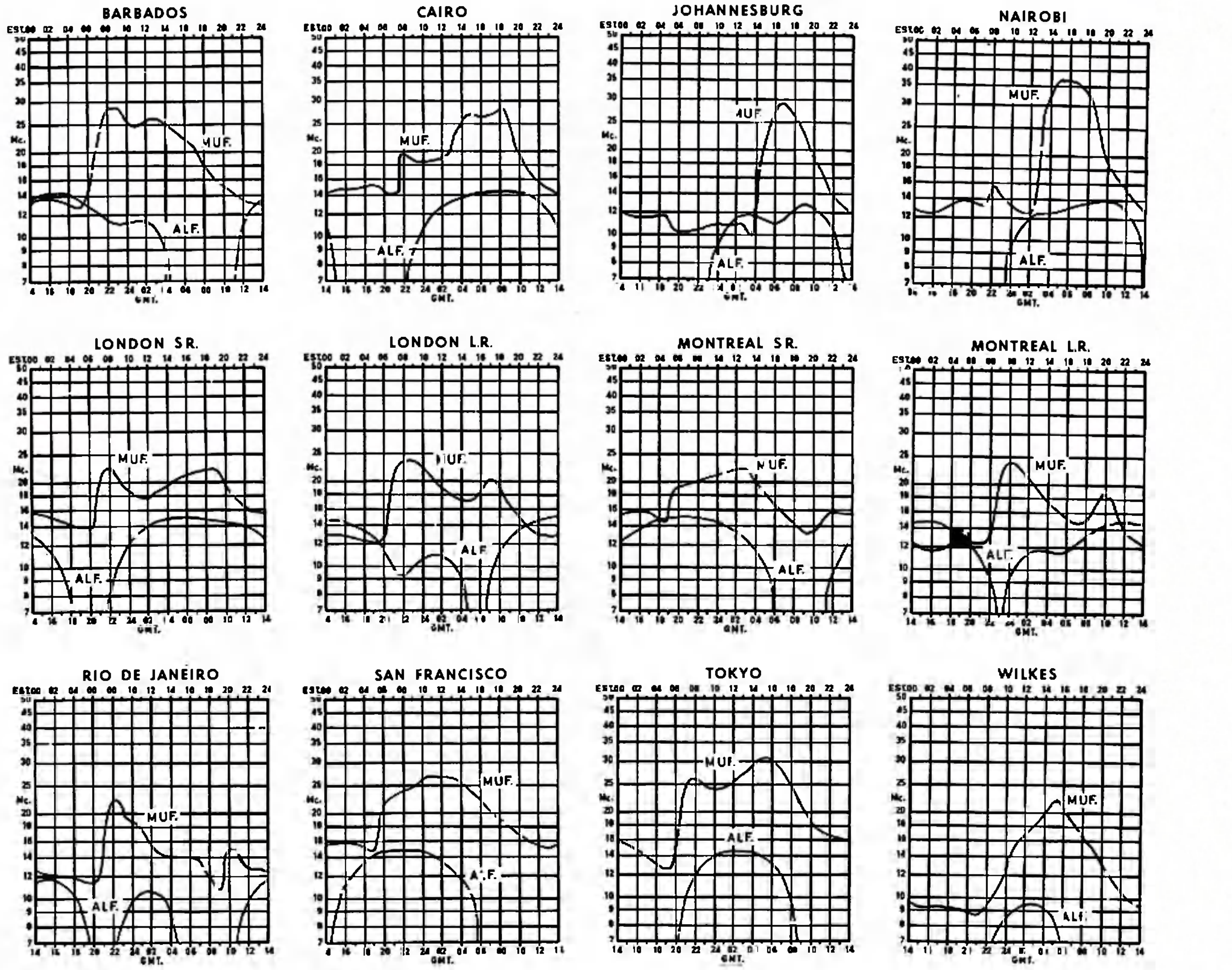
Notes: (1) Several times each hour operator will announce and listen 5 or 10 KHz. below the bottom of the U.S. phone band for DX stations.
(2) If "pile-ups" develop, operator may listen off his transmitting frequency.

Log all contacts in GMT.

For special QSL send SASE or two IRCs to (or via W0 QSL Bureau):—
KC0KC or WA0WOB QSL Manager
P.O. Box 753,
Shawnee Mission, Kansas,
66201, U.S.A.

PREDICTION CHARTS FOR JUNE 1971

(Prediction Charts by courtesy of Ionospheric Prediction Service)



May I Talk to You About the 35th Federal Convention in Brisbane

In last month's "A.R." the "Wind of Change" was mentioned as if it had been something sudden. It is and yet it isn't. Zephyr breezes have blown for some little while. They have now increased to the point where their influence is doing much to improve the exchange of information in an efficient way at a meeting such as the Convention. Every Divisional Councillor and the many observers at the Convention all commented on this. Your Federal President is largely responsible for this. His overseas trips helped, of course, enormously. The main objective for all of us is communication — effective communication. If this can be achieved more positively with less formality, so much the better. The pendulum could swing too far the other way. This is recognised. But we are dealing with persons, not faceless monsters or remote bodies out of reach and out of touch.

Which brings me back to people. Recognition of problems and genuine attempts to resolve them. This is what the Convention is all about. This is what the Delegates dealt with. Your problems, your troubles. I.T.U. and I.A.R.U. seem remote. Not your problems you might say. How wrong could you be? You want W.I.A. to be there to help you in so many ways. In the beginning to help you to learn the fundamentals of electronics, to absorb and use the Morse Code, and to put you in touch with cheap gear and components. Later on the emphasis shifts as you yourself develop expanding interests. You are hedged about by Regulations, far too many of them you may say. In 1910 the W.I.A. began. Not only for social contact. Not only to present a united front. But also the sharing of benefits which only a larger group can command. No, I will not enlarge on this here except to say that the W.I.A. interest in I.A.R.U. is not misplaced. Without the united front—world wide—we would definitely not possess the bands we have today. Pressures by commerce, by governmental agencies and by many other services would have seen to that.

So, at the Convention, I.A.R.U. and I.T.U. matters received much attention because Michael Owen, VK3KI, and Peter Williams, VK3IZ, had returned a few days beforehand from the I.A.R.U. Region III. Association Conference in Tokyo and the I.T.U. Space Conference is scheduled for July in Geneva. Yes, plans had been laid. Keep your fingers crossed; we might keep what we have. We could even hope to gain a little ground. For I.A.R.U. affairs, David Rankin, VK3QV, was appointed to be our Liaison Officer.

Equally, at this Convention, the financial side of W.I.A's affairs got a very good airing. The theme was how to do more at less cost. Facts of life have to be faced however. There was absolutely no question of how to squeeze more money out of members. In fact the contrary applied. Can we do anything more for members within our budget and, if so, what and how? As a newcomer to the Australian scene I was impressed by the massive amount of thought devoted to financial matters. I assure you it was not put on for my benefit. I am too old a hand to be hoodwinked into a belief that this was mere window-dressing.

The proposed computerisation (horrible word!) programme took two full pages of my notes. It stands to reason that, if the thing is done properly, savings can accrue. The most fantastic depth of detail unfolded before Delegates' eyes. Even down to such minutae as how to preserve the confidential nature of information to be sought from members. How to get essential data and the practical steps required to process it were all covered as well as the relative importance of the end result. The computer can churn out, in seconds, any collection of detail which may be required. Not only prints-out of names, call signs and addresses for the call book, for magazine wrappers and umpteen other needs—transient and permanent—subscriptions and their apportionment, but, furthermore, bulk statistics of one kind or another which Federal Executive must have in their endeavours to convince disbelieving authorities of the correctness of their submissions. So, if you have to send your subscription to Melbourne next year or, if you are asked for any details you think may be impertinent, don't worry. The whole thing is under the most rigid Divisional control. The Federal boys will not run away with the loot or misuse it.

Various technical affairs also took up a lot of time. Interference against us and by us and how best to achieve satisfactory results. After all, we pay fees equivalent to others but receive different treatment. The U.S.A. phone operators petitioning F.C.C. for a further 50 KHz. downward of band allocations and how we can most effectively display our opposition.

Project Australis and the dearth of details for you received much comment on how to put this right. The back-room group are doing a splendid job all right, but for goodness sake tell us. Our money is involved apart from anything else. So, a plan was devised and John Battrick, VK3OR, is the corner-stone. Now the V.h.f. Groups in Divisions will have a chance to play with the flight-tested package. Dr. Deane Blackman's proposed Key Section got off the ground. Traffic nets regularisation (s.s.b. vox), operators' identification "at the beginning and end" of transmissions—what is a "transmission", how long, break-in—7050 KHz. was designated as a calling frequency as, for example, calling for aid on safari or using it for sked-making and then QSYing elsewhere —people could leave their receivers running on this frequency—and so on. Space does not allow me to go into detail I fear.

"So You Want to Become an Amateur" booklet is now in print and a very good one it is too. The only error detected so far is the fee payable when applying to sit for the exam.; should, of course, be £2.00 but there are rumblings about raising it. The new Call Book should be out by the time you read this. Much criticism about the delay which, incidentally, was not our fault. How to deal with "A.R." and Divisional Bulletins—how can we economise without lowering standards?

Is that all? Do not be deluded. The discussions on the "Novice" licensing report (received only a week beforehand by the way) from Mr. Rex Black's (VK2YA) Committee got through seven pages of my notes. What do you mean by "Novice" licensing? Like the JAs on 15 metres? No, but definitely no. The report was too good to set it on one side but much more thought and discussion is required before we can go further. Divisions have it. Why not ask about it? As one Delegate aptly remarked, "It's a large thing with few knobs to hold on to." General organisation and the efficient administration of W.I.A. affairs received attention in the light of the impending change-over to the new Federal Constitution after the W.I.A. Company Memorandum and Articles of Association have been signed, sealed and delivered. All this was, of course, tied in with the financial arrangements, "A.R." policy, and the role of the new Secretary-Manager.

Those who were in the 20 years of age group in 1910 would now be in their eighties. With the years, most of the pioneers will be passing on. The Convention again devoted time to ways and means to accumulate and preserve items of historical interest. The onus has been placed on Divisions to examine this aspect, possibly seeking the aid of local libraries and museums. Let us gather together everything we can before it is too late.

Another item was the change-over of the Federal Contest Committee from VK6 to VK4. What a magnificent job they did on this over the past six years and we look forward to another good period, especially as we believe Peter Brown, VK4PJ, is mixed up with it. Symptomatic of the times, by the way, were the very reduced numbers of agenda items about contests and awards rules. A good thing this, so please don't brew up a load of new alterations! Let the people in VK4 get the hang of the thing. Geoff Wilson, VK3AMK, naturally got a commendation on Federal Awards, especially for his excellent handling of the Cook Bi-Centenary Award. Ken Pincot, VK3AFJ, of "A.R." fame, received Life Membership and had his badge bestowed upon him at a moving little ceremony, and Alf Chandler, VK3LC, was commended on his work of running the Publications Department which will henceforth land up on my table.

I know I have had to leave out a lot, e.g. repeaters and beacons, badges, publications, policies, submissions about multiple-choice examination papers and operating procedures, etc. Don Watson, from Townsville, will vouch for this. He sat in as an "observer" for the VK5 Delegate. This was another new departure. The local Division provided "observers" for the far-away Delegates and this innovation was much appreciated not only by the Delegates but also by the "observers" themselves. The point is well taken, with innovations and modernisation, that we must keep the best of what we have however.

The venue of the next Convention is to be Melbourne for several valid reasons.

I started off this article about the I.T.U. and I'll end about it also. Tom Clarkson, ZL2AZ, will be attending the big July Conference in Geneva as an observer on our behalf. As somebody said, it would be difficult to find a better qualified person anywhere in Region III. which encompasses the whole area roughly from India to the mid-Pacific. The Delegates to this Conference are officials of governments. Amateur Radio is only a small part of the whole and must be content with observers. We've done our part with our government. Have you done your part with your Division?

73, VK3CIF.

Photograph of Federal Executive Delegates at the Brisbane Convention of the W.I.A., held over Easter. Right to left: David H. Rankin, VK3QV; Peter D. Williams, VK3IZ; Michael Owen, VK3KI (President); Peter B. Dodd, VK3CIF (Sec.-Man.); Ken E. Pincott, VK3AFJ (Editor "A.R.").

I.A.R.U. REGION 3 ASSOCIATION CONFERENCE, TOYKO, 1971

BACKGROUND TO CONFERENCE

At the Conference of Sydney 1968 at which the Region III. Association was formed, it was decided to have a Conference in 1971 and notice was given by J.A.R.L. that an invitation would be extended to have it in Toyko. This was confirmed and preliminary details completed in January 1971.

In collaboration with the Secretariat, J.A.R.L. made arrangements for the Conference to be held at the Fairmont Hotel and the Zenkyoren Building, Toyko. The meetings commenced with a preliminary informal one on 16th March with formal sessions on 17th, 18th and 19th March, and a concluding one on 21st March.

LIST OF PARTICIPANTS

I.A.R.U.: W0DX, Mr. R. W. Denniston.

Australia: VK3KI, Mr. M. Owen; VK3VX, Mr. A. G. Pither.

New Zealand: ZL4PG, Mr. D. A. Lloyd; ZL2AZ, Mr. T. R. Clarkson.

Philippines: DU1EA, Mr. E. M. Aristores; DU1MBN, Mr. M. B. Nolasco; DU1BEN, Mr. B. P. C. Esquerra; DU1HR, Mr. H. del Rosario; DU1SA, Mr. S. A. Aison; DU9EO/1, Mr. E. O. Orbe.

India: VU2US, Mr. K. Umrao Singh.

Hong Kong: VS6AI, Mr. G. Flenner; VS6DR, Mr. P. Wight.

Japan: JA1AN, Mr. S. Hara; JA1BK, Mr. K. Mizoguchi; JA1NET, Mr. S. Morimoto; JA0LA, Mr. K. Kuwazawa.

Secretary: VK3IZ, Mr. P. D. Williams.

ARRANGEMENTS FOR MEETINGS

After the first meeting was opened by the Secretary-General, the head of the J.A.R.L. delegation (Mr. S. Hara, JA1AN, President of J.A.R.L.) was unanimously elected to be Honorary Chairman of the Conference. After welcoming the Delegates to Tokyo, he invited nominations for the officers of the Conference. Mr. R. W. Denniston, W0DX, was elected Chairman, and Mr. P. D. Williams, VK3IZ, Secretary. The J.A.R.L. described the arrangements that had been made to assist the Secretary in the practical work involved.

THE MEMBER SOCIETIES

Credentials were submitted by the Societies qualified according to the Interim Constitution, and it was agreed that, in addition to existing membership, the societies of India, Ceylon, Hong Kong would be members and that the American Radio Relay League would be a member, in view of the members it has in Region III.

STATUS OF CONFERENCE

In order to clear up some imperfections in the Interim Constitution, the degree of authority of the Conference was discussed, and, it being decided that it was competent to do so, several amendments were made in the Interim Constitution, their purpose to affirm that membership in I.A.R.U. is a prerequisite to membership in the Region III. Association. As a result, P.A.R.A. became the member Society to represent the Philippines. So the member societies represented and eligible to vote at the meeting were W.I.A., A.R.R.L., N.Z.A.R.T., P.A.R.A., A.R.S.I., J.A.R.L., H.A.R.T.S.

The agenda prepared at the preliminary meeting was approved. Reference is now made to the topics discussed and conclusions reached.

THE CONSTITUTION

After receiving from the Secretary-General on the activities of the last three years, and the financial position, and approving the final statement from the Sydney 1968 meeting, consideration was given to matters concerning the organisation of the Association and these revolved around the preparation of a Constitution to meet all foreseen requirements. After prolonged study the principles to be incorporated in a Constitution were agreed. Details are in the Minutes of the new Constitution, salient points being—

1. Conferences held at intervals of three to four years will control the Association. Between Conferences matters requiring the decision by member Societies will be dealt with by post.
2. Each Society will designate a Liaison Officer to be its representative in Association affairs.
3. The inviting Society will be expected to facilitate the efficient and economical running of the Conference, but not to bear the "out-of-pocket" expense that may be entailed. The cost of travel and accommodation for Delegates will be the responsibility of their Society.
4. The management of the Association will be done by four Directors and a Secretary, who will be appointed by the Conference on a personal basis and be responsible to it. Expenses incurred for the Directors and Secretary to carry out their duties will be the responsibility of the Association. This includes attendance at Conferences, at which Directors will participate, but not on behalf of a member Society. Directors and Secretary will be appointed to act until the conclusion of the following Conference.
5. Rules of Procedure for Conferences are to be observed and they form Regulations attached to the Constitution.
6. Subscriptions are to be paid by member Societies, the amount being based on the number of members—the maximum being 15 cents (U.S.) per member with lower figures where there is a very large membership. The minimum subscription to be $25 per annum.

CURRENT SUBJECTS STUDIED

The I.T.U. World Space Conference.—The present situation regarding the approach to the Space Conference was described by W0DX, who as President of I.A.R.U., will be the official observer for the Union at the I.T.U. Space Conference. The status of negotiations with their Administrations was outlined by all the representatives of member Societies present. All information led to appreciation of the great importance to Amateur Radio of strong representation at Geneva.

W0DX described how he was enlisting the aid of all resources available in his task and how Region I. and Region II. would be represented in his team. He pointed out the high desirability of Region III. being represented to make his team a truly representative one of world Amateur Radio.

After prolonged study, the Conference decided on the principle that the Association should send a representative and considered the practicability of meeting the high costs involved. It was apparent that some extraordinary means of finding the funds would be needed and, as these were considered to be justified, it was decided to seek credit for the amount needed and to plan its repayment over several years.

Assuming the success of these arrangements for a representative, the person to be nominated by the leader of the team, W0DX, and to be approved by the Directors. This was done at a Directors' meeting on 19th March and ZL2AZ, Mr. T. R. Clarkson, was appointed.

The 7 MHz. Band.—The need for more spectrum space for the Amateur Service on an exclusive basis was emphasised. This is being pursued. As a general world administrative frequency conference seems to be in the very distant future, the best approach is a "piece meal" one and each Society was urged to try and get agreement by its Administration with a view to getting first national, then regional, and eventually world-wide expansion of the exclusive segment.

A survey of interference on the 7 MHz. band was presented by J.A.R.L. with the result of recent automatic recordings. After discussion of possible methods of meeting the situation, the Conference resolved that all Societies would actively pursue the subject of improving the 7 MHz. band situation.

Development and Encouragement of Amateur Radio Activity in Region III.—Among proposals to encourage activity in the Region a new type of award was suggested. This would recognise the merit of conducting recurrent QSOs in contrast to the brief single ones. This is being studied by several interested Societies.

Publicity and Public Relations.—Societies were urged to try and get Amateur Radio activities brought under notice of the public at large, by seeking publicity in the news media. News items such as the holding of the current Conference can be used to introduce influential reports of Amateurs and their activities. Societies should make known to others their success in this field.

Election of Directors.—The following were elected to be Directors: JA1BK, VK3KI, ZL2AZ, and W0DX.

Election of Secretary: VK3IZ.

Next Conference.—Hong Kong under auspices of H.A.R.T.S.

Invitations were extended by three Societies who offered to have the next Conference, namely, P.A.R.A., H.A.R.T.S. and A.R.S.I. After full consideration it was decided to accept the invitation of H.A.R.T.S. for it to be held in Hong Kong.

A Final Point.—As indicated in the provisions of the Constitution it is recognised that all expenses for Delegates to attend Conferences should be borne by their Societies. This decision highlights the special indebtedness of all concerned, first to W.I.A. and now to J.A.R.L. for meeting Delegates' accommodation expenses, which action has assured the success of the two Conferences—a most significant factor in the important formative stage of the I.A.R.U. Region III. Association.

NEW NEW

YOUR I.A.R.U. REGION III. OFFICER IS DAVID RANKIN, VK3QV

NEW NEW

VK2 MID-WINTER V.H.F.-U.H.F. CONTEST

INVITATION

The Contest Committee of the VK2 V.h.f./T.v. Group invites all Amateurs and S.w.l's with v.h.f. and/or u.h.f. equipment to participate in the 1971 Mid-Winter Contest. This will be held during the Queen's Birthday week-end in June. Awards will be made as stated in Rule 5 and scores from all accepted entries count towards the Annual Chairman's Trophy for VK2 Division.

Objects: Amateurs in VK2 and VK1, at home or mobile or portable at field locations will try to contact as many other Amateurs as possible and over as great a distance as possible. They will do this on any one or more of the Australian Amateur bands from 52 MHz. and above.

Date/Duration: Contest starts Sat. 12th June, 1971, 1400 hours E.A.S.T., and finishes Monday, 14th June, 1971, 1200 hours, with rest periods.

The operating times are:—

Saturday 12/6/71—1400 to 2200 hrs. (8 hrs.)
Sunday 13/6/71—0800 to 1100 hrs. (3 hrs.)
—1200 to 2200 hrs. (10 hrs.)
Monday 14/6/71—0800 to 1200 hrs. (4 hrs.)

The Sunday 1100 to 1200 hrs. rest period is for the VK2AWI broadcast.

RULES

1. There are two time divisions for which entries may be submitted: **Division "T"** for the total, or overall contest duration, and **Division "S"** for the best scoring six consecutive contest hours which may, if desired, be broken by one of the rest periods, e.g. from 1900 Saturday night to closing at 2200, then from 0800 on Sunday morning to 1100, is accepted as six consecutive contest hours.

2. Entries may be submitted for either Division "T" (total) or Division "S" (six hours), or both of these, but the winner of Division "T" will not be eligible to also win Division "S".

3. The **various classes** in which participants may enter are:—

Class H—Home Station.
Class M—Mobile Station.
Class P—Portable (field) Station.
Class SWL—Listener, home station.

A station may enter in more than one class if satisfying the conditions: e.g. he could work from home, then go mobile and then portable.

4. Combining the divisions and the classes gives the following different sections available to contestants:—

Section HT—Home, total.
Section HS—Home, six hours.
Section MS—Mobile, six hours.
Section PT—Portable, total.
Section PS—Portable, six hours.
Section SWL—Listener, home, total.

5. Awards will be made to the winners of above sections for each of the following bands: 52, 144, 420/576, 1215 MHz. and above. Entry forms should clearly be marked in the block provided showing bands used in each section. A special prize will be awarded to the outright highest scorer in the whole contest in addition to any other awards the same entrant may win. As well as the awards mentioned, a **merit award** will be made for the best entry submitted by an operator who has held a call sign for 12 months or less.

6. A **Portable Station** is defined as being one at a field location not using normal car antenna and at least one mile from the home QTH of any operator of that station. Use of a.c. mains is permitted, but the station must not be at the shack of another Amateur.

7. A **Mobile Station** is defined as one whose equipment, power source and antennas are wholly mounted in or on the vehicle, which is capable of being driven with the equipment operating. The vehicle need not be moving and it may be at any location. Maritime and airborne mobile score the same as normal mobiles.

8. **Cross-band operation** is permitted as is the arranging, during contest hours only, of contest contacts. For this contest, h.f. bands are not permitted for the arrangement of contest contacts.

9. **Net frequency contacts** score as part of the band containing them and not on an individual net basis, i.e. 6 mx nets score as part of the 6 mx band score, and 2 mx nets as part of 2 mx.

10. Contacts via repeaters or translators can NOT score in this contest.

11. One scoring contact per station is allowed in every one "clock hour" for each band a station can work. One contact per clock hour means one QSO between, say, 1300 and 1400 hours. It is not necessary to wait a full hour to have a second scoring QSO with the same station on the same band, e.g. "A" works "B" at 1259 hours; they may then work again any time from 1300 to 1359 hours, and their following QSO is between 1400 and 1459 hrs. etc.

12. If two stations have a scoring contact on one band then, in the same clock hour have a contact on another band, both these contacts are allowed to score. If only one station can go to the other band and they have a cross-band contact, this is allowed to score but where both stations can go to the other band, cross-band contacts do NOT score. A pair of stations may therefore have several scoring contacts in each clock hour if they use enough bands.

13. In Section SWL, all scoring contacts heard can be logged, the hour rule not applying in this case.

14. **Serial Numbers** must be exchanged as usual before points may be claimed for a contact. The five or six digit serial number to be the R/S report (R/S/T for telegraphy), followed by three digits starting as shown below and increasing by one for each successive contact:—

For all 6 metre QSOs .... start at 601
For all 2 metre QSOs .... start at 201
For all 420 MHz. QSOs .... start at 401
For all other (incl. t.v.) .... start at 001

Note that the numbers for Net QSOs are to be in the same sequence of numbers as for the whole band.

15. From a.t.v. stations the same serial number is to be sent over the video transmission as is sent over the audio transmission.

16. **Logs** are not required, but may be sent in with the entry. If requested, they should be made available to the Contest Committee. Entries are to be set out on the entry form (or a close copy). This enables results and statistics to be extracted quickly. For cross-band contact, enter QSOs under band transmitted.

17. **Entries** should be sent to reach the Secretary, V.h.f./T.v. Group, Wireless Institute Centre, 14 Atchison St., Crows Nest, N.S.W., 2065, by Friday night, 16th July, 1971.

18. **Incentive Rating and Multiplier.** — The various bands and operating possibilities have been broken up into categories for the application of an Incentive Rating, from which an operator can derive the multiplier for each contest QSO. To obtain the multiplier for a contact, take the Rating for your station (from the Rating Table, herewith), **add** it to the rating for the station you have worked and this sum is called the Multiplier. The same Multiplier therefore applies to both stations in any one contact.

19. The **Distance Points** are based on the airline separation of the two stations in contact and amount to one point per ten miles or part thereof, on any frequency. The minimum distance for scoring is one mile, e.g. 1 to 10 miles equals 1 point; 50 miles equals 5 points; 51 miles equals 6 points, etc.

20. The **Score Calculation** for each contact is done by multiplying the distance points by the multiplier, derived as in Rule 18, e.g. a 6 mx net home station (rating equals 1 from table) has a cross-band contact over a 50 mile path with a 432 a.t.v. portable station (rating 10 x 2 equals 20). The multiplier for each of these stations is then the sum of their ratings: 1 plus 20 equals 21. Applying this multiplier of 21 to the distance points gives: 5 x 21 equals 105 score for the QSO, earned by each of these stations. The total score for a division is the total of all the individual contact scores in it.

21. In **Section SWL** the distance points are based on the airline distance from the station heard to the listener's location and the multiplier is the straight-out rating of the station, from the table.

22. From a.t.v. stations the audio channel may be on any band 144 MHz. or higher, the rating being based only on the band used for the video channel.

23. Only **one call sign** may be used from any one station.

24. Each participant must operate within the terms of his/her licence, abide by the rules of the contest, and sign the declaration at the foot of the entry form.

Entry forms are available from **VK2 Division**.

—C. G. Palmer, VK2ZGX, Chairman, Contest Committee, VK2 V.h.f./T.v. Group.

—Eric VK5LP, Vh.f. Sub-Editor.

TABLE OF INCENTIVE RATINGS AND MULTIPLIERS

Rating for Amateur TV (black and white) is video band rating x 2.

CATEGORY	RATING	6 and 2 mx Nets: H/P/M.	52 and 144 MHz. Tune: Home.	52 and 144 MHz. Tune: P/M.	70 cm. (438) Net. Home.	70 cm. (438) Net: Port./Mob.	420 and 576 MHz.: Home.	420 and 576 MHz.: Port./Mob.	1215 MHz.: Home.	1215 MHz.: Portable/Mobile.	2.3 to 10 GHz.: Home.	2.3 to 10 GHz.: Port./Mobile.	21 GHz.: Home.	21 GHz.: Portable/Mobile.
6 and 2 mx Nets: Home/Port./Mobile	1	2	4	5	4	5	10	11	16	17	20	21	23	24
52 and 144 MHz. Tunable: Home	3	4	6	7	6	7	12	13	18	19	22	23	25	26
52 and 144 MHz. Tunable: Port./Mob.	4	5	7	8	7	8	13	14	19	20	23	24	26	27
70 cm. (438) Nets: Home	3	4	6	7	6	7	12	13	18	19	22	23	25	26
70 cm. (438) Nets: Portable/Mobile	4	5	7	8	7	8	13	14	19	20	23	24	26	27
420 and 576 MHz.: Home	9	10	12	13	12	13	18	19	24	25	28	29	31	32
420 and 576 MHz.: Portable/Mobile	10	11	13	14	13	14	19	20	25	26	29	30	32	33
1215 MHz.: Home	15	16	18	19	18	19	24	25	30	31	34	35	37	38
1215 MHz.: Portable/Mobile	16	17	19	20	19	20	25	26	31	32	35	36	38	39
2.3 to 10 GHz.: Home	19	20	22	23	22	23	28	29	34	35	38	39	41	42
2.3 to 10 GHz.: Portable/Mobile	20	21	23	24	23	24	29	30	35	36	39	40	42	43
21 GHz.: Home	22	23	25	26	25	26	31	32	37	38	41	42	44	45
21 GHz.: Portable/Mobile	23	24	26	27	26	27	32	33	38	39	42	43	45	46

To find the Multiplier for a contact, ADD the Ratings of the two stations, OR: In the above chart, select the horizontal row corresponding to the category of one of the stations. Then select the vertical column for the category of the other station. The Multiplier for that pair of stations is the number shown at the intersection of these two lines.

VHF

Sub-Editor: ERIC JAMIESON, VK5LP
Forreston, South Australia, 5233.
Closing date for copy 30th of month.
All Times in E.S.T.

AMATEUR BAND BEACONS

VK0	53.544	VK0GR, Antarctica.
VK3	144.700	VK3VE, Vermont.
VK4	144.390	VK4VV, 107m. w. of Brisbane.
VK5	53.000	VK5VF, Mt. Lofty.
	144.800	VK5VF, Mt. Lofty.
VK6	52.006	VK6VF, Tuart Hill.
	52.900	VK6TS, Carnarvon.
	144.500	VK6VE, Mt. Barker.
	145.010	VK6VF, Tuart Hill.
	435.000	VK6VF (on by arrangement).
VK7	144.900	VK7VF, Devonport.
VK9	144.600	VK9XI, Christmas Island.
ZL2	145.200	ZL2VHF, Wellington.
ZL3	145.000	ZL3VHF, Christchurch.
JA	51.995	JA1IGY, Japan.
W	50.091	WB6KAP, U.S.A.
HL	50.100	HL9WI, South Korea.
ZK	50.100	ZK1AA, Cook Island.
KH6	50.101	KH6EQI, Hawaii.

The Cook Island beacon is included this month although it has been around for some time. Doug VK8KK in Darwin reports hearing it on 4th April with signals 549. The Hawaii beacon KH6EQI appears to operate nominally around 50.100, but reports indicate the frequency varies as high as 0.107. Doug has been hearing it with some regularity in Darwin with varying signal strengths, rising to 589 on 25th April at 1315 hours. It has also been heard by Ross VK4RO and David VK8AU. It is rather a frustrating signal, however, as Doug reports that if you hear the beacon and dial 4323160 in Hawaii, after eight rings or so you are phone patched across the beacon! In this state you can then work yourself? As Doug says, "Just book your trunk call to KH6 and hear yourself come back—am not impressed!" I wouldn't be either! To make matters even worse, it appears there is very little reliable 6 metre activity in KH6, with KH6GRU as the only likely one, and it is not known whether he ever listens on 52 MHz.

Further notes on the Darwin scene are that a six metre beacon will be in operation before long on 52.200. (This is very pleasing information and further details are awaited.—5LP.) Good signals to Bob C21AA many times 5 x 9 plus for hours on end—seems to be a pipeline that way! Seems as though it is double hop F2 at KH6 with C21 on the first hop. HL9WI in South Korea is being constantly worked in Darwin, along with any number of JAs, with signals being as strong as ever heard on TE. The TE starts about 2030 and goes to 2400, and is like this four nights out of five, with all districts except JA7 and JA8. Doug works quite a number on c.w. Plenty on s.s.b., but this mode still in the minority as yet in JA.

Time is short with Doug for continuing much work with MS signals to David VK8AU at Tennant Creek, but reports an improvement in signals since installing half inch foam heliax cable to the beam, which has a loss of 1.8 dB. per 100 feet at 1.8 GHz.)

ACTIVITY IN CANBERRA

VK1DA reports there are about seven stations operational on the non-net sections of 52 MHz., and half a dozen able to use the net channel of 52.525 MHz., but operation is spasmodic. On 144 MHz. there are about five stations with tunable equipment, but the only regular contacts appear to be the skeds between Eddie VK1VP and Alec VK2AAK on 144.100 MHz. u.s.b./c.w. Ten stations operate on Channel 8 f.m. with regularity, plenty not so regular. Charlie VK1CR is working Sydney stations on Channel B with fair success most nights. Keith VK2ZAA at Tumut and Paul VK2AGJ at Young generally are good copy in Canberra. Graeme VK1CG listens and calls on a.m. on 144 and 52, but there are no takers outside VK1, and the boys are beginning to wonder if anybody in Sydney operates in the lower parts of these bands.

Andrew reports it seems unlikely Canberra will have a repeater for the f.m. channels because it would not significantly improve the coverage of mobile stations in Canberra and would be a little help in increasing the coverage between mobiles in his area of the State. The locals therefore are more favourably orientated towards a beacon (excellent news—5LP) and present plans are to operate on 144.475 with 10w. output, solid state, turnstile or big-wheel antenna, approx. 5 seconds of carrier, then 5 seconds of call sign in c.w., on an elevation a little above Canberra.

Finally, it is interesting to note the art of home building still comes to the fore in Canberra where at the recent Convention a competition for home-brew gear was won by Eddie VK1VP with a line up of varactor triplers and filters (144 MHz. input, 1296 MHz. output), and a 576 MHz. converter. Second was Neil VK1ZT with a 1296 MHz. converter and home-brew dish antenna. Third a two-in-one transmitter made by Graeme VK1CG with 52 and 144 MHz. transmitters in the same unit with 6/40 final each.

Brian VK9BB/4 writes from Atherton in North Queensland to say the paragraph in April "A.R." was incorrect in stating he had worked HL9WI along with VK6s, 8KK and 8AU. He has not been active on 6 metres since leaving New Guinea at the end of November. Currently he is using 146 f.m., but the main trouble seems to be his isolation v.h.f.-wise. However, he has been looking at one or two high points on the south-east edge of the Tablelands with a view to entering the Qld. V.h.f./U.h.f. Contest in May, and is constructing a sly-beam for the purpose! Brian is hoping to have some reasonable contacts into Townsville (130 miles from the best local high spot), but so far 146 signals from there are very weak.

RTTY IN VK5

Signals a little different from the usual have been heard on 144 MHz. in VK5 for awhile now, and were finally tracked down to being r.t.t.y. being used by John VK5JE at Pooraka, north of Adelaide. John would be pleased to answer any queries from anyone regarding v.h.f. r.t.t.y., teletype, equipment, etc. To assist in this and in the hope of fostering interest, with eyes across the border to other areas, write to John E. Dunkley, 9 Elva Ave., Pooraka, S.A., 5095.

VHF RTTY NET

Further to the above, John has given a lot of thought to the establishment of an r.t.t.y. net and after discussion with others tenders the following thoughts: Audio frequency shift keying (a.f.s.k.) as this is more suited to v.h.f. operation, and facilitates auto-start, etc., and receiver tuning is many times less critical than f.s.k. as used on the lower bands. He recommends 144.650 MHz. as the net frequency, being located in some of the upper areas of the 2 metre band, and as far as can be ascertained is free of other nets and beacons. (There has been such a net on 146.584 MHz. in VK3 for some two years or more.—Ed.)

METEOR SCATTER

A little more news on this interesting phase of Amateur Radio. Wally VK5ZWW has been successful in establishing contact with Rod VK2ZQJ via MS on 29th and 30th April at about 0615. Signals were considered good when only random meteor were being used, and the contacts have been good enough to record the efforts on tape. So that makes two States for Wally now by that mode. Also in on the act was David VK5ZMO who heard Rod on 30th April. The story leading up to David's efforts arose from a comment following publication of the Contest announced last month by VK8AU when mention was made that only stations with elaborate equipment would get anywhere. Challenged to overhaul his own gear, David set about improving his receiving gear —the result—VK2ZQJ. So one never knows just what can be accomplished until you try; good luck David, you might join the ranks of those making such contacts. Wally reports that around 0600 to 0700 is the best time, particularly for random scatter contacts. He would be pleased to hear from anyone prepared to give it a go, as he is now on the path to attempting worked-all States via MS.

A further note from Wally VK5ZWW reveals there have been three known openings to JA during April, and stations were worked on two of these. He also has a tape recording of signals received from HL9WI in South Korea on 17th April on 50.100 between 1515 and 1545 hours, and the same station was heard around 1830. During a contact with JA1ODA, Wally was told JA2IIY had worked an LU3 on 16th April, but no further news of this at present.

576 MHz. NEWS

Bob VK3AOT stirred up some activity in VK3 on 576 MHz. over Easter. On Good Friday he worked Dennis VK3BDA at home at Mt. Waverley from Mt. Cowley, distance 83.5m., signals 5 x 9 plus; this just being a new VK3 record. Saturday and Sunday were spent in the Grampians on Mt. William. The path to Melbourne was a poor one, signals to VK3BDA on 144 MHz. were only S7 to S9 with QSB. Two-way contact was made on 576 MHz. 5 x 4 both ways, 143 miles. On Sunday morning, Kevin VK3ZKB went portable to Arthur's Seat, 30 miles south of Melbourne, and was contacted at S9, giving S7 in return. Distance 147.3 miles, a record. The previous VK3 record was set in 1949! Bob suggests this is a definite revival of interest in 576 MHz. (John VK5QZ, holder of the present Australian record on 576 is watching with interest!)

Further news from Bob on the VK3 scene shows that the last of the series of field days for the season held during Easter attracted 11 stations into the field. Conditions were poor and the longest contact was on 2 metres over 240 miles. It is good to see that a series of field days can be supported so well, it is difficult to get many stations into the field in VK5 on one day a year!

That very elusive VK2 station, VK2ZEO in Deniliquin, has been trying 432 with Ian VK-3ZDW, but so far no two-way QSO has been achieved. This may be a contact worth looking for by the 432 operators in VK5, giving them another State.

Continuing, Bob reports excellent 2 metre conditions during early April, when six stations from Mt. Gambier worked into Melbourne, and giving some of the lower powered Melbourne boys their first VK5 contacts. Mt. Gambier signals were also heard in Wangaratta and Deniliquin. On Monday night, the Melbourne Night Owls Club members had to content themselves with listening to VK5VF, the 2 metre beacon on Mt. Lofty, at S9, everyone in Adelaide having gone to bed! VK6VE at Albany at the same time was S1, making it the fifth observed occasion it had been heard in Melbourne for the season. The excellent conditions extended themselves to 432 MHz. and Colin VK5DK in Mt. Gambier had contacts with VK3ZDW, VK3ZBZ and VK3YDJ. Also noted that Ron VK3AKC worked Kevin VK7ZAH on 1296 on 3rd April.

As predicted in these notes awhile ago, this autumn was a time to keep a good ear on 52 MHz., and the period around Easter and the following week or so confirmed this. An urgent telephone call from John VK4ZJB in Brisbane gave me the first hint of something to come, when he advised good signals were being heard in that city from Japan for periods up to seven hours, and considered the best openings since 1959. John also mentioned in his phone call that Bob VK4ZRW in Brisbane had heard a W2 on c.w. on 6 metres. A week or so later, John made another telephone call confirming that conditions were still prevailing in VK4, but this time nothing eventuated in VK5. Many thanks for your interest John, it was worth the effort.

Bear in mind the privately sponsored V.h.f./U.h.f. Contest by David VK8AU to be held in July and details of which appeared in the April issue of "A.R."

A new station is operating from Casey Base in Antarctica with call sign VK0PF and Phil is operating on 53.540 MHz. No other details available at this stage.

That's all the news for this month. Closing with this thought: "Someone has defined courtesy as a form of polite behaviour practised by civilised people when they have time."

73, Eric, VK5LP. The Voice in the Hills.

NEW NEW

AMATEUR TV TRANSMISSIONS

Vision Carrier Frequency
National Standard
426.25 MHz.

NEW NEW

DX

Sub-Editor: DON GRANTLEY
P.O. Box 222, Penrith, N.S.W., 2750
(All times in GMT)

It is very pleasing to note quite a large increase in the numbers of letters arriving at this QTH, most of which have been from the VK4 gang. Many thanks to all who have taken the trouble to write.

The most interesting development in the past weeks has been the upsurge of activity on 40 metres, and according to George ZL2AFZ, 80 also. Maybe it's because 20 has deteriorated and sent the DX down to the lower bands, or that the lower frequencies have improved. Regardless of the reason, the result is that much really good DX can be heard and worked on these two bands.

I have no actual reports of stations working on 80 at the time of writing, however I do have some good reports from 40. Mac Hilliard listening at Campsie, a Sydney suburb, reported a nest of South Americans and others on 40 s.s.b. a few nights ago, among them were PY5, CO2, LU7, CE3, 6W8 and KL7. George ZL2AFZ lists 7X2, VO2, UF6, UA, OY3, KL7, JA, GD3, CN8, KX6, VP2AA, MP4, VP2VI, VP2GLE, CR4, EA8, OA8, YN, EP2 and many others active on 20, but at the same time CE, CO, CE0, PJ, UI8, UL7, UO5, VO2, YA, YN, ZS5, KZ5 and HI plus many Ws and VEs were making life interesting on 40 metres. I personally logged KL7, VE, W, JA, UA0, U5ARTEK, YU, LZ, HA, EA, SP, UF6, DK and G in one brief session on 40.

George ZL2AFZ reports a steep decline in the sunspot numbers, and lists the following figures: March 1969 the figure was 108, March 1970 93, March 1971 70 was the predicted count, whilst figures for next March are estimated at 48, for 1973 the estimation is 33, 1974 should be 20, going down to 10 the following year.

If you worked JD1ABX or ABS from March 17, please forward your QSLs with SAE IRC to Nob Itoh, Box 7, Aobadai, Yokohama, 227, Japan. The stations were active from that date for a short period, and were located on Hahajima Is., formerly Bonin Is.

ZL5AX is occasionally active from the ZL Antarctic, using 14020 at the week-ends. His operating times are dependent on official duties, but he has been noted at 0300z.

Two notes to hand, one from VK5KO, other from VK4VX re the activity of 3B7DA on St. Brandon. Firstly, Reg VK4VX passes on the word that Alex will be going to Rodriquez in June, but to date no further information is available. Secondly, it appears that Alex wants QSLs for contacts made with the VK boys, and John VK5KO asks me to make it known that if any VK wants the 3B7DA QSL, forward plus a stamped addressed envelope to him, John de Cure, 10 Portland Ct., Fulham, S.A., and the card will be sent to you when received from Alex. Should you want to send it direct, the address is Alex Mootoo, 3B8DA, 39 Brown Sequard Ave., Vacos, Mauritius, Indian Ocean.

The following comes from Alf VK3LC who passes on this information received from K6KA: Larry VK9NP, who is ex-K2IXP, has left Townsville for Melissa Reef and will be operating from there for some time. The operation has been approved by the A.R.R.L. as a new country.

DL7FT will leave Berlin on May 24 to operate from an hotel in Albania using the call sign ZA2RPS. He will operate until June 7 with a 3 element beam using the following frequencies: c.w. transmit 14005 and 21005, receive 14050 and 21050. Transceive on 28050. On s.s.b. he will transmit on 14195 and 21245, receiving on 14250 and 21300. He may transmit also on 14185.

ZM7AG is on almost daily for Ws using 14217, and for others on 14180. Usually comes on at 0400z, remaining on for an hour and sometimes much longer. His name is Jim Sheedy and as he is a school teacher he will be there for some time. (Further to Alf's note, there is a memo in Geoff Watts bulletin of Mar. 17 reporting that the International DX Assn. were sending gear to a school teacher at that location, so if this is the case, the QSLs will go to that body.—Don, Sub-Ed.)

Finally Alf reports that VR5DK is due on from mid April for an unknown time, FR7ZU/T will be active for two months from Mar. 14, XW8AX will operate from Cambodia for the next two months or so, and VS9MM is a newie on the Maldives.

Two long and interesting letters from John VK4QA, of Woody Pt., Qld. John has been very active and since March he has listed the following as worked on 20 mx: FG7, PJ, KR6, OE, M1B Mario whose QSL manager is WA3HUP and whom I believe will QSL via the bureau. F, PA0, JD1YAA (via J.A.R.L.), KG6JC (via (W2RDD), UK5, HA5, PJ9VR (Box 383, Curacao, Neth. Antillies), YO, 8P6, ZC4, 5W1AH (QSL to VE7BWG), FO8CK (who speaks only French), IS1, MID (QSL to I1MKN, VP8, VP2GBG (QSL VE3DLC), HC, CR4AJ, EA8, 5H3, ON4, PZ9AA Willy (QSL to Box 1810, Moengo, Surinan or the bureau). John also worked Guy VE8MD, whose exact location is in Zone 2 on Isachsen Isl. in North West Canada, 200m. north of Magnetic Nth. Pole and about 600m. south of the Georgraphical North Pole.

In passing, John mentions that VE7WT has been having trouble getting QSLs from rare VK stations in the VK9 and VK0 call areas. QSLs have been sent to managers and direct to the stations concerned to no avail. Personally, I find this hard to understand. I have never missed out on a card from the VK0 area and to date most of my VK9s have replied. In fact I have found the VK9 boys most courteous and helpful, and I suggest that VE7WT has tried the wrong ones.

Mentioned earlier that Larry VK9NP had gone to another QTH, but his Norfolk Is. QSLs can go to K3RLY, 35 Allview Dr., Ellicott City, M.D., U.S.A.

Clipperton Is. has again emerged as a strong possibility, with FG7XT hoping to take a KWM2 and tribander there in the spring, and F2QQ hoping to make it this month (April). I prefer to wait and see, as this one has been the basis of far too many rumors.

JY has been in the news sheets far more than any other country over the past twelve months and it is now reported that King Hussien JY1 is often in the Arabian net with ST2SA, SU1MA, YK1AA, etc., on 14200 s.s.b. at 0630z. JY1/B skeds WA3HUP 21350 on Sat. and Sundays at 1600z, whilst JY2 Princess Muna is often on 14250/300 at 1700z. QSLs for all three now go to Mary WA3HUP.

Finland Postal Authorities have now stated that all operation from Market Reef must use OH0 prefix, and the word is that the country has been deleted from the DXCC list.

Still a lot of activity from the VP prefixes, VP2EQ on regularly from Anguilla, QSL to WB2ZMK; VP2EZ from the same location until May 1 has WA9VOL as manager; VP2MY was due to go QRT from March 5, and all QSLs for his operation should go to W1IXL. VP2LG has been operating on 28580 of late and his cards should go direct to Box 230, St. Lucia. Also active from there is VP2LT. VP5JA was the call used by the W4s who went to Turks and Caicos during March 27 contest week-end. QSL manager for the operation is K4DSN, Howard Kelley, 6563 Sapphire Dr., Jacksonville, Fla., 32208.

The WA5UHR Golden Microphone of the Month award for QSL manager of the month of February was awarded to KH6GLU, Ed de Young, who is well known for his handling of the Pacific and DX Net, and the QSL chores connected with it.

The special prefixes PP, PV, PW and PX were made available to PY stations during the WPX contest on the week-end of March 27. QSLs for any station using one of these prefixes should go to their PY call.

Another special station was WC4SFF, which was operating during February of this year at the South Florida Fair. The QSLs should go to Box 461, Lake North, Florida, 33460, U.S.A.

Kevin ZK1BM has been in the Pacific Net on occasions, and all his QSLs should go to W7VRO who will also handle cards for ZK1CE after 23/2/71.

With reference to the QSL managers living in the States, I get quite a lot of letters asking for the QTH of these chaps. Unfortunately I do not have an upto date W call book here, and I am unable to help. My call book is about 10 years old, and as well as being obsolete in the usual sense of the word, it does not carry the zip codes without which letters are often returned. As mentioned earlier, I have the DX News sheets from Geoff Watts covering the last two years and can pass on any information from these. But U.S.A. calls, I can't assist you with.

CR9AK was due to be activated by a JA over the WPX week-end and the following two days. The operator was JA1AEA, Jim Suzuki, 6-9-14 Kanamachi, Katsushika, Tokyo 125, Japan, to whom all QSLs should be sent.

The current operation from FM7WN which seems to be on all bands at any old time has DJ9ZB as general QSL manager, whilst K2KGB will handle QSLs for the American gang only.

From San Andreas we have some QSL information, firstly the current HK0BKX operation has WA6AHF as manager, whilst the QSLs for the operation over the last week in Jan. are a little more complicated. K9CQV and W9UCW both operated as /HK0 and their manager is W8GDQ. The other two using the HK0 suffix were K8HKB and W0KUS, and in each case the cards go to the home call.

Three more prefixes for the WPX week-end, HU0A was YS2CEN on 14 s.s.b., QSL to WA8TDY. HW6KAW was a special operation by F6KAW, QSLs to Radio Club DX d'Ivory, 9 Rue St., St. Just, Tour F 94 Ivry-sur-Siene, France. The IC prefix was due to be used on April 12 by IC1AA, SEZ and ZGY from S. Pietro Is. QSLs to DXOTC, Box 143, Palermo Sicily, plus three IRCs.

Further to the operation from Navassa Is. from Feb. 8 to 12 by W0EXD/KC4, it has been confirmed that the QSL chores will be handled by W4OHP.

Some stations currently operating from U.S. islands in the Pacific are KG6SI, QSL to WA6AHF, and KG6SW, QSL to W7YWX, both on Saipan in the Marianas. Geoff Watts newssheet lists KG6SW as having W7YBX as manager and is probably right. KC6WS is on Yap in the Western Carolines, QSL to the operator's home call W3FDP. From Johnston Is., WB6MQB/KJ6 is active, manager being WB6HDG. WA1ARF/KS4 is listed in the Long Is. DX Assn. bulletin as being active from Swan Is. where they are working. The operation is not a DX-pedition, and they are only on when their work schedule permits. QSLs go to WA6MWG.

MP4MBB has regular skeds with MP4BHH and K4MQG on 14240 s.s.b. at 1230z on the long path to U.S.A. He is in the British Commonwealth Net on 21354 daily at 1430z, and accepts skeds via his QSL manager G3LQP.

9M6HM is shortly due to return home, but if you want a contact with him, try via his QSL manager K6ZIF, he is often around 14030 or 21030 c.w. only. In the same direction, 9M8OEA Chuck has been reported in the States on 14200 and 240 s.s.b. His address is Box 795, Kuching, Sarawak.

There has been recent activity from Comoro Is. during the French contest, FH8CY, Box 438, Moroni; FH8CG, Box 135, Moroni; and FH8CE, Box 289, Moroni, being the main stations.

FR7ZP/E from Europa, name Maxime, has a daily sked with JA0CUV/1, probably on 14195 at around 1300z, but reports from the States say his signal is very weak.

The ID1 prefixes used over Mar. 19 to 21 are valid for Islands of the Air Award, Prefix Hunters, and Worked Italian Islands. The islands are situated in the Southern Adriatic Sea between YU and Italy and do not count as a separate country. QSL arrangements for the ID operation say send cards to I1BUP, another says send to I1BGJ, and another says either. So take your pick on this one. If you are not in a hurry and want to use the bureau, send them via the I.S.W.L. Bureau in England, or if you prefer, send them to me and I will mail them on, as I have a regular despatch to that Bureau.

Recently TJ1AW operated from the Cameroons during an important contest. During his activity on 10 metres c.w. he was reportedly subjected to much deliberate QRM as were many other rare DX stations who happened to be in demand. This is just another one of those unpleasant chapters which happen when a mob of jealous incompetent operators who are quite incapable of operating a station do their utmost to prevent the other chap from doing his best. It is not confined to contest operation or DX chasing either. Many of these louts forget that an experienced operator can more often than not identify a signal, and by this I mean a c.w. signal, and if they regularly listen around the bands it won't take long to identify the offenders, unless of course the troublemaker is a pirate. Once identified, the only action as far as I am concerned would be to blacklist him. This is a term which I don't like, but when our pleasure is being ruined by a lot of selfish characters, then drastic action is the only answer. The basis of the above comment is taken from the Long Island DX Assn. bulletin.

YO4WU and YO4UJ, Sever and Maria Diaconu, now have a stateside QSL manager, WB2TSB, R. Tygar, 5 Chelmsford Dr., Wyandanch, N.Y., 11798, U.S.A.

Finally, and to clarify any misunderstandings which may be floating around, I have resigned from the VK2 Division after having been a member of it since 1957. The reason is personal, but as a result of this, it is only fair that I should cease to write for this magazine, and the Editor has been notified accordingly. I have indicated, however, that I am prepared to remain on the job until a suitable replacement becomes available. I stress the word suitable, as there is a lot of work involved, also I feel that despite what the individual Divisions think about work on "A.R." being spread over the various States, the various Sub-Editors should be situated in the same State as the magazine. This would obviate any unnecessary delays due to mail hold-ups, and also have the Sub-Editors in close contact with the general Editor. 73, de Don.

Overseas Magazine Review

Compiled by Syd Clark, VK3ASC
and R. L. Gunther, VK7RG

FEEDBACK

Relevant to the review published in the April "A.R." for "Ham Radio," Jan. 1971, in my haste to defend antenna couplers I overlooked something important in WB2GQY's article, "Inexpensive SWR Indicator". I wish to comment on it here, because of some important principles involved.

In that article a primitive "SWR Meter" is supposedly obtained by a detector fed from a loop slipped around co-axial cable. The loop is run back and forth along the co-ax, supposedly to measure the distance between standing waves.

Unfortunately for this cunning idea, standing waves in a co-axial cable are confined to its inside surfaces. It is most dubious whether this can, as the author suggests, be reflected by a kind-of leakage or induction to the outer surface of the braid—thereby to be picked up by his loop.

Any such outer-surface v.s.w.r. would be a function solely of antenna unbalance, with the principal consequences of distortion of the antenna pattern, and of radiation from (and pick-up by) the transmission line. The cure is simple: use a suitable balun. This subject was discussed at length in 1968 issues of the "Australian EEB"—and so I certainly ought to have spotted the error sooner!

It is not sufficiently appreciated that antenna matching involves two variables: matching the line to the antenna (or conversely), and matching the transmitter to the line. If the line is not terminated in its characteristic impedance it will develop standing waves. As W5JJ has pointed out in recent Amateur literature (e.g. "EEB" April 1971), these will have relatively little consequence for v.s.w.r. less than 5:1 at frequencies less than 30 MHz. in terms of power loss, but they do complicate transmitter matching by presenting it with an indeterminate reactive load. Thus the usefulness of the antenna coupler becomes evident, which acts also to filter harmonics even in an ideally matched system.

Aside from the over-rated role of s.w.r. at h.f., the fact still remains that s.w.r. readings from a directional coupler (reflectometer) type bridge can be misleading (as discussed widely during the past few yeas). In addition, optimum antenna-to-line matching depends on a depressingly large number of difficulty controllable variables—as discussed most interestingly in the October 1970 issue of "Spectrum" (N.Z.), in the article "SWR 1:1, Fact or Fiction".

The answer to proper antenna matching is, of course, the use of suitable instrumentation, e.g. the Antenna Noise Bridge ("QST" 12/67, "H.R." 12/70), r.f. bridge with slotted line ("H.R." 10/70), or "Antennascope" type of insertable r.f. bridge (Orr Radio Handbook). See also "Comments" in "Ham Radio" of November 1970 with a very interesting exchange between a correspondent and an author on the real meaning of reflected power.—VK7RG.

AUSTRALIAN EEB

December 1970—

FET Conversion of BC221 Heterodyne Frequency Meter, I. N. Kallam, VK3. Useful information of great interest to those without instruction books.

A C-D Ignition with Automatic Changeover, T. Vieritz, VK4. Said to add zest to tired motor cars.

Commonsense Transmitter Loading, C. C. Drumeller, W5JJ. If your transmitter does not load properly, this is for you.

February 1971—

A Tachometer for Capacitor Discharge Ignitions, VK7ZAR. More on "solid state" systems for motor vehicles.

A Nice Phase-Modulated Two Watt Two Metre Transmitter, L. Osborn. Small, neat and tidy.

A Sythe-Stone Zener, T. M. Palmer, VK2. This worried me for a while and then I realised that I would spell it Scythe. It seems that silicon carbide sharpening stones have zener properties.

The Use of Avalanche Diodes, VK7RG. An interesting dissertation on diodes and a means of checking unmarked units.

BREAK-IN

Jan.-Feb. 1971—

The Christchurch VHF Repeater. All valve job, neatly packaged.

R.S.G.B. Two Metre MOSFET Converter. ZL3TAU tells how they made this a V.h.f. Group project.

Solid State Quick Check, ZL3TAT. Tells the user whether or not the transistor junction is okay or not. Naturally it also checks diodes. In or out of circuit, powered or unpowered.

March 1971—

Direct Reading Capacitance Meter, ZL2ADE. Reprint from "H.R." Apr. '70. Covers 0-10 pF. and 0-1 uF. in six ranges with linear scale. Accuracy claimed to be plus or minus 5%.

Transistor Checking with an Ohmmeter, ZL-2AHP. Identifies the types, silicon or germanium, NPN or PNP and checks which lead is which.

Teleprinter Equipment Speed Control Data, ZL2ALW. How you can do something about getting your teleprinter operating at the correct speeds.

CQ

November 1970—

Electronic Keyers—1970, W4MXK. Modern IC circuits of simple and iambic keyers for use in keying transmitters. A 2N3440 transistor is used as the keying element. Stated to be suitable for grid block or cathode keying.

The LSD (Lightweight, Study, Discone). An omni-directional v.h.f./u.h.f. antenna.

Review of Drake SPR-4 Com. Receiver, by W2AEF. Described as "a versatile solid state job for operation with a.m., s.s.b., c.w. or r.t.t.y. on 24 selected 500 KHz. segments in the range 150 KHz. to 30 MHz.

A Simple D.C. Voltage Dropper, W2FEZ. Using a six-volt tape recorder from a 12 volt battery.

Evolution of the Decibel, Part 2, K2BZ. The concluding article in a two-part series describing an every-day approach to understanding the "decibel".

Improving the Eico 753 Transceiver, W3CWV. Some of these were sold in VK so there may be men who are interested. The power supply offers regulated rx/tx 250v. h.t. The National NCX-A power supply is similar, but without the regulation.

December 1970—

A Solid State Comm. Receiver, I1TDJ. FET front using TIS34s, tunable i.f. on 3.5 MHz. followed by mech. filter i.f. on 250 KHz. Uses Command set parts in tunable i.f.

An Inexpensive Utility Antenna for 80 Mx, W6SAI. Simple certainly!

A Digitally Divided Frequency Standard for Lab. or Receiver, W7FZU. Using four Motorola ICs, this unit gives outputs on 1 MHz., 100, 50 or 25 KHz. and 5 KHz. Signals are stated to be readable up to at least 100 MHz.

In Defence of CW, W9EG. Should be read by all who feel that it should be dropped as a requirement for Amateur status.

Keyed Solid State Oscillators, Di Ming Lee. Transistors also drift, the reasons for the drift are different and it can be minimised. Here's how!

An AZ-EL Antenna Mount for Satellite Tracking, W2AEF. Uses two R.C.A. rotators, one on each axis. The rotators are sold here by R. H. Cunningham & Co. under the brand name "Stolle".

An FET RF Attenuator, W2EEY. A useful device to avoid receiver overload effects due to strong signals. One of the circuits in Fig. 2 lacks a return path leaving the 5 to 9v. battery "up in the air".

Improving the Ham-M Rotor Indicator, by VK9GN. The use of a simple voltage regulated supply keeps indications "on the beam".

January 1971—

QSK with the Heath SB-Series Equipment, K4DC. True break-in operation is not only desirable for high speed c.w. rag chewing, but is a must for fast, efficient traffic handling. Simple modifications enable such operation without sacrificing ease of operation in the s.s.b. mode.

F.M., K9STH/5. An introduction to the joys and frustrations of this mode.

Crystal Calibrators, How Solid is a Rock, K3STU. Understanding how to calibrate a calibrator and check it periodically, ensures that it will keep you where you wish to be in the band of your choice.

The Mono-Loop Triband Quad, VK2AOU. Operating principles and two element quad construction details.

Sunspot Cycle 20, Progress 1970, Prediction 1971, W3ASK. Enables you to decide the most productive operating times and arrange, in advance, to be there.

An Aural Diode Transistor Tester, W2EEY. This tester provides a simple aural indication of resistance values so one can concentrate on the components being measured without the interruption of having to examine a meter scale every time a test connection is changed.

February 1971—

An Introduction to VHF FM. Sub-titled f.m. techniques for non-f.m'ers, W6HPH/G. F.m. offers several significant technical advantages over conventional a.m. and some over s.s.b. The author describes the merits of f.m. and the construction of two accessory devices to receive and transmit f.m. on the v.h.f. bands.

F.M., K9STH/5. Feature.

Calibrating FM Deviation, VE2AQX. Describes the Bessel Zero Method of calibration which is an absolute method of calibration.

The Table Top Maxi Linear, W6EI. A 3CX1000A7 for 80, 40 and 20 metres.

OHM—The Oriental Ham Magazine

Nov.-Dec. 1970—

This is a racy little magazine which is published in Hong Kong and is usually filled with pictures and jottings about the goings on in Asia generally. This issue carries the news under "JA Govt. Bends" that Japan is likely to approve reciprocal licensing in the near future. No doubt this will boost her image.

Watch Those Cards, ZM2AFZ. Discusses the difficulties of getting cards from rare countries and methods of achieving the near impossible. Of course, if you were one of two or three Amateurs in some countries perhaps you might feel the problem is yours in coping with requests.

The technical content is **"The G5RV"** by G5RV. Many Amateurs know this antenna quite well as it allows all band operation with one antenna from a location of limited extent. Do VKs know that G5RV is now VK9LV?

January 1971—

Electronic Keyers, VS6AM describes a simple unit using a single transistor and about a dozen other components. Operation is from a 9v. battery.

The balance of this issue is given over to stories of various happenings from here and there, mainly in the Orient.

QST

November 1970—

An Advanced General Coverage Amateur Receiver, W6BD. A very interesting specification for those who still have stocks of tubes they wish to use.

160-80-75 Metre Broad Band Inverted Vee Antenna, W2PV, who offers his analysis of how the system operates and shows how to construct a practical two band version of this effective antenna.

A VFO for 80 Through 10 Metres, Di Ming Lee. Here is an idea article showing how to use varactor and PIN diodes to tune and switch a variable frequency oscillator.

A 3-500Z Grounded-Grid Amplifier for 50 MHz., W1QVF and W1HDQ. Simple high power for owners of medium powered exciters.

A Station Control Unit for the Blind Amateur, W1ICP. The first integrated control unit for the blind. With it the handicapped Amateur needs only rx, tx and antenna.

December 1970—

A Second Generation MOSFET Receiver, by W7ZOI. Those of you who are seeking a modern design should be interested in this one. Single conversion, MOSFET mixer with 9 MHz. i.f. and 5.5 MHz. local oscillator using Command transmitter components. A compact and sensitive receiver for 80 and 20 metres.

An Attenuator Box for Audio, W2HG. Very useful for measurement of amplifier gain and other audio jobs.

Some Notes on the Design and Construction of Grounded-Grid Linear Amplifiers, W1KLK and W1ETU/4. If you have a spare 3-1000Z doing nothing you can put it to work. There is a second version using a pair of 3-500Zs for good measure.

A Wide-spaced Multi-element Tribander, W1FBY. Measuring 35 ft. 6 in. along the 20 mx reflector and 25 ft. plus on the boom, this is quite a lot for an antenna raising party to handle.

Spakey, K8ORD. A controlled-space IC keyer.

A High Output VFO for a Beginner's Transmitter, WA3EOK. Output is on 3.5-4 and 7-7.3 MHz. Includes a 2w. amp. and broadband r.f. transformer. Solid state.

Midlatitude Intense Sporadic-E Propagation, W1DEI and W2BOC, Part 1. Causes and results. The result of observations made since the 1930s.

Recent Equipment: The Drake SPR-4 Receiver, W1KLK. 500 KHz. to 30 MHz. in bands 500 KHz. wide. In standard form it covers broadcast and international short wave broadcast bands. Obviously, if you wish to fit appropriate crystals it will cover any of the other segments also. I.f's are on 5645 and 50 KHz.

January 1971—

More Thoughts on Solid State Receiver Design, W1CER. Here are some ideas which should interest the v.h.f. man who wishes to operate 10, 6 and 2 mx while using a single piece of receiving equipment. The up-converting technique described in this article permits coverage of the h.f. bands from 160-15 mx plus WWV and provides birdie-free reception by using oscillator frequencies which fall above the tunable i.f. range of the main receiver.

Receiving F.M., W1KLK, Part 1. Basic principles and circuits.

The Compact-A-Test, G5PP. A complete test instrument for the Amateur station.

The Morse-A-Verter, W7GHM/4. This device will enable a teletypewriter to print characters at any speed from 5-60 words per minute from hand or machine sent morse. All solid state. (Seems to be a much more practical item than the much older valve types which were offered commercially a few years ago. Mate one of these with a typewriter keyboard type keyer and anyone could beat the code bogie.)

Five for Five, K4MI. A simple two element "shortened ZL-Special" designed for a centre frequency of 14.175 MHz.

PEP, Average Power, and Related Matters, W4PPB. Explains the meanings of the terms and how they are related.

Ham Radio Broadens Horizons for the Handicapped, W0QXA. Describes how many physically handicapped people can gain great benefit from Amateur Radio.

CW Communications for the Deaf, WB2KJI describes a small device made by Western Electric to enable deaf people to know when they are being called by phone.

February 1971—

Quad v. Triband Yagi, W4FRU. Performance comparisons between these two popular antennas.

Quick and Easy Portable/Mobile Reception, W1CER. A new twist to converters, operating into a "squark box".

Receiving F.M. Part 2 of W1KLK's article. Describes several f.m. receiving adaptors for use with communications receivers and reviews a number of new f.m. discriminator designs.

New Ideas for the Two Metre Kilowatt, by W1QVF and W1HDQ. Easy to make tank circuit with an improved tuning device. Tubes used are a pair of 4CX250Rs in push-pull.

Integrated Circuit Flip-Flops, WA6KGP. The author describes the various types of Flip-Flop and tells the reader who makes them.

The ATR-166, K1RPB. Part 1 of a two-part article describing a home made transceiver for 160 to 6 metres, with provision for v.h.f. transverters too. It is a valve design.

A 15 Metre Beam "On A Budget". W7PDT tells how he constructed such a beam from split conduit. Total cost is stated to have been $15.

March 1971—

The Editorial this month deals with the "Ups and Downs" in Amateur Radio in U.S.A. The writer seems to think, and provides figures to support his claims, that Amateur Radio is growing once again.

A Bearing and Distance Calculator, KL7EVO. Describes a method of calculating both bearing and distance to ensure that your signals are most likely to produce the results you require.

Converting the HT-41 for 572-Bs, W4DWK/W1CQS. If you have an HT-41 and it has gone through the 7094s here is an answer to the tube problem.

A 75/80 Metre Vertical Antenna Square Array, W2PV. So you can aim those lower frequency signals.

An F.M. Pip-Squeak for Two Metres. W1CER describes a two watt, solid state transmitter using four transistors.

A Ten Watt One-Tube Transmitter, W1ICP and W1NPG. Using a 6T9, this is designed for the c.w. newcomer to Amateur Radio.

I.T.U. I.T.U.

TOM CLARKSON, ZL2AZ

will be attending the World Administrative Space Conference in Geneva this month on behalf of I.A.R.U. Region III.

International Telecommunications Union

Receiving F.M., Part 3. W1KLK on basic principles and circuits. An IC receiver is described.

A Solid State SSTV Monitor, W9LUO. A magnetically deflected s.s.t.v. monitor that provides good picture quality and stable performance. Tube is a 5FP7 and e.h.t supply is of the pulse type.

A Field Day AC Power Monitor. K1PLP describes a unit to read frequency and voltage.

The ATR-166, K1RPB. Part 2 covers the fabrication and alignment of the unit.

Curtis EK-39M Memonic Electronic Keyer, K1PLP and W1FBY review this unit for making c.w. easier to send. Sells in the U.S. for $180 or $240, depending upon whether or not you buy the custom memory with it.

Midlatitude Intense Sporadic-E Propagation, W1DEI/W2BOC. Part 2. Here the author shows how Es clouds can be tracked from oblique propagation data reported by amateur observers and plots cloud sources and movements.

Amateur Space Communications — A Status Report, WA2INB and K3JTE. Up to date information on what is happening in the Amateur satellite world. (Includes picture of VK3KI.)

RADIO COMMUNICATION

January 1971—

Trapezoid Modulation in Amateur Transmitters, HA8WH. In recent years a new type of modulation, trapezoid modulation, has been used in a.m. s.w. broadcasting. The method is investigated and ideas given about employment on main bands.

A VFO for 2 Mx with a Pye Cambridge, G3YFZ. Uses an MPF106.

The One Transistor Wob-bulator, G3XGP. If you already own a c.r.o. this will enable you to quickly align any receiver i.f. to which the oscillator will tune.

Microwaves, 1,000 MHz. and Up, G3RPE. The arguments of horizontal versus vertical polarisation in the s.h.f. regions.

Flare-Spot, Part 2. G3BGL tells how the gang was rounded up. A story about reflection of radio (t.v.) signals from aircraft in flight.

Technical Topics, G3VA. Subjects discussed by Pat this month are: Double-balanced cross-coupled mixers, improved bipolar v.h.f. tuner, reciprocal mixing, intermodulation responses, batteries, continuous stand-by power source, amplified zener, parametric-mode frequency multipliers, transequatorial, auroral and propagation miscellana, suppressed zero voltmeter, proportional temperature control, slow scan t.v. activity, and here and there.

SHORT WAVE MAGAZINE

January 1971—

The Trio JR-310 Receiver, G3DNF. Reporting on an addition to the well known range with some ideas and suggestions.

The Antennascope. Useful test instrument. This is a type of radio frequency bridge which is extremely useful for antenna work. It was originally described in "CQ" if my memory is correct and the circuit is also to be found in recent editions of the "Radio Handbook".

Selectivity for CW Reception, G6HL. Getting really sharp performance. The author uses a mixer after a 455 KHz. i.f. and converts to 30 KHz. to get really sharp selectivity for c.w. work. Strangely enough, one of the more recent German communications receiver designs converts directly from signal frequnecy to 30 KHz.

Mod for the AT5, G3TYJ. This small transmitter is not known in Australia. The author's modification tapped the pi network tank coil so that there was only one 160 or 80 metre Amateur band within the tuning range of the tank capaictor.

Experimental Aerial Tuning Unit, G3OHK. A matching network for vertical aerials.

Extending Use of Beams, VK5WD. Modification methods for multi-band operation. Using a beam on a band for which it was not designed.

73

March 1971—

Integrated Circuit Audio Filter, W2EEY/DL. Miniaturisation reaches audio filters. All functions are achieved by capacitances alone, at about $30 a pop. The Feb. "Ham Radio" goes one step further in describing capacitance-derived circuits which actually simulate inductances by "gyration" or controlled-phase-shift inversion.

Integrated Circuit 6 Metre Converter by WB4KMB. No neutralisation needed, and gives better gain than valves or FETs. Connect eight terminals and you have constructed a converter.

Trap-type Vertical Antenna, W2EEY. Commercial centre-loaded h.f. antennas can be used on 2 mx by adding several tuning stubs to improve phasing (for optimum pattern) and matching.

Resurrecting a Grand-daddy, K6BIJ. This chap reckons he has discovered the direct conversion receiver, variation using crystal diode mixer. He has the germ of a fine idea, but he has omitted a few important details, beware! See "EEB" April 1971.

Digital Frequency Counters, W0LMD. How to do it.

Identifying Surplus Electronic Equipment, W6DDB. An index to the coding used in such equipment. Could be quite useful when needed.

The Horizontal Output Linear, W2AOO. Six t.v. valves in parallel.

Repeater Audio Mixer, W1ELU. Uses an IC and three FETs.

Something New in PC Construction, K6MVH. The use of self-adhesive metal strip; what is "new" appears to be the fact that this "kit" comes with the holes already drilled. Could be quite convenient if a lot of ICs are to be used and if you dislike work. A much cheaper and more versatile substitute for p.c. technique is the use of Sellotape Copper Foil No. 842, as described in the Feb. "EEB".

Reading 5-Code RTTY in Binary, WB2MPZ. A useful method of reading the character directly from the paper tape of a teletype punched tape.

The Coat-banger Ground Plane, K6MVH. The useful (?) part of this article is the interesting suggestion that when a ground plane is mounted on a mountain, a lower useful angle of radiation can be achieved if the ground plane antenna is mounted upside down, so says the author. Wonder what it would do at sea level.

Reducing Mobile Noise, VE3FGS. Run a separate by-passed power lead, and use a relay.

☆

AUSTRALIS BALLOON FLIGHTS

(Continued from Page 17)

It is hoped that several channels of the RTTY telemetry system can be flown on one or more of the next series of HIBAL flights, which will probably occur in June or July. Details of these proposed flights will be put on the VK3 and VK5 Divisional broadcasts early in June. Unfortunately, the present balloon launching site at Mildura does not permit other Divisions to actively participate in these balloon flights, but it is hoped that they will continue to follow the flights with interest—they are, after all, relatively short range tests and demonstrations of greater things to come with the satellite.

The prototype telemetry unit for AO6 was shipped to the U.S.A. (A.M.S.A.T.) during April for testing. Work is proceeding on the translator units.

Some of the Divisional Co-ordinators are: N.S.W., VK2RX; Qld., VK4ZGL; and S.A., VK5NZ.

☆

CALL SIGNS

(Continued from Page 13)

VK3AWO—A. W. Oakes. Deceased.
VK3YEE—E. R. Russell. Now VK3BER.
VK4GK—A. H. McKenzie. Not renewed.
VK4HR—H. Sholz. Not renewed.
VK4JB—O. E. Alder. Not renewed.
VK4LS—L. B. Simpson. Not renewed.
VK4RY—W. L. Hartson. Not renewed.
VK4ZDF—D. G. Hopkins. Now VK4ZF/T.
VK5KR—V. M. Reeves. Not renewed.
VK5PN—W. L. Pearn. Not renewed.
VK5RE—H. H. Hobcroft. Not renewed.
VK5TV—A. T. Brumhead. Not renewed.
VK5UW—R. F. Daniels. Now VK2ADA.
VK5ZBP/T—A. W. Pierson. Not renewed.
VK5ZBT—A. F. Raftery. Now VK5BW.
VK5ZRZ—W. S. Baynes. Transferred to N.S.W.
VK5ZSW—R. H. Whellum. Now VK8ZSW.
VK5ZWM—W. D. Moulton. Now VK5WS.
VK6DJ—W. D. Jackson. Not renewed.
VK6ZAM—G. E. Maxfield. Not renewed.
VK6ZFS—N. D. Stephen. Now VK6ND.
VK7DC—D. H. Clifford. Not renewed.
VK7KM—K. G. McCracken. Transferred to Vic.
VK7ZPW—P. G. Waterhouse. Now VK3ZPX.
VK8JM—J. P. Meehan. Transferred to N.G.

"CQ" AWARDS

Amateurs are advised that applications for the "CQ" Awards can no longer be checked by the W.I.A. Federal Awards Manager. Due to an ever increasing work load for local and overseas awards, it is not possible to devote time to the "CQ" awards which are of a commercial nature. To enable more time a be devoted to official Amateur awards, checking of "CQ" award applications has had to cease.

Anyone wishing to obtain information in relation to the "CQ" awards should contact that organisation direct at the following address: 14 Vanderventer Ave., Port Washington, L.I., N.Y., 11050, U.S.A. Application blanks, etc., are no longer available from the Federal Awards Manager W.I.A.

W.I.A. V.H.F.C.C.

New Member:

Cert. No.	Call	Confirmations 52 MHz.	144 MHz.
79	VK5ZNH	107	—

COOK BI-CENTENARY AWARD

The following additional stations have qualified for the Award:—

Cert. No.	Call	Cert. No.	Call	Cert. No.	Call
1322	AX2BLP	1327	G3PHT	1333	OK1ADP
1323	AX3AFI	1328	AX5FL	1334	AX5DV
1324	W9MCR	1329	3Z5BSV	1335	ZL1BKX
1325	G6XN	1330	KH6GKH	1336	AX5ZS
1326	9Q5CO	1331	VE1WZ	1337	W6QFU
		1332	AX3PJ		

W.I.A. 52 MHz. W.A.S. AWARD

New Members:

Cert. No.	Call	Additional Countries
92	VK3AOT	1
93	VK5ZNH	—
94	VK3KC	2

NORFOLK ISLAND DX-PEDITION

You would like a little island of olde worlde charm with few people, rolling hills, duty free shopping and plenty of fishing? About 5 miles by 3 miles, 8,000 acres in all, some tourists and only a short flight from Sydney. Such is Norfolk Island, a separate "country" for DXCC.

Alf Matthews, VK3ZT, flew across in the last week of March to join Larry Pace, K2IXP, and his XYL Lauren, to help with VK9NP activation. Larry is possibly better known for his mobile activities during the past few months as VK8CGB from various centres starting with Darwin and Perth and latterly as VK4CGB.

A very specially warm vote of thanks goes to Ray Hoare, VK9RH, the only resident Amateur operator, for his extremely able and willing help throughout the entire operation. On the DX bands, Ray has suffered manfully for a long time with endless pile-ups and breakers whenever he appears and it seemed a pleasure to transfer the load onto other shoulders for a spell.

The DX-pedition ran for four weeks from 13th March from a QTH in the town of Burnt Pine, using Larry's FT101 with FV101 external v.f.o., TH3Jr tribander, 14AVQ (particularly useful) and 80 mx dipole. Some 8,000 contacts were made including a limited c.w. operation as VK3ZT/9 by Alf. QSLs should go to K3RLY except for Alf's contacts which should go through normal channels.

At the beginning of the period conditions were excellent on the 14, 21 and 28 MHz. bands to such an extent that Lauren could scarcely keep the log up to date and general sleepiness crept in. After the first week a deterioration set in and never really recovered. Alf's c.w. operation began with 70 contacts per hour and tailed off down to 6 or so. Openings to Europe were brief and very few African stations were heard. Many times Larry and Alf were sitting back listening to VK/ZL stations working DX which was totally inaudible on the island. On 80 mx, the openings to VK/ZL were good for short periods only, with high QRN; a few VE and W contacts were made under difficult conditions. On 40, the QRN also was high, but some good contacts in short bursts were made. On the other h.f. bands it was a delight to experience the incredibly low noise level.

Operating practices were generally very good on both s.s.b. and c.w., thanks to co-operation by everybody. One potent-signal c.w. operator persistently broke in for QTH details—ah well, it takes all kinds! His mates will have something to say to him no doubt.

Approvals are now being sought for a visit to Willis Island in early June, followed by a short operation of a few days to Melish Reef in the Coral Sea. The former is a separate DXCC country and it is understood the latter has recently qualified as a new country also. DX hunters, sharpen up on your signals, therefore, as Melish Reef has probably never been previously activated. These two DX-peditions are also subject to transportation arrangements, weather permitting and so on.

Realising that VK9N is still a much wanted country, Alf is planning a return visit to the island next year, probably much to the relief of Ray VK9RH. Thank you for your notes, Alf, and thanks to Larry and Lauren whom I first met in a caravan park in Tehran, Iran, last year whilst the two families were on the overlander caravan trail from Africa and Europe.—73, de VK3CIF.

BUNYIP TALK

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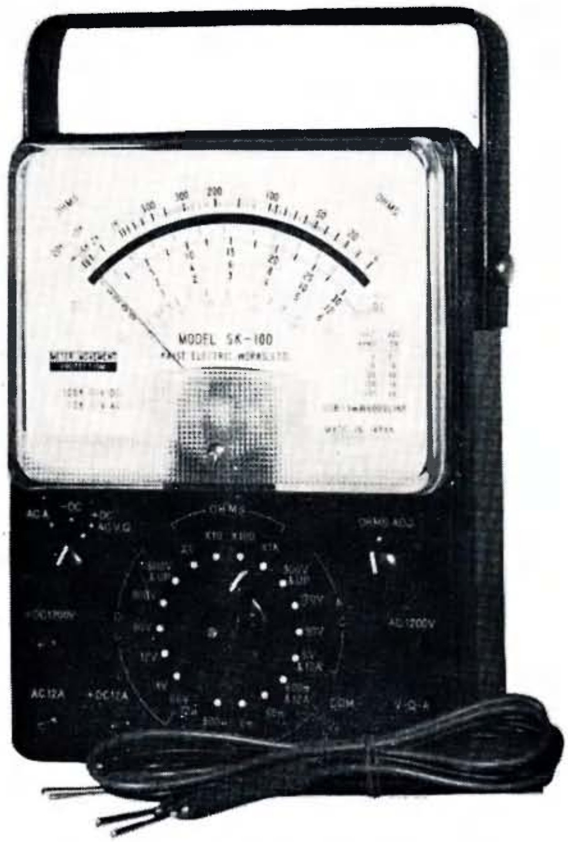

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JULY, 1971

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Price 30 Cents

amateur radio

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JULY, 1971

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THE EDITOR,

"AMATEUR RADIO,"

P.O. BOX 36,

EAST MELBOURNE, VIC., 3002.

★

Members of the W.I.A. should refer all enquiries regarding delivery of "A.R." direct to their Divisional Secretary and not to "A.R." direct. Two months' notice is required before a change of mailing address can be effected. Readers should note that any change in the address of their transmitting station must, by P.M.G. regulation, be notified to the P.M.G. in the State of residence; in addition, "A.R." should also be notified. A convenient form is provided in the "Call Book".

CONTENTS

COVER STORY

The Acitron SSB-400 Transceiver made in Australia. See write up of this hybrid unit on page 25.

FEDERAL COMMENT:

E.D.P. AND ALL THAT

In Singapore I was fascinated by the dexterity and speed achieved in the use of the abacus still to be seen in some of the older-style shops. The large beads on the wires inside the frame were flipped to and fro by agile fingers and in no time at all the whole of one's purchases had been calculated and totalled.

Our small shopkeepers write the amounts down on a paper bag or piece of paper and laboriously add them up, but at least one can audit it. I suppose one could audit the abacus method, but, although the various stages were explained to me, it still remains something of a mystery. These are, of course, one stage beyond the finger counting which goes on even today in parts of the world.

All this seems a far cry from the machines we use today. Everyone shopping in a supermarket will be familiar with the cash machines these people use and, if you value your pocket, how you must keep a sharp eye open on the cash read-out digits even though you get a tear-off strip from which you can subsequently make a check. These machines are themselves a generation or two ahead of the simple cash registers of yester-year where the old bell clanged whenever the handle was turned and the till was opened. However, the supermarket machines go further by enabling an analysis to be kept so that daily totals from different departments or classes of merchandise can be recorded and analysed. In addition, totals of cash and cheques can be read out at any time merely by pressing the appropriate buttons.

Finally, of course, the machine records every transaction on an audit roll within its entrails. A shop with one such machine would record a one line entry in the daily cash book split out into whatever categories is deemed necessary. Machines such as these are, of course, essential where pressures of daily business are quite beyond the scope of the old leisurely hand-written cash slips and where credit transactions are few.

The scope of these machines is limited to recording and totalling amounts. Something more is needed when a degree of memory is involved so, of course, electronic machines were developed. These mainly came out of the earlier mechanical punched paper card or tape systems which had been in use for data processing of various kinds where a print-out of the information was needed. After all it is no use having merely a visual read-out where the data is required for printing purposes or has to be circulated to one or more executives for study and evaluation. The development of magnetic tapes, bits and other advances in electronics were very rapid and even now we are only in second or third generation electronic computer systems.

Again, electronic data processing is of no value unless it can be put to use. It was, and still is, being discovered that the computer can perform a whole multitude of functions in double-quick time. So, although the machines are costly, they can supplant rooms full of people previously buried nose deep all day in Dickensonian ledgers. But they are only as accurate as the information fed into them. As a by-product, the computer is adding rapidly to the language.

In so far as we are concerned it has been calculated that programming the essential details of the members of one of our major Divisions into a computer would reflect a small financial saving. How much greater then would be the savings over the whole W.I.A. membership? The Easter Convention at Brisbane gave us the go-ahead for this work to begin. Each Division now possesses supplies of forms to record membership details. In the proposed central office of Federal Executive members' names are transferred onto a numerical system which will act as a key to the computer processing and these kind of lists will be kept under lock. There are many other safeguards being built into the system as well as a close look into costings.

When the whole of the membership details have been programmed into the computer it will then be possible, on pressing an appropriate button, to obtain a print-out of whatever information is needed. Who lives in Pymble, how many are over 60 or under 18, who live in post code area 7777, and so on. But, even more important, we could print out an up-to-date listing for the Call Book in about fifteen minutes whenever this may be required and also make the machine print out subscription notices analysed to any degree which Divisions require.

Note the emphasis on Divisional control. The machine is programmed with Divisional information. In so far as subscriptions are concerned, these are exactly as required by Divisions. Print-out will go to Divisions regularly so that the Divisional officers will possess regularly up-dated details of Divisional records. No more laboriously-maintained card indices and the like.

All this forms part of a greater degree of centralisation of records aimed at savings in costs without loss of Divisional control. These are major exercises which are now going on behind the scenes and which space precludes further elaboration. As members will have read elsewhere, when the new system has been finalised and polished up to everybody's satisfaction, annual subscriptions will have to come to Federal Executive offices for processing. It costs six cents to post a letter anywhere in Australia and only those who would normally pay cash subscriptions to their Division might be affected. But the whole of these changes are still being worked on, so please do **not** take it that the changes begin when you read this. We all aim for a beginning from 1st January, 1972. There are bound to be the usual teething troubles of course, but, judging by the amount of forethought going into the whole thing, these should only be of a minor nature.

—MICHAEL OWEN, VK3KI,
Federal President, W.I.A.

Novice Licensing—Some Important Correspondence

The following correspondence is self-explanatory. For details of the proposals suggested by the Committee appointed to investigate Novice Licensing see the "Federal Comment" in June "Amateur Radio".

* * *

11th June, 1971.

The Editor,
"Amateur Radio,"
P.O. Box 36,
East Melbourne, 3002.

Dear Sir,

A Special Meeting of the New South Wales Divisional Council was called on 11th June to discuss an article apearing in the June 1971 issue of "Electronics Australia".

Enclosed are copies of letters which were forwarded to the Australian Post Office Radio Branch and "Electronics Australia" subsequent to this meeting.

Would you please ensure that these letters are published in "A.R." at the earliest opportunity for members' information.

Yours faithfully,

The Council of the N.S.W. Division,
Wireless Institute of Australia,

A. G. MULCAHY, President.

* * *

11th June, 1971.

The Editor-in-Chief,
"Electronics Australia,"
12th Floor,
235-243 Jones Street,
Broadway, 2007.

Dear Sir,

The Council of the New South Wales Division of the Wireless Institute of Australia is deeply concerned regarding statements published on pages 132 and 133 of the June 1971 issue of "Electronics Australia" under the title "WIA ACTIVITIES" and we wish you to note that the Council completely dissociates itself from these remarks.

At no time was this Council consulted regarding the publishing of this material nor was the Council associated with or consulted about the preparation of the material allegedly broadcast by the Hunter Branch.

This Council wishes it to be clearly understood that:

(a) It gives no credence to the unsubstantiated accusations that P.M.G. and W.I.A. Officials have entered into collusive unofficial agreements as stated in the subject article.

(b) It at no time informed any person that "A motion suporting the concept of Novice Licensing for Australian Amateurs was carried unanimously by the Convention ..." as reported in the subject article.

(c) It believes that Post Office Officials will consider the introduction of Novice Licensing on the merits of the case presented if and when the Wireless Institute of Australia presents such a proposal.

(d) It is aware of the support offered by Dr. Dean Blackman for the proposal that the form of the A.O.C.P. Examination be modified to conform with modern procedures in relation to educational measurement and evaluation, and it believes that this article constitutes a most unjustified personal attack against Dr. Blackman.

(e) The opinions expressed in this article in no way represent the views of the N.S.W. Divisional Council.

The Council believes that the material printed on pages 132 and 133 has done grave damage to the relations existent between the Wireless Institute of Australia and Senior P.M.G. Officials. It has done grave personal injustice to Dr. Dean Blackman (one of the most dedicated Institute workers) whose views have been distorted and quoted out of context.

We sincerely regret that such a misleading article should have appeared in "Electronics Australia" which enjoys such a high reputation for accurate and truthful reporting.

We trust you will publish this letter in full in your next issue in order that your readers will know that the N.S.W. Divisional Council considers this article to be most inaccurate and misleading.

For and on behalf of,

The Council of the N.S.W. Division,
Wireless Institute of Australia,

A. G. MULCAHY, President.

* * *

11th June, 1971.

Controller Regulatory and Licensing,
Radio Branch,
Central Administration,
Postmaster-General's Department,
7th Floor,
Kings Parkade Building,
57 Bourke Street,
Melbourne, Vic., 3000.

Dear Sir,

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(c) The opinions expressed in this article in no way represent the views of the N.S.W. Divisional Council.

The Council of this Division regrets that material of this vein has been published such that it may be construed by readers as representative of W.I.A. policy and we have requested the magazine concerned to print a letter of rebuttal which we have this day forwarded.

We intend to ask the Editor of "Amateur Radio" to publish this letter and that sent to "Electronics Australia" in order that our members at least will be aware of this Council's action in this matter.

Yours faithfully,

The Council of the N.S.W. Division,
Wireless Institute of Australia,

A. G. MULCAHY, President.

* * *

7th June, 1971.

The Controller,
Radio Branch,
Central Administration,
Postmaster-General's Department,
7th Floor,
Kings Parkade Building,
57 Bourke Street,
Melbourne, Vic., 3000.

Dear Sir,

The Wireless Institute of Australia has for some time been giving serious consideration as to whether the introduction of some form of Novice type licence would be in the best interest of the Amateur Service in this country.

It was the policy of the Institute to advocate the introduction of such a licence until 1968 when the Federal Council decided not to continue to seek such a licence. I believe the last time the matter was raised with the Department was in 1965.

If after the present investigations are completed the Institute should decide to seek such a licence, I presume that the Department will be prepared to consider the matter in the light of the case as then presented.

I would refer you to the June issue of "Electronics Australia" (page 133) that suggests that a private agreement had been reached between "the representative of the Federal Executive" and your office to "offer" a reduced Morse speed of 10 words per minute if the Institute dropped its claim for a Novice type licence.

I am concerned at the publication of such unfounded statements. I certainly have no knowledge of any such agreement either express or implied. Likewise, the suggestion of the existence of some agreement could perhaps be seen by some as a reflection on the integrity of officers of your Department as well as officers of this Institute.

Accordingly, would you please confirm, firstly, that it is also your understanding that no such agreement exists, and, secondly, should the Institute desire to raise the question of Novice licensing again, your Department would be prepared to investigate the matter with us. In order to avoid further misconception I contemplate the publication of this exchange of correspondence if that is agreeable to you.

Yours truly,

MICHAEL J. OWEN,

Federal President, W.I.A.

* * *

10th June, 1971.

Mr. M. J. Owen,
Federal President,
Wireless Institute of Australia,
Post Office Box 67,
East Melbourne, Vic., 3002.

Dear Sir,

I have your letter of 7th June, 1971, drawing the attention of this Department to an article published on page 133 of the June issue of the magazine "Electronics Australia" which mentions discussions between members of the Federal Executive of the Institute and the Department on the possibility of introducing a "Novice" type Amateur licence in this country.

I note that you are concerned that the article appears to suggest that a private agreement had been reached between the Institute's representatives and the Department for a reduced Morse speed of 10 words per minute if the Institute agreed to drop its claim for the introduction of a Novice licence and that your representatives have no knowledge of any such agreement.

In reply, I would like to take this opportunity to point out that I have caused enquiries to be made into this matter and there is no evidence in the Department's records nor is there any recollection on the part of any officer of such an agreement having been made with representatives of the Federal Executive of the Institute.

With regard to your further enquiry concerning this particular type of licence, it is confirmed that the Department would be pleased to examine any fresh proposals relating to Novice operators should the Institute seek to have the subject submitted for further consideration.

H. S. YOUNG,

Controller, Regulatory and Licensing.

THE VK2AAR SPECIAL ANTENNA

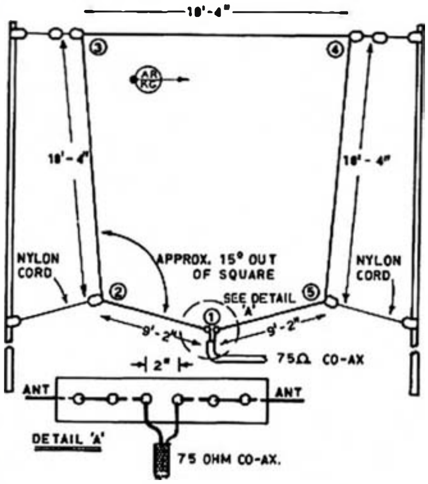
REG. C. STEELE, VK2AAR*

Here is an antenna that is small—you only need a minimum of 20 feet between poles.

Cheap—the components consist of approximately 75 feet of 7/20 copper wire; efficient—all reports during last contest 5-6 to 9, and average 5-8, out of 83 contacts—working only a few hours. Being both horizontal and vertical, it has a 360° coverage.

The s.w.r. of this beauty is 1:1 on 14 MHz. I have used it on 7 and 3.5 MHz., but the s.w.r. goes up to 2.5:1 and 3:1 on those bands. It is definitely a 20 metre antenna.

The sizes given are cut for 14.150 MHz. I have tried many wire antennas over the last 18 months, but have had nothing to compare with this one.



You will see by the diagram that the antenna is not quite square, so don't think it is bad drawing. The angle of the bottom section drags the sides in slightly. This bottom section is fairly critical and sometimes needs a bit of experimenting.

The method of construction is as follows:

Take the 75 feet length of wire and thread through the perspex insulator, leaving enough to connect to the co-ax. Measure 9 ft. 2 in. and wrap wire around insulator at 2, bind; measure 18 ft. 4 in. for horizontal section and again wrap around insulator 3, and bind. Measure 18 ft. 4 in. again and take to insulator 4 and bind, thence to insulator 5, and 9 ft. 2 in. to perspex and thread through three holes as at the beginning. Solder, or use connectors, to 75-ohm cable to antenna.

Hoist antenna to full height after attaching nylon strings to insulators 2 and 5. There is no set height for the antenna, but the higher the better—mine is between two 50 ft. poles, making the lowest section about 18 feet above the ground, allowing that the top has a slight sag in the centre, as my supports are 102 feet apart.

I do not use any balun or a.t.u., but feed straight to the pi-section of the Swan, through a six-section low-pass filter.

Should the guy wire go close to the antenna, make sure no length of guy wire exceeds 18 feet without an insulator. The same applies to the top support wires from antenna to support poles.

I am sure once you have tried this antenna you will scrap your dipole.

* 62 Greenwell Point Road, Greenwell Point, N.S.W., 2540.

☆

PROVISIONAL SUNSPOT NUMBERS

MARCH 1931

Dependent on observations at Zurich Observatory and its stations in Locarno and Arosa.

Day	R	Day	R
1	76	16	76
2	90	17	76
3	82	18	79
4	70	19	63
5	53	20	50
6	47	21	51
7	47	22	55
8	46	23	55
9	35	24	51
10	34	25	48
11	43	26	49
12	63	27	55
13	76	28	49
14	65	29	44
15	68	30	56
		31	52

Mean equals 58.2.

Smoothed Mean for Sept. 1970: 85.4.

—Swiss Federal Observatory, Zurich.

QUAD vs. TRIBAND YAGI*

COL. JOHN H. PARROTT, JR., W4FRU, ex-KA2JP

Clarence Moore, the inventor of the cubical quad, probably little realised when he and his associates were huddled over the reference books back in 1942 that the product of their efforts would receive such widespread acclaim and damnation as has been poured out upon the cubical quad antenna. The controversy continues with proponents and opponents switching sides as often as contest results are published. The purpose of this article is to contribute yet another bit of data to this controversy and to provide the neophyte and old timer alike an additional basis for applying the principles of cost effectiveness to selection of antenna systems.

While stationed in Japan, a sort of DX crossroads of the world, this writer had the opportunity to observe, first hand, the excellent performance of the cubical quad in competition with the yagi, dipoles and an assortment of other antenna systems. In pursuing this undertaking certain steps were necessary to insure that any conclusions made would be meaningful, and that they would be derived from sound data. With this in mind a plan emerged.

OBJECTIVES

In the many articles written on the cubical quad, it is noteworthy that only on a few occasions have the authors been privileged to compare the quad with other types of antennas on a real-time basis, and from the same operating location. Furthermore, when such comparisons were made, the authors generally compared against some type of monoband antenna system. A casual scanning of the 10, 15 and 20 metre phone bands would lead one to conclude that the triband yagi enjoys a rather high position of popularity among the antennas in general use. This being the case, it apeared that a worthwhile contribution to the data already available on the yagi and quad might be made by conducting a series of controlled comparative tests, employing the triband yagi and the quad. The test objectives were then defined: to compare various configurations of a cubical quad antenna with a representative commercial triband yagi; such tests to be conducted over short, medium and long transmission paths, and to arrive at conclusions regarding the relative merits of each antenna.

TEST PLAN AND PROCEDURE

Every effort was made to conduct the tests in a manner which would lessen the possibility of compromising the techniques employed by either the writer or participating stations:

(1) The test to be performed by establishing communications with Amateur Radio stations located throughout the world on a random and scheduled basis.

(2) Amateur Radio stations volunteering to assist in this effort to be briefed on conduct of test and data desired.

(3) A voice s.s.b. transmission to be made to the participating station, identifying the first antenna used as antenna "A".

(4) The voice transmission to be followed immediately by an unmodulated carrier for a period of approximately five seconds.

(5) The antennas would be switched, and a voice transmission be made identifying the antenna as "B", and the procedures above repeated.

(6) Particiating stations will note signal strength related to each antenna, and provide a numerical value as observed on his S meter or other indicating device. These values to be logged, and the test reinitiated with another volunteer station.

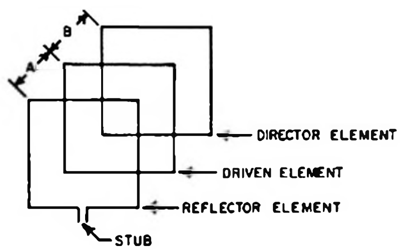


Fig. 1.—Element spacing information for Table 1.

EQUIPMENT PREPARATION

(1) Antenna heights to be as nearly identical as possible.

(2) Centre of antenna horizontal lobe patterns to be as nearly identical as possible when pointing the antennas toward a participating station.

(3) Resonant frequency of each antenna to be matched as closely as possible.

(4) Transmission lines to be matched to antennas and transmitter loading to be as nearly identical as possible with each antenna.

(5) Instantaneous transfer of the antennas.

(6) Relative power and s.w.r. to be monitored continuously.

(7) Prior to and after each data gathering session, equipment parameters will be verified. If a significant deviation in any parameter is noted, data collected will be discarded.

ANALYSIS

Antenna performance conclusions to be based upon an analysis of data derived from a minimum of 50 unmodulated-carrier observations with each antenna configuration, and supplemented with data gathered during conventional s.s.b. QSOs.

ANTENNA SELECTION

This writer had been using a four-element commercial triband yagi (boom length 24 feet, and 55 feet above the ground) for aproximately 1½ years, so the properties of this antenna were fairly well established. Furthermore, in on-the-air comparisons with competitive models of triband yagis in use by other U.S. Amateurs operating from the Tokyo area of Japan, the antenna appeared representative of commercial triband antennas in general use by the Amateur community. Therefore, the yagi in use at the author's station was selected as the reference antenna.

Text material concerning quad antennas, available to the author in Japan, was reviewed. It became evident that there are almost as many variations in quad design as there are writers on the subject. After much deliberation, and many discussions with Amateurs throughout the world, the decision was made to test three models of the quad (a fourth model was tested as will be noted later). Since the physical characteristics of the quad are fairly standard, only the dimensions of the elements and the spacing between them was considered. The dimensions for the three models tested were obtained from a Japanese manufacturer of cubical quads, from Orr's book, "All About Cubical Quad Antennas,"[1] and from Dr. J. E. Lindsay, Jr.,[2] W0HJ.

PRELIMINARY TESTING

Several days were spent "dry running" the test plan to validate the concept, and to smooth out the operating procedures and techniques. Of particular concern was the possible time required to make a valid data-gathering observation. If data were to be reasonably accurate, the transmission path had to be stable, and the signal strength observations must be taken on

1. Orr, "All About Cubical Quad Antennas," Radio Publications, Wilton, Conn.
2. Dimensions later published: Lindsay, "Quads and Yagis," "QST," May 1968.

	Model 1	Model 2	Model 3	Model 4
Reflector Element	72′ 3″	70′ 4″	72′ 5″	72′ 5″
Driven Element	69′	70′ 4″	70′ 5″	70′ 5″
Director Element	—	—	—	69′ 1″
Spacing "A"	7′ 6½″	8′ 5″	13′ 4″	13′
Spacing "B"	—	—	—	13′
Stub	20″-30″	34″-38″	—	—

Table 1.

* Reprinted from "QST," February 1971.

each antenna during a short period of time. The dry runs were valuable in this respect.

A problem became evident during the first day of testing. It appears that those of us who speak and understand English do not always convey the same message when using the same words. As a result, it was necessary to modify the verbal format, utilising simple sentences and placing them in a logical sequence.

It also became apparent that the test could not be conducted under all transmission path conditions; that even under ideal conditions several observations were often necessary before a conclusive report could be compiled. It was decided to conduct the tests only on 20 metres. The operating time available to the writer favoured openings on 20 metres to Europe via the long path, and to Australia, the U.S. and various islands in the Pacific. It was also decided to orient the test antennas so that the topography and obstructions seen by each antenna would be essentially the same. (Physical separation between the two antennas was in the order of one wavelength.)

TESTING

Dimensions of the first quad model selected were furnished by a Japanese manufacturer of cubical quad antennas (see Table 1). The antenna was assembled, utilising commercially-manufactured heavy duty hardware and fibre glass spreaders. It was tuned to a centre frequency of 14,200 KHz. Testing of the first model began in November of 1967 and continued for a period of one month. The results for this period are given in Table 2.

In mid-December 1967, the first quad was replaced by a model constructed according to the formula and dimensions given in Orr's book. The results obtained with model 2 are contained in Table 2.

Construction of the third model (with wider element spacing) was carried out next. Two matching systems (Gamma and Q-section) were experimented with on this antenna. A satisfactory match could be had with either system. However, the Q-section was used for the test because it was the technique used with the previous two quad models (s.w.r. with each antenna was never more than 1.3:1 with a difference between antennas no greater than 0.1).

The results conducted with this model were most enlightening, as shown in Table 2. The model antenna was also used extensively during the first week-end of the 1968 A.R.R.L. DX Contest. Though these contacts were not used in tabulating test samplings, it is interesting to observe that openings to the U.S. (using the quad) lasted 15 to 30 minutes longer on each end of the period than with the yagi. It is assumed that this phenomena would also apply to each of the other quad models.

The fourth quad tested was a three-element wide-spaced model constructed according to more dimensions furnished by W0HJ. The results of the samplings were somewhat disapointing and are given in Table 2. (Frankly, the author felt that the three-element quad would show a substantial improvement over the yagi in every case.) The three-element model did appear to have a better front-to-back and front-to-side ratio than either the yagi or the other quad models. One positive comment: the three-element model is a monster to assemble and put up! In the author's opinion the difference in performance is not worth the small improvement. Perhaps, on the other hand, if one accepts the two-element model as the departure point between a simple mechanical structure and a major project, a four-element model might be more worth the effort. However, this is purely conjecture on the part of the author.

SUMMARY

The antenna tests indicate that:—

(1) One can expect to achieve the same or better results with a two-element quad of proper dimensions than with a three or four-element tri-band yagi.

(2) A wide-spaced quad will perform substantially better than a close-spaced quad.

(3) Dollar for dollar, the quad appears to be a better investment than a yagi.

ACKNOWLEDGMENTS

The writer wishes to thank all of the Amateurs who participated in the series of tests, and particularly the VK gang, who night after night tolerated the request for observations. The support couldn't have been better, and on many occasions, upon completing a check with a particular station, several other stations would call to give their observations (which were taken during the same transmission test).

	Model 1	Model 2	Model 3	Model 4
Total Observations	50	60	60	52
Less than 2,100 miles	12	2	3	3
2,100 to 4,800 miles	33	31	33	32
Greater than 4,800 miles	5	27	24	17
Signal Difference:				
More than 1 S unit better	—	—	—	—
Less than 1 S unit better	—	—	7	9
No discernible difference	1	5	51	43
Less than 1 S unit poorer	27	46	2	—
More than 1 S unit poorer	22	9	—	—

Table 2.

ANGLE MODULATION

LECTURE No. 14A *C. A. CULLINAN,* VK3AXU*

Although there are no Frequency Modulated Broadcasting Stations in Australia, considerable use is made of f.m. in the broadcasting industry in link systems and wireless-microphones. Angle Modulation is used extensively in v.h.f. mobile services, Amateur services and is used for the sound transmission in Australian t.v., therefore a knowledge of Angle Modulation is needed by candidates sitting for a P.M.G. Certificate of Proficiency.

"Modulation" is the process by which the characteristics of an electrical wave are impressed on another electrical wave (carrier wave).

"Amplitude Modulation," as discussed in Lecture No. 12, means modulation in which the **amplitude** of a carrier wave is varied in accordance with an applied audio-frequency wave (in the systems in which we are interested) and the **carrier frequency does not alter** because of the process of modulation.

"Angle Modulation" is another method of modulation in which the phase angle of the carrier is the characteristic which is varied by the modulating voltage.

Frequency Modulation (f.m.) and Phase Modulation (p.m.) are particular forms of Angle Modulation.

One of the problems which exist with amplitude modulation is that practically all forms of electrical discharge as exist in nature (lightning is one such form) and the majority of man-made electrical discharges are in the form of amplitude modulation. As all amplitude modulation receivers are designed specifically to receive amplitude modulated signals they respond to both natural and man-made interference which is in the a.m. form and this is the reason we hear "static" and other types of interference sometimes when listening to a.m.

Both natural and man-made electrical discharges may cover a wide frequency range and may be detected from frequencies as low as 5 KHz.

Now the noise, whether from natural or man-made sources, which is picked up by an amplitude modulation receiver is proportional to the received bandwidth.

Therefore one method of reducing the effect of noise is to reduce the bandwidth of the receiver either by improving the selectivity or by reducing the upper audio frequencies after detection. However, both of these methods remove the high frequencies and reduce the fidelity of the reproduced sound.

Here in Australia all m.f. broadcasting stations can transmit musical tones up to 10,000 Hz. and in many cases can exceed this. Such music can be termed "high fidelity".

But if in a receiver either the selectivity or a "tone control" is adjusted to remove reproduction above 5,000 Hz., this may reduce noise but it will also cause poor quality reproduction.

As far as speech is concerned, the majority of telephone trunk lines transmit only a band of frequencies from 300 Hz. to 3.4 KHz. Speech on these lines is very intelligible but may not be natural due to the removal of the lower bass and higher audio frequencies.

* 6 Adrian Street, Colac, Vic., 3250.

● Continuing the series of lectures by C. A. Cullinan, VK3AXU, at Broadcast Station 3CS for students studying for a P.M.G. Radio Operator's Certificate.

This statement may not appear to be correct if one has been using a modern telephone and commented on its naturalness; however, the design of the receiver in the modern telephone handpiece is a triumph of electrical and acoustical research.

Sometimes man-made electrical noise may be a combination of amplitude modulation and frequency modulation, but in most cases it is the amplitude modulation form which predominates.

This state of affairs was realised many years ago and in attempts to overcome this, consideration was given by many inventors to a method of modulation in which the amplitude of the carrier would be held constant but the frequency would be varied by the modulating voltage.

However, this was not very successful because the attempt was made at m.f. broadcasting frequencies and the bandwidth had to be limited to that of a.m. broadcasting stations. In fact, the variation in frequency that could be obtained was very small.

HISTORICAL BACKGROUND

Now it may come as a surprise to many to learn that proposals for frequency modulation go back almost to the beginning of the century, long before the three-element valve was invented by Lee de Forest.

The first patent for frequency modulation known to the writer is Serial No. 785,803, issued on 28th March, 1905, by the United States Patent Office to Cornelius D. Ehret, his application having been lodged on 10th February, 1902.

It is interesting to note that Ehret proposed "to vary the natural period of oscillation (frequency) by changing the value of inductance, capacitance or resistance in the oscillatory circuit" and in one part of the claim states "the inductance is shunted by a telephone transmitter. Any variation in the resistance changes the frequency."

For many years a different form of f.m. has been used in radio telegraphy. Long wave transmitters used either a Poulsen arc or an Alex. Anderson h.f. alternator to generate, directly, a carrier wave. Because of the difficulty of starting and stopping such machinery for the dots and dashes of the Morse Code, keying was arranged to change the frequency of the oscillator. Thus the dots and dashes would be sent on one frequency and the spaces between on another frequency, which was known as the "back wave".

This method of radio telegraphy is used even today with high-powered valve transmitters to avoid the great load change on power supplies and power lines that would occur when keying a high-power transmitter.

In the early 1930's Major Edwin H. Armstrong, one of the U.S.A's great inventors in radio fields, gave consideration to the problem of developing a transmission system for music and speech, which would not be duplicated in nature.

In his investigations, Major Armstrong considered the use of frequency modulation and found that the only manner in which a wide audio frequency response could be obtained was to increase the transmitted bandwidth to a far greater extent than that used in normal broadcasting.

It was at this point where Major Armstrong demonstrated his genius because, whereas others had tried to develop f.m. for use in the already crowded U.S.A. m.f. broadcast band, he realised that the only way to make high-fidelity f.m. a success would be to go to the very high frequency portion of the spectrum where the use of a wide-bandwidth would not be a problem.

The feasibility of this was confirmed by construction of a low-power phase modulated v.h.f. Amateur band transmitter and carrying out transmissions on Amateur frequencies.

Tests with this transmitter were so successful that Major Armstrong built a high powered f.m. transmitter, using phase modulation.

This transmitter was installed at Alpine, New Jersey, U.S.A., and used the call sign W2XMN. The aerial was a 16 element turnstile, 900 ft. above the Hudson River and produced approx. 20,000 watts at a frequency of 42.80 MHz.

A very large number of tests were made on this station and these proved that Major Armstrong was on the right track because clear reception was possible during thunder storms which blotted out more powerful a.m. signals, and in many circles f.m. was hailed as being the end of normal a.m. broad-

casting because of its freedom from noise and its far better quality of reproduction.

It may be as well to interpolate some comments here: As this is written in 1970, high quality f.m. has been in existence for about 35 years, yet today there are approximately 3,000 a.m. broadcasting stations in the U.S.A. alone. Somewhere about 1,500 of these do not operate at night and the most popular transmitter is the 1 kw. size.

Now in the U.S.A., due to the great number of m.f. a.m. stations, night time interference between them is at a very high level and because of this, many are restricted to the bandwidth they can transmit. Some must cut off all audio frequencies above 1½ KHz.

In Europe, stations are spaced at 9 KHz., and all stations remove the audio frequencies above 9 KHz. This means a reduction in the upper frequencies that can be transmitted.

Also, it must be realised that in many of the larger cities of the U.S.A. man-made interference has always been at a far greater intensity (level) than in Australia so that even in the early 1930's noise was a major problem in broadcasting in U.S.A., this being aggravated by the low power being used by many stations. Another matter to consider is that natural noise or static appears to be more dominant in the Northern Hemisphere than in the Southern.

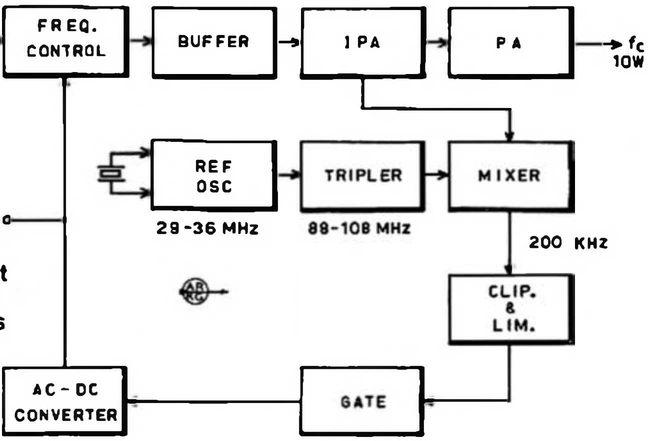
These comments still apply in 1970 and the writer feels that it is a perfectly valid statement to make that in the majority of cases m.f. a.m. broadcasting in Australia is technically superior to that in North America and Europe.

Here in Australia we are more fortunate as the Australian Broadcasting Control Board requires a frequency response of ±2 dB. over the range of 50 to 10,000 Hz. for a transmitter. The A.B.C.B. also stipulates the frequency response required from microphone input at a studio to radiated output, when interconnecting land-lines or links do not exceed 20 miles in length. This cannot be stated directly in decibels. It is necessary to refer to the mask shown on page 69 of the Board's Technical Standards, second edition. The Standards for Noise and Distortion are quoted on page 39.

It is true that f.m. can transmit easily a.f. tones up to 15 KHz., but in point of fact there is very little musical content in the audio frequencies above 10 KHz., and it is doubtful if the majority of people can hear them.

In the U.S.A. there are now many f.m. broadcasting stations, quite a number transmitting stereo, and it is an interesting exercise to examine photos of many studios of such stereo stations to find that only one mono. microphone is provided.

Briefly, in the U.S.A. system for transmission of stereo by f.m. broadcast stations, the left plus right stereo signals, up to 15 KHz., are transmitted normally. Then there is a highly stable "pilot" tone at 19 KHz., being followed by a signal comprising the left minus right stereo signals. These are on a sub-carrier placed 38 KHz. out from the assigned station frequency and occupy the portion of bandwidth from 23 to 53 KHz. (±15 KHz. of 38 KHz.).



Block diag. of a Direct Carrier FM. exciter. In these two exciters note the elaborate means used to keep the carrier centre frequency correct.

This system of stereo transmission allows mono. receivers to reproduce the left plus right signals as normal mono. so that the system is compatible for mono. receivers.

Many U.S.A. f.m. broadcasters also have what is known as s.c.a. (sub. carrier authorisation) and use this to transmit continuous music for background music for shop, factories, hotels, etc., and derive considerable revenue by selling the service to such customers.

S.c.a. is based on a sub-carrier, centered on 67 KHz., the modulation occupying the range from 59 KHz. to 75 KHz. The presence of the stereo and s.c.a. sub-channels calls for a reduction in the frequency deviation (% modulation) of the main and stereo channels to 80%, whilst the 19 KHz. "pilot" and the s.c.a. channels each take 10%. As a result, at 100% modulation the total deviation of the f.m. carrier is ±75 KHz.

If the stereo and s.c.a. are not being transmitted, then the normal a.f. band to 15 KHz. will use the full deviation of ±75 KHz. However, irrespective of whether mono., stereo or s.c.a. is being transmitted, the maximum deviation is 75 KHz.

In an amplitude modulated system, irrespective of the actual mode of transmission, it is essential that the carrier frequency remains constant within close limits and this is the reason broadcasting stations use temperature controlled quartz crystal oscillators. It is common for the temperature to be held at 55°C. ±1°. The frequency of all m.f. broadcasting stations in Australia must be held within ±10 Hz. If the frequency is allowed to drift excessively then receiver tuning becomes difficult.

Stories of m.f. stations varying greatly in frequency are brought about because of drifting mixer oscillators in superheterodyne receivers. The writer's car receiver, transistorised, drifts, particularly at the low frequency end of the m.f. band, and is recognised as a receiver defect.

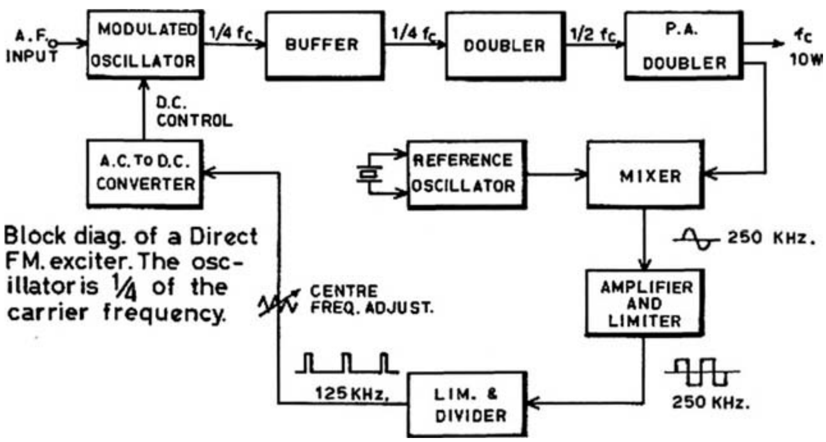
THEORY OF OPERATION

As described earlier, frequency modulation and phase modulation are both variants of angle modulation.

Now frequency modulation, as its name and definition imply, is obtained by changing the frequency of a carrier wave during the modulation process. Actually, the frequency must be swung symmetrically above and below the assigned frequency and a problem which arises in f.m. transmission is to be able to vary the frequency at the same time holding the centre frequency constant.

In an a.m. transmitter, whether self-excited or crystal controlled, every endeavour is made to make the oscillator as stable as possible, but this class of stability can cause difficulties with frequency modulation, but may be easier with phase modulation.

A.m. broadcast transmitters usually have a small variable reactance connected across the crystal circuit because it is possible to get a small variation



Block diag. of a Direct FM. exciter. The oscillator is 1/4 of the carrier frequency.

in frequency by altering the reactance across the crystal. One particular crystal oscillator, of the writer's knowledge, could be shifted ±30 Hz. (in the middle of the m.f. band).

However, if a self excited oscillator is used it is possible to obtain very wide changes in frequency by varying the reactance of the oscillator "tank" circuit.

Many s.w. broadcasting stations, which have to change frequency quickly, use self-excited oscillators instead of crystal oscillators, however, these oscillators are inherently very stable.

Obviously if some way could be found to vary, at audio frequencies, a reactance shunted across a self-excited oscillator "tank" it would be possible to vary the frequency of the oscillator at audio frequencies, thus producing frequency modulation.

Fortunately a valve can be operated in a special manner so that it appears to be a reactance, furthermore, if an audio frequency voltage is applied to its grid then the valve will appear to be a variable reactance.

Now if such a valve is connected across the "tank" circuit of a self-excited oscillator, the frequency of the oscillator can be made to vary above and below its normal frequency in accordance with the audio frequency voltage impressed on the grid of such a reactance valve, or as more commonly termed, a reactance modulator.

Also, if a reactance valve modulator is connected across a quartz crystal oscillator it can produce a small amount of phase shift, which is phase modulation. It may be connected across the tank circuit of an amplifier stage to produce phase modulation and as a change in phase is also a change in frequency, a small phase change at a low frequency can be multiplied to become a large frequency change at a higher frequency.

Another variable reactance device is a **varactor diode** and in 1970 in the U.S.A. this device has almost completely supplanted the valve reactance modulator in broadcast f.m. transmitters.

There are several other methods of generating angle modulation in addition to phase modulation and frequency modulation as described above.

These are a magnetic frequency modulator, the Shelby cathode-ray tube, and the phasition tube and the klystron tube. These are now redundant for high quality angle modulation as used in f.m. broadcast work.

In the U.S.A., it is the usual practice for manufacturers to offer f.m. exciters with power outputs ranging from 10 to 20 watts for high fidelity use. If greater power is needed then these can be followed by one or more r.f. amplifiers to form a complete transmitter.

As of January 1970 there were at least nine manufacturers in the U.S.A. of such f.m. exciters and broadcast f.m. transmitters. It is interesting to examine some of the data for these exciters:

Only one manufacturer made an all-valve, 10-watt exciter, and this was the only one using phase modulation. (This is a Serrasoid phase modulated exciter.)

Seven of the remaining makers use all solid-state techniques with transistor output. The other maker uses solid-state devices and a valve output.

Then six of the nine makers use a varactor modulator and two use transistors as the modulators. The varactor is a very high frequency device and in four of the makes it is used to modulate the oscillator which is at the carrier frequency. This is known as direct carrier f.m. (d.c.f.m.).

Some of the others prefer to modulate the oscillator at a lower frequency. As this is direct modulation of the oscillator on another frequency, it is known as direct f.m. (d.f.m.).

In Britain, the Marconi Co. developed a method to obtain f.m. by direct modulation of a quartz crystal oscillator operating at 1/24th of the carrier frequency. This has been given the trade name of f.m.q., standing for frequency modulation, quartz.

Also in Britain, S.T.C. manufactured f.m. broadcast type transmitters using reactance valve modulators.

(to be continued)

INTRUDERS INTRUDERS

WHAT IS ON
14008 KHz.?

Please report details to your Divisional Intruder Watch Co-ordinator.

OBSERVATION POST

By HF EVERTICK

Spending a few hours walking round the 13th National Radio and Electronics Engineering Convention displays of the I.R.E.E. in Melbourne at the end of May turned out to be interesting and very instructive.

Time did not permit attendance at any of the lectures given in separate halls, but some of the subjects caught the Amateur imagination — telemetry system for small projectiles at about 460 MHz., semiconductor reliability testing, crystal filter designs, cylindrical dipole antenna equations, stripline u.h.f. frequency multiplier circuitry, Intelstat tracking, telemetry and command services, hybrid micro electronics and so on. An interesting sidelight was the interference by various transmitters to human body implants, as for example, heart pacers.

The Amateur content of the various stands was often quite low. Here and there the eye locked onto displays of components of which some of the latest developments could be outside our pocket range. In between all the computer material, colour t.v. dems., car-phones, test equipment, visual telephones and recorder (both sound and video) goodies there before your vision would be undoubtedly Amateur-looking equipment. As, for example, the Acitron SSB400 transceiver with digital frequency read-out designed and manufactured here in Melbourne. On another shelf the Acitron SSB100 transceiver and further along a linear—all include the 160 mx band through to 28 MHz., and 2 metres on the 400. Some, I was told, are in production, others are in prototype form.

Round the corner I spotted an elaborate Eddystone receiver with continuous tuning from 10 KHz. to 30 MHz. on all modes, some Geloso amplifiers and, upstairs, a very neat Collins 65S1 digital read-out receiver with manual or automatically selected or controlled frequency spot tuning.

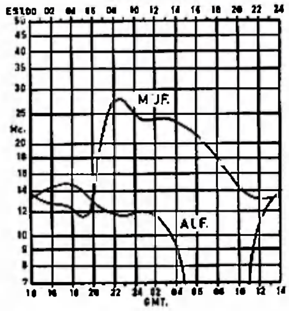
Nothing much of interest in antennas for Amateur h.f. use other than whips, but one stand displayed a 10 ft. diameter precision parabolic spinning of the kind now lathe-turned in Melbourne and usable in the range 450 MHz. to 20 GHz.

Many of the advertisers in our journal were well represented.

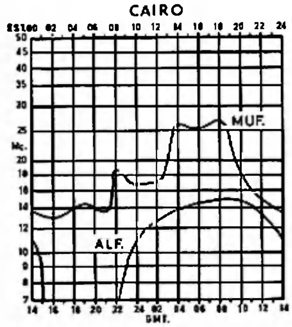
PREDICTION CHARTS FOR JULY 1971

(Prediction Charts by courtesy of Ionospheric Prediction Service)

BARBADOS



CAIRO



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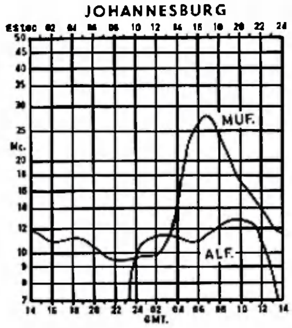

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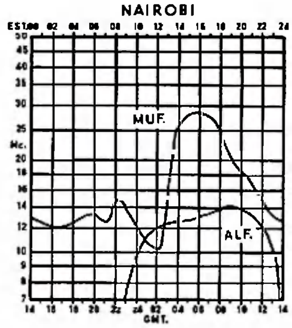
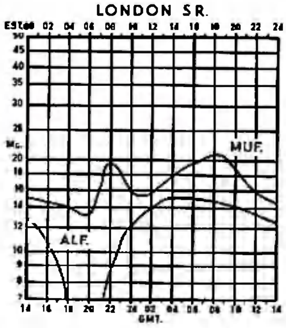


LONDON S.R.



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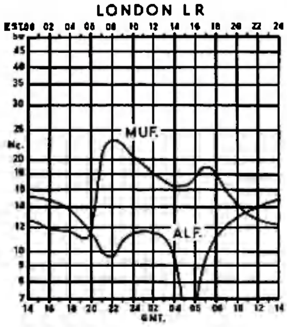
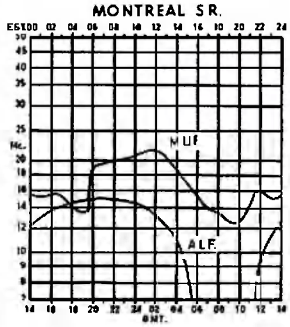


MONTREAL S.R.



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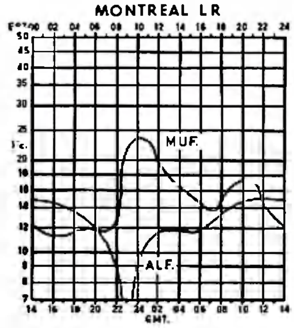
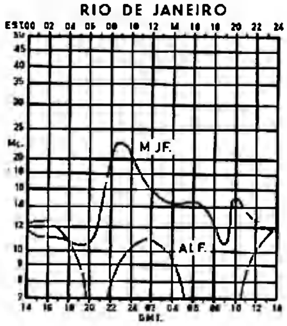
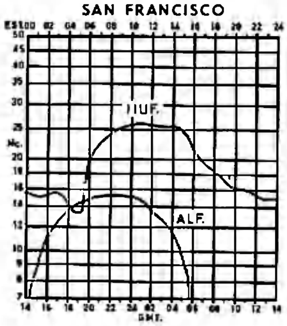


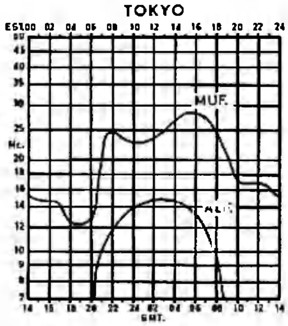
RIO DE JANEIRO



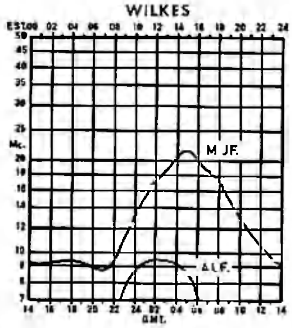
SAN FRANCISCO



TOKYO



WILKES



THE R.F. BRIDGE*

DON NELSON, WB2EGZ

Sometimes an important idea goes unnoticed or is not sufficiently developed to gain wide acceptance. Such, I believe, is the case of the radio frequency bridge. The r.f. bridge has been marketed for many years by the General Radio Company[1]; however, this precision instrument is probably too expensive for most Amateurs. A moderately priced r.f. bridge, manufactured by Omega-t Systems,[2] has been available for several years. Oliver Swan, W6KZK, described the basic circuit of the r.f. bridge in an earlier issue of "Ham Radio".[3]

Few Amateurs seem to have recognised the advantages of the r.f. bridge over the simple v.s.w.r. bridge. The r.f. bridge, for example, will allow you to optimise your antenna, thus reducing the dependency on a matching network. The r.f. bridge has other uses as well, some of which I'll discuss in the following paragraphs.

THE CIRCUIT

The instrument consists basically of a broadband noise generator coupled to a bridge network by a wideband 1:1 balun transformer. By carefully compensating for circuit strays, the bridge upper frequency limit can be extended to 450 MHz.

The circuit of Fig. 1 was developed not without some difficulty, mainly in reducing circuit strays and constructing the balun transformer. In its present state of development, this circuit is useful to 220 MHz.

The noise generator uses a zener in an unstable (thus noisy) mode by operating it at low current. It will pay to experiment with the value of R1 for the highest noise level of your zener. When the noise-generator output is amplified by a two-stage broadband amplifier, the instrument is useful from about 1 to 450 MHz.; again, the upper frequency limit is determined by how well wiring strays are compensated.

CONSTRUCTION

Simple construction was used, with parts mounted on a perforated board. Battery power was used for maximum utility. Wiring the bridge circuit is tricky, as might be expected with broadband equipment. If the layout shown is followed, you can expect good results. I feel there may be better layouts, and I'm sure that every unit built will be slightly different with regard to compensation for circuit strays.

By far the most difficult part of the construction is the toroidal balun. The resultant transformer,[4] shown in Fig. 1 has broadband characteristics that exceed those of the more common trifilar-wound units. Pay strict attention to details!

The bridge section was laid out with regard to u.h.f. performance, keeping wires on one side of the bridge equal to those on the other. Wiring strays are compensated by balancing them with the exact capacitor combination that gives the best null. Because I have found the trimmer adjusts slightly differently on 6 metres and higher, I assume there are a few sneaky r.f. paths. One suspect component is the large carbon potentiometer. Our sophisicated doubts about the layout are unfounded below 30 MHz., however. (Solid relief for the unsophisicated worrier.)

This gem is self-contained in a Bud CU2103-A Minibox, ready to check antennas, receivers, quartz crystals, and other series-resonant circuits. You will, of course, need a receiver for null detecting at the frequency of interest.

Recommended replacement for the common v.s.w.r. bridge — the radio-frequency bridge and noise generator.

CALIBRATION AND USE

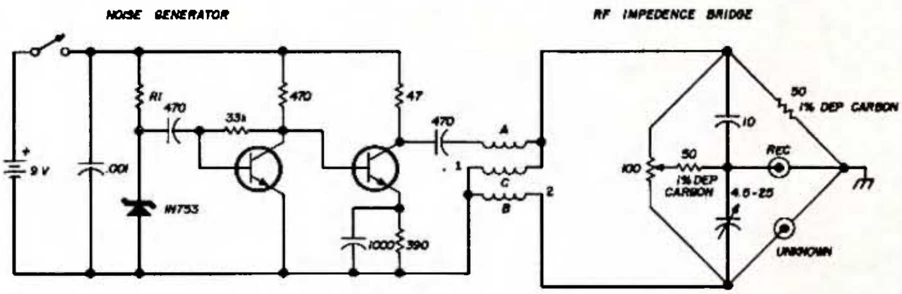
In theory, if not in practice, the 100-ohm pot. will balance any resistance placed in the "unknown" arm of the bridge. At one end of the scale is zero; at the other is infinity. Fifty ohms is mid-rotation with a linear pot. At 50 MHz. and higher, I've found a rotational shift of the 50-ohm (r.f.) point. This means a special calibration check will be necessary at very high frequencies (v.h.f.). Normally, for the h.f. range, the dial calibration will hold.

The best null is at midrotational scale. Because the null deteriorates at the extremes of rotation, it is not worthwhile to use the instrument beyond a 20-to-300 ohm range.

Calibration is performed using non-inductive resistors of known values placed, then nulled, across the "UNK" terminal, with a receiver connected to the "REC" terminal. Carbon composition resistors are fine if values are known to 5%. Above 100 MHz., deposited carbon resistors are preferable because of their low inductance The dial plate should be calibrated in the h.f. range, say 10 MHz. Trim the bridge capacitance for best null with a 50 ohm resistor and correct setting of the pot. Don't be too surprised if a 50 ohm resistor changes value through the v.h.f. range.

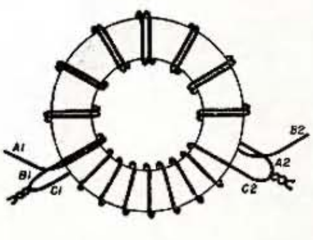
ANTENNA MATCHING

Tuning an antenna with a v.s.w.r. bridge is a hit or miss proposition, because the v.s.w.r. bridge confuses resistive and reactive impedances. I don't mean to imply that accurate tuning is impossible with the v.s.w.r. bridge, but without a tedious procedure, the lowest v.s.w.r. will probably occur at a frequency different than that of optimum transmission. The r.f. bridge technique eliminates the tuning error, and allows an accurate measurement of v.s.w.r. once the antenna is correctly tuned.



NOTES.
1. R1 - CHOOSE SUITABLE VALUE FOR BEST NOISE OUTPUT (APPROX 2200 OHMS)
2. TRANSISTORS - 2N918, 2N3563, OR HEP 56.
3. 0.375 OD TOROID FORM, INDIANA GENERAL CF 102, CORE MATERIAL 03

Fig. 1.—Schematic of the r.f. bridge and noise generator.



Windings A and B of the balun are No. 26 Formvar twisted 3 turns/inch before wrapping on core. Nine turns of the twisted pair are wound on the core. Winding C is also 9 turns of No. 26 Formvar, continuing the A and B winding direction and connecting A2 to B1.

* Reprinted from "Ham Radio," December 1970.

(1) First connect the r.f. bridge directly to the antenna or at an electrical half wavelength away from the antenna. An electrical half wavelength is different from the physical length of the wire. You can determine the electrical half wavelength with this bridge by setting the bridge to zero and placing a short across the end of the transmission line. Now cut small lengths from the line until a null is obtained at the frequency of interest (Fig. 2). Using a half wavelength or multiple thereof effectively places the bridge at the antenna, thereby reducing transmission line errors.

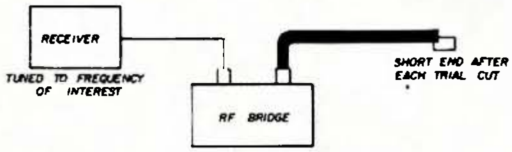


Fig. 2.—Determining one-half wavelength of transmission line when using the r.f. bridge for antenna measurements.

(2) Tuning the antenna to a frequency is the next step. You will find its resonant frequency by a null on the receiver. A sharper null will be seen with the bridge adjusted to the impedance of the antenna system. Adjust antenna length until the null occurs at the desired frequency.

(3) By adjusting the matching section, tune your antenna to the desired impedance as shown by the r.f. bridge.

RECEIVER INPUT MATCHING

Provided you already have a receiver to act as a null detector, you will find the r.f. bridge invaluable for determining the optimum tap position for inputs to converters, preamplifiers, and receivers. The procedure is the same as before, except that the "UNK" terminal is now connected to a receiver input. With the bridge dial preset to the desired impedance, adjust the tap on the antenna coil for best null (see Fig. 3).

OTHER USES

Any series-resonant circuit can be checked with the r.f. bridge. This, you will recall, is the combination that cannot be dipped easily on a grid-dip oscillator. Place the LC combination across the "UNK" terminal with the bridge dial set to zero. Tune receiver for null (see Fig. 4).

If a resistance is in series with L and C, the bridge will show its value. An interesting example of an R, L, C combination is the quartz crystal. While this bridge has limitations in crystal measurements, it is utilitarian. Set the dial to infinity (minimum noise for open circuit). Tune the receiver for an increase in noise at the resonant frequency of the crystal. Adjust the bridge for null. This value is the resistance of the crystal's RLC arm. In general, the lower this value, the higher will be the activity of the crystal.

The r.f. bridge takes over where the v.s.w.r. bridge leaves off. To my embarrassment, the r.f. bridge singled out several mistakes in my station, as it may in yours. I feel certain that building this bridge will be the most rewarding project the experimenting Amateur will undertake this year.

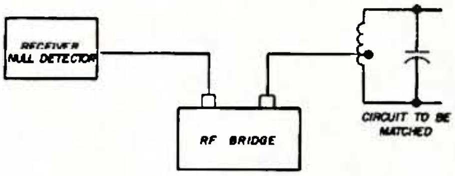


Fig. 3.—Arrangement for matching input circuits.

Grateful acknowledgment is made to Mike Ward, WB2YJK, for his efforts in the design of this project.

REFERENCES

1. General Radio Co., West Concord, Mass.
2. Omega-t Systems, Inc., 516 W. Belt Line Road, Richardson, Texas, 75080.
3. Oliver Swan, W6KZK, "Impedance Bridge," "Ham Radio," February 1970, p. 67.
4. C. L. Ruthroff, "Some Broadband Transformers," Proc. I.R.E., Vol. 47, August 1959, pp. 1337-1342.

Parts layout, which should be followed closely for trouble-free results.

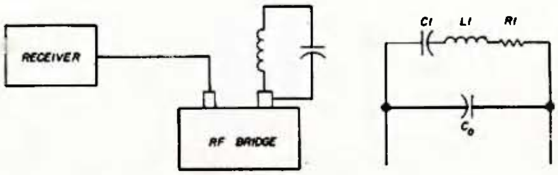


Fig. 4.—Connections for checking series-resonant circuits. Network at right is the equivalent circuit of a quartz crystal.

CR8 LICENSING

From Bill Hempel, VK1BH: "Write to—

The Director,
Posts, Telegraphs and Telephones,
Dili, Portuguese Timor.

with photostat of your VK licence, whereupon a licence will be issued for three weeks with renewals available once you are there, subject to extension to your 14-day passport visa.

"Several call signs have been issued to VK8s, but nobody has operated because no transmitting gear may be imported."

HF Everttck comments: "Apparently this is one of those places similar to Iran where the right hand is more massive than the left. It is believed that there may be only two ways to circumvent this: either to initiate a long term approach to Lisbon through a local Portuguese representative or possibly direct or to be on good terms with a V.I.P. in the Administration to give assistance to import gear into the country. If a local resident has a licence, it might be possible to do a deal through him, but this avenue may already have been explored. There seems to be scope here for a reciprocal licensing agreement.

"Quite obviously, it would be very awkward if equipment were to be smuggled into the country since difficult questions would arise if subsequently discovered, quite apart from the unlawful aspects of smuggling as such, which is an illegal activity always to be frowned upon. It was not too many years ago that an overland tourist with a mobile rig in his caravan arrived at a remote Customs House in 3V8 and was imprisoned, merely for possessing it, until he could contact his Embassy and get himself released some days later."

HOME STATION ANTENNA FOR 160 METRES

Part Three—The Balanced Horizontal

J. A. ADCOCK,* M.I.E. (Aust.) VK3ACA

INTRODUCTION

A short low horizontal on medium frequencies has a very poor efficiency. Horizontal antennas should be made as large as possible, but in most cases only small dimensions are practicable. Even an antenna 120 feet long and 60 feet high is small and rather inefficient compared with a resonant antenna a quarter wave length high.

If the antenna is to be used for multi-band, the most satisfactory arrangement would be a centre fed with 600 ohm open wire feed line and tuned at the transmitter. Such an antenna will provide the dual function of a "horizontal doublet" or a "T" with the feeders in parallel.

This section will deal with this type of antenna and will endeavour to show what can be obtained from a balanced horizontal for transmission and reception.

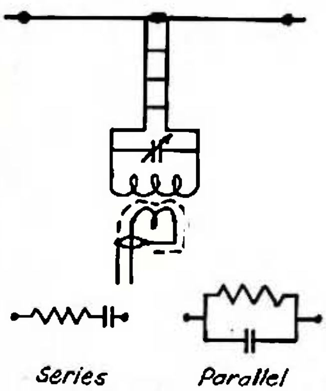


Fig. 13.—The method of feeding a short horizontal antenna and the equivalent series and parallel circuits of the load of the antenna.

The radiation resistance of a horizontal antenna is most affected by the presence of the ground. Because this is a secondary effect and the ground is not directly in series with the electrical circuit, the radiation resistance and the efficiency is much more difficult to predict. These estimations are difficult because the depth of the virtual ground below the actual ground cannot be known and the dielectric constant and resistivity of the ground cannot be easily measured. Even if they could, the calculations are far too involved.

In a lossless system the radiation resistance not only becomes lower the shorter the antenna, but becomes lower the closer it is to the ground, and on the ground would equal zero. In a lossy system the losses will be very large for an antenna of very low radiation resistance. If the ground is lossy the feed point resistance will be higher, but the absorbtion of the signal will be considerable.

Because the radiation resistance is lower for the horizontal than the vertical, the vertical mode will dominate. Therefore, if we desire to take advantage of the horizontal antenna for either transmitting or receiving, it must be perfectly horizontal and the feeders must be perfectly balanced. To obtain good balance the antenna should be geometrically balanced.

As with the vertical, the calculation of radiation resistance at the centre of a short dipole in free space is fairly simple. To determine the resistance at a distance along the feeder and to introduce the effect of the ground is much more involved. In the following sections, methods of how this can be done and some simplified methods are suggested. As discussed earlier, the load can be considered as an effective parallel or series circuit but the series circuit is most commonly used. This, together with a parallel tuning circuit, is shown in Fig. 13.

The possibility of using a horizontal counterpoise was investigated by the author, but unfortunately this was found to be unworkable. A number of other experiments and on-air checks were tried to test the theories presented in the next sections.

CALCULATIONS FOR HORIZONTAL ANTENNAS

The radiation resistance at the centre of a balanced horizontal antenna in free space is given by:—

$$R_R = \frac{790\ L_E^2}{\lambda^2} \quad \ldots\ldots \quad (10)$$

where R_R = the effective series resistance component of the load at the feed point at the centre of the antenna.

L_E = the effective total length of the antenna.

The calculation of effective length of one leg of the antenna is the same as for a vertical. Length may be taken as $L \div 2$ for a short antenna, $2L \div \pi$ for a resonant antenna, or the form factor may be calculated from equation 3 or 5 or obtained from Fig. 7. The electrical length given in the graphs has been taken as the length of one leg of the antenna compared with a quarter wavelength as with previous calculations, i.e. $\lambda/4 = 1 = 90°$.

Similarly, as with equation (6) for a horizontal antenna

$$R_R = 197.5\ (\text{elect. length} \times F)^2 \ldots (11)$$

The comments relating to accuracy of calculation to long verticals also apply here.

From the equations it will be noticed that the radiation resistance of a centre fed antenna is twice that of a vertical of the same leg length. In the case of a vertical, the other half of the antenna is virtual or reflected in the ground. The curves and methods for vertical

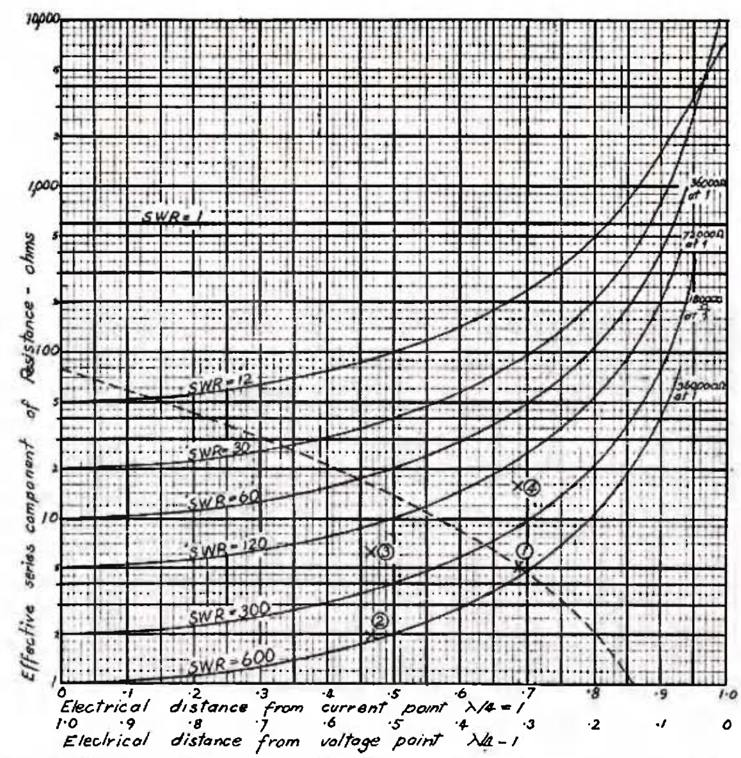


Fig. 14.—The curves shown represent the effective series resistance component of the load at various positions along a 600 ohm line over a range of s.w.r's. The dotted curve is the radiation resistance at the centre of a doublet in free space, the length of one leg of which is shown by the figures on the bottom line.

* P.O. Box 106, Preston, Vic., 3072.

antennas can be applied so long as the calculated resistance is doubled. The curves of Fig. 8 may have some application to end-loaded horizontals, although capacitance to ground, etc., may increase the effectiveness of the end load. The free space radiation resistance at the centre of the antenna calculated by equation 11 is shown by the dotted curve of Fig. 14.

In order for this value to be of any use it is necessary to know what resistance should be presented to the transmitter at the end of a 600-ohm line. A series of curves have been plotted showing the effective series resistance at a point along the line for various s.w.r's. To prevent complication, only the effective series resistance component is shown. These curves are similar to a set in the A.R.R.L. Antenna Book which give effective series or parallel resistance or reactance. However, the curves of Fig. 14 give a wider range. The curves were based on the equation:—

Series R =

$$Z_0 \left(\frac{Z_0 Z_R + Z_0 Z_R \tan^2 x}{Z_0^2 + Z_R^2 \tan^2 x} \right) \quad .. \quad (12)$$

where Z_0 = characteristic impedance of the line (in this case taken as 600 ohms).

Z_R = resistance at the current point.

x = electrical distance from the current point.

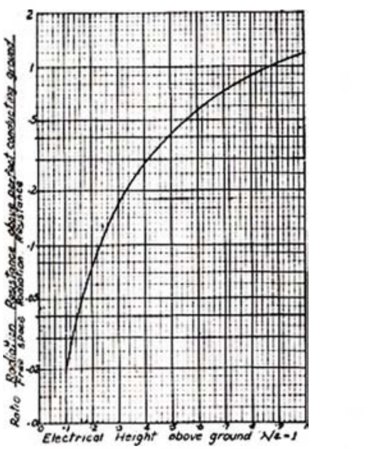


Fig. 15.—Variation in radiation resistance of a short horizontal doublet above a perfectly conducting ground for relatively low heights.

The equation for reactance is not given here, but it was plotted and found to follow very closely the curve of Fig. 9 except close to the voltage point.

In applying the curves of Fig. 14, the distance of the current loop is taken as a quarter wavelength from the end of the antenna. If it is possible to know the reactance at the feed point, the electrical distance from the current point or the end of the antenna can be checked by using the open circuit reactance curves of Fig. 9 (ref. 4). It has been used for this purpose in the next series of this article—Part Four (Calculations and Discussions). The reactance component is also necessary if it is desired to calculate the effective parallel components of the load or it can be introduced into coil design calculations. In most practical cases of interest, it is unnecessary to consider the value of the reactive component of the load.

The measurement of the reactive component is difficult without a bridge but if r.f. voltage, current and power are known a reasonable result of both resistance and reactance can be calculated from standard formulae. The variation in radiation resistance of an antenna above a perfectly conducting ground is shown in Fig. 15. Possible applications of the change of resistance curve of Fig. 15 to determine the radiation efficiency of the antenna are discussed in the next series.

REFERENCE

4. Radiotron Designers' Handbook (fourth edition). Reactive component of impedance, p. 903.

TWO-STUB NOTCH FILTERS FOR T.V.I.*

Barry Priestley, G3JGO, has sent along some useful information on a technique which appears to offer an extremely effective means of producing filters providing a deep notch at a specific frequency. This system is an extension of the established use of single co-axial stubs, but using two stubs.

Information on this technique, published in the Swiss journal "Old Man," was passed to G3JGO by Geoff Stone, G3FZL, and translated by J. H. Hill, G3JIP, who carried out a number of tests which confirmed the original claims; these results were subsequently confirmed by G3JGO and R. K. Hemmings, G3VCT.

About this time, further information was provided by W. Burton, G8ANQ, in this case using short-circuited half-wave stubs rather than the open circuited quarter-wave versions; he showed how the stubs could be "tuned" by using a pin to provide an easily variable short-circuiting device. Both versions are shown in Fig. 1.

As a result of all this combined effort, G3JGO draws the following conclusions on this promising technique: the notch can be made 70 to 80 dB. deep when using good quality ¼" co-axial cable; this compares with roughly 30 dB. for a single stub. The notch is also narrower, as might be expected from the use of two high-Q circuits.

The possibility of using three stubs in order to develop either a very narrow notch or alternatively using stagger tuning to provide a shaped response curve also exists, although these ideas have not been tried.

The spacing of the stubs is not critical—G8ANQ suggests 9" at 145 MHz., but has used 3" successfully. The lengths of the stubs are very critical; unfortunately bench alignment with a signal generator (as described in the G3SL article mentioned below) is difficult due to pulling of the generator. Capacitive tuning of open stubs, or the pin as a movable short circuit, has proved useful.

G3JGO considers that there is no reason why the open circuit version should not be used on a transmitter to notch out, for example, transmitter harmonics in Band 1. This particular application has not been tried although it would seem a logical extension of the techniques discussed many years ago by T. N. Lloyd, G3SL, "Curing T.V.I. with Co-axial Stubs" (R.S.G.B. Bulletin, March 1958). Either form of resonant stub could be used in various filter applications.

The G3SL article provided a great deal of practical information on making and using single co-axial stubs designed around the characteristics of a number of standard cables. Typically he used 3 ft. 7 in. of Uniradio 70 cable having a velocity constant of 0.67 to form an open circuited quarter-wave stub to attenuate 43 MHz. harmonic output of his transmitter; he suggested starting with about 5 ft. cable and snipping bits off until the notch was at 43 MHz., using a signal generator and valve voltmeter alignment techniques.

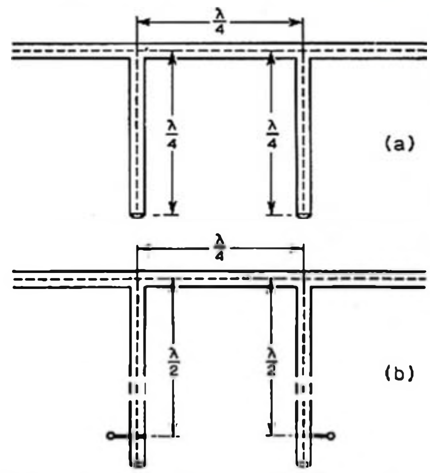


Fig. 1.—Two stub filters capable of providing a notch of about 70 or 80 dB. at centre frequency. (a) is the open-circuited quarter wave stubs; (b) the G8ANQ version using short-circuited half wave stubs with movable "pin" short-circuiting device.

* Reprinted from "Radio Communication," Technical Topics, December 1970.

PROVISIONAL SUNSPOT NUMBERS

APRIL 1971

Dependent on observations at Zurich Observatory and its stations in Locarno and Arosa

Day	R	Day	R
1	59	16	104
2	56	17	93
3	58	18	104
4	56	19	110
5	65	20	103
6	58	21	98
7	59	22	82
8	61	23	55
9	43	24	50
10	52	25	44
11	46	26	53
12	86	27	50
13	100	28	49
14	113	29	48
15	126	30	36

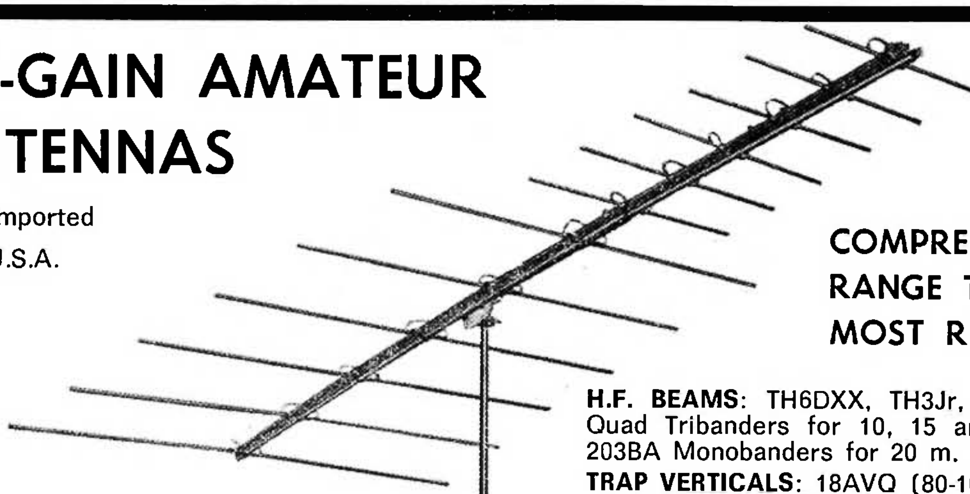
Mean equals 70.7.

Smoothed Mean for Oct. 1970: 91.8.

—Swiss Federal Observatory, Zurich.

HY-GAIN AMATEUR ANTENNAS

Fully Imported from U.S.A.



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Australis Oscar Balloon Report

G. N. LONG,* VK3YDB

THE TECHNICAL ASPECTS

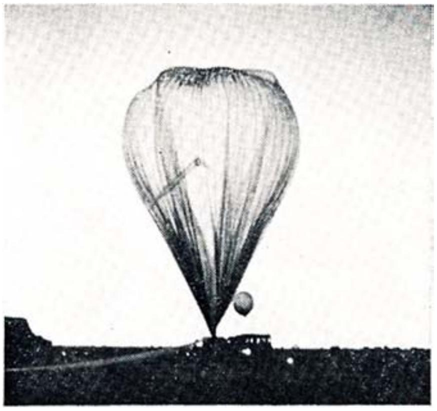
Last month a report was presented by Richard Tonkin on the Hi-ball flights which took place from Mildura during the months of April to May. This report will attempt to cover some of the technical results and some of the difficulties experienced during these four flights.

The package comprised the Australis receiver and the Australis transmitter with its associated keying circuitry. This was then encased in a minibox. Due to the nature of the other experiments being carried on the balloon, a great deal of r.f. "hash" is produced. In an attempt to minimise this a voltage regulator was also incorporated in the package. The h.t. from the balloon power system (20 to 25 volts) was fed to the regulator through an appropriate feed-through capacitor; the only other things on the box were two co-ax. output connectors. During the flight the translater package was housed in a polythene box, this being for thermal insulation.

The package was air-shipped to Mildura in the care of George Long, VK3YDB. Upon reaching Mildura and having consultations with the Hi-ball people, it was found that the package was small enough and the current drain low enough to fly on any of the flights in that series. This brought about many new problems in itself, one of which was that a new aerial would have to be fitted up for each flight. Aid came in the form of Kevin VK3ZKD, who worked for many hours and produced three aerials which were all used.

The aerials themselves were made of standard **cheap** flexible steel tape. This was chosen because it is a very easy medium from which an aerial, that is subject to many stresses, can be made. The two aerials were constructed to go on the same mast with about 20" of separation. The mast was constructed of 1" diameter plastic electrical conduit. The 144 MHz. aerial was a quarter wave ground-plane at the end of the conduit and below this the 432 MHz. aerial was constructed, this being a turnstile. The aerial positioning was very important and more will be said about this later.

* Eyre Road, Mt. Dandenong, Vic., 3788.



George VK3YDB was up before dawn to take this photo of the balloon being filled with helium gas.

The flight unit was tested in Mildura to make sure that the system still functioned satisfactorily, but, more importantly, to make sure that the translator could be integrated into the balloon package without undue interference between the systems on the package and the translator. During these tests a fault in the power supply developed; this caused the final amplifier in the transmitter of the package to be destroyed. At that late stage it was impossible to get a spare up from Melbourne so it was decided to fly the first flight with low transmitter output, this being under 100 mW. The only readily available transistor to operate at these frequencies in Mildura at that stage was in the author's rig, so, finally, a "TRW" type "B" transistor from this was used. After the first flight (70,000 feet), the package was shipped back to Melbourne and the correct device was inserted and power output brought up to 1 watt.

As stated in the previous article, there were four flights. The package flown was the same for all flights, varying only in power output. The same aerial design was used for all flights; the aerial position with relation to the gondola was changed on two occasions.

The results of the four flights were:

Flight No. 1

Altitude—70K (70,000) ft.
Power output—less than 600 mW.
Aerial position—pointing upwards.

General result.—The flight was well received in both Melbourne and Adelaide; no report of reception in either VK1 or VK2. Moderate to heavy QSB. Heavy interference from other on-board equipment was experienced.

Copy from the package was readable until 50K after cut-down.

Flight No. 2

Altitude—105K (105,000) ft.
Power output—1 watt.
Aerial position—pointing downwards.

General results.—On ascent, the package was received well in both capital cities, but on reaching flight altitude the signal was lost in VK3; copy was still quite readable in VK5. The signal to VK3 was, in most cases, too far down to be read. The suspected cause for the loss of the signal was a large temperature inversion which was covering most of Victoria. It was observed that the level of interference from other equipment was very high. On recovery, it was found that the voltage regulator was faulty. The fault was traced to an IC. The package was again returned to Melbourne and the voltage regulator was changed and a much simpler design, using a 15v. zener and a 2N3055, was installed. No further problems were had with this circuit for any of the remaining flights.

Flight No. 3

Altitude—90K (90,000) ft.
Power output—1 watt.

General results.—The signal was observed to be a little bit stronger, but the same conditions as applied to Flight No. 2 took place in this flight. Signals were quite readable in VK3 during the ascent, but were almost totally lost after flight altitude was attained. Again, an inversion was found to be covering the greater part of VK3. A valuable clue was supplied to the Group about this problem when stations in VK5 reported hearing VK3 stations calling even though the 432 MHz. transmission back to Melbourne could not be copied. Interference from on-board equipment was again at a very high level, particularly the 2 MHz. c.w. beacon carried on the balloon. This was found to be because the 2 MHz. beacon aerial wrapped itself around the 432-144 MHz. aerials used by the Australis translator.

Flight No. 4

Altitude—120K (120,000) ft.
Power output—1 watt.
Aerial position—pointing upward.

General result—exceptional. A four State hook-up took place. High level signals were received in VKs 1, 2, 3 and 5. No deep fades were reported and all the systems worked well. Interference from other systems on the balloon were very low. By cut-down, everybody using the experimental package had gone to work and no results were gained as to the behaviour of the package during descent. The most important fact to come out of the flight was that, even though an inversion was experienced during the flight period, there was not any deep fading or loss of the signal in the area covered by the inversion.

The problem of why the package could not be received in VK3 during Flights 2 and 3 had many people thinking. The only reason advanced, which seemed to cover all the facts, was that the problem was not due to any single reason or fault, but due to a number of cumulative conditions. The fact that the problem showed up only when the aerial was pointing downwards seems to be the heart of the problem. The following is what was thought to have happened.

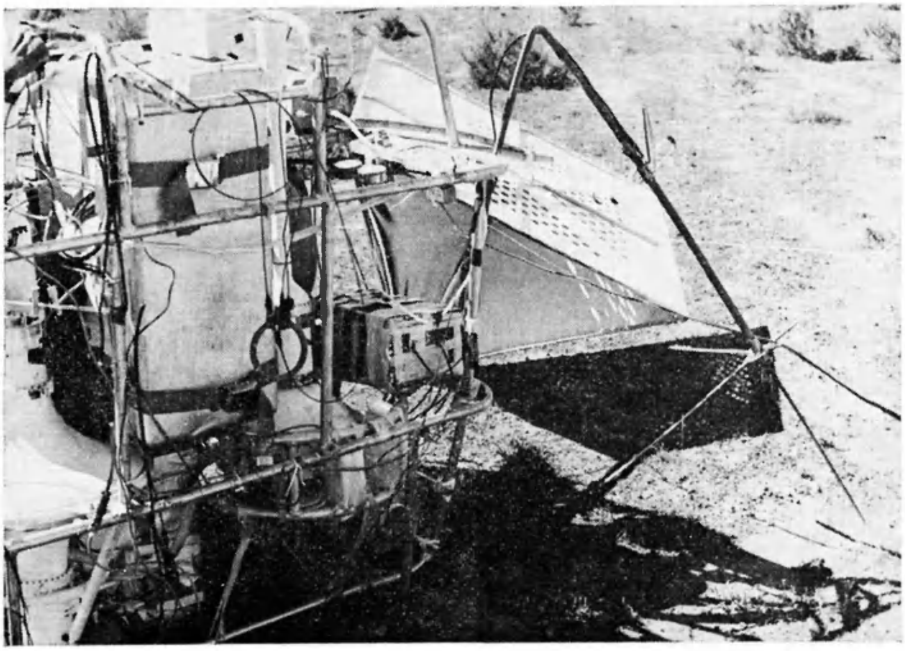
Because the aerial was pointing downward and subject to screening in certain positions of rotation of the balloon, the signal was reduced. This, with the added attenuation of the temperature inversion at the time, caused signals in VK3 to be too low to be read, but when the aerial was pointing upwards, the aerial was not screened and, so even after the attenuation of the inversion, good signals could be copied.

This problem is very important because, if an inversion alone is enough to stop signals on the 432 MHz. band, then signals from a satellite operating in this band would also be stopped.

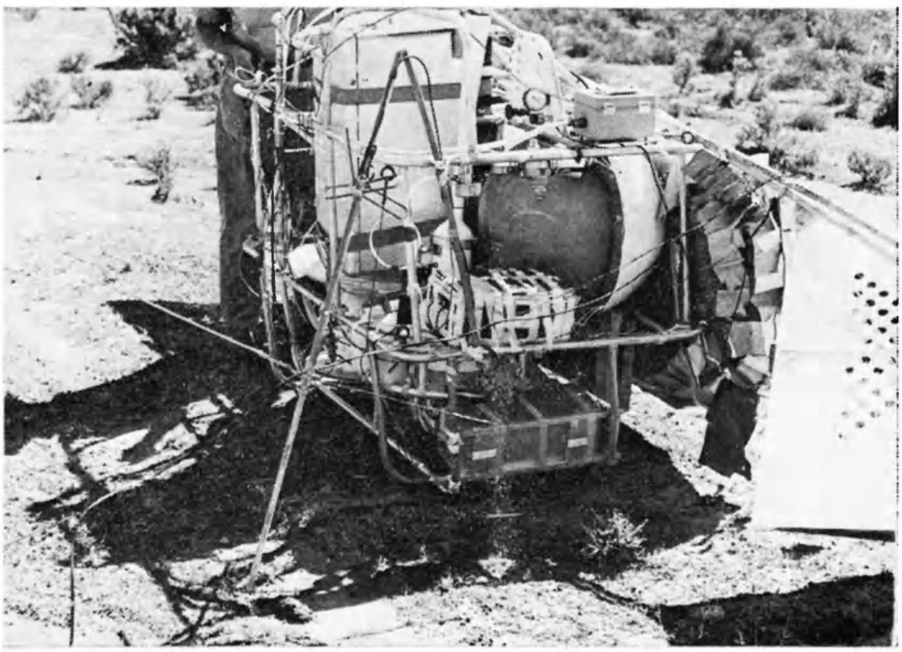
It should be pointed out at this stage that it has been recorded that the rotation rate of the balloon could be as low as one rotation every two hours so, if the aerial was screened by some part of the gondola, it could remain screened for up to two hours.

It was noticed that mobiles travelling in the respective capital cities that had not heard of the balloon flights and were using Channel B for their morning run to work, were getting into the package with very good signals on some occasions.

Any future launches of the balloon series (it is hoped to have some more shortly) will be publicised in all States with as much notice as possible to give everybody a chance to get into the package and so prepare their equipment for the future launch of Australis-Oscar 6.



The instrument gondola of the 120,000 feet Hi-Bal Balloon Flight after landing near Mildura.



The gondola after landing. The 144/432 MHz. antenna can be seen (somewhat bent) in the foreground.

TECHNICAL ARTICLES

Readers are requested to submit articles for publication in "A.R.," in particular constructional articles, photographs of stations and gear, together with articles suitable for beginners, are required.

Manuscripts should preferably be typewritten but if handwritten please double space the writing. Drawings will be done by "A.R." staff.

Please address all articles to:
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AMATEUR FREQUENCIES:
USE THEM OR LOSE THEM!

VK-ZL-OCEANIA DX CONTEST, 1971

W.I.A. and N.Z.A.R.T., the National Amateur Radio Associations in Australia and New Zealand, invite world-wide participation in this year's VK-ZL-Oceania DX Contest.

Objects: For the world to contact VK, ZL and Oceania stations and vice versa. Note.—VK and ZL stations, irrespective of their locations, do not contact each other for Contest purposes except on 80 and 160 metres.

Dates.—Phone: 24 hours from 1000 GMT on Saturday, 2nd October, 1971, to 1000 GMT on Sunday, 3rd October, 1971.

C.W.: 24 hours from 1000 GMT on Saturday, 9th October, 1971, to 1000 GMT on Sunday, 10th October, 1971.

RULES

1. There shall be three main sections to the Contest:
   (a) Transmitting—Phone;
   (b) Transmitting—c.w.;
   (c) Receiving—phone and c.w. combined.

2. The Contest is open to all licensed Amateur transmitting stations in any part of the world. No prior entry need be made.

Mobile marine or other non-land based stations are not permitted to enter.

3. All Amateur frequency bands may be used, but no cross-band operation is permitted.

Note.—VK and ZL stations irrespective of their location **do not** contact each other for Contest purposes **except on 80 and 160 metres**, on which bands contacts between VK and ZL stations are encouraged.

4. Phone will be used during the first week-end and c.w. during the second week-end. Stations entering both sections must submit separate logs for each mode.

5. Only one contact per band is permitted with any one station for scoring purposes.

6. Only one licensed Amateur is permitted to operate any one station under the owner's call sign. Should two or more operate any particular station, each will be considered a competitor, and must submit a separate log under his own call sign. (This is not applicable to overseas competitors.)

7. Entrants must operate within the terms of their licences.

8. **Cyphers**: Before points can be claimed for contact, serial numbers must be exchanged and acknowledged. The serial number of five or six figures will be made up of the RS (telephony) or RST (telegraphy) report plus three figures which may begin with any number between 001 and 100 for the first contact and which will increase in value by one for each successive contact.

Example: If the number chosen for the first contact is 021, then the second must be 022 followed by 023, 024, etc. After reaching 999, start again from 001.

9. **Scoring:**

(a) **For Oceania Stations other than VK/ZL**: 2 points for each contact on a specific band with VK/ZL stations; 1 point for each contact on a specific band with the rest of the world.

(b) **For the rest of the world other than VK/ZL**: 2 points for each contact on a specific band with VK/ZL stations; 1 point for each contact on a specific band with Oceania stations other than VK/ZL.

(c) **For VK/ZL Stations**: 5 points for each contact on a specific band and, in addition, for each new country worked on that band, bonus points on the following scale will be added:

1st contact	....	50 points
2nd „	....	40 „
3rd „	....	30 „
4th „	....	20 „
5th „	....	10 „

(d) **80 Metre Segment**: For 80 metre contacts between VK and ZL stations, each VK and ZL call area will be considered a "scoring area", with contact points and bonus points to be counted as for DX contacts.

Note.—Contacts between VK and ZL on 80 metres only.

(e) **160 Metre Segment**: For 160 metres, contacts between VK and ZL, VK and VK, ZL and ZL, and VK/ZL to the rest of the world: Each VK/ZL call area will be considered a "scoring area" with contact points and bonus points to be counted as for DX contacts [Rule 9 (c)].

Note.—A contestant in a call area may claim points for contacts in the same call area for this 160-metre segment.

For this purpose the A.R.R.L. Countries List will be used with the exception that each call area of W/K, JA and UA will count as "countries" for scoring purposes as indicated above.

10. **Logs:** (i.) **Overseas Stations—**

(a) Logs to show in this order: Date, time in GMT, call sign of station contacted, band, serial number sent, serial number received, points. Underline each new VK/ZL call area contacted. A separate log for each band must be submitted.

(b) **Summary sheet** to show the call sign, name and address (block letters), details of station, and, for each band, QSO points for that band, VK/ZL call areas worked on that band.

"All-band" score will be total QSO points multiplied by sum of VK/ZL call areas on all bands, while "single-band" scores will be that band QSO points multiplied by VK/ZL call areas worked on that band.

(ii.) **VK/ZL Stations:**

(a) Logs must show in this order: Date, time in GMT, call sign of station worked, band, serial number sent, serial number received, contact points, bonus points. Use a separate log for each band.

(b) **Summary** to show: Name and address in block letters, call sign, score for each band by adding contact and bonus points for that band, and "all-band" score by adding the band scores together; details of station and power, declaration that all rules and regulations have been observed.

11. The right is reserved to disqualify any entrant who, during the Contest, has not strictly observed regulations or who has consistently departed from the accepted code of operating ethics.

12. The ruling of Federal Contest Manager of the W.I.A. will be final.

13. **Awards:**

VK/ZL Stations: W.I.A. will award certificates as follows:

(1) To the top scorer on each band irrespective of single-band or multi-band operation and irrespective of call area, i.e. a maximum of one award may be made for VK and ZL, for each band.

(2) To the top scorer in each VK and ZL call district, i.e. a maximum of 15 awards, 10 VK and 5 ZL awards may be made.

To be eligible for awards in either of the above mentioned categories an operator must obtain at least 1,000 points or there must be at least three competing entries in the category.

Overseas Stations: Certificates will be awarded to each country (call area in W/K, JA and UA) on the following basis:

(1) Top scorer using "all bands" provided that at least three entries are received from the "country" or the contestant has scored 500 points or more.

(2) Other certificates may be awarded, to be determined by conditions and activity.

N.B.—There are separate awards for c.w. and phone.

14. **Entries**: All entries should be posted to Federal Contest Committee, W.I.A., Box N1002, G.P.O., Perth, Western Australia, 6001, **or** N. Penfold, 388 Huntriss Road, Woodlands, Western Australia, 6018. VK/ZL entries to be **received** by 31st December, 1971. Overseas entries to be **received** by 22nd January, 1972.

RECEIVING SECTION

1. The rules are the same as for the transmitting section, but no active transmitting station is permitted to enter this section.

2. The Contest times and logging of stations on each band per week-end are as for that transmitting section except that the same station may be logged twice on any one band—once on phone and once on c.w.

3. To count for points, logs will take the same form as for transmitting, as follows: date, time in GMT, call of station heard, call of the station he is working RS(T) of the station heard, serial number sent by the station heard, band, points claimed. Scoring is on the same basis as for transmitting section and the summary should be similarly set out with the addition of the name of the S.w.l. Society in which membership is held if a member.

4. Overseas Stations may log only VK/ZL stations, but VK receiving stations may log overseas stations and ZL stations, while ZL receiving stations may log overseas stations and VK stations.

5. Certificates will be awarded to the top scorer in each overseas scoring area and in each VK/ZL call area provided that at least three entries are received from that area or that the contestant has scored 500 points or more.

REMEMBRANCE DAY CONTEST, 1971

In recent years a close relationship has developed between the N.Z.A.R.T. and the W.I.A. in many fields. This year, reflecting these ties, New Zealand Amateurs are invited to participate for the first time in the W.I.A. Remembrance Day Contest. Whilst the scores of the ZL operators will not affect W.I.A. Divisional scores for the Trophy, they will be eligible for the Certificates specified in the Rules, and to this end are invited to submit logs to the Federal Contest Manager in Brisbane. It is hoped that the participation of New Zealand operators will add considerably to the activity on the bands and to the success of the Contest.

A perpetual trophy is awarded annually for competition between Divisions of the W.I.A. It is inscribed with the names of those who made the supreme sacrifice and so perpetuates their memory throughout Amateur Radio in Australia.

The name of the winning Division each year is also inscribed on the trophy and, in addition, the winning Division will receive a suitably inscribed Certificate.

Objects: Amateurs in each VK Call Area, including Australian Mandated Territories and Australian Antarctica, will endeavour to contact Amateurs in other VK and ZL Call Areas on all bands. Amateurs may endeavour to contact any other Amateurs on the authorised bands above 52 MHz. (i.e. intrastate contacts will be permitted in the v.h.f./u.h.f. bands for scoring purposes).

Contest Date: 0800 hours GMT on Saturday, 14th August, 1971, to 0759 hours GMT on Sunday, 15th August, 1971.

All Amateur stations are requested to observe 15 minutes' silence before the commencement of the Contest on the Saturday afternoon. An appropriate broadcast will be relayed from all Divisional stations during this period.

RULES

1. There shall be four sections to the Contest—
   (a) Transmitting phone,
   (b) Transmitting c.w.,
   (c) Transmitting open,
   (d) Receiving Open.
2. All Australian Amateurs may enter the Contest whether their stations are fixed, portable or mobile. Members and non-members will be eligible for awards.
3. All authorised Amateur bands may be used and **cross-mode operation is permitted**. Cross-band operation is not permitted.
4. Amateurs may operate on both phone and c.w. during the Contest, i.e. phone to phone or c.w. to c.w. or phone to c.w. However, only one entry may be submitted for sections (a) to (c) in Rule 1.

An open log will be one in which points are claimed for both phone and c.w. transmissions. Refer to Rule 11 concerning log entries.

5. For scoring, only one contact per station per band is allowed. However, a second scoring contact can be made on the same band using the alternate mode. Arranged schedules for contacts on the other bands are prohibited.
6. Multi-operator stations are not permitted. Although log keepers are permitted, only the licensed operator is allowed to make contact under his own call sign. Should two or more wish to operate any particular station, each will be considered a contestant and must submit a separate log under his own call sign. Such contestants shall be referred to as "substitute operators" for the purpose of these Rules and their operating procedure must be as follows:—

Phone: Substitute operators will call "CQ RD" or "CQ Remebrance Day" followed by call of the station they are operating, then the word "log" followed by their own call sign, e.g. "CQ Remembrance Day from VK4BBB log VK4BAA".

C.W.: Substitute operators will call "CQ RD de" followed by the group call sign comprising the call of the station they are operating, an oblique stroke and their own call, e.g. "CQ RD de VK4BBB/VK4BAA".

Contestants receiving signals from a substitute operator will qualify for points by recording the call sign of the substitute operator only.

Remembrance Day Contest Trophy

SCORING TABLE

To

From	VK0	VK1	VK2	VK3	VK4	VK5	VK6	VK7	VK8	VK9	ZL1	ZL2	ZL3	ZL4	ZL5
VK0	–	6	6	6	6	6	6	6	6	6	2	2	3	4	1
VK1	6	–	1	1	2	3	5	4	6	5	1	2	3	4	6
VK2	6	3	–	1	2	3	5	4	6	5	1	2	3	4	6
VK3	6	4	1	–	2	1	4	3	6	5	2	2	3	4	6
VK4	6	3	1	2	–	3	6	5	4	3	3	3	3	4	6
VK5	6	5	2	1	3	–	4	3	3	6	4	4	4	5	6
VK6	6	6	2	1	4	2	–	3	5	6	4	4	5	6	6
VK7	6	5	1	1	3	2	5	–	5	6	2	2	3	4	6
VK8	6	5	1	1	2	3	6	4	–	3	4	4	6	6	6
VK9	6	5	1	2	3	4	5	6	1	–	5	5	6	6	6
ZL1	6	1	1	1	2	2	5	3	5	6					
ZL2	6	1	1	1	2	2	5	3	5	6					
ZL3	6	3	3	3	4	4	6	4	6	6					
ZL4	6	4	4	4	5	5	6	5	6	6					
ZL5	1	6	6	6	6	6	6	6	6	6					

Note.—Read Table from left to right for points for the various Call Areas.

In addition, all intrastate contacts on 52 MHz. and above are worth 1 point each per band.

7. Entrants must operate within the terms of their licences.

8. **Cyphers.**—Before points may be claimed for a contact, serial numbers must be exchanged and acknowledged. The serial number of five or six figures will be made up of the RS (telephony) or RST (c.w.) reports plus three figures, that will increase in value by one for each successive contact.

If any contestant reaches 999 he will start again with 001.

9. **Entries** must be set out as shown in the example, using **only one side** of the paper and wherever possible standard W.I.A. Log Sheets should be used. Entries must be clearly marked "Remembrance Day Contest 1971" and must be postmarked not later than **3rd September, 1971.** Address them to **Federal Contest Manager, W.I.A., Box 638, Brisbane, Qld., 4001.** Late entries will be disqualified.

10. Scoring will be based on the table shown.

Portable Operation: Log scores of operators working outside their own Call Area will be credited to that Call Area in which operation takes place, e.g. VK5ZP/2. His score counts towards N.S.W. total points score.

11. All logs shall be set out as in the example shown and in addition will carry a **front sheet** showing the following information:

Name............................Section....................

Address......................Call Sign..................

.........................Claimed Score...................

No. of Contacts..................

Declaration.—I hereby certify that I have operated in accordance with the Rules and spirit of the Contest.

Signed..................................

Date.......................

All contacts made during the Contest must be shown in the log submitted (see Rule 4). If an invalid contact is made, it must be shown but no score claimed.

Entrants in the Open Sections must show c.w. and phone contacts in numerical sequence.

12. The Federal Contest Manager has the right to disqualify any entrant who, during the Contest, has not observed the regulations or who has consistently departed from the accepted code of operating ethics. The Federal Contest Manager also has the right to disallow any illegible, incomplete or incorrectly set-out logs.

13. The ruling of the Federal Contest Manager of the W.I.A. is final and no disputes will be discussed.

AWARDS

Certificates will be awarded to the top scoring stations in Sections (a) to (c) of Rule 1 above, in each Call Area, and will include top scorer in each Section of each Call Area operating exclusively on 52 MHz. and above. VK1, VK8, VK9, VK0, ZL1, ZL2, ZL3, ZL4 and ZL5 will count as separate areas for awards. There will be no outright winner. Further Certificates may be awarded at the discretion of the Federal Contest Manager.

The Division to which the Trophy will be awarded shall be determined in the following way.

To the average of the top six logs shall be added a bonus arrived at by adding to this average the ratio of logs entered to the number of State licensees (including Limited licensees), multiplied by the total points from all entries in Sections (a), (b) and (c) of Rule 1.

$$\text{Average of top six logs} + \left\{ \frac{\text{Logs Entered}}{\text{State Licensees incl. Z \& Y Calls}} \times \text{Total Pts. from all Entrants in Sect. (a) (b) (c)} \right\}$$

VK1 scores will be included with VK2, VK8 with VK5, and VK0 with VK7. Also, VK9 logs and score will be added to the Division which is geographically the closest. ZL scores will not be included in the score of any W.I.A. Division.

Acceptable logs for all Sections shall show at least five valid contacts.

The trophy shall be forwarded to the winning Division in its container and will be held by that Division for the specified period.

RECEIVING SECTION

(Section D)

1. This Section is open to all Short Wave Listeners in Australia and New Zealand, but no active transmitting station may enter.

2. Contest times and loggings of stations on each band are as for transmitting.

3. All logs shall be set out as shown in the example. The scoring table to be used is the same as that used for transmitting entrants and points must be claimed on the basis of the State in which the receiving station is located. A sample is given to clarify the position.

It is not sufficient to log a station calling CQ—the number he passes in a contact must be logged.

It is not permissible to log a station in the same call area as the receiving station on the m.f. and h.f. bands, 1.8-30 MHz., but on bands 52 MHz. and above such stations may be logged, once only per band, for one point. See example given.

4. A station heard may be logged once on phone and once on c.w. for each band.

5. Club receiving stations may enter for the Receiving Section of the Contest, but will not be eligible for the single-operator award. However, if sufficient entries are received, a special award may be given to the top receiving station in Australia. All operators must sign the declaration.

Awards

Certificates will be awarded to the highest scorers in each call area. Further Certificates may be awarded at the discretion of the Federal Contest Manager.

Federal Executive Report

Two meetings of Federal Executive have been held since the Easter Convention in Brisbane—one on April 28 and the other on May 26. At the latter meeting it was decided to split the work into two parts and to take all residual outstanding at a further special meeting early in June.

Novice licensing was singled out for special discussions during June and July. The proposed extensions to the **U.S.A. telephony segments** of the h.f. bands by the F.C.C. on petitions received from a number of U.S.A. Amateurs was discussed at length and I.A.R.U. was addressed on the subject along the lines indicated in recent Divisional broadcasts.

The various **appointments to F.E.** for the year 1971/72 were discussed. A new one this year is a Key Section Manager. Detailed proposals relating to various forms of interference were included in letters to the Standards Association of Australia in relation to Draft Standards 1693 and 1695. The **Publications Department** (relating to overseas books and magazines) was taken over by the embryonic F.E. office early in May. An interim list of overseas books and their prices to members is available from Divisions. Subscriptions to overseas magazines are available through F.E. at Box 67, East Melbourne, Vic., 3002. The costs of magazine subscriptions will be found in this journal's advertisements. Compare these with the prices you would pay by direct subscription and such extras as the costs of buying foreign exchange.

The **$1,000 loan to the I.A.R.U. Region 3 Association** received much discussion since this would derive from the I.T.U. trust fund. This loan is for the express purpose of financing the Region 3 representative at the I.T.U's W.A.R.C. in Geneva currently in session, which will include discussions and decisions on all the frequency allocations. In order to safeguard the loan as reasonably prudent as possible, seven conditions were required to be met by the Region 3 Association. All this is in the hands of the W.I.A. Liaison Officer, David Rankin, VK3QV.

It was also noted that another Society of the Region 3 Association had decided to forego their claim for travel fares to and from the Tokyo Conference in March. F.E. regretted we could not follow suit because of financial stringency and the relative magnitude hitherto of the W.I.A. contributions to Region 3

A number of early **re-organisational** matters are beginning to come forward for decision, as, for example, the best method of handling a number of separate accounts hitherto maintained by voluntary and other efforts. **Project Australis** was also in the limelight and very great behind-the-scenes activity on this is currently going on. The objective is, of course, to disseminate the greatest possible amount of data as early as possible.

The change over of the **Federal Contests Committee** from VK6 to VK4 has taken place except that this year's VK/ZL Contest will remain with VK6ZDK. The new Federal Contest Manager is Peter Brown, VK4PJ. He and his team will receive and will assuredly need all our good wishes.

A number of routine matters were, of course, dealt with, too numerous to list, but here is a final thought. For those who will be advocating Novice licensing, it is a good thing to think about encouraging beginners but how about helping us to clear our bands of the intruders so that we can all have a bit more elbow room.

—VK3CIF.

EXAMPLE OF TRANSMITTING LOG

Date/ Time GMT	Band	Emission and Power	Call Sign Worked	RST No. Sent	RST No. Received	Points Claim.

Note.—Standard W.I.A. Log Sheets may be used to follow the above form.

EXAMPLE OF RECEIVING LOG (VICTORIAN S.W.L.)

Date/ Time GMT	Band	Emission	Call Sign Heard	RST No. Sent	RST No. Received	Station Called	Points Claim.
Aug. '71							
14 0810	7 Mc.	A3 (a)	VK5PS	58002	—	VK6RU	1
14 0812	"	"	ZL2AZ	59007	—	VK3KI	2
14 1035	52 "	A3	VK4ZAZ	56010	—	VK5ZDR	2
14 1040	"	"	VK3ALZ	59025	—	VK3OV	1

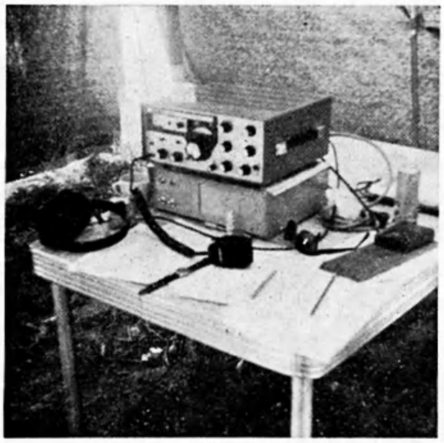
Note.—Standard W.I.A. Log Sheets may be used to follow the above form.

VK1VP/P EXPEDITION FOR NATIONAL FIELD DAY CONTEST, 1971

ANDREW DAVIS, VK1DA*

The high mountains to the west of Canberra are very attractive for portable v.h.f. operation as some of them are easily accessible by road. Mount Ginini, 5,782 feet above sea level, with a good road leading to the D.C.A. installation on top and only 50 miles drive from Canberra has been chosen for many v.h.f. field operations by locals and others over the last couple of years. Another is Mt. Gingera, several miles south of Ginini and several hundred feet higher. Mt. Franklin is several miles north and correspondingly lower.

For this expedition, we were originally going to Gingera, but recent heavy rain had made access impossible. We settled on Ginini.



40 metre station. Other h.f. station was at other end of same table.

Eddie VK1VP, Graeme VK1CG, Reg VK1ZMR and I arrived on site by about 8.30 on the Saturday morning. Reg and I set up the tent and h.f. antennas; but there were problems with the beam and the dipoles. After raising and lowering the beam (with the dipoles mounted on top) four times, we decided to do without the 40 mx dipole as it was shorting against the 80 mx one. A simple operation was performed by Reg with a pair of side cutters, and we were away. We also forgot to make the beam tower rotatable, in the "heat of the moment", and that caused one more raising and lowering. Then, when we stood back and noticed that the director and reflector were not horizontal (and the beam looked more like a tornado victim), it was just too bad, and we left it that way.

We also had some trouble getting stakes into the ground. The hill must be solid rock—at least it was in the positions we were trying to get the stakes in!

Meanwhile, Eddie and Graeme were setting up the v.h.f. gear. The antennas took some time to assemble and the sun shone brightly on two backs for a couple of hours. The v.h.f. station was located in Eddie's Land Rover, which was really well set up for field operation. Shelves, speakers, power outlets, 240v. supply metering (for use when operating from 240v. instead of 12 volt batteries only) and antenna feed-throughs are permanently installed.

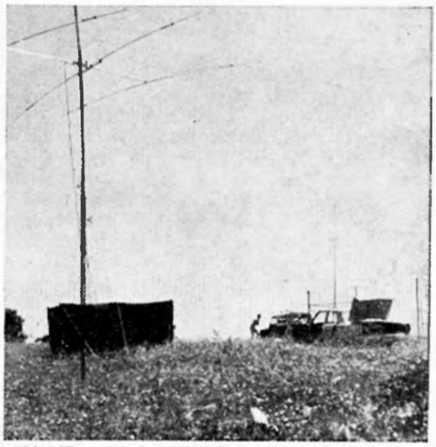
Eddie uses N type connectors from the "shack" to all antennas, using UR67 50-ohm co-ax. The antenna feed-throughs referred to above enable short lengths of co-ax. with B.N.C. connectors to be used in the "shack", making changes quick and reliable (e.g. changing converters or bands), and you do not have heavy co-ax. flopping around carrying your transmitter away when you turn the beam.

Quickest of all to erect was the 14AVQ—it's as light as a feather. Once you know where to clamp the thing together (that's easy, you mark the position with tape at home), it's a one-minute job to get up in the air from start to finish. However, you must spend some time with the radials as they are the secret of the antenna's success. The trap verticals can be unclamped in the centre or thereabouts and are then a suitable size for carrying on ski bars, etc.

We had everything up and running by about noon, so we sat about and listened to the bands until the contest started. We also had the occasional bite to eat.

I operated 40 most of the time, occasionally going to 20 on Sunday, when 40 slackened off. 40 was quite good and the vertical did well, scoring a G on phone and giving excellent coverage around Australia.

Reg operated on all the other h.f. bands. 20 was the best scorer for him, with 80 close behind. However, the beam did not go as well as we had expected; it did well on 20 and not well on 15 and 10, the reverse of what I would expect for a compact beam. So when 10 was open on Sunday morning, we didn't do too well. Reg also had a faulty speech amp., putting him out of action for a while.



TA33JR was about 24 feet above the ground. (Note strange angle of director and reflector.)

One very pleasant surprise was the lack of interference between the two h.f. rigs. They were about 1 foot apart. Some spots were as high as S8, but that is good compared to other rigs I have operated under similar conditions. There were no key clicks either, showing that once modified, these rigs are quite clean on c.w.

Graeme operated 52 MHz., and Eddie operated 144 and 432 MHz. The 146 f.m. gear was sitting between them, and whenever the mobiles in Sydney were silent, the f.m. provided some good contacts.

Generally though, v.h.f. conditions were poor. On 144, quite a few contacts were made into Sydney (normally easy from this mountain) and also

Fast refuel—one of many. Reg "supervises," Graeme checks oil, Eddie fills small can for next time.

with country stations that normally work the repeater only. Interstate, VK3AOT was heard on Saturday night and on Sunday morning. Just before packing up on Sunday afternoon, VK-3ZQC was worked, on 144 MHz. This was quite a contrast to last year, when we worked many VK3 stations.

We are hoping that the activity on the f.m. nets caused by repeaters will encourage more Amateurs to build and use equipment on the non-net or tunable sections of the v.h.f. bands. For it is certain that the results attained using f.m. and vertical polarisation are easy to beat using c.w., s.s.b. or a.m., on horizontal polarisation. Instead of having marginal contacts on f.m. net channels, we could be having solid reliable contacts, and more of them.

We started to pack up at about 2.30 on Sunday. 20 and 40 were still good for a few points, so I stayed on the air until about 3.15. I think there is a section of Murphy's rules which says that you cannot take home as much as you took, using the same space. In other words, you do an inefficient packing job when you are up on a mountain. We proved it! However, by about 4 p.m. we were on our way, with all the gear on board.

(continued next page)

* 32 Kalgoorlie Cres., Fisher, A.C.T., 2611.

EQUIPMENT

Two FT200 transceivers, 80 metre dipole, TA33Jr triband beam, 14AVQ trap vertical (used almost 100% on 40).

Home-brew transmitters for 52, 144, 432 MHz. a.m., having power outputs of 40, 25 and 15 watts respectively. Common 50-watt transistor modulator/power supply for the 144 and 432 MHz. tx's, which operate from 12v. battery. Huge 12v. battery, charger for same, stabilised 12v. supply for converters.

A modified T.C.A. 1674 unit for 146 f.m. channels A, B and C; power output 55 watts.

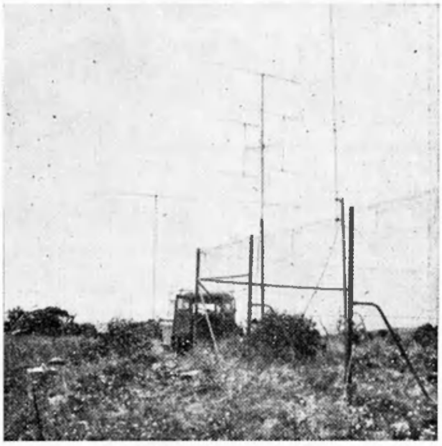
FET or MOSFET converters for v.h.f. bands—home-brew. Home-brew receiver for 4-6 MHz. tunable i.f. for 52 MHz. Collins 75S2 receiver for 21 MHz. i.f. for 144 and 432 MHz. Davco DR30 receiver for 21 MHz. tunable i.f. for 144 and 432 MHz. Spare transmitter for each above; spare converters for each band.

Four element beam on 20 ft. mast for 52 MHz. Two 10 element beams stacked vertically for 144 a.m., matched with a half-wave section of 70-ohm co-axial line. Two 5 element beams stacked vertically for 146 f.m., matched as above. Four 9 element beams H-stacked for 432 MHz., matched with lines as above. All antennas fed with UR67 (50 ohm) co-ax.; fittings mostly N type from antenna to tx, BNC inside the shack.

2.5 kva. alternator, 75 yards extension cable, tent, towers for all beams, rope, headphones, morse keys, log books, etc., and FOOD.

The gear was carried in and/or on a Land Rover and a Valiant sedan.

We certainly had a good time in the contest and we are sure everyone else in it did also. A contest is a fine way of testing your gear and your operating techniques (including your temper). A field day is even better as it gives you a chance to get out of the power line noise and i.t.v. plaguing you in the city.



Six metre beam, v.h.f. station in Land Rover, 144 and 432 MHz. beams, 14AVQ (note radials).

Get together with some locals and organise an expedition for next year's contest. You don't need to do it on a grand scale—that can come later. It's easy to borrow camping gear or even hire it (same applies to the generator—share the cost among three or more).

We'd like to see some multipliers introduced for v.h.f. operation in this contest (higher scoring anyway). Seems peculiar that a 200-mile contact is worth the same points on 80 metres as on 432 MHz. Alternatively, how about multiple contacts? We invite comments and suggestions from other operators.

Finally, thanks to all the home stations who came on the air and provided some extra activity this year.

☆

DEFINITE SUNSPOT NUMBERS FOR 1970

Day	Jan.	Feb.	Mar.	Apr.	May	June
1	115	121	137	112	118	102
2	83	96	129	105	118	92
3	78	82	113	121	122	64
4	69	68	107	116	119	63
5	66	72	107	120	113	59
6	57	93	103	115	115	57
7	30	104	111	123	98	58
8	37	102	118	147	87	61
9	59	123	120	172	90	60
10	84	133	125	188	111	92
11	106	175	103	183	132	122
12	138	153	88	163	134	138
13	145	145	104	141	142	153
14	160	124	84	124	145	165
15	155	115	65	106	159	168
16	145	139	48	92	161	153
17	160	142	29	82	169	148
18	168	143	41	68	173	134
19	165	120	48	67	176	105
20	133	125	93	65	146	99
21	118	128	115	64	143	96
22	104	132	122	57	125	96
23	79	164	135	67	106	87
24	73	166	140	90	122	102
25	98	173	142	93	110	126
26	123	143	122	81	125	127
27	130	150	115	88	126	114
28	156	146	110	106	106	113
29	154		103	112	118	124
30	138		111	116	116	127
31	131		101		127	
Mean	111.5	127.3	102.9	109.5	127.5	106.8

Day	July	Aug.	Sep.	Oct.	Nov.	Dec.
1	137	77	98	63	86	91
2	153	63	104	57	82	78
3	153	64	110	43	80	78
4	159	59	115	55	78	76
5	165	65	120	75	67	88
6	161	63	133	53	89	90
7	125	72	136	72	86	91
8	115	82	125	76	69	100
9	104	76	116	78	77	96
10	90	71	103	79	78	110
11	81	75	82	75	97	120
12	74	73	76	80	89	110
13	79	92	73	84	105	90
14	68	94	76	87	117	85
15	61	108	75	87	125	84
16	61	100	68	94	133	68
17	59	99	65	84	135	63
18	56	108	75	76	135	79
19	92	113	98	83	132	95
20	92	117	114	70	128	104
21	120	117	129	69	119	101
22	122	108	109	73	105	97
23	106	101	104	89	96	85
24	110	116	129	100	77	66
25	122	114	114	111	62	75
26	138	109	107	117	65	64
27	153	91	87	142	74	53
28	146	101	85	131	89	50
29	153	114	81	139	78	59
30	122	120	77	126	103	74
31	108	111		117		68
Mean	112.5	93.0	99.5	86.6	95.2	83.5

Yearly Mean equals 104.7.

—Eidgenossische Sternwarte, Zurich.

New Equipment

ACITRON SSB-400

We believe this unit (photograph is on the front cover), known as the SSB-400 and is designed specifically for Amateurs, is the first Australian designed and made product of this type.

The transceiver is basically a 400 watt p.e.p. transceiver covering the Amateurs bands 160 through to 10 metres and including also two metres at a lower power level of 20 watts p.e.p. out.

The receiver front end uses dual gate zener protected Mosfets for improved cross-modulation and intermodulation performance. This in turn feeds into an integrated circuit balanced mixer which in turn goes through an eight-pole 9 MHz. crystal filter with a bandpass of aproximately 2.3 KHz. The i.f. system also uses dual gate zener protected Mosfets for greatly improved a.g.c. action, followed by the product detector and finally the audio system which delivers 3 watts of audio output at less than five per cent. distortion.

The local oscillator system starts with a 5-6 MHz. v.f.o. which is heterodyned with high frequency carrier crystals in an integrated circuit balanced mixer. The output of this feeds through bandpass filters before it goes into the transmit and receiver mixers, thus greatly reducing the possibiilty of spots.

The frequency readout incorporates aproximately twenty integrated circuits in a complete frequency counter which in turn drives a set of gallium arsenide seven-segment display indicators. These of course have the advantage of greatly reduced size and greatly increased life over the more conventional nixie type display.

The clock oscillator for the frequency counter is a 100 KHz. crystal, this gives approximately 50 cycle accuracy on the readout itself. The readout system is designed to readout to the nearest 1 KHz.,but has a built-in scaling switch which enables the final decimal place to indicate 100 cycle steps.

The unit tunes directly both 7.5 and 15 MHz. which enables the digital readout clock oscillator to be accurately set up without any sophisticated test equipment.

The transmitter consists of a 9 MHz. balanced modulator, once again an integrated circuit, which gives greatly improved carrier suppression. This in turn feeds through the 9 MHz. filter and into the transmitter mixer. The output of the transmitter mixer feeds through the receiver front end which is band switched to obtain the required spurious rejection, the output of this feeds through a broad-band transistor amplifier and finally into the p.a. valve. Apart from the final p.a. valve, which is a v.h.f. dual tetrode, the unit is fully solid state.

For two metre operation an in-built conversion system enables the 28 MHz. band to act as an i.f. for the two metre converter. Two MHz. coverage is given on ten and consequently also on two metres. The front end on two metres consists also of dual gate zener protected Mosfets and the transmitter output on two metres consists of strip lined v.h.f. transistors.

The transceiver comes complete with a matching power supply and extension speaker and has all the normal features such as v.o.x., a.l.c., c.w. both upper and lower sideband, noise blanker, etc.

The SSB-400 is currently in production and should be available to the general public during the month of September.

ZONE 29 AWARD

The Zone 29 Award is issued by the West Australian Division of the Wireless Institute of Australia to licensed Amateurs and S.w.l.'s throughout the world. To qualify for this award, the following conditions must be satisfied:—

1. Establishment of two-way communication with any twenty-five different Amateur stations situated in Zone 29. Communication to be made after 0001 W.A.S.T. January 1952.

2. The total of 25 different stations may be obtained by operation on one or more of the Amateur bands.

3. Any types of emission which are permitted by the local licensing authority may be used.

The Certificate will be endorsed when issued as confirmation of fulfilment of the following special conditions:—

(a) All 25 stations obtained from operation on one band only. (Open)
(b) All 25 stations obtained from operation of phone transmission (s.s.b., a.m., f.m., etc.).
(c) All 25 stations obtained from operation of c.w. transmission.
(d) All 25 stations obtained by one band operation and phone only.
(e) All 25 stations obtained by one band operation and c.w. only.
(f) 25 stations heard by S.w. Listener in (a) to (e) of above.

Confirmation in writing of all contacts must be submitted to:—

The Secretary,
W.I.A. (W.A. Division),
Box N1002, G.P.O.,
Perth, W.A., 6001,

together with $1(A) or 10 I.R.C.

CORRESPONDENCE:

NOVICE LICENSING

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers.

Editor "A.R.," Dear Sir,

I am somewhat perturbed by the correspondence which has appeared in your pages on the subject of Novice Licensing. Up to date this correspondence has all been from those who favour this type of licence, and nothing from those against the proposal. I am, therefore, compelled to the opinion that either such correspondence has been suppressed, or more likely, those against the proposal are suffering from the great Australian weakness of yielding to a very local minority.

As I understand the position, a report was prepared by a sub-committee and presented to the last Federal Convention. I further understand that copies of the report will be made available on application to the chairman of the sub-committee (this information was garnered from the VK2 call-back on Sunday, 9th May, when VK2APQ broke in and announced the fact). If this report contains anything really important, surely it should have been published in the pages of "A.R.," so that all members may readily study it.

I have made it my business to read the report, and have also read the Federal Comment in June "A.R.," and I feel it is time some attention was drawn to the inaccuracies in the report, and some comments made about it in general.

Firstly, it is obvious that the committee was composed entirely of gentlemen desirious of establishing a novice-type licence, and as one would expect, the report is biased accordingly. They made major efforts to obtain opinions from overseas proponents of novice licensing, but apart from one small plea in a letter in your magazine, no other effort to obtain arguments against the proposal appear to have been made. They have made a rather weak attempt to state a case against the proposal, but to me they give the impression that they were not particularly anxious to go to much trouble in that matter, and such comments as they received or thought up for themselves (they admit doing so) are dismissed in as few words as possible.

The report goes to some pains to point out that the Amateur population of the U.S.A. doubled between 1951 and 1961, but at least the report has the grace to say that this was possibly not entirely due to the advent of novice licensing. To my mind, the increase was due largely to two other factors which the report appears to ignore. There would logically be a natural increase, and at the same time the period 1951 to 1961 saw the introduction of the Technician Class licence. Why the report does not cover this aspect more fully, when on the cover they quote figures from the U.S.A. which show that the Technicians out-number the Novices by nearly 2.5 to 1, eludes me. Why also does the committee list the number of Amateurs in Australia for September and October 1970 rather than for a period comparable with those they quote for the U.S.A.? Was it just a co-incidence that Australia showed no increase in October? Surely this is not the fairest way to seek a comparison.

Allow me to partly rectify their oversight, by saying that the Amateur population in Australia increased from 5,904 in December 1969 to 6,289 in December 1970, an increase of just over 6% in 12 months. From the figures quoted on the cover of the report, the increase in U.S.A. in the 10 months period March 1969 to January 1970 was only 152, which equals only 0.05%, and assuming the increase rate was maintained for a further two months, we arrive at 0.06%. Fantastic! Is this the reason the committee saw fit to use the American figures for 1951 to 1961 rather than those for 1961 to 1971? Admittedly it looks very fine to see a doubling of the numbers, so let us have a look at the Australian scene. Although, so far, I have been unable to locate the actual figure for Australia for 1951, I am reliably informed that it was in the vicinity of 2,000 to 2,200, and certainly did not reach 2,500. In 1961 we had 4,400 licensees, and taking the middle of the first three figures, i.e. 2,200, what do we find? Right! We also doubled our Amateur population between 1951 and 1961. Sure we achieved a Limited Class licence in the period, but U.S.A. also achieved the Technician licence, so we evened with U.S.A., without Novices.

The report does not quote the percentage increase in U.S.A. during 1961 to 1971, nor do I have the figures available, but as a matter of interest the Australian figures rose from 4,440 to 6,289, an increase of 40%, which is still quite a respectable increase.

Repeatedly through the report, the inference is made that due to Novice licensing, other countries are at an advantage over Australia as far as the number of licensees is concerned, but is this true? Let us look at Appendix "C" of the report which lists countries with Novice licensing and the frequencies available to them, although, for the moment the frequencies are not under discussion. Using the latest available information from the I.A.R.U., as published in "A.R." last October, and the latest population figures I have been able to trace (U.N. Statistics and Consulates where possible), what do we find? Look at the table below:

Country	Amateurs	Popul'n (million)	Proportion
Czechoslovakia	2350	14.3	1 in 6100
Dominican Rep.	500	4.2	1 in 8400
Finland	2000	4.5	1 in 2200
Faroe Islands	30	0.038	1 in 1266
India	•	•	•
Israel	600	3.0	1 in 5000
Japan	100936	101.1	1 in 1000
Korea	90	32.0	1 in 320000
Zambia	54	4.5	1 in 833000

• Adequately covered in Federal Comment "One in a Million."

There is no point in repeating the figures for U.S.A. as these are covered at great length in the report. The report also states that the position in Japan is three times better than in Australia, but is this so? Not on my calculations. It was recently stated that there are 250,000 Novices in Japan. If this is the case, what does it mean? Perhaps the Novice licence appeared subsequent to the compilation of the I.A.R.U. figures in mid 1970, and the Japanese figure should read 350,936. If this is the case (and until I see proof I doubt it) then the ratio of Amateurs to population looks most remarkable, but have a listen on 15 metres and decide whether or not you wish to have similar conditions in Australia. Also, what a fantastic effort to produce 250,000 Novices in six months.

Be that as it may, it would appear that the issuing of Novice licences does not do a great deal for the Amateur movement in the countries where such licences are available.

Looking further at the figures provided by the I.A.R.U., it is obvious that Australia is well above the average of the majority of countries in the world, in fact is bettered only by Argentina (1 in 1460), Canada (1 in 1490), Faroe Islands (1 in 1266), New Zealand (1 in 700—I cannot agree with the report of 1 in 1000), Norway (1 in 1400), U.S.A. (1 in 800) and Japan with an indefinite ratio. Perhaps the advocates for a Novice licence can explain why three of the countries with a better ratio than Australia do not have a Novice type licence. Try as I may, I have been unable to see any great virtue in quoting the U.S.S.R. as an advertisement for Novice licensing, although the sub-committee saw fit to do so. With a population approaching 243 million, the figure of 15,085 licensees is not particularly impressive.

Let us look at some further figures for countries, which from the report, one would infer are technologically retarded as they have no Novice licence. Germany, 1 in 3850; United Kingdom, 1 in 3650; France, 1 in 9350; Italy, 1 in 15,000; Sweden, 1 in 2340; Switzerland, 1 in 6900. Who in their right senses would consider these countries technically backward?

The report states that "Amateur Radio in Australia is in a very retarded situation". With 1 in 1,940 is this really so? Surely the analysis of the figures quoted shows that this is far from being the case.

Appendix "D" lists 17 arguments in favour of an Australian Novice licence. After sifting the wheat from the chaff, very few valid arguments remain, and I query whether they are sufficient to warrant a Novice licence. To go through the whole 17 arguments at this time would take far more space than I feel you will grant, but let us look at one of them that has not so far been commented upon. Argument 6 can be summarised as:

(a) Increased licence fees will inhibit Amateur Radio.

(b) Inactive Amateurs will relinquish their call signs.

(c) Increased W.I.A. membership fees will tend to reduce membership.

(d) The number of Amateurs who are not members of W.I.A. is not pleasing.

(e) Any action which will increase membership will be beneficial to the Institute.

(f) A Novice licence would bring additional citizens into the Amateur Service and into the sphere of Institute administration.

Whilst it is admitted that these are the committee's "opinions", and that they look quite sound, should we not also look at the other side of the coin. There is so far no proof of (a), and when licence fees are considered against the cost of equipment, it does not appear a valid argument. As for (b), time alone will tell, but a check of the records show that there is quite a large number of licences not renewed every year, and these cannot be due to any increase in licence fees as there were none in the years reviewed. Possibly in two years a clear picture will emerge. There is some small evidence that (c) is valid, but until membership returns for 1971 are available I feel the committee is being a little pessimistic. In previous years when fees have increased, the W.I.A. still showed a nett increase. The latest fee increase being somewhat more than those in previous years, probably leads the committee to their conclusion. From what I have seen, I believe that the majority who do not renew their membership when due, eventually return to the fold. Whilst I agree wholeheartedly with the sentiment expressed in (d), an examination of the I.A.R.U. figures again show that Australia with 52% is better than "par for the course", and very much better than the countries which the committee is so fond of quoting. For example, in Japan 33%, New Zealand 42% and U.S.A. 28% of licensees are members of their national society. As for (e), I would only alter it to read "any reasonable action".

Dealing briefly (I hope) with (f) what participation in Institute affairs can be expected? Being by now intoxicated with the idea that whatever America does is right for Australia, we will take the U.S.A. as a guide. We find that approximately 8.5% licensees are Novices. We may, therefore, expect approximately 525 Novices in Australia, of which (and again I quote the American figures) half, or 262, will not continue beyond the Novice stage. Of this 262, it appears that not more than 52% will become W.I.A. members. So after all this, we have 136 extra members of the W.I.A. and the committee recommends that these people should be Associate members of the Institute. Pray somebody tell me why Associates? Associate fees do not even cover the costs, and from the point of view of the licensee it would be, to say the least, frustrating to have a licence in any form and have no voting rights within the Institute. Remember what happened in VK6 when Limited licences became available! If that is not forming a "ghetto" I would like to know what it is. Okay, I will accept the idea that their position will improve once (and if) they get a full licence, but why not make them full members right from the start and give them every encouragement to go for a full licence? As for participation in the administration of the Institute, if one bases on past experience only 1 of the 136 joining the Institute will take any active part in its affairs. Whilst I feel they have partly nullified their own argument, I draw solace from the fact that in about 100 years there will be enough new members from the Novice ranks to supply all the executive officers to cover State and Federal requirements.

But enough of such levity. By now it should be obvious that the committee has not sold me on the idea of a Novice type licence. Perhaps the committee would care to expound their views on a few questions, and I mean expound and not brush aside with comments similar to those contained in their report such as "This is negatived by all the opinions of American correspondents"; "This does not agree with American experience". This is not America but Australia, so let us do our own thinking. We get ample proof that America is far from perfect, and we already have too much of what is bad foisted on us (and I'm not referring only to t.v. programmes).

Amongst the things I would like to know are:

(a) Why did the R.S.G.B. decline a Novice licence when it was offered? Admittedly the English tend to be conservative, but there is usually very sound reasoning behind their actions.

(b) How did Argentina, Canada and New Zealand achieve more Amateurs per head of population than Australia without a Novice licence.

(c) What is going to happen to all the equipment in the possession of Novice licensees after the expiration of the one-year tenure recommended? Is it not reasonable to expect that much of this equipment will prove to be too much of a temptation to the owners, and we will have a spate of piracy?

(d) How is the P.M.G's Department going to police the activities of this hoped-for increase in the Amateur ranks, when they do not have the manpower to adequately do the job at the present time?

(e) Assuming that the manpower can be found to adequately police the Amateur bands, what will be the cost and what will be required in the way of increased licence fees to meet such extra costs?

(f) What is the estimated costs of the straight-out administration of a Novice licence scheme as far as the P.M.G's Department is concerned, and will it affect examination and/or licence fees?

(g) With the best will in the world, it is impossible to imagine that there will not be an increase in the amount of t.v.i., b.c.i., etc., with the advent of Novices to the bands, and here again the load thrown onto the P.M.G's Department will be increased. Already the figures show that although the overall number of cases of interference is falling each year, the interference caused by Amateurs is on the increase. Surely this argues against the lowering of the required technical standards.

(h) In the event of a large growth in the number of interference cases, what is the likelihood of the Department taking the easy course and curing the trouble by cancelling all licences?

(i) Would it not be better for would-be-Novices and Novices of school-age to concentrate on their school studies?

In this regard I find the comment in the report somewhat facetious, more so as the committee comprises members of the teaching profession. While it is an accepted axiom that all work and no play makes Jack a dull boy, the fact remains that there will be a tendency for Novices of school-age to spend an undue amount of time fiddling with radio, rather than devoting their time to more essential studies, hence leaving Jack still a dull boy. A Novice licence is a vastly different proposition from attending some youth organisation activity one night a week. The position may be different in the case of a person contemplating a career in electronics, but in such a case their school studies simplify the problem of obtaining an A.O.C.P.

(j) Why does the committee recommend Novice allocations in all the h.f. bands with the exception of the 14 MHz. band? Their remarks regarding the 160 metre band show a lack of knowledge. To quote the report, "This band is not greatly used and would be suitable for low power local communication, such as within a district radio club network. With the low powered operation involved, it is unlikely that any undue risk of broadcast interference would occur". From my observations, I would say that 160 metre carries nearly as much work as does 80 and 40 metres, and further more, the occupancy is on the increase and will continue to do so, as it is now virtually the only band on which a.m. is the accepted mode, and those wishing to use a.m. can be assured of getting a contact. The band is not restricted to local work, many contacts being made interstate, and this with powers of 10 watts or less. Surely those wishing to use 160 and a.m. are restricted enough now with only 60 KHz. without putting Novices there.

The report states "Amateur Radio offers wonderful therapy for handicapped persons and those located in remote areas. The main problem is one of training such people to the A.O.C.P. level and one must admit that this difficulty is insurmountable." Is the committee not aware that the P.M.G's Department already makes provision for physically handicapped persons, and this problem is by no means insurmountable. Indeed, the provisions are much more liberal for the handicapped than they propose for Novices. This problem is already being tackled in VK3 with some success. The problem is not as easy for the person located in a remote area, but I fail to see that it is insurmountable, unless the Novice advocates are grasping at straws.

Despite all the foregoing, there must be some reason or reasons why the Amateur populations vary so much from country to country. The first thought would be that the standards of education and economy vary widely. Whilst no doubt this is a factor, it does not explain why Canada and New Zealand both show better ratios than Australia. Let me take this a step further and look at the Australian scene, where the educational and economic levels between States show a negligible difference:

VK1	1 in 1400
VK2	1 in 2350
VK3	1 in 1690
VK4	1 in 2180
VK5	1 in 2100
VK6	1 in 1770
VK7	1 in 1640
VK8	1 in 1395

Why such a wide variation around the national average of 1 in 1940. The strangest aspect to my mind is the fact that the State with the largest number of Youth Radio Clubs, the most extensive facilities for the education of prospective Amateurs and the largest number and percentage of Associate members, shows the worst figures.

Is it possible that the deletion of the Aboriginal population from the count would make a difference? Certainly it would make a slight improvement to the averages. Briefly (and here I have only the 1966 census figures), the Aboriginal population in Australia is about 80,000, of which VK2 has 14,219, VK3 1,790, VK4 19,003, VK5 5,505, VK6 18,439, VK8 21,119. Although this may partly explain the differences, the theory falls down badly in the case of VK6 and fails completely in the case of VK8. There is a further possibility, and that is the migrant population, but I leave those figures for somebody else to work on. One could go on almost indefinitely along similar lines, but whether or not any worthwhile conclusions would be reached is a moot point.

If one accepts the proposition that the only desire of those advocating a Novice licence is to increase the Amateur population, can the desired result be achieved by other means? I believe it can, and in fact the committee's report points the way. Having looked at a number of recent examination papers, it appears to me that the advent of new techniques require a wider field of knowledge than was required 20 years ago, but the examination as such is no harder. Why then do we find a 75% drop-out/failure rate? Let us look at the W.I.A. classes. Whilst the intention is not to produce electronics geniuses, the object is to cram a rather large amount of learning into about nine to twelve months, and this only one night per week for two hours per night. Unless the student is prepared to do a fair amount of private study he faces an almost impossible task. He stands a much better chance if he has done some preliminary reading before ever joining a class. If nothing else, he will have gained familiarity with the language of radio, and with a little luck may even have managed to grasp some elementary theory. I do not for a moment suggest that this would entirely eliminate drop-outs, but I would expect it to reduce the number. The fact still remains that there will be a percentage not prepared to make the personal effort, and these will fall by the wayside, whether they are aiming at a Novice, Limited or Full licence.

This still leaves the problem of those who go through the class, but fail the examination. Here I blame the modern educational system. When I went to school (more years ago than I care to remember) we spent a large amount of time on the three R's. We also had a delightful subject known as "composition". From what I can see of the present system, not much attention is paid to such subjects. I see a fair amount of the product of the present system, and find the handwriting in the main illegible, the spelling atrocious, and the English expression almost beyond comprehension. What hope has a candidate of passing an examination requiring essay type answers to a specific number of questions in a limited time? Put yourself in the position of the person given the task of marking such papers. How would you mark a paper you could either not read or understand? Let us face it, there is no hope of changing the educational system, but there is a chance of changing the examination system.

I would wager that most of the candidates know the answers to the questions, and could talk on the subject at length, but they just cannot express their thoughts by the use of the written word. As I see it, a change in the examination system would remove any need (if such exists) for a lower standard of licence. By the same token, the extra effort to achieve a 75% pass as against, say, a 50% Novice pass, would not be so great and would result in greater personal satisfaction to the successful candidate, as well as achieving a full A.O.C.P. in one examination rather than in two examinations.

Can anything be done on the matter of the code? The pro-Novice group advocate 5 w.p.m. There are those that consider 8 w.p.m. acceptable, whilst the examination requires 10 w.p.m. Can we find a compromise? I believe so. As I recall it, the code examination takes only a matter of minutes. As a suggestion, would any advantage be found in devoting a little extra time to this part of the examination, and run say two or three minutes at 5 w.p.m., followed by two or three minutes at 8 w.p.m., followed by a further three minutes at 10 w.p.m. A pass could be gained with a mark of 95% at 5 w.p.m., 85% at 8 w.p.m., and 75% at 10 w.p.m., any one of the three being sufficient to qualify.

Sir, I thank you for the space you have made available. Much more could be said, much more research could and should be undertaken, but I would prefer others to do it. All I hope is that the foregoing will arouse the interest of all Amateurs in Australia and that they will consider deeply the matter of Novice licensing and not rush into a hasty decision, nor allow their Federal Councillors to be bulldozed into a decision which could adversely affect Australian Amateurs in the future. Remember the report is in the possession of Federal Councillors. Insist that it be produced at meetings, read and discussed FULLY, and only then make a decision.

—R. W. Higginbotham, VK3RN.

NEW NEW

AMATEUR TV TRANSMISSIONS

Vision Carrier Frequency
National Standard

426.25 MHz.

NEW NEW

VHF

Sub-Editor: ERIC JAMIESON, VK5LP
Forreston, South Australia, 5233.

Closing date for copy 30th of month.
All Times in E.S.T.

AMATEUR BAND BEACONS

VK0	53.544	VK0GR, Antarctia.
VK3	144.700	VK3VE, Vermont.
VK4	144.390	VK4VV, 107m. W. of Brisbane.
VK5	53.000	VK5VF, Mt. Lofty.
	144.800	VK5VF, Mt. Lofty.
VK6	52.006	VK6VF, Tuart Hill.
	52.900	VK6TS, Carnarvon.
	144.500	VK6VE, Mt. Barker.
	145.010	VK6VF, Tuart Hill.
	435.000	VK6VF (on by arrangement).
VK7	144.900	VK7VF, Devonport.
VK9	144.600	VK9XI, Christmas Island.
ZL2	145.200	ZL2VHF, Wellington.
ZL3	145.000	ZL3VHF, Christchurch.
JA	51.995	JA1IGY, Japan.
W	50.091	WB6KAP, U.S.A.
HL	50.100	HL9WI, South Korea.
ZK	50.100	ZK1AA, Cook Island.
KH6	50.101	KH6EQI, Hawaii.
	50.015	KH6ERU, Hawaii.

Not much change to the beacon list this month, although there are one or two things I am not happy about. There seems to be some confusion over the call sign of the VK0 beacon, it seems possible that it should be VK0PH, but there is nothing to confirm this. The frequencies of the two Hawaii beacons seem to be open to question, so will someone hearing them please advise me if changes are needed!

Mike VK3ASQ passes along the news that 6 metre activity in the Antarctic is not dead. Late in April Phil VK0PH on Casey Base worked a station on Macquarie Island, and believed to be the first VK0 to VK0 v.h.f. contact. Phil runs a continuous keyed c.w. beacon on 53.44 MHz. and tunes the band from 1900 to 2000 hours daily. On Monday, Wednesday and Friday he listens on 14.120 MHz. for reports or skeds.

It is well established that sporadic E conditions in the polar regions peak a few months later than for the mid-latitudes. As Macquarie Island is within single hop sporadic E distance of Tasmania and southern Victoria, there is some possibility of openings to VK0 at times.

Rod VK2ZQJ, ex-VK5ZSD, ex-VK6ZDS, and Wally VK5ZWW are getting into the headlines with quite regular working one another via random meteor scatter. Contacts take place between 0615 and 0645, this being the optimum period for random meteors. Received signals have varied from momentary pings to a 4½ minute steady signal. Wally now has VK2, 5 and 8 to his credit for such working, and has copied bits of VK4 but no formal contact. Other stations involved in MS work are VK8KK in Darwin, VK8AU Tennant Creek, VK6ZAA in Perth, VK4RO Ayr, and VK5ZDX Adelaide.

Interesting news of increased two metre activity around the Albury N.S.W. area. VK2RS runs a couple of hundred watts p.e.p. to a 16 element collinear up 100 feet on 144.300 MHz. VK2BWF runs 60 watts input to a QQE03/20 (I repeat, 60w.!). Both tune 2 metres from 2130 to 2135 most nights and call from 2135 to 2140. The path to Melbourne so far has proved quite reliable. VK3AJM in Wangaratta, 30 miles closer, is another in the area. VK2ZEO in Deniliquin also works into Melbourne, though at present activity is being directed towards Amateur t.v. in conjunction with VK3ZKU in Katunga, on 432 MHz.

Activity on 432 and 1296 MHz. seems to have been relatively quiet. However, we note that VK5UN (ex-VK7WF) is making his 1296 MHz. gear portable in readiness for the coming season's activities. If he and VK3AKC can make a contact on that band it will mean a further extension of the Australian record.

VK2ZTM, in a brief note which was missed previously, mentions a correction needed to the item on Repeaters in March "A.R." Sydney is Channel 4 and Central N.S.W. is Channel 1 in and Channel A out and later to be a complete channel 1 system. In the meantime, one might care to listen for the Sydney repeater which transmits its call sign VK2BWI/R1 in m.c.w. every five minutes as a beacon. Transmitting time is 23 seconds.

VK5ZDY at Stirling, high up in the Mt. Lofty Ranges, continues to make good use of his fine elevated site. A brief note refers to good signals being heard from VK3YEJ, VK3ZBN and VK3BJB, all at Mildura, on 11th May, using Channel B f.m.

MEET THE OTHER MAN

Meet David VK8AU (ex-VK3ZAT, VK4AK, VK3AUU, VK3AAU), of Nobles Nob, Tennant Creek. First licensed in 1955, David moves around quite a bit judging by the various call signs. At present he is fully operational only on 52 MHz., running 400 watts p.e.p. from a pair of 572Bs into a 9 element Swan-type yagi at 25 feet. He uses an FTV650 transverter or VK3 V.h.f. Group converter for receiving. Tunable i.f. is a Drake 2B. He has a 15 element Swan-type yagi for 2 metres at present on the ground(!), while on 432 he has a 30 watt output capacity using a BAY96.

Whilst in VK3 on 52 MHz. he worked VK1 to 9 inclusive, ZL1, 2, 3 and 4 plus KH6 and JA. From the same area on 144 MHz. VK3, 5 and 7. While at Tennant Creek David has worked on 52 MHz.: VK1, 2, 3, 4, 5, 7 and 8, JA, HL9 and KR6. I note also he worked VK7LZ on 288 MHz. while in VK3. He is a member of the W.I.A. and during 1960-61 was Sub-Editor for the V.h.f. page in "Amateur Radio". From Nobles Nob, 1150 feet above sea level, he has been interested in meteor scatter working and has a fairly constant path to Doug VK8KK in Darwin, a distance of 540 miles.

David is to return to VK3 later this year and hopes to become operational on 1296 MHz. for which he has a varactor tripler "half built". He also wants to "fiddle" with processing s.s.b. so that it can be multiplied from 144 MHz. instead of heterodyning, something which he says appears to be feasible. He is particularly interested in encouraging v.h.f. operators to endeavour to work greater than line of sight distances at all times, not just when conditions are good. With this in mind, he has sponsored a mid-winter contest during the month of July, details of which will be found in April issue of "A.R."

David concludes his information with the comment "Why do a lot of people use crummy receivers to feed their v.h.f. converters into, while they have good communications receivers for the h.f. bands? It's no wonder they can only work the station over the back fence."

Thought for the month: "While money isn't everything, it does keep you in touch with your children." Until next month, when my news will come to you while on holidays in Alice Springs. 73, Eric VK5LP. The Voice in the Hills.

VHF-UHF STATE RECORDS

MAY 1971

(N.B.—Australian records are in bold type)

MHz.		Date	Miles
	NEW SOUTH WALES		
50/52	VK2ADE to VE7AQQ	8/4/59	7320
144	VK2ATO/2 to ZL2HP	2/1/66	1456
432	VK4ZT/2 to VK4KE/4	12/7/69	219
576	No claim		
1296	AX4ZT/2 to AX4NO/4	12/4/70	250
	VICTORIA		
50/52	**VK3ALZ to XE1FU**	1/5/59	8418
144	VK3ZNC to ZL2HP	13/12/65	1673
432	VK3ALZ to VK5ZDR	28/5/66	402
576	VK3AKE to VK3ANW	11/12/49	80
1296	**VK3AKC to VK7ZAH**	17/2/71	278
2300	VK3XA to VK3ANW	18/2/50	9
3300	VK3ZGT/VK3ZGK/3 to VK3ZDQ/3	14/12/63	63
	QUEENSLAND		
50/52	VK4ZAZ to K6ERG	16/3/58	5305
144	VK4ZAZ to VK7ZAH	1/1/67	1187
432	VK4KE/4 to VK4ZT/2	12/7/69	219
576	No claim		
1296	AX4NO/2 to AX4ZT/2	12/4/70	250
	SOUTH AUSTRALIA		
50/52	VK5KL to W7ACS/KH6	26/8/47	5361
144	**VK5BC to ZL2HP**	28/12/65	1957
432	**AX5ZKR to AX7ZRO/7**	15/3/70	482
576	**VK5ZJL/5 to VK5QZ/5**	28/12/69	185
1296	VK5ZSD to VK3ZHU/5	28/9/69	75
	WESTERN AUSTRALIA		
50/52	VK6BE to JA8BP	30/10/58	5490
144	VK6KJ to VK3AOT	1/2/70	1517
432	VK6ZDS to VK6LK/6	25/4/66	66
576	VK6ZDS/6 to VK6LK/6	15/12/63	101
1296	No claim		
	TASMANIA		
50/52	VK7LZ to JA9IL	3/12/59	5462
144	VK7ZAH to VK4ZAZ	1/1/67	1187
432	**AX7ZRO/7 to AX5ZKR**	15/3/70	482
576	No claim		
1296	**VK7ZAH to VK3AKC**	17/2/71	278
	AUSTRALIAN E.M.E. RECORDS		
144	**VK3ATN to K2MWA/2**	28/11/66	10417
	AUSTRALIAN A.T.V. RECORDS		
432	**VK5AO/T/P to VK5ZEF/T/P**	16/2/00	93

DX

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(All times in GMT)

As intimated previously, this will be the last batch of notes I will be preparing. The reasons are purely personal, and there is a good possibility that I will return to the game in a few years' time, probably with a full call. In the meantime I would like to thank those who have consistently assisted me in what has not been an easy task and trust that you will support the new scribe. The address for all future notes will be: The Editor "A.R.," P.O. Box 36, East Melbourne, Vic., 3002.

A letter to hand from ardent S.w.l., Ernie Luff, in Elizabeth, S.A., told me he has received JY1/King Hussein's card at last, also one from TA3GP in the same mail. Ernie reports a good signal from ET3ZU/A on Zukar Is., who says QSL to I1IJ.

Whilst on the subject of VK5, I have a welcome letter from Bill VK5WV with further details of VK0 activity. Bill is manager for Ken VK0IN during his stay on Mawson, which should be till about February 1972. Address is Mr. Bill Verrall, 7 Lilac Ave., Flinders Park, S.A., 5025.

Bill tells me the gear at Mawson belongs to Col VK0CC and is as recently described in this column. Other activity from the same shack is by Keith VK0MX. John VK0JM has been active from Casey on 20 metres, whilst Fred VK0TM works from Macquarie.

The following information to hand from Noel VK2AHH at Kempsey. Africans are coming through via the long path from 0600z to 0730z, including TJ1AW, 9U5DS, CR6KT, CR7AC, CN8CG, CT3AN, 9J2DA, 5N2AAN, also 9G1GT (Ron Taylor, Box 1914, Accra, Ghana), PJ7JC (J. Cijntje, C/o. LRTD, St. Maarten), LZ1KAA (Box 1133, Sofia), FG7GC (Box 521, Pointeapitre, Guadeloupe), TU2DB (D. Budet, Box 1820, Abidjan, Ivory Coast), and 7P8AB (Dr. A. Jaques, Box 389, Maseru, Lesotho. Noel also advises that UK2FAD, who is often about the bands at around 0600z, is a good catch as he is in Kaliningradsk. HC8FN is often on 21 at around 0130, as are some KZ5s and KP4s, whilst on 14 MHz. OD5ET (1150z), HK0BKX (0515) and VP9DL at 0500z are worth looking for.

From John VK4QA I note that JY1, who has been news for a long time in Amateur circles and is not always easy to catch, has now shown up in the Pacific DX Net. Together with 9H1BX on Malta, and KW6AA, Box 61, Wake Island, John managed to hook him.

Firstly, as I start on the overseas DX news sheets, we have some recent prefixes, all valid only for prefix hunters unless stated otherwise. FG0MH and FS0MH was WB8ABN/F0MH operating from the FG7 area and later from FS7 during April. The I2 prefix was used by several Italian stations recently, but no reason is stated. JY9AA and JY9AB is our friend Mary Anne WA3HUP and Charlie W3GE, their two weeks' jaunt should be completed by now. OG2A was used for the WPX contest by some OHs as part of the SRAL's 50th anniversary. QSLs for all these to OH2BAD. OI1VR was used during the same event, and is OH1VR.

Still on prefixes, but a very interesting trio are TA3GB with QSL manager W2FXA; also TA3HC, TA3KE who is TA3GB's XYL, TA6JB (manager DL9ZB) and the TC3CH contest operation (QSLs go to LA3UF).

MP4TDM, the only station in the Shiekdom of Ras-al-Khaima, has a sked with GW3AHN every Friday at 1830z on 14260. His QSL manager is K1DRN, or cards can go direct to Box 101, Ras-al-Khaima, Trucial States. MP4MBC is on quite regularly from Masirah Is., and cards should go to his home QTH where he is G3XEC.

Raymond Marti, ex-F1ASI, is now signing TR3MR and often heard during the period from 1300 to 2300z. Manager is VE2DCY, and the home address is C/o. S.E.E.G., B.P. Libreville, Republic of Gabon. In the same general area we note that TT8AD QRV daily on 14225 at 0600, and 21225 at 1130, also if conditions are good he will be on 28625 at 0930. TT8AC has a sked with W4SPX 14290 Sundays at 0430, whilst TT8AF is now back home as F2HF.

Looking for Wyoming for W.A.S.? WA7IFX (Jim) is active on all bands, with a preference for 14/21 on either mode. He is on the air from 0300-0700 and 1200 to 1530z.

VR1U has been worked of late. He is VR2EY who makes an occasional visit to that location, as there is no resident operator there. Reported contact was made at 0445 on 14240.

Several stations are active from JT in Zone 23, they are JT1AH, JT1KAA, JT2AB, JT3KAA, UA9VH/JT1, the latter being on s.s.b., the others on c.w., and whenever I have heard them they have rough notes. Box 639, Ulan, Bator, seems to be the most likely venue for a QSL which will be notoriously slow, but will eventuate. Mine was sent via Box 88, Moscow, and returned via the bureau.

KB6CT has been working between 0800 and 0800 quite regularly, in many cases with ZL2ASJ or ZL4NH assisting. The reported channel is 14265, and QSLs for operators Art, Bill and Jim go to Federal Elect Corporation, A.P.O. San Francisco, Calif., 96401, U.S.A.

QSLs for the operation of KJ6CF from Johnson Is. between Aug. 21 and Sept. 21, 1970, can be sent to Don at his present address, which is Don Pierce, 3400 51st Loop, Sandia Base, New Mexico, 87116, U.S.A. Other recent operations from the Pacific included KM6DX, QSL manager is W7PHO, and KX6IL whose manager is WA3OYY.

The St. Lucia Amateur Radio Club were scheduled to operate from VP2LDD on 1st and 2nd May using all bands. There is only one report of the operation being worked, but I believe the QSLs were to be handled by VP2LT.

VR5DK, who has been operating from that QTH for some time now, has returned to ZL. The operator's name is Darleen and QSL manager is now VE6AKV. VR5LT is fairly active from Tonga.

Graham ZL5AX is now active from Ross Is. and often works into this country. He asks for QSLs to be sent to ZL1SV, but via the N.Z.A.R.T. Usual period of activity is anywhere between 0700 and 0900z. ZM7AG is also active working into the States.

The gentlemen of the British Commonwealth Net are now on their summer QRG, 21354 s.s.b. at 1430 daily. G3LQP is net control with VS9MB, ZB2A, MP4s, 9H, 9M2, 9V and many other interesting calls. Personally, at that time of the night I would prefer sleep, but strangely enough 15 metres does come to life at odd hours like this when we in VK show a disinclination to detach ourselves from a nice warm bed.

Recent successful operation by Aldo ET3ZU/A from Zuqar Is., situated in a channel between Ethiopa and Yemen, has resulted in this fine operator's decision to return there at a later date. I1LJ is the QSL manager for the completed operation which drew some praise from the Long Is. DX Assn. for the good operating, and some caustic comments directed at some of the smart types who tried to interfere with the fine efforts of the operator concerned.

It is a pity that these stupid types, and that is only a very mild description of them, should always try time and time again to interfere with the efforts of somebody who is doing their best to provide an interesting contact for so many of his fellow Amateurs. They have not neither the brains nor the ability to do something constructive for the Amateur movement. Possibly they are not licensed, and on reflection this is most likely the case. And while on the subject, it would not do Amateur Radio any harm if the Radio Branch had a good look over the bands around the time of our broadcasts, particularly in the evenings.

SOME QTHs

The following lists are taken from a recent copy of "Monitor," the monthly magazine of the ISWL, to whom we are indebted for much of the assistance which I have been obtaining over the past years, both with the DX News and the now defunct SWL notes.

CX4CR—Mario Rebufello, Ponongos, 3490-bis Montevideo, Uruguay.
DK2NU—Josef Muller, Bei der Muhle 2, D-3011 Laatzen, W. Germany.
EP2JP—Jamshid Partovi-Nejad, Box 1000, Armish-Maag, A.P.O. New York, 09205, U.S.
EP2WB—Wolfgang Bauer, Box 3421, Teheran, Iran.
FH8CG—B.P. 135, Moroni, Comoro Is., Africa.
FM7AB—Jean-Pierre Viode, Observatoire de la Martinique, Martinique, French West Indies.
FR7AI/T—B.P. 4, St. Clotilde, Ile de la Reunion, Indian Ocean.
FY7AE—Cesar Moyal, B.P. 496, Kourou, French Guiana, Sth. America.
I1JX—Antonio Vernucci, via R. Lanciani 30, 00162, Rome.
JA0CUV/1—Tack Kumagai, Box 22, Mitaka, Tokyo.
KG6JAC—Box 6125, Merizo, Guam, 96910.
KR6IL—Det 1-2152 Comm. Sqdn., A.P.O., San Francisco, C.A. 96235.
KW6GJ—W. Smith, Box 353, Wake Is., 96930.
OK3HM—J. Horsky, Krajinska 3029, Piestany, Czechoslovakia.
PJ2HT—Box 879, Curacao, Neth. Antillies, Sth. America.
VK9AC—Box 5122, Boroko, Papua.
VP2AAP—Fred Perkins, C/o. Antigua A.S., Box 4187, Patrick A.F.B., Florida, U.S.A.
VP8LV—Box 137, Pt. Stanley, Falkland Is.
VQ9TF—Box 4, Mahe, Seychelles, Indian Ocean.
VQ9W—Box 234, Victoria, Mahe, Seychelles.
VR4CG—George Cruichshank, Box 310, Honiara, Solomon Is.
VR4EN—Box 332, Honiara, Solomon Is.
W3HNK—J. Arcure, Box 14, Norwood, Penna. 19074, U.S.A.
W7TE—Eugene Farley, 1418 Federal Way, Salt Lake City, Utah, 84102, U.S.A.
XT2AA—Jacques Feyssac, B.P. 75, Ouagadougou, Upper Volta Rep.
YB3AAI—Box 27, Surabaja, Java, Indonesia.
5H3MV—Gordon Davis, Box 23059, Oyster Bay, Dar-es-Salaam, Tanzania.
5R8AP—Ishmael Mason, N.A.S.A., Box 3242, Tanarive, Malgasay Rep.
9G1DY—Box 2949, Accra, West Africa.

QSL MANAGERS

HC8FN to WA2WUV	TR8VW to DK2NU
HC8RF to HC1RF	TU2CK to W4VPD
HR2GX to VE1ASJ	TY9ABC to DJ6QT
JD1YAA to JA1WU	TY0ABD to DJ6QT
KG6JAC to DJ9ZB	VS9MB to G3KDB
KG6SI to WA6AHF	XT2AA to K3RLY
KZ5EE to K1ZMQ	XT2AB to DJ1QP
MP4BHH to K4MQG	XT2AC to DJ6QT
OA3Y to SM0FO	ZD3D to VE2DCY
OH0AA to OH0NI	ZD3N to DJ1QP
PJ0FC to W1FJJ	ZD3P to DJ6QT
TA1TS to WA0ETC	ZD5X to WA5LEV
TA3HC to LA3UF	

That is all for another month, and for me the final issue. I would thank those who have supported me over the past couple of years and sincerely urge as many of our readers from this country to support the new sub-editor. As I have often intimated, supply of notes from overseas news sheets depends entirely on our ability to supply them with information no matter how unimportant it may seem. With an increase in postal charges looming in the very near future in the U.K., the Geoff Watts DX news sheet, which is probably the most comprehensive in the world, is no longer available to us on the free list, so this will mean that we shall have to hunt harder for news. Many thanks by the way to Geoff for his help in the past and if any individual cares to subscribe to his weekly news sheet, the procedure is simple. His address is Geoff Watts, 62 Belmore Rd., Norwich NR 72-T, England. The sheet is a single foolscap duplicated sheet, printed with very fine type, the average copy contains details on around 30 call areas, frequencies, times are given where known, also full QSL information. Cost is three pounds sterling for 57 issues, two pounds for 38 issues, and 19 issues can be obtained for one pound sterling. The latter would be ideal for anybody wanting to try it out. All issues are mailed by airmal from the U.K., and arrive here about four days after issue. 73, de Don VK2/8205.

One or two additional notes to Don's DX news by HF Evertick:

Darleen Souligny, ex VR5DK, operated as ZL1ATC from Huntley and from Jack ZL1BL's QTH in May and early June. Her itinerary from June 8 was to be Melbourne, Perth and Mauritius (contact via 3B8CR) to Rodriguez Is. for a six-weeks' stay from about June 16. Thereafter she plans a safari into East Africa and, subject to licensing, hopes to operate from 5X5 and 5Z4. She may call into Dares Salaam to contact Garth 5H3LV, but any chances of obtaining a Zanzibar call seem remote as Garth himself, in securing his 5H1LV licence, had many problems to surmount. Darleen's QSL manager for her DX-peditioning is VE6AKV and her home call is WA6FSC.

Further news about Larry Pace's (K2IXP) DX-pedition to Willis Is. and Mellish Reef (mentioned in June "A.R.") indicates a merry party of travellers with him including VK7AZ (boat owner), VK2SG, VK3AJW, VK4FJ and VK4XY. We wish the party success and a safe voyage.

Both these DX-peditions are purely private ventures worthy of support. Another DX-pedition in June, much in demand stateside, was FR7ZL/E from Europa Is. and possibly FR7ZD/T on Tromelin.

BUNYIP TALK

HOW WOULD IT BE TO HAVE THE CW SEGMENTS AT THE OTHER ENDS OF THE H.F. BANDS?

Overseas Magazine Review

Compiled by Syd Clark, VK3ASC
and R. L. Gunther, VK7RG

ASIAN BROADCASTING UNION TECHNICAL REVIEW

March 1971, Issue No. 13—

Keep Track of those R.F. Power Tubes, Pat Finnegan, Station WLBC (U.S.A.). Of interest to all who want to get most life from transmitting valves. Also covers in different wording part of "A.R's" lecture series No. 10 on Harmonics.

Radio Wave Propagation, a Kinase of Nippon Hoso Kyokai (Japan). Makes good reading to go with VK3ACA's excellent series on "Home Station Antenna for 160 Metres". Also covers in more detail the section on propagation in Lecture No. 1, "A.R.," January 1970.

The A.B.U. Review might not be readily available, but it should be possible to borrow a copy from a broadcasting station in most parts of the world, other than some parts of Africa and South America, as a great number of broadcasting organisations are members or associates of the A.B.U. —VK3AXU.

HAM RADIO MAGAZINE

March 1971—

Phase-Locked Local Oscillator, VE5FP. A phase-locked local oscillator is described in full detail, covering 14 to 50 MHz. This is part of the coverage of phase-locked systems which is receiving so much attention in Amateur circles in these times.

TR-50 Customised Six Metre Transverter, by K1RAK. The mixer-driver involves only three valves (push-pull 5763s in output), with a 4X150 linear p.a. The system is driven at 14 MHz. A receiving converter achieves a good noise figure with a single and dual gate FET combination.

RTTY Signal Generator, W7ZTC. MC-890-P and MC-824-P ICs are used as an r.t.t.y. reversal generator to produce an ryryry signal for testing teleprinters.

Tabulated Characteristics of Vacuum-Tube and Transistor Amplifiers, W5JJ. A clear, thorough, and most valuable tabulation of the essential characteristics of Class A, B and C amplifiers of these two kinds of devices. W5JJ points out, among much else, a fact which seems to have confused numerous authors of articles using transistors: Class B operation is defined for transistors exactly as for valves. The base is biased so that the collector is just short of cut-off, and collector current flows for about 180 degrees of each input signal cycle. An unbiased transistor is, therefore, operating in Class C, not Class B, because of the natural offset provided by the base-emitter junction threshold! To achieve Class B operation with a transistor, it has to have a bit of forward bias until the abovementioned conditions are achieved.

Plain Talk About Repeater Problems, by VE7ABK. Various solutions are presented to the intermodulation and desensitisation problems commonly faced in repeater operation. Among other things, intermodulation can be reduced by using bandpass or band-reject cavity filters tuned to the interfering signal.

The Cordover Audio Oscillator Module, by WB2GQY. "Introducing a completely assembled circuit board that has many Amateur applications—for less than a dollar!" Two transistors connected in the garden-variety regenerative-switch mode (collector to base, each). It is supposed to feature a 5-watt output transistor, but since a heat sink can't be attached to the module, you are no worse off using two computer board transistors—and cheaper. Herein lies a moral: a commercially-assembled piece of stuff is not necessarily better (or cheaper) just because someone else has put the wires together.

Rating Tubes for Linear Amplifier Service, W6UOV. Again Eimac provide competent technical information to assist consumers in the best selection of their products. Here, peak envelope power and intermodulation distortion are measured and evaluated. No reason why these methods shouldn't be applied to any valves. Noteworthy is the fact that maximum IM distortion does not necessarily occur at maximum drive; IM in fact passes through various maxima and minima.

The Repair Bench, L. Allen. How to use a sweep and markers to tune i.f's. Good.

New Products. Various commercial items of moderate interest, but quite a good announcement about the availability of a "QRPP Magazine", published by K8EEG, titled "The Milliwatt". Includes construction projects, technical articles, operating news, etc. Published six times per year for $US3.00 annually; W. Mattox, K6EIL/2, 115 Park Ave., Binghamton, New York 13903, U.S.A.

O.H.M. (The Oriental Ham Magazine)

February 1971—

For those Amateurs who are keen to keep in touch with what is happening in the Far East and especially in the British Crown Colony of Hong Kong, this newsy little magazine will do the job. In this issue they talk about a DX-pedition to Spratly where Dick Bartlett was to go in April.

There is an "Intruder Report" on page 7 which lists a number of stations which are supposed to be elsewhere in the spectrum.

Harts on Two Metres. Stan VS6FE describes a mobile rally held recently on that band in Hong Kong and the fun that was had by all.

QST

April 1971—

A Transmatch for Field Day, W1KLK. Here is an easy to build Transmatch that will permit any antenna feed line, balanced or unbalanced, to be matched to that 50 or 75 ohm unbalanced transmitter output.

The Digital Message Generator with RTTY, K1KLP. Another one for the baud-ists.

Digital Filters, ZL2AVF. Seems like another device which will find its way into some Amateur rigs, perhaps to narrow the bandpass for c.w. Probably to pass the two (mark and space) tone frequencies used in r.t.t.y.

The Down-to-earth "Sky Hook". W3HVE describes how he overcame his tilt-over mast problems. All materials are commonly available in Australia and there should be no difficulty in duplicating the design. The concrete counterweight is a useful "gimmick". I have seen another type in VK3 which used four gallon oil drums filled with an appropriate quantity of water.

The Five Finger Keyer, W2IMU. Working on the assumption that the more of the hand you use the better and faster it can send Morse Code. One man's meat, etc.

Simplified Antenna Switching, W1ICP. A simple method, particularly suited to the needs of the newcomer to Amateur Radio. The relay is an s.p.d.t. type.

A 2.3 GHz. Crystal Controlled Converter, by W4HHK. A practical idea for narrow band u.h.f. reception.

Receiving F.M., Part IV., W1KLK. Basic principles and new circuits.

Husky Power Supply for Sweep Tube Amplifiers, W1CER. Take one transformer rated at 900-0-900v. 700 mA., full wave rectifier, and feed to a filter consisting of 3 x 330 uF. electros in series and bingo—you have 900v. at ½ amp. continuous/over 1 amp. s.s.b. rating.

The Two Metre Eggbeater, WA2PTS. Polarisation is stated to be no problem to this omnidirectional antenna using two full wave loops.

The Lafayette HA-750 6 Metre Transceiver. Review by W1HDQ.

Polydimensional C.W., W6MUR. Defined by the author as "The Ultimate Solution to C.w. QRM". You'll need to read it yourself to see whether or not it is a "have-on". Stated to be a system recently "de-classified by the U.S. Government".

Modern Ham Jargon Defined, W7RGL. An old theme in new guise.

RADIO ZS

April 1971—

Tuning the VHF and UHF Spectrum, ZS2FM. An article designed to show newcomers how they can go about making the most use of these bands.

Indexing Systems. ZS6ACK describes some methods of indexing the QSOs you conduct and the QSLs sent out so that you do not waste money duplicating some of them.

Captain Alsar, HC0EBP, Makes An Incredible Voyage. VK4SS tells the story of the incredible journey of the raft "La Balsa".

Fifty Years of Amateur Radio. Eddie ZS1DH describes the days when "Amateurs" could not be Amateurs without being builders and they all rolled their own from raw materials. It seems that when he began in 1920 there were no radio retailers, wholesalers or manufacturers.

In the same issue is an "insert" describing a **New, Solid State Receiver,** covering the range 0.5-30 MHz., which will receive a.m., c.w., s.s.b. type signals with i.f. bandwidths of 6 and 3 KHz. called the "Barlow-Wadley XCR-30 Receiver". Performance is stated to be quite outstanding for a price of R297 and in a box 11½ x 7½ x 4 inches, operating from six dry cells.

NEW CALL SIGNS

FEBRUARY 1971

VK2CG—L. K. Phillips, 179 Trongate St., Granville, 2142.
VK2TR—R. A. J. Taylor, Station: Bay St., Tathra, 2550; Postal: P.O. Box 328, Bega, 2550.
VK2ATQ/T—R. A. Cameron, 6 Cottrell Pl., Baulkham Hills, 2153.
VK2BCQ—D. Charlton, 30 Barcoo Island, Sylvania Waters, 2224.
VK3JT—W. B. Magnusson, 359 Williamstown Rd., Yarraville, 3013.
VK3LW—A. B. Bradley, 22 Langdon St., Portarlington, 3223.
VK3NU/T—R. G. Thomas, 35 Crow St., East Burwood, 3151.
VK3ZD—K. J. Horan, 34 Roberts St., Glen Waverley, 3150.
VK3AJV—R. E. Durrant, 330 Burwood H'way, Burwood, 3125.
VK3AQU—I. N. Glanville, 1 Speed St., Ararat, 3377.
VK3BEZ—Wireless Institute of Australia (Eastern Zone), Station: Mt. Tassie; Postal: P.O. Box 175, Maffra, 3860. (Later changed to VK3WI/R3.)
VK3BFB—Geelong Amateur Radio Translator Group, Station: "Bayview," Haines Rd., Gnarwarre; Postal: 5 Kyle Ave., Belmont, 3216. (Later changed to VK-3BGL/R2.)
VK3BFD—A. A. George, 3/5 South Ave., Moorabbin, 3189.
VK3BFE—R. C. McPhee, 4 Frederick St., Balwyn, 3103.
VK3YFG—D. W. Edwards, 92 South Valley Rd., Highton, 3216.
VK3YFH—G. W. Gulley, 155 Melbourne Rd., North Geelong, 3215.
VK3YFJ—P. G. Niehoff, 109 Victoria Rd., Northcote, 3070.
VK3YFS—N. Spano, 3 Seaholme Ave., Seaholme, 3018.
VK3ZPX—P. G. Waterhouse, 4/76 Barton St., Reservoir, 3073.
VK3ZZD—D. K. Morgan, 18 Iris Ave., Wendouree, 3355.
VK4OD—E. O. K. Phillips, Dixons Rd., Buderim, 4556.
VK4QZ—D. L. Leonard, 30 Canopus Circuit, Atherton, 4883.
VK4YM—W. D. Mather, 23 Paradise Is., Surfers Paradise, 4217.
VK4ZGG—G. K. Gold, 62 Tarragindi Rd., Annerley, 4103.
VK4ZRY—R. W. Young (Dr.), 7 Boblynne St., Chapel Hill, 4069.
VK5SZ—R. G. Gibson, Station: O.T.C. Cottage No. 10, Lambett St., Ceduna, 5690; Postal: C/o. O.T.C. Satellite Station, Ceduna, 5690.
VK5UG—J. M. Hansen, P.O. Box 445, Woomera, 5720.
VK5ZHS—H. J. Sipols, 231 Victoria Rd., Largs Bay, 5016.
VK6CX—R. A. Bee, 2 Marton Rd., Amelia Heights, 6020.
VK6GE—G. Cole, 125 King St., Boulder, 6432.
VK7ZGW—G. A. W. Wood, 8 Norwood Ave., Launceston, 7250.
VK8VF—Darwin Radio Club Inc., Club House Building, No. 121, East Point Reserve, Darwin, 5790. (Beacon)
VK8ZTH—R. M. Hester, 33 Roberts Cres., Alice Springs, 5750.
VK9AT—W. D. Batty, Station: Lot 1, Section 4, Minihi Ave., Boroko, P.; Postal: C/o. P.O. Box 56, Port Moresby, P.
VK9DV—D. Van Nortwick, Station: Ukarumpa; Postal: C/o. P.O. Box 191, Ukarumpa, E.H.D., N.G.
VK9HL—R. R. Hooper, Station: Poinciana Ave., Lae, N.G.; Postal: P.O. Box 251, Lae, N.G.
VK9KJ—K. L. Finney, Station: Musgrave St., Port Moresby, P.; Postal: P.O. Box 3155, Port Moresby, P.
VK9ZAF—J. R. Beaumont, Station: Ukarumpa, N.G.; Postal: P.O. Box 191, Ukarumpa, E.H.D., N.G.
VK9ZAP—R. Pearson, Station: Section 37, Lot 6, Mavaru St., Boroko, P.; Postal: C/o. P.O. Box 2087, Konedobu, P.
VK9ZEN—E. M. Norris, Station: Section 34, Lot 21, Allamanda Cres., Madang, N.G.; Postal: P.O. Box 586, Madang, N.G.
VK0ZPO—C. L. Scally, Mawson, Antarctica.

CANCELLATIONS

VK2JD—J. Davis. Not renewed.
VK2JO—R. C. Caldwell. Not renewed.
VK2NE—H. M. Bone. Transferred to Qld.
VK2OY—J. C. A. Young. Transferred to Qld.
VK2PG—J. H. Gore. Transferred to A.C.T.
VK2AEJ—J. W. Smith. Not renewed.
VK2ANI—U. N. Fierz. Not renewed.
VK2AOZ—L. H. Ferris. Not renewed.
VK2AVP—H. A. Perkins. Not renewed.
VK2BAB—K. S. Mullan. Not renewed.
VK2BCS—C. C. Talbert. Not renewed.
VK2BHM—H. B. Milburn. Not renewed.
VK2BJP—J. K. Olsen. Not renewed.
VK2BPP—N. L. Pinkerton. Deceased.
VK2BSM—S. T. Marr. Not renewed.
VK2ZBN—J. Bracken. Not renewed.
VK2ZEN—E. M. Norris. Now VK9ZEN.
VK2ZFL—J. Lak. Not renewed.
VK2ZKP—L. K. Phillips. Now VK2CG.
VK2ZRV—F. R. Forrester. Not renewed.
VK2ZTQ—R. A. Cameron. Now VK2ATQ/T.
VK3ACM—C. A. McKenzie. Not renewed.
VK3ADC—D. Charlton. Now VK2BCQ.
VK3AEK—E. J. Bayliss. Not renewed.
VK3AGR—R. G. J. Horne. Not renewed.
VK3AHT—W. B. Magnusson. Now VK3JT.
VK3AID—F. C. Hutton. Transferred to Qld.
VK3AXB—J. Linden. Transferred to N.S.W.
VK3BAS/T—R. G. Thomas. Now VK3NU/T.
VK3BBU—P. B. Parry. Not renewed.
VK3BDC—B. A. Cook. Transferred to W.A.
VK3BDJ—D. J. Bainbridge. Not renewed.
VK3BDQ—J. K. Horan. Now VK3ZD.
VK3YAF—J. R. Beaumont. Now VK9ZAF.
VK3YAM—P. R. Maher. Deceased.
VK3ZGJ—G. J. Champion. Not renewed.
VK3ZJT—E. M. Timms (Mrs.). Not renewed.
VK3ZMM—I. W. Cerchi. Not renewed.
VK3ZPW—P. J. Wright. Not renewed.
VK3ZQO—A. B. Bradley. Now VK3LW.
VK3ZRL—R. W. Nash (Major). Transferred to N.S.W.
VK3ZTR—T. R. Chappel. Deceased.
VK3ZWQ—D. S. McQuie. Not renewed.
VK4RA—R. A. Stephens. Not renewed.
VK4RQ—H. C. Noble. Not renewed.
VK4RR—K. W. Beale. Not renewed.
VK4YU—D. Dawson. Not renewed.
VK4ZRP—R. Pearson. Now VK9ZAP.
VK5ZLC—C. R. Ludewig. Transferred to Port Moresby.
VK6AS—A. A. Smith. Not renewed.
VK6LI—W. F. Cashwell. Left country.
VK6NR—N. Cooper. Not renewed.
VK6WS—W. Schofield. Not renewed.
VK7GC—A. H. Sandilands. Transferred to N.S.W.
VK7WF/T—W. J. Emmett. Transferred to S.A.
VK8JH—J. L. Hester. Not renewed.
VK9AU—S. A. Sibley. Returned to Mainland.
VK9HS—N. E. Parsons. Returned to Mainland.

LICENSED AMATEURS IN VK

FEBRUARY 1971

	Full	Lim.	Total
VK0	11	1	12
VK1	82	28	110
VK2	1387	460	1847
VK3	1314	650	1964
VK4	522	199	721
VK5	520	234	754
VK6	362	137	499
VK7	160	69	229
VK8	37	14	51
VK9	91	10	101
	4486	1802	6288 Grand Total

THE IMAGE PROBLEM

I attended a scientific conference recently and was sitting there listening to the usual conference fare—good papers poorly presented and the converse—when I was treated to something a bit out of the ordinary. One speaker described a propagation experiment which involved a rather elaborate antenna and receiving system. The transmitter, however, was an Amateur station, and the speaker pointed this out two or three times in his presentation—almost as if he were proud of the fact! The contrast of this attitude with that which existed a few years ago is remarkable. The Amateur has been regarded for years as a technician or hobbyist with no real capability for contributing to science, at least by many scientists. At the university I recently graduated from, some electrical engineering faculty members for years didn't admit to being Hams, because of the potential stigma it carried. As for using Amateur Radio in research experiments—it just wasn't done.

So what's the point? Well, the image of the Amateur is changing in the scientific community. Credit for the change belongs, in large part, to the Amateurs in A.M.S.A.T.; in project Moonray; and to those in the scientific community who are actively using Amateur Radio in their research work. Many of them, it is interesting to note, use Amateur gear because the big budget slash has them operating on a shoe-string (in the best ham tradition!). The change is a freshing, needed, and long overdue one.

Helping to push the change are people like D. T. Bellair, of the University of Melbourne. He has written a paper titled "Disturbances to Trans-Ionospheric Propagation at 29.45 MHz. Observed using the Australis-Oscar 5 Satellite". The paper deserves publication in a scientific journal; it represents a worthwhile contribution to ionospheric radio propagation research. Of course, I admit to being a bit biased about his paper; like the gentleman at the scientific conference, Bellair is quite proud of the fact that his results were obtained with the help of Amateurs.

—Reprinted from A.M.S.A.T. Newsletter, Vol. 3, No. 1, March 1971.

WATER-COOLED MICROPHONE

To a Canadian must go the honour of being the first to broadcast speech and music. This was as long ago as 1906, when Professor R. A. Fessenden, working in the U.S.A. transmitted a short programme on Christmas Eve of that year from Brant Rock, Massachusetts. His transmitter was a 50 KHz. alternator, modulated by a water-cooled microphone.

—Origin unknown.

FEDERAL AWARDS

AUSTRALIAN D.X.C.C. COUNTRIES LIST AMENDMENT

Deletion: 9K3/8Z5 Kuwait/Saudi Arabia Neutral Zone. Only contacts made prior to 18/12/69 will be credited.

All D.X.C.C. members who have claimed Kuwait/Saudi Arabia Neutral Zone have had their scores amended as necessary.

COOK BI-CENTENARY AWARD

The following additional stations have qualified for the Award:

Cert. No.	Call	Cert. No.	Call	Cert. No.	Call
1338	VE4FU	1344	G2YV	1350	ON5KD
1339	AX3AMO	1345	AX3VJ	1351	WB6VZI
1340	SP9ABE	1346	AX2BMI	1352	G5FH
1341	ZE2KV	1347	3Z8AG	1353	JA2EG
1342	ZL3RP	1348	WB0AAT/KR6AQ	1354	ZL1HD
1343	AX2SI	1349	CR7FR	1355	AX6TU

V.H.F./U.H.F. Section

Cert. No.	Call
27	AX2ZVF

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Results of 2nd "World Rtty Championship" 1971

The table shows the points obtained in the five contests which were taken into account. The final placing is given by the best four scores out of five possible.

No.	Call	BARTG Spring	DARC WAE	RTTY DX S'stakes	A. Volta RTTY	Giant Flash	Total Points
1.	I1KG	30	30	25	30	30	120
2.	VK2FZ	20	30	30	—	—	80
3.	I1CGE	13	22	18	20	—	73
4.	I1CAQ	15	—	10	22	22	69
5.	WA2YVK	1	18	1	25	20	64
6.	W4YG	16	—	7	12	25	60
7.	VE7UBC	17	25	5	—	12	59
8.	VK3DM	1	22	8	9	16	55
9.	VE2LO/W6	—	30	14	—	—	44
10.	FO8BS	—	—	20	13	8	41

VK2EG finished 73rd with 5 points, whilst VK3KF finished in 169th position.

17th EUROPEAN (WAE) DX CONTEST

The Deutscher Amateur Radio Club (DARC) has the honour to invite Amateurs all over the world to participate in the 17th WAE DX Contest 1971.

Contest periods: C.W.—0000 GMT Saturday, Aug 7 to 2400 GMT Sunday, Aug. 8. Phone—0000 GMT Saturday, Sept. 11, to 2400 GMT Sunday, Sept. 12.

Bands: All bands 3.5 through 28 MHz.

Classifications: Single operator, all bands; multi-operator, single transmitter.

Rest period: Only 36 hours of operation out of the 48 hours are permitted for single operator stations. The 12 hours of non operation may be taken in one, but not more than three periods any time during the contest.

Exchange: A contest QSO can only be established between a non-European and a European station. The usual five or six digit serial number RST/RS report plus a progressive QSO number starting with 001.

Points: Each QSO will count 1 point, except on 3.5 MHz. where it will count 2 points. A station may be worked once per band. Each confirmed QIC—given or received—counts 1 point.

Multipliers: The multiplier for non-European stations is determined by the number of European countries worked on each band. Europeans will use the latest A.R.R.L. countries list. In addition, each call area in the following countries will be considered a multiplier: JA, PY, VE, VO, VK, W/K, ZL, ZS, UA9/0. The multiplier on 3.5 MHz. may be multiplied by three. The multiplier on 7 MHz. may be multiplied by two.

Scoring: The final score is the total QSO points multiplied by the sum total multipliers from all bands.

QTC-Traffic: Additional point credit can be realised by making use of the QTC traffic feature. A QTC is a report of a confirmed QSO that has taken place earlier in the contest and later sent back to a European station. It can only be sent from a non-European station to a European station. The general idea being that after a number of European stations have been worked, a list of these stations can be reported back during a QSO with another station. An additional 1 point credit can be claimed for each station reported.

(a) A QTC contains the time, call and QSO number of the station being reported, i.e. 1300/DJ3KR/134. This means that at 1300 GMT you worked DJ3KR and received number 134.

(b) A QSO can be reported only once and not back to the original station.

(c) Only a maximum of 10 QTCs to a station per band is permitted. You may work the same station several times to complete this quota. Only the original contact, however, has QSO point value.

(d) Keep a uniform list of QTCs sent. QTC 3/7 indicates that this is the 3rd series of QTCs sent and that 7 QSOs are reported.

Contest Awards: Certificates to highest scorer in each classification in each country. Continental leaders will be honoured. Certificates will also be given to stations with at least half the score of the continental leader. Newcomers (single operator participants holding their first licence less than one year) will receive a certificate when scoring 10 per cent. of the continental leader.

Disqualification: Violation of the rules of this contest, or unsportsmanlike conduct, or taking credit for excessive duplicate contacts will be deemed sufficient cause for disqualification. The decisions of the Contest Committee are final.

Logs: It is suggested to use the log sheets of the DARC or equivalent. Send large size s.a.s.e. to get the wanted number of log and summary sheets (40 QSOs or QTCs per sheet). Use a separate log for each band.

Deadline: C.W.—Sept. 15; Phone—Oct. 15.

Mailing Address: WAEDC Committee, D-895 Kaufbeuren, Postbox 262, Germany.

SILENT KEYS

It is with deep regret that we record the passing of—

VK4EU—Dale West.
VK4GZ—Esmond Waddle
VK4HR—Harry Scholz

ANTARCTICA RESEARCH

The W.I.A. has been requested to assist in current scientific discussions about propagation into, out of, through, or via Antarctica. It appears that there is a lot of scientific knowledge stored away in individuals' minds or log books but not brought together for general discussion and application. So, next May a Symposium on technical and scientific problems affecting Antarctic Telecommunications is proposed to be held in Norway.

Has anybody any knowledge, experience or odd items of information to contribute to this subject of Antarctica? If so, please write it down and send it in as early as possible to Federal Executive, W.I.A., P.O. Box 67, East Melbourne, Vic., 3002. Thank you.

—VK3CIF.

HAMADS

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CLEARANCE Old-timers' spares. Canadian radar aircraft Communications Receiver, mobile transceivers, wavemeter, Pye base station, H/D beam rotators, all must go. Offers wanted. VK3ZZ, 57 Orchard Cres., Box Hill, Vic. Phone 857-7429.

FOR SALE: FT-DX-400, eighteen months old, mint condition, $450. Phone Geelong 74314.

FOR SALE: Galaxy 3 Transceiver with vox, 100 KHz. calibrator and home-made power supply, $175. Also Drake 2B receiver, $150. Both one-owner only. VK3VM, phone 20-4396 (Melbourne).

FOR SALE: Heathkit HW32A s.s.b. transceiver complete with power supply, speaker, microphone, manual and new pair spare 6GE5 finals, excellent performer, mint condition, $250. VK3AHG, 20 Grandview Rd., Box Hill Sth., Vic., 3128. Phone 288-2024.

SELL: Heathkit HW22 s.s.b. Transceiver, converted to 80, 40, 20 with Dynalab Kit. Complete with a.c. p.s./speaker unit, 12-volt d.c. supply, mobile mount, mike, cables, etc., bargain $175. Heathkit SB610 Monitor Scope, new, $180. VK3OM, phone 560-9215 (Melbourne).

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WANTED: Heathkit DX100-B Transmitter, in good order and condition, with handbook. J. T. Edwards, VK2AKE, Box 33, P.O. Moss Vale, N.S.W., 2577.

WANTED: SB34. Would anyone having, or knowing anyone who might have, a SB34 for sale, please send info. to Stan Beaton, VK3ZE, 101 McKinnon Road, McKinnon, Vic., 3204. Postage refunded.

WANTED: Single band or tri-band Transceiver, similar to HW32A, Swan 140, 120, Galaxy III., NCX3, SR160, Swan 240, etc. Full details to W. Roper, 48 Orchard St., Glen Waverley, Vic., or telephone 232-9492.

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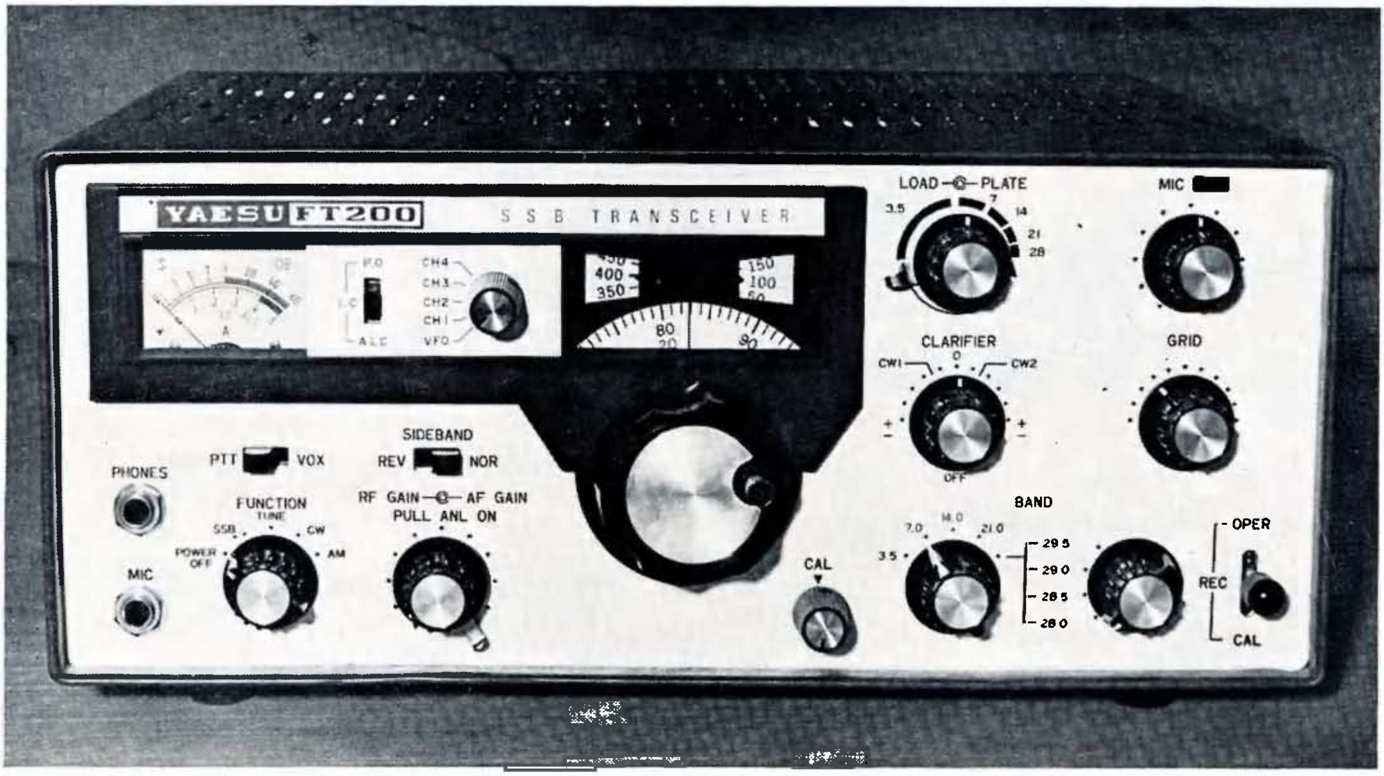
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Vol. 39, No. 8
AUGUST, 1971
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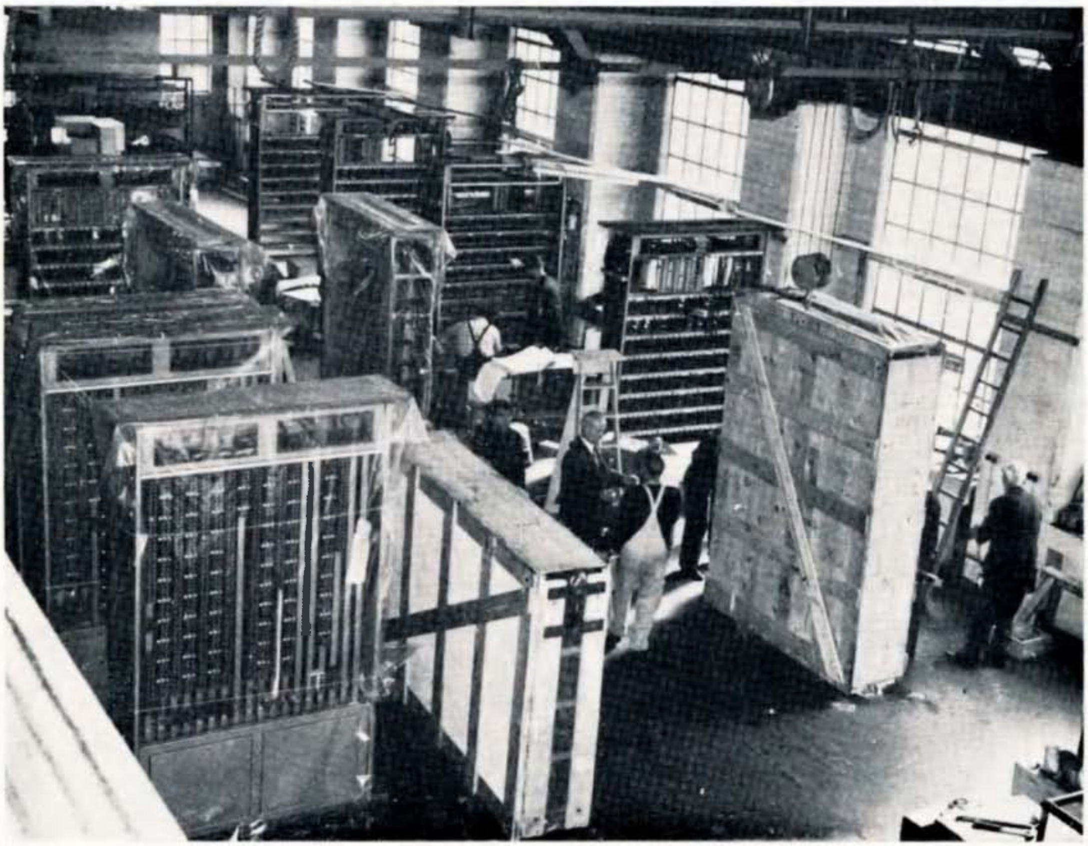

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amateur radio

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA. FOUNDED 1910

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Members of the W.I.A. should refer all enquiries regarding delivery of "A.R." direct to their Divisional Secretary and not to "A.R." direct. Two months' notice is required before a change of mailing address can be effected. Readers should note that any change in the address of their transmitting station must, by P.M.G. regulation, be notified to the P.M.G. in the State of residence; in addition, "A.R." should also be notified. A convenient form is provided in the "Call Book".

CONTENTS

COVER STORY

Industry, as well as Radio Amateurs, uses relays for switching purposes. Here 22 relay racks are being pre-wired for signalling of Melbourne railway yard. Each rack holds 231 transistor radio size relays.

(Block by courtesy of V.R.)

FEDERAL COMMENT:

AN OPEN REPLY TO AN ANONYMOUS LETTER

"Michael Owen, VK3KI,

Dear Sir,

Having perused Ron's (VK3RN) correspondence item in the July issue of 'Amateur Radio,' I can only fully agree with his findings.

The Institute is seeking an increase in membership—that is the impression I get from the various articles I read. My personal advice is, you are not seeking in the right area. There are many who would join the organisation if it would at least attempt to try to do something for them. I have spoken with Limited licensees on the question of the W.I.A., but they have said that they would not join. They feel that the Institute serves only one class, and that it has done nothing towards fighting for better frequency allocations for them.

The Institute has now worsened their image in their sight, in as much that you are willing in principal to allow an unskilled Novice on the h.f. bands, and the Limited licensee well knows of your opposition towards his gaining a little extra. If these people were allowed to operate on some of the h.f. bands it might liven it up a bit, because they are quite dead at the moment. As far as I am concerned these people in most cases are more than technically qualified—the greater percentage being employed in the electronic industry as engineers and advanced technicians.

Close your eyes if you dare—but let me warn you that it is in danger of starting an organisation* totally divorced from you, then it will be too late for you to make amends.

—A VERY FULL-UP CALL

*This could [be] closer than realised."

Dear Mr. Anonymous Letter Writer,

Unfortunately, as you did not put your name or address on your letter, I cannot reply to you personally. However, as I think you have raised some important issues, I think that it is proper to reply to your letter through this magazine. I hope that you do not mind.

At the outset, I would like to thank you for your interest in writing to me expressing your opinion. I think that is very good; it is really what the Institute is all about. It's task is to represent the Amateur Service in our country and obviously it can't do this without knowing what Amateurs think. Of course I think I should also point out that the anonymous letter is usually the least effective way of expressing views.

Having said that, may I join issue with you, Mr. Anonymous Letter Writer, on a number of things that you say in your letter as I am afraid that you have been misinformed on a number of points.

You are right, of course, when you say that the Institute seeks an increase in membership. The higher the percentage of licensees that are members of the Institute, the more representative the organisation is of the Amateur Service and, at the same time, the more effective can be its representation. That is why I think that it is in all our interests for as many Amateurs as possible to be members of the Institute.

But then you go on to say that you have spoken to many Limited licensees but that they feel that the Institute represents only one class of licence and has done nothing towards fighting for better frequency allocations for them. Your comment really surprises me. As I was a Limited licensee myself for ten years prior to 1967, I have always had a particular interest in the v.h.f. spectrum.

Mr. Anonymous Letter Writer, you seem to have overlooked the fact that the Limited licence was only introduced because of the representations of the Institute. You also overlooked the fact that a major portion of the Federal Council and Federal Executive's time in the last two years has been devoted to the International Telecommunications Union Space Conference which, as I write to you, is now in session in Geneva. This Conference is of great interest to the v.h.f. operator and it is possible that it could substantially affect his operating rights and privileges. You overlook also, that as a result of what the Institute has done, our country is one of the countries at this Conference that has taken up the cause of the Amateur Service. You also overlook the fact that as a member of the Region 3 Association (which, incidentally, was formed as a result of the initiative of the Institute in 1968) the Institute is a substantial contributor to the costs of sending a representative, Tom Clarkson, ZL2AZ, of New Zealand, to Geneva as a member of the International Amateur Radio Union Observer team. There, he is our special representative at the Space Conference.

You asked for "better frequency allocations". Yes, I know all about the 6 metre band—you cannot win them all. But really, are you serious in seeking more v.h.f. spectrum? I have not noticed an overcrowding problem on either the 144-148 MHz. allocation or the 420-450 MHz. allocation. Have you? I am not sure that your letter makes your complaint completely clear.

I think you really mean that Limited licensees should be permitted to operate on bands below 52 MHz. Many people will agree with you, but I rather think that more will disagree with you. Of course, if you are a member of the Institute, it is open to you to attempt to persuade the other members of the Institute to adopt a long term policy in relation to the Morse qualification requirement.

But, of course, the simple fact is that this is not just a matter for the Australian Post Office. Australia, as a member of the International Telecommunications Union, is bound by the I.T.U. Convention, an international agreement between countries. That agreement specifies that a Morse qualification is required for Amateurs licensed to operate below 144 MHz., though in fact in Australia, this qualification is only required below 52 MHz.

I am afraid that you have completely misconceived the present position in relation to Novice licensing. You also seem to think that I am personally "pushing" the Novice licence proposals. I am not. Neither I nor the Federal Executive have expressed any view at all on this matter. The policy of the Institute at this time is not to advocate the issue of a Novice type licence, but the Institute is having another look at this policy. The Federal Council has sought a report from a committee formed for the purpose and the Divisions are now seeking the views of members generally. That is the reason that I am not expressing any view on the question of a Novice licence. As Federal President, I feel that on this matter I should not, in any way, attempt to influence members to my particular view at this time.

If, Mr. Anonymous Letter Writer, you are a member (and you do not make this clear), then you **can** and I suggest **should**, take part in Institute affairs by expressing your view. As I said at the outset, that is what the Institute is all about. I agree with you that we do need more Amateurs on the h.f. bands. I think we need more Amateurs on all bands, but I believe that the Institute has to be realistic. We cannot, even if we want to (and I do not suggest that we do), just go and change the International Regulations. The Institute can, however, make it easier and more attractive for the Limited licensee to obtain a full licence. Do you remember, Mr. Anonymous Letter Writer, that the Morse code speed used to be 14 words per minute? It was the Institute that successfully sought a reduction of this speed to 10 words per minute.

No, Mr. Anonymous Letter Writer, I do not think that neither I nor the Institute has to make amends to the Limited licensees. We are not perfect and certainly we cannot expect all our members to be in agreement on every issue all the time, but I do think that the Limited licensee has no basis for thinking the Institute is not representing him.

Indeed, it may well be that the thinking Limited licensee, who knows the real facts, could conclude that he should be a member of the Institute because of what it is now doing for him and because, perhaps, it could do even more, given more support by Limited licensees.

Yours sincerely,

Michael J. Owen, VK3KI,

Federal President.

ANGLE MODULATION

LECTURE No. 14B

C. A. CULLINAN, VK3AXU*

Using sine waves, it is possible to illustrate the differences between amplitude, frequency and phase, and this has been done in Fig. 1.

Fig. 1a shows a single sine wave at three different amplitudes.

Fig. 1b shows three sine waves of the same amplitude and phase, but differing in frequency.

Fig. 1c shows three sine waves of the same frequency and amplitude, but differing in phase.

These three figures should be studied closely.

FREQUENCY MODULATION

When using an audio frequency voltage to produce f.m. it is the amplitude of the voltage which causes the carrier frequency to shift or deviate symmetrically from its assigned frequency pre-emphasis of 75 micro-seconds. However, in Australia for television sound the maximum deviation is ±50 KHz. and audio frequency pre-emphasis of 50 micro-seconds.

In the U.S.A. for f.m. broadcast stations the maximum deviation is ±75 KHz., and audio frequency pre-emphasis of 75 micro-seconds, however for television sound the maximum deviation is ±25 KHz. with an audio frequency pre-emphasis of 75 micro-seconds.

Digressing for a moment; in the Australian mobile radio-telephone services in the frequency bands 70-85 MHz. and 156-174 MHz., as from 30th June, 1969, the maximum deviation permitted for angle modulated stations has been ±5 KHz. (International maritime mobile u.h.f. radio-telephone and existing P.M.G. subscriber services were excluded.) The reduction of deviation to ±5 KHz. was made to enable 30 KHz. channeling of mobile stations so that more "speech" type stations could be accommodated in the available spectrum space. However, in January 1970 the demand for f.m. mobile services was becoming so great that stations in the same area had to share a common carrier frequency.

It is proposed to use the Australian standards in the remainder of this lecture to avoid confusion. This means that the loudest passage of, say, a musical concert would cause the carrier to deviate ±50 KHz. Thus the maximum applied audio frequency modulating voltage produces the maximum **frequency** deviation of the carrier whilst the carrier amplitude remains constant.

This is in direct contrast to amplitude modulation where the carrier frequency remains constant but the amplitude varies.

Thus if one of the sine waves shown in Fig. 1a was applied simultaneously to an f.m. transmitter and an a.m. one it would produce a certain amount of frequency deviation in the f.m. transmitter and a certain amount of amplitude variation in the a.m. transmitter. Then each of these characteristics would be varied if either of the other waves of Fig. 1a was to be substituted.

● Continuing the series of lectures by C. A. Cullinan, VK3AXU, at Broadcast Station 3CS for students studying for a P.M.G. Radio Operator's Certificate.

Furthermore, it must be realised that in an f.m. transmitter the frequency deviation depends entirely on the amplitude of the modulating wave, not on its frequency, thus if we take two frequencies at random, say 200 Hz. and 3,000 Hz., the **carrier frequency deviation** depends on the **amplitudes** of these frequencies.

Now in speech, music and sounds produced in nature, it is almost impossible to find a sustained sine wave, as almost all sounds are made up of many waves and produce complex waves. Our radio and television receivers recover such complex waveforms from the transmitted signal and the loudspeaker converts this into the motion of particles of the air, to produce sound waves which our ears can register and understand.

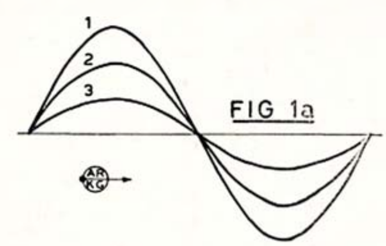
However, so far in this discussion of f.m. we have described only the manner in which an audio frequency voltage, sine wave or complex, causes deviation of the carrier frequency and this, on its own, would not enable intelligent signals to be transmitted as we must recover, in our receivers, the frequency components of the modulating wave.

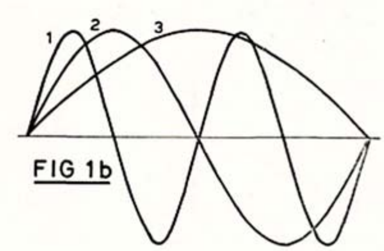
Therefore, in an f.m. transmitter the rate or frequency with which the deviation takes place is determined by the frequency of the modulating voltage. Referring back to our previous example, let us assume that both the 200 Hz. and the 3,000 Hz. waves are at the same amplitude, then each, if applied separately, will produce the same amount of deviation, but in the first case the **rate of deviation** will be 200 times per second and in the second case it will be 3,000 times per second.

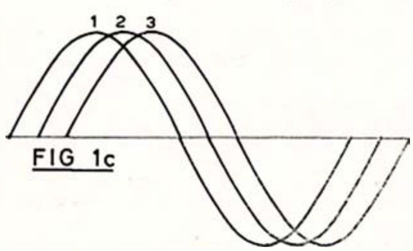
In the receiver the rate of deviation is recovered as the various audio frequencies and the deviation is recovered as the amplitude or volume level of the signal.

In Fig. 2a we see an audio frequency voltage in the form of a single sine wave applied to an f.m. transmitter operating at 100 MHz. and of sufficient amplitude to produce 10% deviation. It will be observed that the carrier frequency varies above and below its unmodulated value of 100 MHz. by an amount which is directly proportional to the amplitude of the modulating voltage; in this case ±5 KHz.

The frequency deviation is known as f_D, and as mentioned earlier, its maximum excursion is 50 KHz. This does not mean that the total bandwidth for full modulation is 100 KHz., but is the value of twice the modulating frequency







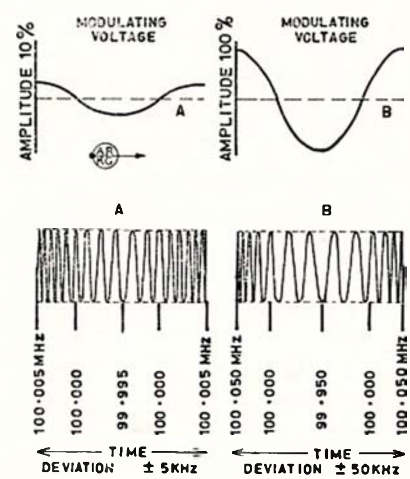


FIG. 2

Fig. 2 is not drawn for any particular audio frequency. Therefore if the audio frequency is, say, 100 Hz. then time is 1/100th second, for 1,000 Hz. time is 1/1,000th second, and for, say, 15 KHz. time is 1/15,000th second.

Fig. 2 shows that the deviation is entirely dependent on the amplitude of the modulating voltage, not on frequency.

It is the frequency of the modulating voltage which governs the rate at which the deviation takes place.

Modulation index equals deviation of f.m. carrier divided by audio frequency producing this deviation.

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plus double the deviation; i.e. if a modulation frequency of 15 KHz. is applied to give full frequency deviation, then the bandwidth will be (2 × 15) + (2 × 50) = 130 KHz. This is shown in Fig. 2b which illustrates an audio frequency modulating voltage producing a deviation of ±50 KHz.

Note that Figs. 2a. and 2b are not drawn to the same scale, as 2b would be ten times the size of 2a if drawn to the same scale.

The centre frequency of 100 MHz. has been used for ease in explanation. In Australia there would not be any angle modulated transmitter on this frequency, the nearest to it being the sound transmitter of television channel 4 where the centre frequency is 100.75 MHz.

The effect of an inductance on an alternating current is to cause the current to lag 90° behind the voltage and the amount of the current will be dependent on the frequency of the voltage, the amplitude of the voltage and the amount of the inductance. Should the frequency be held constant then there will be an increase of current as the inductance is decreased.

This may be restated by saying that if the inductance is held constant, then the current will increase as the frequency decreases. Mathematically this may be expressed as: $I = E \div (2\pi fL)$.

It will be remembered from Ohm's Law that when two resistances are connected in parallel then the resulting resistance is less than the value of the lowest resistance.

A similar state of affairs exists if two inductances are connected in parallel as the resulting inductance will be less than either of the two inductances.

Inductances are impedances, mainly reactive, and we can state the parallel resistances formula for impedances like this: $Z = (Z1 \times Z2) \div (Z1 + Z2)$.

We have stated above that one property of an inductance is to cause the current in an a.c. circuit to lag behind the voltage and it is proper to consider that anything that can cause the current to lag behind the voltage may be considered to have the property of an inductance even if physically it does not resemble an inductance in any manner.

We also know from a.c. theory that the effect of a capacitance in an a.c. circuit is the opposite of an inductance, that is, a capacitance causes the current to lead the voltage.

As mentioned earlier, a valve may be connected in such a manner that it appears to be a reactance and the circuit may be arranged so that this reactance can be either positive or negative.

Fig. 3 shows the circuit of a reactance valve modulator. This reactance valve modulator will appear as an inductive reactance.

Here briefly is the manner in which this occurs.

The resistance R is made very large in comparison to the capacitive reactance of condenser C and as a result of this, r.f. **current** from the oscillator tank circuit passing through R and C is essentially in phase with the **voltage** across the oscillator tank. This means that the current through condenser C is in phase with the voltage across the oscillator tank circuit.

Going back to a.c. theory, we remember that the **voltage** across condenser C will lag behind the **current** by 90° and it is **this voltage** which is applied to the grid of the valve. Now as the voltage on the valve grid varies so does the valve's **plate current** in phase with the grid voltage; i.e. whenever the grid voltage decreases so does the plate current and vice-versa.

It was stated above that the voltage across C is 90° out of phase with the current (lagging) and as the valve plate current is in phase with the grid voltage (across C), then the valve plate current lags behind the oscillator tank current by 90°, therefore the valve is, in effect, an inductance in parallel with the oscillator tank circuit.

The amount of plate current drawn by the reactance valve, and thus its effective inductance, depends on the grid bias of the valve. If the bias is changed by applying an audio frequency voltage to the grid of the valve, the plate current will vary in accordance with this voltage and so will the effective inductance of the valve. As this inductance is in parallel with the oscillator tank inductance, the frequency of the oscillator can be varied in amplitude in accordance with the amplitude of the audio frequency voltage and the rate at which the oscillator frequency is varied will be governed by the actual frequency of the a.f. voltage at the grid of the modulator valve.

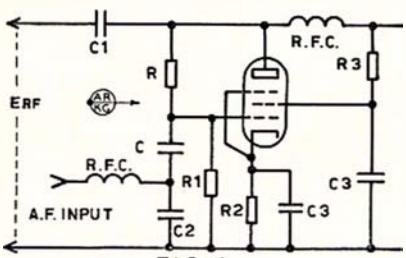

FIG. 3

REACTANCE VALVE MODULATOR

C and R, phase shift network; C1, d.c. blocking condenser; C2, C3, by-pass condensers; R1, grid leak; R2, cathode bias resistor; R3, screen dropping resistor; E, r.f. input voltage from oscillator "tank" circuit.

Thus an audio frequency has brought about frequency modulation of an oscillator valve by changing the inductance of the oscillator tank circuit.

If the condenser C and the resistance R in the reactance valve circuit are inter-changed and the reactance of C is made far greater than the resistance of R, then the r.f. **current** flowing through C and R will be 90° ahead of the r.f. **voltage** across the oscillator tank circuit and the reactance valve will appear as a capacitive reactance.

Therefore with an audio frequency voltage impressed on the grid of the reactance valve frequency modulation of the oscillator valve will be obtained by varying the capacitance of the oscillator tank circuit.

In practice the phase shifts may not be exactly 90° and in practical transmitters two reactance valves may be used in push-pull, also negative feedback may be employed.

The amount of frequency deviation that can be obtained is not very great so that it becomes necessary to use considerable frequency multiplication to get the necessary frequency deviation.

There is another way in which angle modulation differs from amplitude modulation. An amplitude modulated carrier frequency cannot be multiplied successfully because any multiplication also multiplies the sidebands and renders them unintelligible.

It is quite easy to amplitude modulate a carrier and beat or heterodyne it to another frequency because only the carrier frequency is changed. This is what happens in a superheterodyne receiver where an incoming amplitude modulated signal is heterodyned to an intermediate frequency for amplification. It does not matter if the a.m. signal is double sideband with carrier, d.s.b., s.s.b., or i.s.b.

However, an angle modulated carrier may be multiplied as well as heterodyned without difficulty.

Let us refer back to Fig. 2. The centre frequency is 100 MHz. and the deviation is ±50 KHz. Suppose we have an oscillator on 4 MHz. and reactance valve modulates it to give a frequency deviation of ±2 KHz. To put the carrier on 100 MHz. it will be necessary to multiply the 4 MHz. frequency twenty-five times and this will automatically increase the deviation frequency of ±2 KHz. to ±50 KHz. Actually a multiplication factor of twenty-five could be awkward to obtain but was chosen to make our figuring easy.

As mentioned previously, the development of solid-state devices has resulted in transmitters in which the full deviation can be obtained at the carrier frequency by direct modulation of the oscillator which is at the carrier frequency (d.c.f.m.), and as a result of this the reactance valve modulator is rapidly dropping out of favour.

One of the problems which occur when frequency modulation is derived by modulation of the oscillator is that the centre frequency of the oscillator may drift. (It is not usual to frequency modulate a quartz crystal oscillator although it can be done—if a crystal oscillator is to be used, it is more usual to employ phase modulation.)

There are several methods of keeping the oscillator on its centre frequency, despite modulation, and there are several variations of these methods. In one method a sample of r.f. from the oscillator is divided down to a lower frequency and compared to a quartz crystal oscillator. Stated simply, if the divided frequency and that of the crystal are the same, then there will not be any difference between them. However, if the modulated oscillator drifts then there will be a difference between the divided signal and the quartz crystal frequency. This difference can be extracted to determine if it is higher or lower than the crystal frequency, then amplified. It may then be fed to a two-phase electric motor which is geared to a small variable

(Continued on Page 10)

P.e.p., Average Power, and Related Matters*

JAMES N. THURSTON, W4PPB

When an Amateur picks up a catalogue and looks at the power ratings of transmitters or amplifiers, it is more than likely that he will be confused, dismayed or possibly convinced that manufacturers have double or triple standards when it comes to power ratings. It is my purpose to clear up some of this confusion by discussing what some of the power ratings actually mean.

The maximum input power that a transmitter can run is usually determined by the final amplifier stage. On one hand we have the problem of not exceeding the tube capabilities, especially with respect to dissipation. With the linear amplifiers that are used in s.s.b. service, the maximum input is also limited as to the amount of distortion in the form of flat-topping that can be tolerated.

As explained in the A.R.R.L. Handbook, p.e.p. is an abbreviation for peak envelope power. P.e.p. is the power resulting with key-down operating conditions, or conditions that occur on the highest audio peaks. Thus, a p.e.p. input of 100 watts means that the d.c. input power to the amplifier would be 100 watts if the maximum allowable steady signal were applied, if someone whistled the maximum allowable sine wave into the microphone, or if a two-tone input were applied so that the peaks would just reach 100 watts. In many linear amplifiers (except class A), the d.c. input power rises from a small value at zero signal input to a maximum with the drive signal applied. Also, if the amplifier is truly linear, the input signal and the output signal must be linearly related.

Perhaps some numerical examples will help to illustrate some common situations. For our first example let us suppose that we have an a.m. signal with a carrier rating of 100 watts. Assume that single-tone, sinusoidal modulation is applied so as to modulate the carrier 100%. Since the carrier amplitude doubles on modulation peaks with amplitude modulation, the input power on peaks will be four times the carrier value. Thus the amplifier must have a p.e.p. input rating of 400 watts. The average input power with 100% modulation will be 150 watts, since 50 watts will be supplied for the side frequencies. With a final amplifier stage that is 50% efficient, there will be 75 watts of power dissipated in the final amplifier tubes, for a steady 100% modulated input. Thus this final stage has the dual requirement of being able to handle a p.e.p. input of 400 watts without distortion and also of being capable of dissipating about 75 watts without overheating. Of course voice waveforms are not sine waves, and the average power figures given above are conservative as far as voice input is concerned.

As a second example, let's use the same amplifier rated at 400 watts p.e.p. and use it for s.s.b. operation. If a single-tone input is used, the peak power input of 400 watts which would result could not be permitted to continue for more than a very few seconds. The reason being that the input of 400 watts would mean that the tubes would be dissipating 200 watts, which is beyond the 75-watt dissipation rating previously assumed. Fortunately, however, the nature of the human voice with its pauses and variations in amplitude is such that the average power input is far less than the peak power input. An average power dissipation rating of 75 watts should normally be more than adequate for a 400-watt p.e.p. s.s.b. input. The ratio of p.e.p. ratings to average dissipation ratings is often six or eight to one, which explains why many s.s.b. transmitters must be tuned quickly, and why many are tuned up at a low level.

As a third example let us take a linear amplifier that is used for c.w. operation. In effect, it is either full on or full off, depending upon whether the key is up or down. Obviously the transmitter is heating up when the key is down, and is cooling off when the key is up. The duty cycle is a measure of the percentage on time, and is considerably less than 50% for average c.w. operation. Such factors as pauses, spaces between dots and dashes, and letters and words are of course taken into consideration. Usually a linear amplifier will run hotter with a given maximum input on c.w. than it does on s.s.b. because the usual duty cycle for c.w. is greater than it is for s.s.b. Because of this, many transmitters have c.w. ratings which are about 75% of their s.s.b. ratings.

As an example, the word "amateur" followed by a standard 7-unit space, has a duty cycle of slightly less than 50%. This is probably higher than that of an average text. A 40% duty cycle, with a maximum input of 400 watts, would mean an average power input of 160 watts, and a plate dissipation of 80 watts at the 50% efficiency level previously assumed. Under such conditions, the transmitter, if rated at 75 watts allowable dissipation, would overheat somewhat. The key-down input should therefore be reduced to 75/80 of 400 watts or 375 watts on c.w. as compared to 400 watts p.e.p. on s.s.b.

Much discussion over power measurement is heard on the air, and much of it is confusing. The term "d.c. input" is often used in connection with s.s.b. equipment. Without definition or qualification this term means little or nothing. When one talks into a microphone connected to a s.s.b. transmitter with a typical linear amplifier, the amplifier plate-current meter fluctuates from its resting value to peak values which are much higher. How high these peaks actually go depends on the voice waveform; what we read on the plate meter depends on the meter characteristics. It is often assumed that the highest meter reading is one half of the actual peak value, but this could be in error by a large factor. Actually an oscilloscope in the transmitter output circuit is the only accurate method of measuring peak power. A well set up two-tone measuring system as described in the A.R.R.L. Handbook is another method.

To summarise, both p.e.p. and average power values of input should be measured and understood in order to assure that the station transmitter is operating properly and within legal limits. Normally the s.s.b. peak power rating is the largest, with the c.w. rating close behind, and the a.m. carrier rating only about 25% of the s.s.b. p.e.p. rating.

* Reprinted from "QST," January 1971.

PRACTICAL V.H.F. AND U.H.F. COIL-WINDING DATA*

Complete Details on Inductors from 2 Nanohenries to 1 Microhenry

DONALD KOCHEN, K3SVC

This article contains computer generated data for building inductors from 2 to 1,000 nanohenries (1 nanohenry equals 0.001 μH.). Since no calculations are involved, it is a simple matter to scan the tables and select the inductor that best meets your particular requirements. The first part of the article describes single-layer solenoids from 10 to 1,000 nH.; the last part describes straight-wire inductors above a chassis that range from 2 to 100 nH.

V.H.F. INDUCTORS

Many v.h.f. experimenters have developed a sixth sense for winding r.f. coils—they've had to, since there does not seem to be any convenient coil winding data for this part of the spectrum. (The A.R.R.L. Lightning Calculator stops at 1 μH. and the Allied Coil Winding Calculator stops at 0.1 μH.)

The typical design procedure is to wrap some wire around a pencil (a coil form is also permitted) and trim the coil to resonance with the aid of a grid-dip meter and fixed capacitor. However, it takes a fair amount of experience to select the proper wire size and coil diameter that will give the desired inductance and still have reasonable Q and low capacitance.

Tables 1, 2, 3 and 4 describe coils of 1 to 10 turns wound with an inside diameter of ⅛" to ½".† Because of their size, these coils are especially attractive for use with solid-state receivers and transmitters.

DESIGN PHILOSOPHY

The goal is an inductor that has high Q, low capacitance and compact size. Low coil capacitance means the inductor will have a high self-resonant frequency, and therefore a more useful frequency range. This can be achieved by a single-layer solenoid with adequate turns spacing. A good rule of thumb is to have a space equal to the wire diameter between adjacent turns with coil length about 1.5 times the coil diameter. The result is a coil with low capacitance and reasonable Q. All coils computed in the tables have turns spacing equal to the diameter of the wire used; as a check, the overall length of the coil is also given.

Those coils whose length is 1 to 2 times diameter are shown in bold type since they are considered to be optimum. By scanning the tables you can see that any inductance can be obtained by an optimum coil.

All calculated inductances were rounded off to the nearest 10 nanohenries. This means that the error of values below 30 nH. will be ±5 nH. This seemed sufficient since adjacent objects will introduce errors into the free-space design anyway. Below 10 nH. it is usually easier to build straight-wire inductors.

USING THE TABLES

The tables are intended for air-core coils whose dimensions are indicated in Fig. 1. Each table describes coils wound with a different inside diameter. Wire size and number of turns are specified along the edge of the chart. The data within the table is inductance in nanohenries (on top) and coil length in inches (below). The use of the inductance tables is best illustrated by several practical examples.

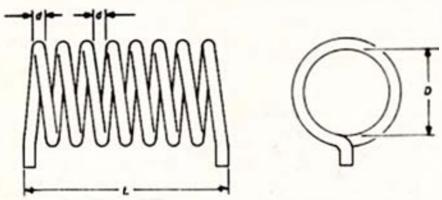

Fig. 1.—Air-wound coil showing construction dimensions.

Example 1:

What is the inductance of 5 turns of No. 18 wire, 0.25" diameter, wound with spacing equal to wire diameter?

From Table 2, opposite No. 18, and below 5 turns, you find this coil has 90 nH. inductance and is 0.44" long.

A coil of given inductance can be easily designed by scanning the optimum regions (bold-faced type) of each table. If the exact value is not found, the inductance may be mentally interpolated by changing the turns by a fraction or by compressing or expanding coil length.

Example 2:

A 50 nH. coil is required for a 20-w. transmitter. (Possibility is given first, then a comment.)

0.125" diam., 5 turns No. 24.
Poor choice at this power level.
0.250" diam., 4 turns Nos. 12 or 14.
Fair choice, only slightly out of optimum region.
0.250" diam., 3½ turns No. 16.
Marginal at this power level.
0.250" diam., 3 turns No. 18.
Marginal at this power level.
0.375" diam., 2.7‡ turns No. 10.
Good choice.
0.375" diam., 2.7 turns No. 12.
Good choice.
0.375" diam., 2.3 turns No. 14.
Good choice.
0.500" diam., 2 turns No. 10.
Good choice.
0.500" diam., 2 turns No. 12.
Good choice.

Example 3:

Same 50 nH. coil as in Example 2, but this time it is required for a receiver.

0.125" diam., 5 turns No. 24.
Good choice, compact size.
0.250" diam., 3.5 turns No. 16.
Good choice.
0.250" diam., 3 turns No. 18.
Good choice.
0.375" diam., 2.7 turns No. 10.
Good choice, but large size may add too much capacitance to the circuit.

U.H.F. INDUCTORS

As you can see from Tables 1, 2, 3 and 4, it is impractical to wind coils less than 10 nH. For less than 10 nH. the inductance of a straight piece of wire is sufficient. Quarter-wavelength resonators are common in microwave work and may be considered as an inductance in parallel with distributed capacitance.

Full-sized quarter-wave resonators are useful above 1 or 2 GHz. because of their convenient size and high Q. But at 432 MHz. or even 1296, the designer may want a more compact resonator. This can be accomplished by shortening the length needed for quarter-wave resonance and making up for the decreased inductance by adding external capacitance.

Obviously this is a design trade-off resulting in a lower Q, since $Q = X_L/R$, and decreased inductance means lowered Q. However, you have gained more compact size: e.g., 432 MHz. tank circuits may be built 1 or 2 inches long as compared with a full quarter-wavelength of 7 inches. You have also avoided an impedance-matching problem since connecting circuitry will usually be capacitive anyway.

In a transistor tank circuit the collector capacitance, tuning capacitor and coil capacitance are combined. Output is taken by either capacitor-divider coupling, transformer coupling or tapping down on the coil. (Motorola has an excellent application note for r.f. transistor design.[2])

(Continued on Page 9)

* Reprinted from "Ham Radio," April 1971.

† The tables were computed from the formula

$$L = \frac{\left(\frac{ND}{2}\right)^2}{4.5D + 101} \qquad (1)$$

where L is inductance, D is coil diameter and l is coil length. This formula approximates the low-frequency inductance of a coil in free space. However, after building a few coils and measuring their inductance with a Boonton 250A RX meter at 100 MHz. it appears that the error is only 10% for most coils.

‡ Instead of winding fractional turns, the coil may be wound with 3 turns and "stretched" to the desired inductance.

Wire Size	Number of Turns 1	2	3	4	5	6	7	8	9	10	
18	5	10	20	30	30	40	50	60	70	70	nH.
	0.12	0.20	0.28	0.36	0.44	0.52	0.60	0.69	0.77	0.85	Inch
20	5	10	20	30	40	50	50	60	70	80	nH.
	0.10	0.16	0.22	0.29	0.35	0.42	0.48	0.54	0.61	0.67	Inch
22	5	10	20	30	40	50	60	70	80	90	nH.
	0.08	0.13	0.18	0.23	0.28	0.33	0.38	0.43	0.48	0.53	Inch
24	5	10	20	30	50	60	70	80	100	110	nH.
	0.06	0.10	0.14	0.18	0.22	0.26	0.30	0.34	0.38	0.42	Inch

TABLE 1.—Coil data for 0.125 inch diameter air-wound coils.
(Bold-face values represent optimum designs)

Wire Size	Number of Turns 1	2	3	4	5	6	7	8	9	10	
12	10	20	30	50	70	80	100	120	130	150	nH.
	0.24	0.40	0.57	0.73	0.89	1.05	1.21	1.37	1.54	1.7	Inch
14	10	20	40	50	70	90	110	130	150	170	nH.
	0.19	0.32	0.45	0.58	0.71	0.83	0.96	1.09	1.22	1.35	Inch
16	10	20	40	60	80	100	120	140	170	190	nH.
	0.15	0.25	0.36	0.46	0.56	0.66	0.76	0.86	0.97	1.07	Inch
18	10	30	50	70	90	120	140	170	190	220	nH.
	0.12	0.20	0.28	0.36	0.44	0.52	0.60	0.69	0.77	0.85	Inch
20	10	30	50	80	100	130	160	190	220	250	nH.
	0.10	0.16	0.22	0.29	0.35	0.42	0.48	0.54	0.61	0.67	Inch
22	10	30	60	90	120	150	180	220	250	290	nH.
	0.08	0.13	0.18	0.23	0.28	0.33	0.38	0.43	0.48	0.53	Inch
24	10	30	60	100	130	170	210	250	290	340	nH.
	0.06	0.10	0.14	0.18	0.22	0.26	0.30	0.34	0.38	0.42	Inch

TABLE 2.—Coil data for 0.25 inch diameter air-wound coils.
(Bold-face values represent optimum designs)

Wire Size	Number of Turns 1	2	3	4	5	6	7	8	9	10	
10	10	30	60	80	110	130	160	190	210	240	nH.
	0.31	0.51	0.71	0.92	1.12	1.32	1.53	1.73	1.94	2.14	Inch
12	10	30	60	90	120	150	180	210	240	270	nH.
	0.24	0.40	0.57	0.73	0.89	1.05	1.21	1.37	1.54	1.70	Inch
14	10	40	70	100	130	170	200	240	280	310	nH.
	0.19	0.32	0.45	0.58	0.71	0.83	0.96	1.09	1.22	1.35	Inch
16	10	40	70	110	150	190	230	270	320	360	nH.
	0.15	0.25	0.36	0.46	0.56	0.66	0.76	0.86	0.97	1.07	Inch
18	10	40	80	130	170	220	270	320	370	420	nH.
	0.12	0.20	0.28	0.36	0.44	0.52	0.60	0.69	0.77	0.85	Inch
20	10	50	90	140	190	250	310	360	420	480	nH.
	0.10	0.16	0.22	0.29	0.35	0.42	0.48	0.54	0.61	0.67	Inch
22	20	50	100	160	220	280	350	420	490	560	nH.
	0.08	0.13	0.18	0.23	0.28	0.33	0.38	0.43	0.48	0.53	Inch
24	20	60	110	170	240	320	400	480	560	650	nH.
	0.06	0.10	0.14	0.18	0.22	0.26	0.30	0.34	0.38	0.42	Inch

TABLE 3.—Coil data for 0.375 inch diameter air-wound coils.
(Bold-face values represent optimum designs)

Wire Size	Number of Turns 1	2	3	4	5	6	7	8	9	10	
10	20	50	80	120	160	200	250	290	330	380	nH.
	0.31	0.51	0.71	0.92	1.12	1.32	1.53	1.73	1.93	2.14	Inch
12	20	50	90	140	180	230	280	330	380	430	nH.
	0.24	0.40	0.57	0.73	0.89	1.05	1.21	1.37	1.54	1.70	Inch
14	20	60	100	150	210	260	320	380	440	500	nH.
	0.19	0.32	0.45	0.58	0.71	0.83	0.96	1.09	1.22	1.35	Inch
16	20	60	110	170	240	300	370	440	510	580	nH.
	0.15	0.25	0.36	0.46	0.56	0.66	0.76	0.86	0.97	1.07	Inch
18	20	70	130	190	270	340	420	500	590	670	nH.
	0.12	0.20	0.28	0.36	0.44	0.52	0.60	0.69	0.77	0.85	Inch
20	20	70	140	210	300	390	480	580	680	780	nH.
	0.10	0.16	0.22	0.29	0.35	0.42	0.48	0.54	0.61	0.67	Inch
22	20	80	150	240	340	440	550	660	780	900	nH.
	0.08	0.13	0.18	0.23	0.28	0.33	0.38	0.43	0.48	0.53	Inch
24	20	80	160	260	370	490	620	750	890	1030	nH.
	0.06	0.10	0.14	0.18	0.22	0.26	0.30	0.34	0.38	0.42	Inch

TABLE 4.—Coil data for 0.5 inch diameter air-wound coils.
(Bold-face values represent optimum designs)

Wire Size	Length (Inches) 0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	
	2	5	9	12	15	19	22	26	29	33	nH.
2	0.4	0.7	1.1	1.5	1.8	2.2	2.5	2.9	3.3	3.6	pF.
	5.3	2.4	1.5	1.1	0.9	0.7	0.6	0.5	0.5	0.4	GHz.
	3	6	10	14	18	22	26	30	34	38	nH.
4	0.3	0.6	0.8	1.1	1.4	1.7	2.0	2.3	2.5	2.8	pF.
	5.4	2.4	1.6	1.2	0.9	0.8	0.6	0.6	0.5	0.4	GHz.
	3	7	12	17	21	26	30	35	40	44	nH.
6	0.2	0.5	0.7	0.9	1.2	1.4	1.6	1.9	2.1	2.3	pF.
	5.5	2.5	1.6	1.2	0.9	0.8	0.7	0.6	0.5	0.5	GHz.
	4	9	14	19	24	29	34	40	45	50	nH.
8	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	pF.
	5.5	2.5	1.6	1.2	0.9	0.8	0.7	0.6	0.5	0.5	GHz.
	4	10	15	21	27	33	38	44	50	56	nH.
10	0.2	0.4	0.5	0.7	0.9	1.1	1.2	1.4	1.6	1.8	pF.
	5.4	2.5	1.6	1.2	1.0	0.8	0.7	0.6	0.5	0.5	GHz.
	5	11	17	23	30	36	42	49	55	62	nH.
12	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.3	1.4	1.6	pF.
	5.4	2.5	1.6	1.2	1.0	0.8	0.7	0.6	0.5	0.5	GHz.
	5	12	19	26	33	40	47	54	61	67	nH.
14	0.1	0.3	0.4	0.6	0.7	0.9	1.0	1.1	1.3	1.4	pF.
	5.4	2.5	1.6	1.2	1.0	0.8	0.7	0.6	0.5	0.5	GHz.
	6	13	21	28	36	43	51	58	66	73	nH.
16	0.1	0.3	0.4	0.5	0.7	0.8	0.9	1.0	1.2	1.3	pF.
	5.3	2.5	1.6	1.2	1.0	0.8	0.7	0.6	0.5	0.5	GHz.
	6	14	22	30	38	47	55	63	71	79	nH.
18	0.1	0.2	0.4	0.5	0.6	0.7	0.8	1.0	1.1	1.2	pF.
	5.3	2.5	1.6	1.2	1.0	0.8	0.7	0.6	0.5	0.5	GHz.
	7	15	24	33	41	50	59	68	76	85	nH.
20	0.1	0.2	0.3	0.5	0.6	0.7	0.8	0.9	1.0	1.1	pF.
	5.3	2.5	1.6	1.2	1.0	0.8	0.7	0.6	0.5	0.5	GHz.
	7	17	26	35	44	54	63	72	82	91	nH.
22	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.1	pF.
	5.2	2.5	1.6	1.2	1.0	0.8	0.7	0.5	0.5	0.5	GHz.
	8	18	27	37	47	57	67	77	87	97	nH
24	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	pF.
	5.2	2.5	1.6	1.2	1.0	0.8	0.7	0.6	0.5	0.5	GHz.

TABLE 5.—Inductance of wire 0.25 inch above a ground plane.
(Upper value is inductance in nH., middle value is capacitance in pF., lower value is self-resonant frequency in GHz.)

Wire Size	Length (Inches) 0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	
	3	7	12	17	22	27	32	38	43	48	nH.
2	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	pF.
	6.3	2.7	1.7	1.3	1.0	0.8	0.7	0.6	0.5	0.5	GHz.
	3	8	14	19	25	31	36	42	48	54	nH.
4	0.2	0.4	0.5	0.7	0.9	1.1	1.2	1.4	1.6	1.8	pF.
	6.2	2.7	1.7	1.3	1.0	0.8	0.7	0.6	0.5	0.5	GHz.
	4	9	15	21	28	34	40	47	53	59	nH.
6	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.3	1.4	1.6	pF.
	6.1	2.7	1.7	1.3	1.0	0.8	0.7	0.6	0.5	0.5	GHz.
	4	10	17	24	31	37	44	51	58	65	nH.
8	0.1	0.3	0.4	0.6	0.7	0.9	1.0	1.1	1.3	1.4	pF.
	6.0	2.7	1.7	1.3	1.0	0.8	0.7	0.6	0.5	0.5	GHz.
	5	11	19	26	33	41	48	56	64	71	nH.
10	0.1	0.3	0.4	0.5	0.7	0.8	0.9	1.1	1.2	1.3	pF.
	5.9	2.7	1.7	1.3	1.0	0.8	0.7	0.6	0.5	0.5	GHz.
	5	13	20	28	36	44	53	61	69	77	nH.
12	0.1	0.2	0.4	0.5	0.6	0.7	0.8	1.0	1.1	1.2	pF.
	5.8	2.7	1.7	1.2	1.0	0.8	0.7	0.6	0.5	0.5	GHz.
	6	14	22	31	39	48	57	65	74	83	nH.
14	0.1	0.2	0.3	0.5	0.6	0.7	0.8	0.9	1.0	1.1	pF.
	5.8	2.6	1.7	1.2	1.0	0.8	0.7	0.6	0.5	0.5	GHz.
	6	15	24	33	42	51	61	70	79	89	nH.
16	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.1	pF.
	5.7	2.6	1.7	1.2	1.0	0.8	0.7	0.6	0.5	0.5	GHz.
	7	16	26	35	45	55	65	75	85	94	nH.
18	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	pF.
	5.6	2.6	1.7	1.2	1.0	0.8	0.7	0.6	0.5	0.5	GHz.
	7	17	27	38	48	58	69	79	90	100	nH.
20	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.7	0.8	0.9	pF.
	5.6	2.6	1.7	1.2	1.0	0.8	0.7	0.6	0.5	0.5	GHz.
	8	18	29	40	51	62	73	84	95	106	nH.
22	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.8	0.9	pF.
	5.5	2.6	1.7	1.2	1.0	0.8	0.7	0.6	0.5	0.5	GHz.
	9	19	31	42	54	65	77	89	100	112	nH.
24	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.8	pF.
	5.5	2.6	1.7	1.2	1.0	0.8	0.7	0.6	0.5	0.5	GHz.

TABLE 6.—Inductance of wire 0.5 inch above a ground plane.
(Upper value is inductance in nH., middle value is capacitance in pF., lower value is self-resonant frequency in GHz.)

Tables 5, 6 and 7 contain computed data describing a wire of diameter D and length L, spaced height H above a ground plane as shown in Fig. 2.§ Wire size, height above ground and length in inches are specified along the edge of the inductance tables. The data within the table is inductance (nH.) on top, capacitance (pF.) in the middle, self-resonance (GHz.) on the bottom. As before, the use of these tables is best illustrated by several typical examples.

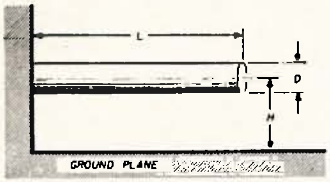

Fig. 2.—Length of wire above a ground plane exhibits both inductance and capacitance. Dimensions are used to calculate values.

§ The inductance values shown in Tables 5, 6 and 7 were calculated from the formula

$$L = .0116967 \left(\log 4H/D + \log \frac{A}{B}\right) + .00508 \left(B - A + \mu 1 \delta - 2H + \frac{D}{2}\right)$$

$$\text{where } A = 1 + \sqrt{1^2 + \frac{D^2}{4}}$$

$$B = 1 + \sqrt{1^2 + 4H^2}$$

$$\mu \text{ (permeability)} = 1$$

Skin effect, because of its very small value, was neglected. The capacitance of the straight wire above a ground plane was calculated from

$$C = \frac{\pi \epsilon l}{\ln \left(\frac{4H}{D} - 1\right)}$$

where ϵ is permitivity. As a check, capacitance measurements were made on a Boonton 250A RX meter operating at 1 GHz. Readings were within 0.4 pF. of the calculated values. Next, the circuit of Fig. 2 was duplicated, and a signal generator and r.f. detector were loosely coupled to the resonator. For each case measured the self-resonant frequency was within 20% of that calculated from the computed inductance and capacitance. It is also gratifying that there is some correlation between the computed LC resonant frequency and resonance of quarter-wave transmission lines.

Example 4:

What are the characteristics of a 2" length of No. 10 wire, spaced 0.25" above a ground plane?

From Table 5, a 2" length of No. 10 wire has 21 nH. inductance in parallel with 0.7 pF. Self-resonant frequency 1.2 GHz. (1200 MHz.)

DESIGN PHILOSOPHY

A quick scan of Tables 5, 6 and 7 reveals some interesting phenomena that should be kept in mind when laying out circuits. For example, moving the inductor closer to a ground plane increases its capacitance. Not so obvious is the fact that this also decreases inductance. The inductor and the ground plane may be considered

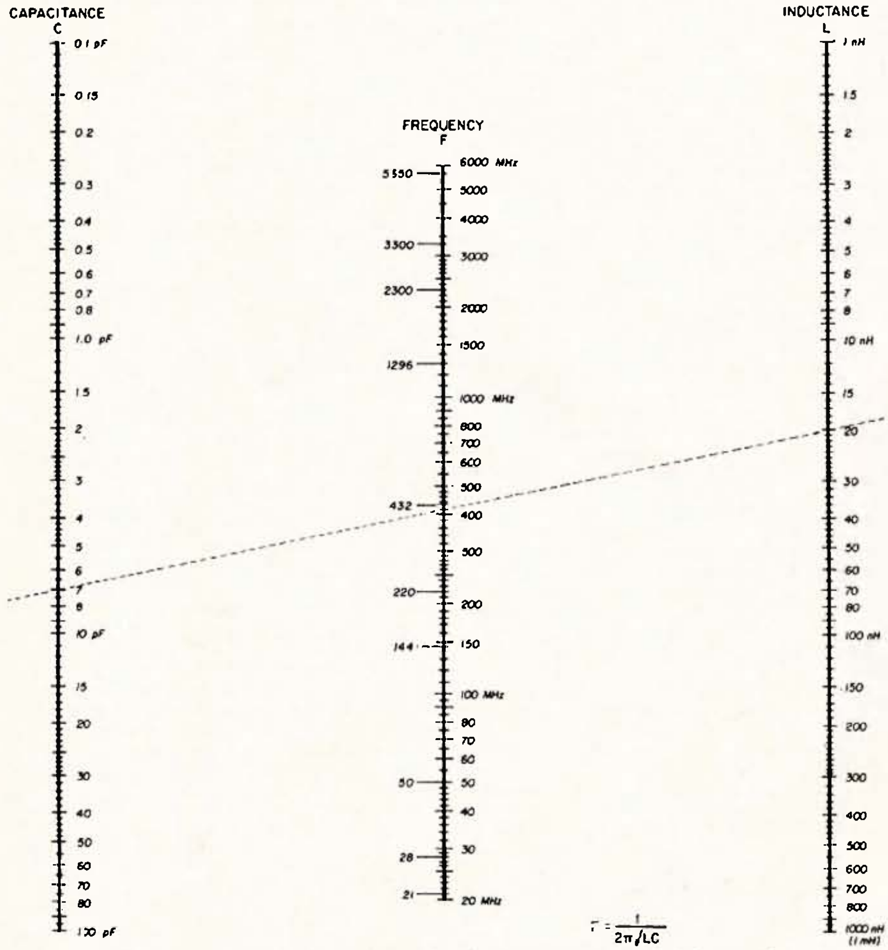

Fig. 4.—Resonant-frequency nomograph may be used to determine capacitor and inductor values over range from 20 to 6,000 MHz. The example indicates that 20 nH. will resonate at 425 MHz. with a 7 pF. capacitor.

Wire Size	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	
	Length (Inches)										
2	3	8	14	21	27	34	41	47	54	61	nH.
	0.1	0.3	0.4	0.6	0.7	0.9	1.0	1.1	1.3	1.4	pF.
	7.1	3.0	1.9	1.3	1.0	0.9	0.7	0.6	0.6	0.5	GHz.
4	3	9	16	23	30	37	45	52	59	67	nH.
	0.1	0.3	0.4	0.5	0.7	0.8	0.9	1.1	1.2	1.3	pF.
	6.9	3.0	1.8	1.3	1.0	0.9	0.7	0.6	0.6	0.5	GHz.
6	4	10	18	25	33	41	49	57	65	73	nH.
	0.1	0.2	0.4	0.5	0.6	0.7	0.8	1.0	1.1	1.2	pF.
	6.7	2.9	1.8	1.3	1.0	0.8	0.7	0.6	0.6	0.5	GHz.
8	4	11	19	27	36	44	53	61	70	78	nH.
	0.1	0.2	0.3	0.5	0.6	0.7	0.8	0.9	1.0	1.1	pF.
	6.5	2.9	1.8	1.3	1.0	0.8	0.7	0.6	0.5	0.5	GHz.
10	5	13	21	30	39	48	57	66	75	84	nH.
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.1	pF.
	6.4	2.8	1.8	1.3	1.0	0.8	0.7	0.6	0.5	0.5	GHz.
12	5	14	23	32	41	51	61	71	80	90	nH.
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	pF.
	6.3	2.8	1.8	1.3	1.0	0.8	0.7	0.6	0.5	0.5	GHz.

Wire Size	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	
	Length (Inches)										
14	6	15	24	34	44	55	65	75	86	96	nH.
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.7	0.8	0.9	pF.
	6.2	2.8	1.8	1.3	1.0	0.8	0.7	0.6	0.5	0.5	GHz.
16	7	16	26	37	47	58	69	80	91	102	nH.
	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.8	0.9	pF.
	6.1	2.8	1.8	1.3	1.0	0.8	0.7	0.6	0.5	0.5	GHz.
18	7	17	28	39	50	62	73	35	96	108	nH.
	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.8	pF.
	6.0	2.7	1.7	1.3	1.0	0.8	0.7	0.6	0.5	0.5	GHz.
20	8	18	30	41	53	65	77	89	101	114	nH.
	0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.6	0.7	0.8	pF.
	5.9	2.7	1.7	1.3	1.0	0.8	0.7	0.6	0.5	0.5	GHz.
22	8	19	31	44	56	69	81	94	107	119	nH.
	0.1	0.2	0.2	0.3	0.4	0.5	0.5	0.6	0.7	0.8	pF.
	5.8	2.7	1.7	1.3	1.0	0.8	0.7	0.6	0.5	0.5	GHz.
24	9	21	33	46	59	72	85	99	112	125	nH.
	0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.7	pF.
	5.8	2.7	1.7	1.3	1.0	0.8	0.7	0.6	0.5	0.5	GHz.

TABLE 7.—Inductance of wire 1.0 inch above a ground plana.
(Upper value is inductance in nH., middle value is capacitance in pF., lower value is self-resonant frequency in GHz.)

to be a transformer with a shorted secondary. Hence, increased coupling results in less inductance. It turns out that the capacitance changes more than inductance, and the net result is a lower resonant frequency.

Moving the inductor away from the chassis will raise the Q. Beyond a height of one inch, however, the computed L and C rapidly approaches the free-space inductance as a limit, and the law of diminishing returns applies.

Considering the resonator as a transmission line, its characteristic impedance is $Z_0 = \sqrt{L/C}$. Thus, moving the quarter-wave resonator too far from the chassis will raise its impedance to match the approximately 377-ohm radiation resistance of space. Then the resonator will then behave more like an antenna than a resonator.

Adding additional ground planes at right angles to form a co-axial cavity around the wire lowers the resonant frequency by about 10%. This implies that L and C have changed by more than that amount since they move in opposite directions. An estimate of the inductance and capacitance of a co-axial shielded wire can be made by considering it simply as a wire that is closer to a single ground plane.

U.h.f. resonators are usually made from the larger diameter wires, but data for wires smaller than No. 18 is included mainly for estimating component-lead inductance. The resonant frequency given in the table sets the upper limit at which the inductor may be used; above resonance it acts like a capacitor. The inductor should be chosen so that with the added external circuit capacitance the LC combination will resonate at the desired frequency.

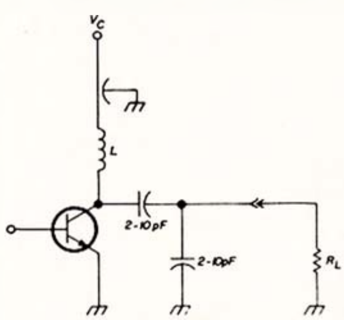

Fig. 3.—Typical 425 MHz. tank circuit. Effective circuit capacitance of 7.4 pF. will resonate with 19 nM. at 424 MHz.

Example 5:

It is desired to design a transistor tank circuit for 430 MHz. as shown in Fig. 3. The transistor has an output capacitance of 3 pF., and the two impedance-matching variable capacitors are assumed to present an average capacitance of 4 pF. at the collector. Thus, total capacitance will be 7 pF. plus inductor capacitance. An LC nomograph (Fig. 4) indicates that 20 nH. will resonate with 7 pF. at 425 MHz.

The data for No. 14 wire spaced 0.25" above a ground plane (Table 5) shows that a 1½" length has 17 nH. inductance and 10.5 pF. capacitance. Therefore, the tank circuit consists of 19 nH. in parallel with 17.4 pF. and has a mid-range resonance of 424 MHz.

SUMMARY

It is one thing to design on paper but u.h.f. and microwave work always require a certain amount of "cut and try". The approximations made and factors ignored in this article would probably send chills up the spine of a physicist. However, physicists don't have to design equipment and make things work.

Each piece of equipment is a unique problem. Armed with basic data and some mental fudge factors, the designer can obtain a quick solution of reasonable accuracy. Compared to that, an exact calculation is usually impractical.

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Book Review

UNDERSTANDING AMATEUR RADIO

Publisher: A.R.R.L. Cover price $US2.50

Amateur Radio has something to interest all types of people. Amateur Radio also provides a training ground whereon newcomers can learn Electronics and Communications principles and practice. "Understanding Amateur Radio" takes the newcomer through from first principles to a complete and quite elaborate station in a clear and concise manner. See the Secretary of your Division for this and many other interesting titles, or write to Federal Executive.—VK3ASC.

ANGLE MODULATION

(Continued from Page 5)

condenser, connected across the oscillator tuned circuit and this brings the oscillator back on its centre frequency if it drifts.

In another method the two-phase motor is replaced with an automatic frequency control (a.f.c.) which produces a voltage whose polarity depends on the direction of the oscillator drift and the amplitude is governed by the amount of drift. This voltage is applied as bias to the grid of the reactance valve modulator or to the varactors if they are being used to derive the frequency modulation.

As has been stated, it is difficult to frequency modulate a quartz crystal, but the Marconi Co. developed a method using a quarter wave transmission line between a reactance valve modulator and a quartz crystal. The crystal oscillates at 1/24th of the carrier frequency and the reactance valve modulator is capable of swinging the crystal frequency ±3.125 KHz. When the crystal frequency is multiplied twenty-four times to obtain the carrier frequency the deviation is ±75 KHz. There is f.m. sound broadcasting in Britain and ±75 KHz. is the maximum deviation permitted.

(to be continued)

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ERRATUM

Re article "Angle Modulation," Lecture No. 14A, in July 1971 "A.R.," page 9, column 1, second complete paragraph: The cut-off frequency should read 7½ KHz., not 1½ KHz.

V.H.F. METEOR SCATTER PROPAGATION

Hints on using Meteor Trail Ionisation for Six Metre DX

WALLY WATKINS, VK5ZWW (ZL2TCW)*

In most textbooks towards the end of the chapter dealing with v.h.f. propagation, reference is made to the esoteric forms of communication. However one look at the table, which shows antenna power and receiver capabilities necessary for these forms, usually puts paid to any idea of using them.

Meteor scatter is no mode for the casual operator. However, it is within the grasp of all v.h.f. operators in Australia who have reasonable gear, ample patience and operating skill at both ends of the path.

Since August 1970 experiments and tests have been carried out to determine power levels and antennae required for meteor scatter in Australia. The path Tennant Creek, N.H., and Adelaide, S.A., was used for primary evaluation, the distance being 1,100 miles. Antennae and receiving set-up was similar at each end of the path but transmitter power was different.

As is generally known, the meteor signal is reflected, not from the particle itself, usually the size of a grain of sand, but from the stream of ionisation left by the meteor as it is heated and vaporised by friction with the atmosphere.[1] This takes place in the E layer, about 100 km. above the earth, so that distances worked closely correspond with those of Es propagation.

It must be pointed out at this stage that there are two sets of conditions existing for meteor scatter propagation. Firstly random meteors exist throughout the twenty-four hours peaking to a maximum at 0600 local sun time and dropping to a minimum at 1800 hours. The second is when the earth passes through a belt of space debri, which is predictable from year to year, and is known as a meteor shower. For those who wish to delve more deeply into the mechanics of meteor scatter, the classic article by Walt W4LTU in "QST" of April 1957 is recommended.

It has been found that the minimum transmit requirements are well within the scope of the average Amateur. A 6 element beam is quite satisfactory provided it is up high enough to clear surrounding objects. The transmitter should run a 6/40 in the final with either 600 or 1,000 volts on the anodes. It is assumed that one is running s.s.b. and the 6/40 is operating in AB1.

At this location the FT-DX-100 runs into a homebrew transverter using an E80CF oscillator-buffer at 24 MHz., a 6939 mixer-driver and a 6/40 with 1,000 volts on the anodes. The converter is a VK3 FET with oscillator injection from the E80CF. The antenna is a 9 element yagi on a 30-foot boom.

Because it is possible to talk faster than the average Amateur can copy c.w., s.s.b. is superior for this type of propagation. A voice average is about 80 w.p.m. and even though only bits of words are heard at a time, the whole text can be more easily pieced together. It is not intended to denigrate c.w., for c.w. has been found to be a convenient way of station identification, especially with solid state programmed keyers. However s.s.b. is usually used for the actual exchange of reports.

* 244 Shepherds Hill Rd., Bellevue Heights, S.A., 5050.

WHAT IS NEEDED?

What is now needed to make an actual contact via meteor scatter? First you must arrange for someone to be on frequency at the appropriate time. Thereafter patience is needed. It is here that the phrase "esoteric communication" takes on real meaning. If one participant has had previous experience and has passed on this experience to the other, then everything will fall readily into place.

For random meteors a five-minute calling period is used with each station taking alternate turns to call and listen. The identification, call signs and/or reports are repeated for the five-minute period. I have found that pre-recorded endless tapes are ideal for this purpose. During the peak of a known shower, the technique changes. The five-minute calling periods are retained, however station identification is given followed by a key-up period of three seconds. This allows for a form of break-in operation and enables the other station to attempt a reply on the same meteor trail. The second method can be used during random meteor attempts but it is not recommended until some experience is obtained using the first method.

Frequency readout should be capable of an accuracy of ± 500 Hz. and timing of segments can be synchronised with VNG or WWV. Over most paths enough is received during the first five-minute segment to v.f.o. onto the frequency and this is desirable even though it may be slightly off the nominal frequency.

What frequency should be used? This is a matter of personal choice and would be one subject brought up when arranging skeds. Two stations at one end of the path would be advised not to transmit during the same five-minute segment as this would preclude break-in operation. It is also recommended that stations calling with an easterly component in their antenna heading should call during the odd five-minute segments of the hour and those with a westerly component listen during the odd five-minute segments. During the even segments the roles are reversed.

Identification in the form "This is VK5AA" is acceptable, but phonetics **must not be used**. Identification is kept up until something definite is heard, then a special reporting system is used or if a contest is on the usual cypher is given.

REPORTING

Report coding for s.s.b. is as follows (c.w. coding would consist of only the initial letter or letters):

Tango (T)	=	Bits—not enough to identify.
Mexico (M)	=	Words which can be pieced together to make out call signs and/or report.
Oscar (O)	=	Both call signs and/or report copied in a single burst.
Roger (R)	=	Report received.

Combinations of M-R and O-R should be self explanatory and are frequently used. For "break-in" type of operation, providing it has been arranged in advance, there is no need to include the word "break" in the identification as this would be a waste of valuable time. Once contact has been established much time can be saved if extraneous matter in the way of call signs is kept to a minimum. The report or cypher is the important matter to get across and must, of course, be repeated more frequently.

If you are interested in trying this form of propagation you will find it is now up to you to take that first step and arrange that first sked—you will be surprised by how much you hear.

Meteor scatter should lead to some good "Ross Hull" scores this year, especially during the "Geminids" shower in December. On 13th and 14th December, 1970, VK8AU and VK5ZWW swapped two cyphers via M/S using break-in operation, so it can be done.

Thank you to those who have kept skeds with me (between 0500 and 2400), namely VK8AU, VK8KK, VK4RO, VK-2ZQJ, VK2ZNS, VK2ZRH, VK1VP, VK3ASV, VK3ZQC, VK5ZDX, VK5QZ and VK5ZDY,[2] and to those 6 metre operators in Adelaide who have put up with endless hours of endless tape giving my identification.

REFERENCES

1. "QST," April 1957, p. 20.
2. Up to 30th June, 1971.

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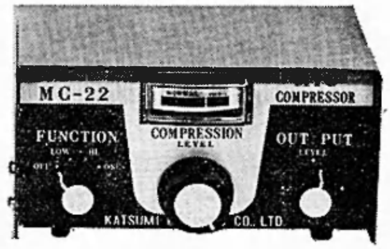

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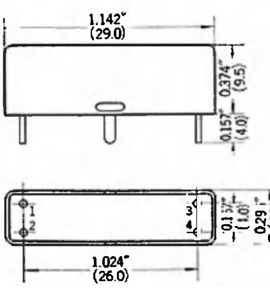

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HOME STATION ANTENNA FOR 160 METRES

Part Four—Practical Application

J. A. ADCOCK, M.I.E. (Aust.) VK3ACA*

VERTICAL vs. HORIZONTAL FOR TRANSMITTING

As can be seen from Fig. 1, the majority of signal from a vertical is along the ground and zero in the vertical direction, whereas with a horizontal the signal is zero along the ground and maximum vertically. Since surface wave propagation is by the vertically polarised mode only, only the vertical component is useful in surface wave propagation. During the day this mode of propagation may be useful over a distance of 100 miles over flat country—example, Melbourne to Colac; propagation is poor over mountainous country being not much use more than 10 miles. At night propagation via the ionosphere is possible.

With the vertical antenna signals returned via the ionosphere will be weak close to the transmitter and strong some distance away. This gives rise to a dead zone between the limits of the ground wave and the sky wave. If the lobe signal strength from a horizontal and a vertical were equal, the strength of the rays at 45° to the ground would be equal, this corresponds to a distance of approximately 350 miles. In fact if the vertical and horizontal were of equal efficiency, the peak lobe signal strength at right angles to the wire is greater for the horizontal than the vertical.

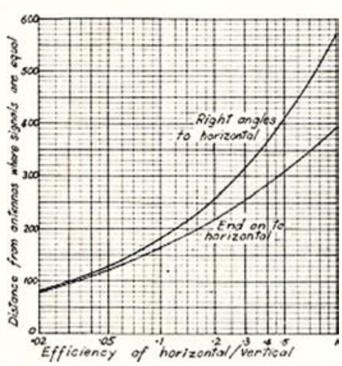

Fig. 16.—The distance in miles, from the antenna up to which the horizontal is advantageous, is plotted against comparative efficiency. The curves are for signals reflected from an ionosphere 180 miles high by a single hop. The earth is assumed to be flat and the effect is illustrated in Fig. 17.

Antennas of equal efficiency would produce signals of equal signal strength at distances of up to 600 miles broadside to the horizontal or 400 miles end on. Inside these distances from the transmitter the signal from the horizontal would be stronger. Outside these distances the signal from the vertical would usually be stronger. This effect is illustrated in Fig. 17. (These figures are based on the assumption that the signals are mainly reflected by the F layer at night. This is true at least at high angle radiation. The matter is more complicated when considering lower layer reflection.)

Where the horizontal antenna is less efficient (this includes most practical cases for short antennas close to the ground) the area in which the horizontal is advantageous becomes less. A horizontal with an efficiency of only half that of the vertical will still give an advantage over a distance from 300 to 400 miles. The use of a horizontal of very poor efficiency can provide a useful signal in the dead zone (between 20 and 100 miles at night).

The distance over which the horizontal should be preferable to the vertical is shown in the graph Fig. 16. The graph is based on the assumption of an ionosphere height of 180 miles and a flat earth. (Efficiency referred to is power efficiency as calculated by the methods given in other sections.) These assumptions are reasonable for late at night and over the distances considered. If it is desired to apply the graphs to other ionospheric heights the distances can be worked out by simple proportion.

VERTICAL vs. HORIZONTAL FOR RECEIVING

For receiving surface waves the same applies to receiving as transmitting—the receiving antenna must be largely vertical for best results. For receiving signals via the ionosphere, the situation is quite different. Since a signal loses polarisation via the ionosphere it does not follow that the transmitting and receiving antennas must be of the same polarisation. The receiving patterns for the two antennas will be the same as their transmitting patterns.

Since the main concern of a receiver is signal to noise ratio, relative efficiencies of receiving antennas are of no significance (it being assumed that the antenna noise is well above the threshold noise of the receiver). The main consideration is the angle from which the noise is coming. The majority of local noises are vertically polarised. The majority of distant static is received at a low angle and therefore received best on a vertical antenna. Local storms and storms within a radius of 500 miles will probably produce a stronger noise on a horizontal antenna.

Because most noise is received best on a vertical antenna, very considerable advantages can accrue from using a horizontal receiving antenna. Another advantage of a well balanced horizontal is that it gives good rejection against strong local signals. The best mode of the receiving antenna under different noise conditions for different propagation distances are shown in Table 1.

It can often happen that an interstate or country signal can be almost inaudible on a vertical antenna and 5 and 9 on a horizontal.

To take full advantage of horizontal reception it is desirable that the antenna should have practically no vertical component. This is difficult to achieve because of the tendency of the vertical component to dominate. For best results the virtual ground should be parallel with the antenna. The antenna, feeders and tuning unit should be balanced and as symmetrical as possible. The position is complicated by surrounding buildings. Objects like drain pipes and iron roofs may be sufficiently coupled to the antenna to produce a considerable vertical component and thus destroy some of the properties of the horizontal.

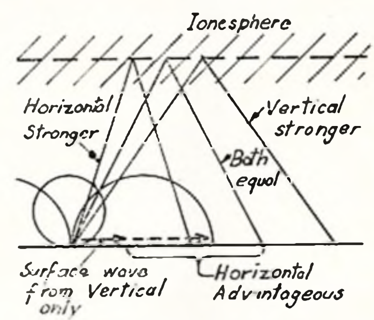

Fig. 17.—Illustrating how a horizontal with an efficiency less than that of a vertical can produce a stronger signal in a limited area.

CALCULATIONS AND DISCUSSION

The purpose of this discussion is to examine results obtained in practice and to endeavour to make some useful conclusions. Most of the practical results agree with those obtained by calculations. Some of the conclusions drawn are largely supposition, but should be useful to any person who is experimentally inclined and would like to try them in practice.

The antenna used by the author is a horizontal centre fed length of wire 84 feet long and 30 high. The feeders

	Low Noise Conditions	High Noise Conditions
1. Surface Wave	Vertical	Vertical
2. Intermediate distances up to 800 miles	Horizontal or sometimes Vertical	Horizontal
3. Long distances	Vertical	Either, depending on results

Table 1.

* P.O. Box 106, Preston, Vic., 3072.

are sloping but these have been considered vertical. The feeders can be fed either in parallel against ground or as a doublet. The normal earth consists of a water pipe driven into the ground close to the transmitter plus four radials at right angles averaging 20 feet long and connected at the ends to various objects such as water pipes. A counterpoise is available for erection when required. The counterpoise is parasitically tuned against ground as in Fig. 12 (b). The power input to the class C final of the transmitter is 50 watts and allowing for 70% efficiency, is approximately 35 watts input to the antenna.

The values of resistance in each case were initially determined by $W \div I^2$, as described in Part Two. Later, measurements of both resistance and reactance were made using a Wayne Kerr type B201 bridge. An attempt was also made to make measurements on a Q meter but it was found that there was too much interference from the antenna. In general, the R values were higher than those measured by the bridge, suggesting that the estimation of power input may have been too high.

The value of resistance was found to be difficult to measure in the case of the balanced horizontal. This was because the resistance is the minor component and is more difficult to measure, and also the bridge was not balanced to ground. The values shown here were measured on the bridge except the resistance of the doublet which was calculated from $W \div I^2$. If the bridge was correct, it would make the value of R about 10 ohms.

The following were the values determined for the purpose of calculation.

The antenna with feeders in parallel:
R = 23 ohms.
X = 135 ohms (650 pF.).

As above, but with a counterpoise:
R = 7.7 ohms.
X = 173.5 ohms (501 pF.).

Fed as a doublet:
R = 6.2 ohms.
X = 658 ohms (132 pF.).

Calculations for the Vertical Antenna

Series-Parallel Conversion.—In earlier sections, series-parallel conversion was referred to. It is interesting to consider this conversion although details here are not given and only the first case is considered.

Series resistance = 23 ohms
Series reactance = 135 ohms.

These values would be represented by the equivalent series circuit of the load Fig. 3c.

By applying the standard formula (Ref. 5):

Parallel resistance = 814 ohms
Parallel reactance = 139 ohms.

These values would be represented by the equivalent parallel circuit Fig. 3c.

This means that if the antenna was tuned by a series reactance Fig. 11a, the load presented to the line would be 23 ohms. If a parallel tuned circuit was used, such as Fig. 11d or e, the resistance of the load in parallel with the coil would be 814 ohms. To match a 50-ohm line, the turns tapping would be in the ratio $\sqrt{814 \div 50} = 4$ to 1.

Efficiency Case 1.—The antenna with feeders in parallel:

Electrical length of half top ($\lambda/4 = 1$) = 0.312.

Equivalent electrical length of top (Fig. 10) = 0.52.

Electrical length of vertical section = 0.222.

Form factor (from Fig. 7) = 0.91.

From equation (6):
$R_R = 98.75\ (0.91 \times 0.222)^2$
$= 4.03$ ohms.

Electrical distance of feed point from the end of the antenna:
0.52 + 0.22
= 0.74.

The accuracy of the efficiency calculations and the application of the graphs depends largely on whether this point, 0.74, is correct. As pointed out earlier, it can be checked from the known reactance at the point being considered.

From Fig. 9 at 0.74, X = 250. This is not a good agreement but when calculated for a point where X = 135, R_R would be 4.2 ohms. Not a large difference in this case.

From equation (8):
Efficiency = $4.03 \div 23$
= 0.175 (17.5%).
Loss resistance = 23 — 4.03
= 19 ohms.

Case 2.—In the case of the antenna with the counterpoise connected, R_R and X should still be the same but since the counterpoise is above the ground the length of the radiating section was 3 ft. shorter vertically.

Equation (6): $R_R = 3.28$ ohms.

Efficiency, equation (8) = 0.43 (43%).

If this result is correct it would suggest a 4 dB. improvement when using the counterpoise. From on-air checks, estimates of improvement vary from very little to 2 S points. Although these readings are not conclusive, the results indicate a worthwhile improvement.

The Effect of the Horizontal Section.—Many find it difficult to believe that the horizontal section of the antenna adds nothing to the radiation even when the top is larger than the vertical section. Some mistakenly refer to a "T" or an "inverted L" as a horizontal and think that the direction of the antenna will affect the radiation pattern. Although the top of the antenna produces no useful radiation it does greatly increase the efficiency. The loss resistance for the original "T" antenna was calculated to be 19 ohms. If the top was removed the loss resistance would be at least as high.

Radiation resistance with the top = 4.03 ohms.

Radiation resistance without the top:
F for a 0.222 vertical (Fig. 7) = 0.505.

From equation (6):
$R_R = 98.75\ (0.222 \times 0.505)^2$
$= 1.24$ ohms.

Efficiency = $1.24 \div (1.24 + 19)$
= 0.061.

Compare this with the "T" antenna with an efficiency of 0.208, the improvement with the top section added would be 3.3 times (i.e. 3.3 times the radiated power).

Calculations for the Horizontal Antenna

The length of one leg of the top = 42 ft.

Electrical length of top ($\lambda/4 = 1$) = 0.312

Form factor (Fig. 7) = 0.51

From equation (11):
$R_R = 197.5\ (0.312 \times 0.51)^2$
$= 5.0$ ohms

Electrical length of feeder = 0.222

Electrical distance from end of antenna to tuner = 0.222 + 0.312 = 0.534.

Refer to the graph of Fig. 14, the radiation resistance calculated above can also be obtained from the dotted curve (point 1). The resistance at the end of the line can be found by continuing along the graph to electrical distance 0.534. The resistance at this point would be 1.9 ohms—point 2 on Fig. 14. From measurement, the resistance was actually 6.2 ohms. If we take 6.2 ohms at point 0.534 (point 3), this corresponds to a resistance at the centre of 16 ohms (point 4) and an s.w.r. of 180. If the ground were perfectly conducting the resistance should be (from Fig. 15):
$5.0 \times 0.093 = 0.465$.

To sum up the following emerges:

Radiation resistance above perfect ground = 0.465 ohm.

Radiation resistance in space = 5.0 ohms.

Actual resistance = 16 ohms.

The actual effect of a poorly conducting ground is impossible to determine. Is it possible to apply the same method for determining efficiency as for a vertical antenna? That is: efficiency = theoretical radiation resistance $\div$ actual resistance.

In the case being considered,
Efficiency = $0.465 \div 16$
= 0.029 (2.9%).

As with the vertical antenna a check was made to see if the measuring point was as calculated. To check this, the reactance can be obtained from Fig. 9 at point 0.534 as 530 ohms, which compares with 658 ohms (measured) which corresponds with 0.47 from the end. This represents an error which, if correct, would make little difference to the feed point resistance calculations. It probably indicates that the antenna proper had a characteristic impedance greater than 600 ohms.

Comparing the efficiency of the horizontal with that of the vertical, the result is:
$0.029 \div 0.175$
= 0.165.

Some results obtained from reports when comparing the horizontal with the vertical for transmitting were as follows:

(Continued on Page 15)

OBITUARY

AIR COMMODORE ALFRED GEORGE PITHER, C.B.E., VK3VX

It is with the very deepest regret that Federal Council and Executive records the passing away suddenly of Air Commodore Alfred George Pither, C.B.E., VK3VX, on Friday, 2nd July.

After his retirement a few years ago from the active list of the R.A.A.F., he decided to take up Amateur Radio and was helped by his great friend, Dr. Alan Butement, VK3AD, towards obtaining the licence. George started off with a Swan 350 and had been on the air regularly since then, with fresh fields on 2 metres to explore on his return from Japan a few months ago.

George came on to Federal Executive early in 1967, firstly on Intruder Watch activities and later with the I.T.U. portfolio. An early article on this subject by him appeared in "A.R." of July 1967. Since that date he had been keen and active in Federal affairs and it is a tribute to his great personality that all the members of Federal Executive attended the funeral and wreaths were sent from afar.

Born in Victoria, George was 62 years of age, having devoted his life to the R.A.A.F. which he joined on passing out from Duntroon. From the beginning of the war he was concerned with radar and was the prime mover in setting this up in Australia and in Darwin and the North in particular during hostilities. After the war years had passed into memory he became Superintendent of the Woomera rocket range and held this post for several years. It was under him that so many social and general activities blossomed in that place. He himself even took to painting with water colours a la Churchill.

A grand personality. He will be sadly missed by all who knew him.

CHARLES FRYAR, VK2NP

It is with deep regret we report the passing on of this true Amateur on Friday, 2nd July, 1971. He was an excellent operator on both phone and c.w. At one time he won the W. T. Crawford Trophy as a Morse operator.

He was well known and respected on and off the air. He was well known on 2 metres and it was a joy and enlightenment to QSO him on this band.

He was one of the greatest givers of all times, both with his knowledge and bits and pieces, and was very interested in field operations as some of his friends can tell.

Charlie was a licensed Amateur since 1930 and was very active until a couple of years ago when he became too ill to use his gear. He was the instigator of the Gladesville and District Radio Club, started in 1937.

INTRUDERS

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ANTENNA FOR 160 METRES

(Continued from Page 14)

Distance 30 miles (no surface wave path): horizontal 2 S points better than vertical.
Distance 100 to 150 miles: on some occasions equal, better or worse.
Distance 500 miles: horizontal between 1 and 3 S points down on vertical.

It would appear that the distance where signals were equal from the two antennas is between 100 and 150 miles. From Fig. 16 the distance should be between 200 and 230 miles. This may indicate that the horizontal was even less efficient than calculated! The actual results were rather variable, suggesting considerable differences in conditions, but the final results would appear to confirm the calculations so far.

Fantasy

The rather rash assumption that efficiency for a low short horizontal can be worked out by such a simplified formula would appear to work out in this case. The assumption can be broken down into further assumptions.

Loss resistance in a lossless wire above a lossy ground equals radiation resistance above a perfectly conducting ground plus induced loss resistance above a lossy ground.

In most cases of a short low antenna above a lossy ground where the wire is also lossy, the induced loss will be the greater. A further rash assumption is made. It is likely that the resistance of a lossless antenna above a very lossy ground will be somewhere about its free space resistance, leading to the further rash breakdowns. Efficiency of a lossless antenna above a lossy ground = resistance above a lossless ground ÷ radiation resistance in free space. Therefore actual efficiency of a horizontal antenna = radiation resistance above a lossless ground ÷ (radiation resistance in free space + wire loss resistance).

Note.—It is not intended that the above should be applied to a high, resonant antenna.

From the latter rash formula it is apparent that the efficiency cannot be greater than the ratio given in the former formula.

The above rash conclusions are offered as a guide to anyone who wishes to test them in practice. If anyone can provide a complete practical analysis of the above they are welcome to try, but who but a Radio Amateur would try to use a short low antenna above a lossy ground.

Conclusions from Results

1. The efficiency of a vertical antenna is fairly easy to determine.
2. It is suggested that the efficiency of a horizontal antenna can be determined in a similar manner.
3. The results have been cross checked with results in practice and would appear to be correct.
4. The comparison between the efficiency of the horizontal and the vertical is useful in determining the area in which the horizontal would have advantage over the vertical.
5. In short range work, outside the surface wave area, it is greatly advantageous to have a choice of a vertical or a horizontal antenna. The doublet centre fed with open wire feed line provides the best answer since it can be used in either configuration.

REFERENCE

5. Radiotron Designers' Handbook. Conversion from series to parallel impedance, p. 157.

ANTARCTICA RESEARCH

Further to the paragraph in July "A.R." page 32, the tentative programme for the proposed Symposium includes (a) a review of communications requirements and statement of main practical difficulties affecting fixed and mobile (including position determination by radio) services within Antarctica and externally thereto and therefrom; (b) operational technical problems (co-ordination, maintenance, antennas, noise, snow static); (c) review of advantages and disadvantages of various transmission media (all frequencies and scatter), and use of satellites; (d) scientific results and developments likely to improve Antarctica communications and consideration of papers thereon (predictions, scatter, propagation, antennas in snow, poor earth, unmanned stations, modulation and data systems, etc.), and ending with policy and cost discussions and recommendations.

INDONESIA LICENSING

Notes from VK2AOK received from YB0BY

The Central A.R. organisation is:—
Organisasi Radio Amatir,
Republik Indonesia (O.R.A.R.I.)
Djl Lembang 41,
P.O. Box 2761, Djakarta,
Republic of Indonesia.

YB0—The capital Djakarta.
YB1—W. part of Java Is., Box 288, Bandung.
YB2—C. part Java Is., C/o. YB2AB, Samarang.*
YB3—E. part Java Is., C/o. YB3BT, Surabaya.*
YB4—S. part Sumatra Is., C/o. YB4GA, Palembang.*
YB5—W. part Sumatra Is., C/o. YB5AI, Padang.*
YB6—N. part Sumatra Is., C/o. YB6JA, Medan.*
YB7—Bornea Is. (Indonesian part).
YB8—Moluccas (Celebes, etc.).
YB9—Bali to West Irian.

* Addresses are available.

LICENSED AMATEURS IN VK

MARCH 1971

	Full	Lim.	Total
VK0	11	1	12
VK1	84	29	113
VK2	1403	471	1874
VK3	1319	652	1971
VK4	520	197	717
VK5	518	234	752
VK6	361	137	498
VK7	160	66	226
VK8	35	14	49
VK9	91	10	101
	4502	1811	6313 Grand Total

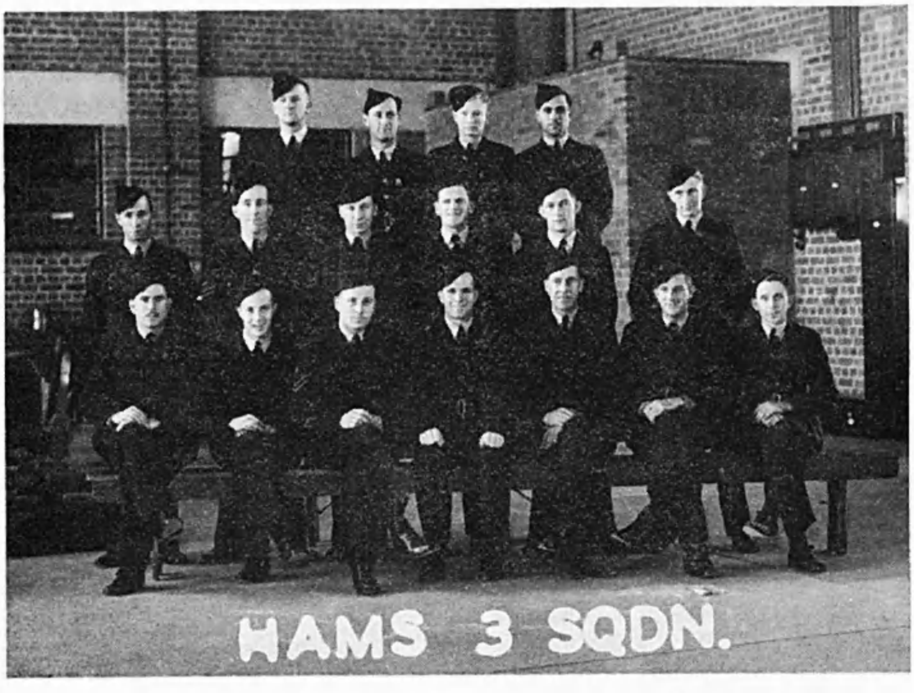
W.I.A. BROADCASTS

7146 KHz.

VK2WI, Sundays, 1100 hrs. E.A.S.T.
VK3WI, Sundays, 1030 hrs. E.A.S.T.
VK4WI, Sundays, 0900 hrs. E.A.S.T.
VK5WI, Sundays, 0900 hrs. C.A.S.T.
VK6WI, Sundays, 0930 hrs. W.A.S.T.
VK7WI, Sundays, 1000 hrs. E.A.S.T.

AUSTRALIAN FLYING CORPS No. 1 SQUADRON IN EGYPT 1917

In foreground, with cane, is Major Richard Williams, who will be giving the opening address for the R.D. Contest as Air Marshal Sir Richard Williams, K.B.E., C.B., D.S.O., R.A.A.F. (retd.) (Photograph by courtesy of R.A.A.F.)



3 SQUADRON AMATEURS AT RICHMOND, N.S.W., 15th July, 1940

Back (left to right): John Parr, VK3OM; Ned White, VK2HA; Ron Horne, VK4RR; J. Perooz, VK2PE.
Centre: Frank Carey, VK2AMI; Bill Smith, VK2BS; George Fenton, VK2GV; Snow Campbell, VK3MR; George Curl, VK2AJB/VK6NO (Silent Key); Jim Edwards, VK2AKE.
Front: Ken Williams, VK2XD; Arthur Wignell, VK2ALK (Silent Key); Rex Corthorn, VK2VG, now VK3VG; Vic Jarvis, VK2VJ (Silent Key); Ern Catt, VK2FU; Daddy Gibson, VK2GH; and Geoff Thornton, VK2IP.
Not in photograph: Ted Aked, VK2AEU; Tim Teehan (ZL) (Silent Key).

NEW CALL SIGNS

MARCH 1971

VK1GC—G. Cochrane, 37 Devonport St., Lyons, 2606.
VK1SR—S. N. Graves, 26 Glynn Pl., Hughes, 2605.
VK1ZSR—R. B. Staddon, 11 Melrose Dr., Mawson, 2607.
VK2QC—F. A. O'Donnell, 20 Wood Rd., Griffith, 2680.
VK2WZ—W. G. Rayner, 12 Barrawarn Pl., Castle Hill, 2154.
VK2XJ—D. P. Wickens, 53 Hill St., Roseville, 2069.
VK2YK—E. J. Pickles, 106/61 Osborne Rd., Manly, 2095.
VK2BAG—A. R. Eckersley, 46 Alexander St., Smithfield, 2164.
VK2BCV—A. H. Sandilands, 5/29 Mimosa St., South Bexley, 2207.
VK2BDM—D. Miller, 1/27 Aubin St., Neutral Bay, 2089.
VK2BDV—S. S. Durland, 3/100 Wallis St., Woollahra, 2025.
VK2BET—E. Trimingham, 149 Somerville Rd., Hornsby Heights, 2077.
VK2BGV—G. Voron, 7/30 Arcadia St., Coogee, 2034.
VK2BGW—R. W. Grouse, 63 Wattle Ave., Macquarie Fields, 2564.
VK2BME—J. Mack, 78 The Crescent, Cheltenham, 2119.
VK2BMM—M. S. McKenzie, 16 George St., Penshurst, 2222.
VK2BPC—P. J. Corbett, 2/33 Fifth Ave., Campsie, 2194.
VK2BQA—E. Garrett, 5 Balyata Ave., Caringbah, 2229.
VK2BQF—A. Greenberg, C/o. A. Slutzin, 295B Edgecliff Rd., Woollahra, 2025.
VK2BQG—M. Greenberg, C/o. A. Slutzin, 295B Edgecliff Rd., Woollahra, 2025.
VK2BXA—J. Linden, 513 Webb St., Lavington, 2641.
VK2ZCM—C. Mugdan, 34 Lochville St., Wahroonga, 2076.
VK2ZJD—J. Davis, 4/14 Princes H'way, West Wollongong, 2500.
VK2ZKY—J. S. Shenstone, 14 Broughton Rd., Homebush, 2140.
VK2ZQZ—S. M. Garnham, Jilliby Rd., Wyong, 2259.
VK2ZRS—R. S. Shepherd, "Wyuna," Culargambone, 2828.
VK2ZRX—W. S. Baynes, 10/42 Orpington St., Ashfield, 2131.
VK2ZSN—N. K. Showell, 25 William St., Keirville, 2500.
VK2ZUW—R. R. Alexander, 62 Pass Rd., Thirroul, 2515.
VK2ZVD—J. J. Van Dan Bogert, 32 Bilga St., Kirrawee, 2232.
VK2ZVI—R. F. Worthington, 65 River St., Cundletown, 2430.
VK2ZZN—D. G. Rowe, 57 Carlingford Rd., Epping, 2121.
VK2ZZX—R. W. Nash, 62 Haigh St., Maroubra, 2035.
VK3CR—R. J. Flanagan, 51 Valetta St., Carrum, 3197.
VK3MM—M. P. Marschall, 2 Parker St., Regent, 3072.
VK3SB—W. Yates, 1 Oswald St., Cheltenham, 3192.
VK3ZU—R. Dorin, 12 Oleander St., Glen Waverley, 3150.
VK3ADT—K. V. Brayshaw, 89 Roslyn St., Burwood, 3125.
VK3AXE—K. G. McCracken, 13 Malcolm Crt., Mt. Waverley, 3149.
VK3BAS—P. R. Dickson, 6 Murray St., Bendigo, 3550.
VK3BCB—Christian Bros. College, 385 Queensberry St., North Melbourne, 3051.
VK3BGL/R2—Geelong Amateur Radio Translator Group, Station: "Bayview," Haines Rd., Gnarwarre; Postal: 5 Kyle Ave., Belmont, 3216.
VK3CDX—J. E. Forster, 8 Bristow Ave., Forest Hills, 3131.
VK3YFI—J. E. Leitch, 34 Hill St., Box Hill South, 3128.
VK3YFR—A. E. Fraser, 28 Deakin St., Mitcham, 3132.
VK3ZGU—G. S. Cooper, 8 Norwood Crt., Bundoora, 3083.
VK4HU—F. C. Hutton, Middle Creek, via Pomona, 4568.
VK4OY—J. C. A. Young, 6 Koombala St., Tugun, 4224.
VK4QK—C. M. Cohen, 105 Waterview Ave., Wynnum, 4178.
VK4ZFS—F. V. Sharpe, 138 Adelaide St., Clayfield, 4011.
VK5QJ—J. C. Hulse, C/o. Adelaide Bible Institute, Mt. Breckan, Victor Harbor, 5211.
VK5UN/T—W. J. Emmett, C/o. McPhar Geophysics, 50 Mary St., Unley, 5061.
VK5ZFY—F. Richelme, 12/12 Howard St., Underdale, 5032.
VK5ZLH—H. L. Day, 7 Piccadilly Circuit, Colonel Light Gardens, 5041.
VK6BX—B. A. Cook, 28 Pier St., East Fremantle, 6158.
VK6JX—J. A. Large, 6 Hann Court, 46 Cape St., Osborne Park, 6017.
VK6MJ—J. K. Millband, 11 Salisbury St., Cottesloe, 6011.
VK6ZBB—W. E. Olson, Lot 8, Morrison Rd., Upper Swan, 6056.
VK7GW—G. A. W. Wood, 8 Norwood Ave., Launceston, 7250.
VK7ZGT—G. L. Thomson, 131 Westbury Rd., Launceston, 7250.

CANCELLATIONS

VK2ASR—S. N. Graves. Now VK1SR.
VK2BFD—F. A. O'Donnell. Now VK2QC.
VK2ZUO—W. G. Rayner. Now VK2WZ.
VK3AEU—R. J. Flanagan. Now VK3CR.
VK3AHS—W. Yates. Now VK3SB.
VK3AIY—R. Dorin. Now VK3ZU.
VK3AUH—R. R. Hooper. Now VK9HL.
VK3BFB—Geelong Amateur Radio Translator Group. Now VK3BGL/R2.
VK3ZQE—J. A. Evans. Not renewed.
VK4EP—P. Ellis (Rev. Bro.). Transferred to Vic.
VK4GZ—E. M. Waddle. Deceased.
VK4MS—W. R. McLaughlin. Deceased.
VK4PM—J. G. Porter. Not renewed.
VK4XI—D. D. Kinnersley. Not renewed.
VK4ZLL—L. Labruyerg. Transferred to N.S.W.
VK4ZSR—G. R. Sallaway. Not renewed.
VK4ZTC—A. J. Crane. Transferred to Vic.
VK5AN—J. W. Emmel. Not renewed.
VK5BP—1st Gawler Scout Group. Not renewed.
VK5DZ—M. J. Groth. Transferred to N.Z.
VK5JY—J. N. Combe. Not renewed.
VK5ZNR—G. J. Simmons. Not renewed.
VK5ZWR—W. R. Chapman. Transferred to N.S.W.
VK6FR—R. F. Frost. Transferred Interstate.
VK6IW—A. F. Wreford. Not renewed.
VK6TJ—A. C. Gray. Not renewed.
VK6YL—A. Clowes (Mrs.). Not renewed.
VK6ZEK—J. P. Hughes. Not renewed.
VK7JF—J. E. Forster. Now VK3CDX.
VK7ZFM—F. Richelme. Now VK5ZFY.
VK7ZGP—G. P. Power. Not renewed.
VK7ZGW—G. A. W. Wood. Now VK7GW.
VK7ZNR—A. N. Richardson. Transferred to Vic.
VK8AG—L. B. Burston. Transferred to N.S.W.
VK8DS—D. C. Skeen. Not renewed.

APRIL 1971

VK2GB—R. S. Coote, 26 Clontarf St., Seaforth, 2092.
VK2AAC—A. F. Cutting, 7/2 Andover St., Carlton, 2218.
VK2BEO—M. Greenberg, C/o. 295B, Edgecliff Rd., Woollahra, 2025.
VK2BMJ—J. H. Mowtell, 16 Ian St., Rose Bay, 2029.
VK2BTR—W. T. Rice, 17 Minerva St., Sutherland, 2232.
VK2YK—A. Greenberg, C/o. 295B, Edgecliff Rd., Woollahra, 2025.
VK2ZLY—L. Labruyere, 9E Elizabeth Bay Gardens, 15-19 Onslow Ave., Elizabeth Bay, 2011.
VK2ZRY—E. W. Reynolds, 111 Northcliff Dr., Lake Heights, 2502.
VK2ZTU—K. M. Tuck, 318 Vallombrose St., Albury, 2640.
VK2ZWZ—W. R. Chapman, 167 Gypsum St., Broken Hill, 2880.
VK3AHH—R. F. Frost, 40 Tudor St., South Oakleigh, 3167.
VK3AUY—S. A. Sibly, 17 Luck St., Eltham, 3095.
VK3BAU—B. A. Austin, R.A.A.F. Base, Laverton, 3027.
VK3BBU—P. B. Parry, 12 Milverton St., Moonee Ponds, 3039.
VK3BDJ—D. J. Bainbridge, 23 Locke St., Essendon, 3040.
VK3BFG—P. J. Cossins, 14 Coleman Rd., Wantirna South, 3152.
VK3BFH—R. L. Lemke, 5 Echuca St., Bendigo, 3550.
VK3BFI—P. Ellis (Rev. Bro.), St. Patrick's College, Ballarat, 3350.
VK3BJB—J. E. Beevers (Mrs.), 11th St., Mildura West, 3500.
VK3YFK—D. P. Ramsey, 19/43 Caroline St., South Yarra, 3141.
VK3YFM—C. J. Heath, Tower Motors, Morrissey St., Merrigum, 3618.
VK3YFN—C. A. Milhuisen, 34 Brinsley Rd., Camberwell, 3124.
VK3YFO—W. D. Miles, 255 Burwood H'way, East Burwood, 3151.
VK3YFP—J. F. Topp, 29 Clifton St., Richmond, 3121.
VK3ZGG—C. H. Robertson, 105 The Boulevarde, Thomastown, 3074.
VK3ZLO—R. W. Davis, 69 Jubilee St., Mt. Waverley, 3149.
VK3ZYL—R. A. Piner, 13 Sheales St., Dandenong, 3175.
VK4NX—H. M. Bone, 65 Rosemont Ave., Moana Park, Surfers Paradise, 4217.
VK4UM—R. S. Morton, 17 Crown St., Toowoomba, 4350.
VK4XQ—H. N. Starr, 101 Stanhill Dr., Chevron Island, Surfers Paradise, 4217.
VK4ZHT—V. Husin, 3 Elmfield St., Upper Mt. Gravatt, 4122.
VK4ZNH—N. H. Eberhardt, 75 Figtree Pocket Rd., Chappel Hill, 4069.
VK4ZNR—R. N. Boland, 44 Birch St., Cairns, 4870.
VK5DA—D. G. Aslin, 65 Wehl St., North Mt. Gambier, 5290.
VK5PJ—Port Augusta Youth Radio Club, P.O. Box 15, Port Augusta, 5700.
VK5PV—J. J. Roos, Flat 218, Block 2-B, Wirruna St., Woomera, 5720.
VK5QA—F. T. Wilson, 3/22 Airport Rd., Brooklyn Park, 5032.
VK5UH—R. E. Lewis, Flat 257, Block 2-E, Carinya St., Woomera, 5720.
VK5UO—D. E. Wikstrom, Weapons Research Establishment, Mess Club, Woomera, 5720.
VK6HU—P. V. Hughes, 58 Preston St., Como, 6152.
VK6HV—H. K. F. Vun, 30 York St., Tuart Hill, 6060.
VK6II—29 DX Club of W.A., C/o. Hon. Sec., 12 Munyard Way, Morley, 6062.
VK6JZ—J. Garratt, C/o. 67 Hennessy Ave., Orelia, 6167.
VK6OD—D. E. Pfranger, 23 Kennedy St., Exmouth, 6707.
VK6OZ—A. R. Vanston, Lot 2, Ivanhoe St., Morley, 6062.
VK6PS—Perth Modern Senior School Radio Club, Roberts Rd., Subiaco, 6008.
VK6SU—L. R. Glatt, Station: U.S. Navacom Stn., Exmouth; Postal: P.O. Box 20, Exmouth, 6707.
VK6WO—R. T. R. Norcross, 33 Caladenia Way, Koongamia, 6056.
VK6ZBT—C. J. Duddington, Station: White Rd., Narrogin; Postal: P.O. Box 151, Narrogin, 6312.
VK6ZEF—R. J. Wynn, 58 Clayton St., East Fremantle, 6158.
VK6ZKL—R. P. Lockley, 96 Waddell Rd., Bicton, 6157.
VK7GN—D. A. J. Menzies, 332 West Tamar Rd., Riverside, 7250.
VK8GY/T—G. L. Tillett, 1/6 Hong St., Alice Springs, 5750.
VK8SS—S. A. Stephens, 55 Carruthers Cres., Alice Springs, 5750.
VK9AZ—Posts and Telegraphs Training College Radio Club, Racecourse Rd., Boroko, P.
VK9JM—J. R. Meehan, Montport Mission, Kiung, W.P., T.P.N.G.

CANCELLATIONS

VK2OZ—A. R. Vanston. Now VK6OZ.
VK2RW—R. W. M. Cusiter. Deceased.
VK2ASY—D. K. W. Bradbury. Transferred to Vic.
VK2BQF—A. Greenberg. Now VK2BYK.
VK2BQG—M. Greenberg. Now VK2BEO.
VK2ZWP—W. T. Rice. Now VK2BTR.
VK3CN—L. C. Walters. Not renewed.
VK3XX—C. W. Jamieson. Not renewed.
VK3AFE—B. F. Huggard. Transferred to N.Z.
VK3BAW—E. A. Williams. Not renewed.
VK3BCD—E. G. Egan. Not renewed.
VK3BCR—H. G. Austin. Not renewed.
VK3YEK—J. E. Beevers (Mrs.). Now VK3BJB.
VK3ZRX—D. M. Bennett. Not renewed.
VK3ZVT—D. S. Thomas. Transferred to A.C.T.
VK4FM—F. P. Moody. Not renewed.
VK4FW—L. R. Woolley. Deceased.
VK4ZBQ—C. P. O'Brien. Not renewed.
VK4ZMS—R. S. Morton. Now VK4UM.
VK4ZWD—W. D. Metcalfe. Not renewed.
VK5GY—T. P. Gardner. Not renewed.
VK5SI—W. O. B. Wilson. Transferred to A.C.T.
VK5ZEQ—R. G. Gully. Not renewed.
VK5ZER—D. G. Aslin. Now VK5DA.
VK6KV—D. T. Lysle. Not renewed.
VK6TG—E. G. Gabriel. Not renewed.
VK6ZGI—Perth Modern Senior High School Radio Club. Now VK6PS.
VK7RO—R. E. Rogers. Not renewed.
VK8ZGY—G. L. Tillett. Now VK8GY.
VK8ZSS—S. A. Stephens. Now VK8SS.
VK9AQ—N. A. Miller. Returned to mainland.

R.D. CONTEST

14th and 15th AUGUST, 1971

ALL SET TO GO?

Opening address by Air Marshal Sir Richard Williams, K.B.E., C.B., D.S.O., R.A.A.F. (Retd.)

Overseas Magazine Review

This is different but it uses material supplied by VK3ASC and VK7RG.
Any comments? See end for key.

ANTENNAE: Simple vertical arrays (6); plain facts for tyro and beginner (also feeders and trans-matches) (6); wet string falacy (7); 160 mx centre-loaded whip (17); compact verticals (16); portable (4); Kirk helicoidal beams (11); G4ZU single boom (10); 2 mx parallel fed vertical collinear (9); microwave paraboloids (3).

MASTS: A-frame (4); 10 extra feet on the tower (13).

ROTATORS: Simple (perhaps too simple) (1); delayed action braking (6).

CHANGE-OVER APPL.: Sol. state switch (8).

TRANSMITTERS: Beginners' 1-valve high power (7); transistor 12w. for 10 mx (12); solid state 10 mx d.s.b. (13); power level comparisons (15); p.c.b. ATK-2 modulator (18); lazy man's v.f.o. for 2 mx (11); stability without xtals with solid state module (12); "rubber" xtals (18); digital proportional radio control (10); advanced pre-amp. compressor clipper (13); power FETs (15); tripler 70 cm. (17); tripler to 23 cm. (18); 160 mx s.s.b. transverter from 40 mx (18).

RECEIVERS: Latest techniques in new design "plagiarise and hybridise" (2 to 5); direct conversion heterodyne (8); freq. counter (6); xtal calibrator (13); Drake 2B mod. for 160 mx (17); R1155 modernising (18); AR88 S meter (3, 5); SB303 review (10); r.t.t.y. converter (6); re-vamping old rx (11); xtal WWV for Swan Cygnet (9); FET for a.m. b.c. rx (6); noise blankers (9, 12); solid state preselectors (12); FET dual gate pre-amp. for 2 mx (13).

TRANSCEIVERS: One-tube cheap 2 mx (13); ZL2BDB tribanders (8); 2 mx f.m. (12); SIC for s.s.b. and a.m. (5); HW100 mods. (1); H23 handi-talkie mods. (12); FT200 review (11); Drake TR3 break-in c.w. mod. (11).

AMPLIFIERS: Switching remote linears (12); low power design concepts (13); high power for 80-10 mx (15); higher power tripler for 70 cm. (2); 500w. 2 mx pentode linear (9); grounded grid pair 813s (3); using SL610/12 r.f. (1); ensuring transistor stability (1).

REPEATERS: (12 to 15).

KEYERS: IC (8, 17); touch-coder one-letter memory (6).

POWER SUPPLIES: Auto current overload protection (8); solid state protective devices (10); SCR regulated (19); dual input design (8).

TEST EQUIP.: All sorter tester (3); simple r.f. wattmeter (7); simple freq. std. (4); noise generator (2); f.m. low cost vxo signal source (12); meter evaluator (12); simple s.w.r. device (18); r.f. magnetometer and f.s. meter (10, 11).

F.M.: Newcomer tips (10); advantages (12); U.S.A. stds. (12); transceiver directory (13); simple circuit (18); simple varactor modulator (12); n.b. 455 KHz. discriminator (1).

MOBILE: Camper installation (10).

INTERFERENCE: Recognising f.m. intruder signals (6); t.v. (15).

T.V.: Slow scan techniques (1).

PROPAGATION: Tropospheric 2 mx study (18).

SATELLITES: Reception (2, 16, 17).

MICROWAVES: (1 to 5, 12, 18).

COMPONENTS: Variable capacitor do's and don'ts (2); compact band-pass filter for 2 mx (5); low-pass filter for F.D. (8); tuning diodes (9); v.h.f./u.h.f. practical coil winding date (15); ferrite inductors (15); DIY "computer" (19); f.m. net alert bell (11).

OTHER: Blind operators' aid (11); graphs of power, volts, impedance (15); FET symbols (19); cheap 24-hr. digital clock (3); dry cells re-charger (looks interesting) (5).

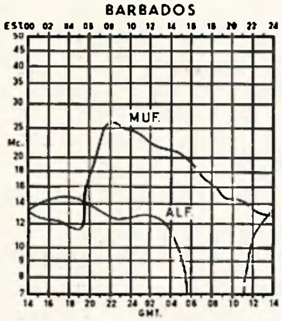
KEY (all are 1971)

"Radio Communications": Feb. (1), Mar. (2), Apr. (3), May (4), June (5).
"QST": May (6).
"Break-In": Apr. (7), May (8).
"CQ": Mar. (9), Apr. (10), May (11).
"73": Apr. (12), May (13).
"Ham Radio": Mar. (14), Apr. (15).
"Short Wave Mag.": Feb. (16), Mar. (17), Apr. (18).
"Aust. E.E.B.": Mar.-Apr. (19).

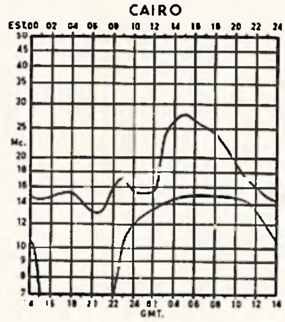
PREDICTION CHARTS FOR AUGUST 1971

(Prediction Charts by courtesy of Ionospheric Prediction Service)

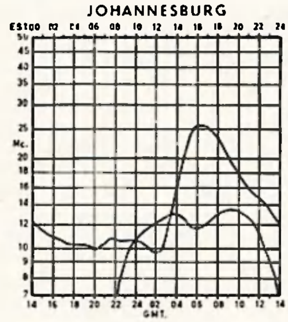
BARBADOS



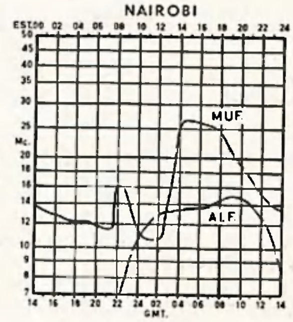
CAIRO



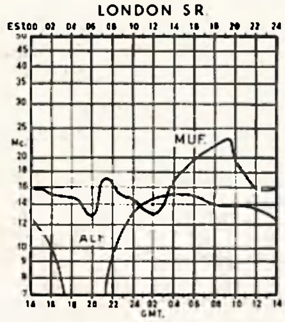
JOHANNESBURG



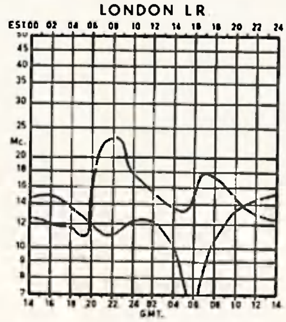
NAIROBI



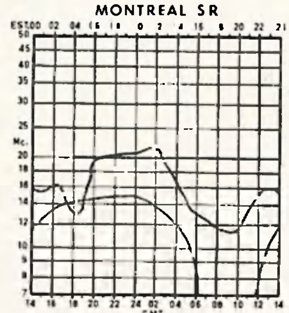
LONDON SR



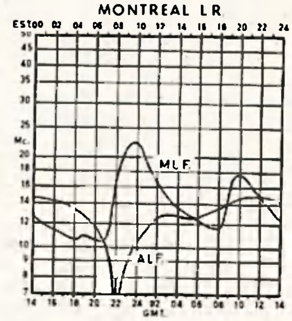
LONDON LR



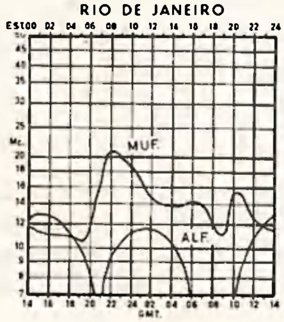
MONTREAL SR



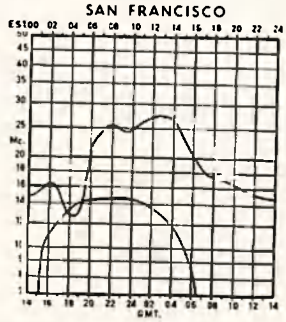
MONTREAL LR



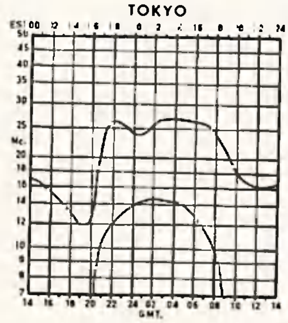
RIO DE JANEIRO



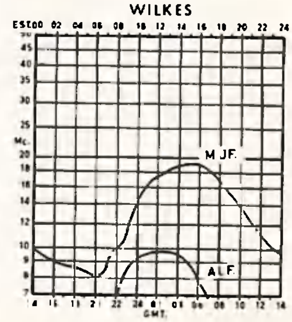
SAN FRANCISCO



TOKYO



WILKES



OBSERVATION POST

By H. F. Evertick

We seem to have very little exchange of news about visiting Amateurs to our shores. Is this symptomatic of something? Extremely knowledgable and interesting recent visitors who come to mind are WA6FSC (VR5DK, ZL1ATC, 3B9DK), ZL2AMJ, VP9DC, G3UJB, G2FUX, CE6DR, SM5DEQ, VU2JD, VU2OV and K2IXP.

Perhaps, of greater interest to the reader than those who have been here are those who will be visiting Australia. There is, then, a fair chance that we can welcome our visitors with a measure of hospitality, twist their arms to give a group talk perhaps and generally to exchange a yarn or two. Is there a feeling that news of visits must be jealously guarded?—"He is my friend, I will not share his company with any Tom, Dick or Harry"; "I alone will take pleasure in sharing his pleasure of new scenes and fresh faces". Or is it perhaps apathy? "I have my own group of friends, to heck with strangers." "Too busy." Shy? Afraid of him patting your pocket-book perhaps?

Most of us were brought up in the true Amateur spirit. Is there any real difference between talking to "Bob" over the air and an "eye ball" when he is a visitor? If you visit Timbucto or Athens, would you like to meet the local Amateurs in a friendly way?

Would we, therefore, like to have news of visitors who plan to be with us for a brief moment in time? As a starter, a panel is appended. Why not write in when you know about visitors shortly to arrive. Many of us can then join in with a welcome of some kind—be it ever so humble.

Although the Amateurs' interests seem limitless, many of the DX fraternity speak in glowing terms of our wonderful country. No better tourist ambassadors could be found anywhere.. In this way they take pleasure in persuading overseas Amateurs to visit Australia or even local Amateurs to visit places they would otherwise bypass. Very excellent contacts are made, good friends are acquired and the talk even encompasses such things as the unique quality of the red and black soils of the Downs.

Some people have asked if we can and should do more. For example, sending to ships and radio officers aboard ship a printed note of how to contact a local Amateur or local groups for the benefit of the travelling Amateur. Most of these would welcome a few hours ashore next to a rig in congenial company or even some advice on what sight-seeing should be done. Most of them would jump at the idea of a contact "back home". Is there a need for a visitors' column? Write to the Editor and we shall soon see.

VISITING AUSTRALIA

9J2HE—During September
M.V. "Canberra"
Perth, eastwards.

GOLDEN JUBILEE

Congratulations! and Many More Happy Days to VK4DO for 50 Years in Amateur Radio

Hal Hebler, North Rockhampton, built his first crystal set in 1921 and has progressed from a 1923 10-watt 240 metre R/T rig made out of completely home-made components (except the valves) using a coupled Hartley oscillator and loop (absorption) modulation right through to the present day s.s.b. gear with home-brew power supplies.

The receivers included a "lo-loss" 2-valve model with a quarter inch plate glass panel, the holes of which had to be drilled with rat-tail files.

Antennae in use are a 2 el. quad for 14 MHz., a dipole for 7 MHz. and a 3 el. yagi on 53 MHz. which, with a converted ex taxiphone, is used for JA contacts when openings occur.

Hal considers the W.A.Z. certificate the highest award in Amateur Radio —he has three: c.w., a.m. and s.s.b.

In 1926 he made two-way contacts with the U.S.A. using 140v. on a 201A rx tube and was heard in ZL on phone. W.A.C. in 1936 was made in 50 minutes with 48 watts and on phone in 1948 in 28 minutes.

The holder of numerous Awards—going back to 1924—Hal is active in the R.D. and VK-ZL contests. His most difficult things to do in Amateur Radio? To copy a 500-word c.w. Trans-Pacific Test message in 1926 and to get QSL cards from Zone 23 before the JTs went there.

☆

FEDERAL CONTEST COMMITTEE

For the past six years the Federal Contest Committee has been located in Perth, Western Australia under the leadership of the Federal Contest Manager, Neil Penfold, VK6ZDK. Neil and his group have done an excellent job as members will know, but the time has come for a change.

At the last Federal Convention the Queensland Division volunteered to take over the administration of our Contests and the VK4 Federal Councillor has now advised that his Division has appointed Peter Brown, VK4PJ, as the new Federal Contest Manager. Peter's address becomes—

FEDERAL CONTEST MANAGER,
G.P.O. BOX 638,
BRISBANE, QLD., 4001,

and logs for all local Contests will go to G.P.O. Box 638 for the next three years at least. However, VK6ZDK will, for the present, remain administrator for the VK/ZL Contest and consequently contestants should look carefully at the rules to determine the correct address for their Contest logs.

Correspondence

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers.

NOVICE LICENCE

Editor "A.R.," Dear Sir,

In the letter in July "A.R." from VK3RN, he makes a brief reference to frequency allocations proposed by the committee pressing for the introduction of Novice licensing. The reference is on page 127, para j.

I would like to go much further than talking about 160 metres and amplify the remarks he makes on 160 metres to the other h.f. bands. To my mind, there has been complete "Novice" thinking by the committee, especially as they have been so keen to use U.S. Amateur Radio as examples.

The recommendation of the allocation of the lower end of all h.f. bands is ludicrous, and surely is used to try and get the experienced DXers jammed into a small portion of the DX bands. If the committee say this is not so, let me make two points to show the impracticability of the proposal.

(a) On 3.5 MHz. for example, the Novice has 3505 to 3525 KHz., leaving the experienced DXer 3500-3505 only, if the regulations give the Novice that spectrum. The DXer will, of course, not be confined to that 5 KHz., and because he will have high class receiving equipment, unless very local, the Novice will not cause him much trouble. On the opposite side, the Novice will probably have only a simple receiver, incapable of handling the amount of interference received from the DXer chasing his 5-band DXCC, or working his regular "skeds". The result: he closes down.

(b) The present licensing procedure in the U.S. precludes thousands of Amateurs in the States from operating below 25 KHz. on any of the bands 3.5 to 28 MHz. Therefore Australian Amateurs, and of course, all other countries, will regularly be operating above the first 25 KHz. of any of the above bands and, accordingly, force the Novice, solely because of lack of experience and operating ability to close down. How much would he copy through a station operating at 25 w.p.m. or even higher.

In my discussion with Rex Black on Novice licensing, at no time did he mention the frequency spectrum proposed for them, otherwise I would have pointed out the futility of proceeding with the idea that has emerged.

It amazes me to think that instead of encouragement to get on the bands, a proposal is made that will do nothing but discourage them to get on the h.f. bands, and as a result make for discontent.

—F. T. Hine, VK2QL.

• • •

Editor "A.R.," Dear Sir,

I have been following the discussions about Novice licences with interest and wish to place on record that I favour the introduction of this type of licence. Having read in another radio magazine about the general types of conditions which might be considered. I can see such a Novice licence as a useful aid in the instruction which I provide to a local Y.R.C.S. Group.

First, I think that my holding a Novice licence as the Group Leader would add some prestige to my training efforts. Second, I can look forward to some of my class progressing to the Novice standard and joining with me in regular "skeds" and so gaining experience under my supervision before being let loose to contact other Novices and other Amateur operators. Third, I feel that lads who have had Novice training will turn out better Morse operators than those who just gain the A.O.C.P. under present licensing and examination conditions. Fourth, I can see the advantage of a Novice licence as a way for older people to enter the Amateur Radio hobby. Fifth, I think that the local adult radio club would benefit by increasing its membership if it contained a group of Novice operators as well as the present A.O.C.P., Limited (Z call), and S.w.l. members.

—Gordon Procter,
Y.R.C.S. Group Leader, Gosford.

• • •

Following is a precis of a letter from Mr. Karol Nod, ex OK3UH, of Sydney:

I agree that pros and cons must be considered, so far we have only heard the arguments for it.

We are a very slow and unprogressive people in this matter. It seems that the top operators are afraid of Novice licensing—for what reason? If the Novice operator causes QRM or interference to yourself, please teach him better ways.

Those of us who hope to see Novice licensing in the Amateur Service would like it to apply to the young and the old, and thus reviving c.w. net activities. Novices will surely bring a new breed of operators back into the c.w. parts of the bands who would stay with the mode.

Having read VK3RN's article there is no problem about the disposal of the equipment in the Novice's possession after the year end—it would be sold, dismantled or used in VK-QRP contests. A Novice licence will not bring additional people into the Amateur fraternity.

Finally, I think the full licensee must show more friendliness to the beginner by wise counsel and advice in the true Amateur spirit. The air should not be used by some for their own amusement at the expense of others' pleasure.

SPX BULLETINS

The SPX Bulletins are issued bi-weekly by the IUWDS World Warning Agency for Satellites at the World Date Centre A for Rockets and Satellites, Code 601, Goddard Space Flight Centre, Greenbelt, Maryland, 20771, U.S.A., and are distributed regularly to the COSPAR National Spacewarn contacts for satellite information and to Satellite Warning Centres for their further distribution to interested institutions in their countries or regions.

Paragraphs A and B of these Bulletins are not being reproduced as they would duplicate the list given in Section 1 of the Survey of Satellites and Space Probes. Paragraph C hereunder contains information not previously published in the Bulletin. This information is being included regularly in each issue of the Bulletin.

"C"—SPACECRAFT PARTICULARLY SUITED FOR INTERNATIONAL PARTICIPATION (Category I)

1. **Spacecraft with essentially continuous radio beacons on frequencies less than 100 MHz., or higher frequencies if especially suited for ionospheric or geodetic studies** (* denotes new information).

Designation National Name	Frequency (MHz.)	Reference in COSPAR Info. Bulletins
1965-032A Explorer 27	Feb. 14, 1970: 20, 40, 41 (250 milliwatts); also 360 (100 milliwatts); also 162 and 324	
*1966-110A ATS 1	Oct. 11, 1970: 0000 UT at 148.885°W, 1.351°N, drifting 0.015°/day. Inclination 2.846°; 136.47; 137.35 (2 watts)	37, p. 35
*1967-111A ATS 3	Oct. 11, 1970: 0000 UT at 63.544°W, 0.820°S, drifting 0.014°/day. Inclination 1.117	44, p. 68
1968-002A Explorer 36 (GEOS-B)	162, 324, 972 (300, 400 and 500 milliwatts)	49, p. 41
1968-069A ESSA 7	136.77 at 250 milliwatts	46, p. 42
1968-084A Aurorae	136.170 at 0.2 watt	47, p. 32
1968-100B TTS 2	136.86 at 100 milliwatts	48, p. 37
1968-110A OAO 2	136.441 at 160 milliwatts	48, p. 38
1968-114A ESSA 8	136.770 at 250 milliwatts	48, p. 39

2. **Satellites which provide telemetered information on a continuing basis** (* denotes new information).

Designation National Name	Freq. (MHz.)	Details	Reference in COSPAR Info. Bulletins
*1966-016A ESSA 2	137.50	Deactivated Oct. 10, 1970	35, p. 43
1968-017A Explorer 37	136.521 137.590 (150 mW.)	(x-rays) spin rate is 55-60 rev. min., aspect angle is controlled between plus or minus 5°	46, p. 35
*1968-114A ESSA 8	137.620	APT-8-picture sequence starting at 58°N descending, providing coverage on entire sunlit portion of earth	48, p. 39
*1969-037A Nimbus 3	136.95	APT has been programmed off due to spacecraft attitude problems	50, p. 55
1970-008A ITOS 1	136.77 137.5	Tracking beacon (250 mW.) APT (5 watts). Up to an 11-picture sequence starting at 59°S ascending, providing coverage over the sunlit portion of the earth. An APT station can receive up to four pictures in a single pass	53, p. 39
*1970-025A Nimbus 4	136.95	APT (5 watts). Remains off due to power conflicts with other experiments on board	54, p. 28

3. **Optical objects used for geophysical studies.** (Also suitable for air density studies.) Additional research interest is indicated by † for gravitational field, and § for rotational speed of atmosphere.

		Priority			Priority
†1961-001A	NNN	3	§†1967-042A	Ariel 3	3
1963-030D	NNN	6	†1968-090A	Cosmos 248	3
†1964-053A	Cosmos 44	5	§1969-108A	Cosmos 316	1
§†1966-044A	Explorer 32	8	§1970-043B	Cosmos 347	2
1966-056A	PAGEOS 1	6			

4. **Satellites useful for simultaneous observation programmes with small cameras.**

		Incl.	Per. (km.)	Ap. (km.)	Magn.	Remarks
1963-049A	NNN	90	1070	1090	Plus 5	
1964-001A	NNN	70	820	930	Plus 5	cylinder, 8 x 1.5 m.
1964-053A	Cosmos	65	600	860	Plus 4	cylinder shape
1965-070F	Cosmos	56	1360	1510	Plus 5	rocket body
1965-073F	Cosmos	56	1380	1690	Plus 5	rocket body
1966-056A	PAGEOS 1	85	2640	5710	Plus 2	

(With acknowledgment to COSPAR Bulletin, Dec. 1970)

DX

By H. F. EVERTICK
C/o. P.O. Box 36, East Melbourne, Vic., 3002
(Times are in G.M.T.)

A plea for help. An answering call. But yours truly tackles this column this month without much aid from anyone at the time of going to press. Perhaps everyone is DX-ing on the square-eyed monster!

During June there were enough DX-peditions to satisfy most of the avid DX hunters and July seems no exception either. VK9NP portable Willis Island by Larry Pace and his merry men as set out in July "A.R." QSLs to K3RLY. Unfortunately sea conditions had deteriorated so much that the Mellish Reef trip did not eventuate. Operations from Willis were on all bands and the operating was first class.

Darleen WA6FSC, etc., passed through Melbourne and Perth early in June on her way to Mauritius where she was active as 3B8DK for a short spell before embarking for Rodriguez Island where she activated 3B9DK from the last week in the month. Troubles developed with the 15 mx part of the rig and the signals on 20 mx suffered for a time until the antenna was hoisted more into the air. She is due to leave Rodriguez late in July to continue her safari to 5Z4, 5X5 and the like. At the time of writing, a 5Z4 call seems possible, but the 5X5 might be a little doubtful although in the last few months licensing there has been restored. QSLs to VE6AKV.

Mention of 5X5 reminds me that 5X5NA is active from there. Uganda has become a rarity lately since the days of the VQ5s and even 5Z4 (previously VQ4) and 5H3 (ex VQ3) are now almost as rare as the former French Colonies in Africa. From that area 7Q7AA is heard spasmodically on 20, very infrequent 9J2s, seldom any 9U5s and 9X5s, the occasional 9Q5 but several CR6s, CR7s and ZEs.

Early in July the avid DXers had the pleasure (sic) of chasing Martin as 3C1EG on the Island of Fernando Poo in the Gulf of Guinea. Other areas activated by him were to be Equatorial Guinea and the Island of Annobon (possibly as 3C0ON).

Nearer home you will see elsewhere some notes on Indonesia. The addresses of some of the local representatives of O.R.A.R.I. are given as—

YB2AB—R. Imam Purwito, Djl. Argopuro No. 4, Samarang.
YB4GA—Johannes Titaley, Gg. Sumatara No. B-5, Palembang.
YB6JA—Dr. Soegito, Djl. Ampera No. 2, Kampus Universitas Sumut, Medan.
YC3BT—Aryanto, Djl. Indragiri No. 52, Surabaia.
YD5AI—Armeyn Ch., Djl. Pasar Raya No. 57, Padang.

Others shown on the lists were YB1s AG, AK, BH; YB2s AJ, AR; YB3DD, YB4GA, YB-8SC, YB9UA and YB0s AE, AC, AT, BY and CJ. The lists were sent on by VK2AOK, for which many thanks. It is noted that expatriat's calls do not appear to have been listed.

An examination of the sunpot predictions shows that conditions on 10 mx will become extremely spasmodic, 15 mx will probably be open most of the time during daylight hours, 20 mx should be open during the day, sometimes at night, and deep dips to fade-out around sunset and sunrise, 40 mx average during the day but opening by darkness—if you can find the holes between the **Intruders**. 80 mx for locals during the day but opening well to all VK and ZL areas and beyond by night, and finally 160 mx opening at night. Several VKs worked through to KL7CL on 160 mx c.w.

Ample DX is still available. On 80 we miss out on the DX which congregates around 3790 KHz. On 40 5H3LV and a G or two came through well. On 15, Ws and JAs are still plentiful with 3B8CZ still consistent. On 20, there is ample DX for all and among the less frequent calls heard were (s.s.b.) EA8FF (Box 660, Las Palmas), CN8CG, EA9EJ (list by CR6FA), FK8AC, FO8DS, JD1ABO on Marcus Is. (QSL JA1BA), KS6DT (Dept. of Education, Pago Pago, Am. Samoa, 96920), KX6NR, PY0 DX-pedition to Trinade Is. not yet heard, VP-1AJ, VP2VI, ZD5F, ZL4OL/A on Campbell Is. (QSL ZL2GX) often on 80 mx, ZM7AG (QSL K3RLY), YJ8BJ (Bill, the Australian), YJ8BL (QSL W6NJU), 5Z4KL, 8P6AZ, 9G1FF, 9H1BX, 9M8SPD Mary (QSL Box 795 Kuching, Sarawak), 9N1MM (QSL K3WVQ), 9Y4VV.

QSL cards are now under circulation from the operation of VK0KB.

For PX hunters July should bring two new ones in KC2GMF, Great Mammoth Fair, Box 111, Freehold, N.J. 07728, and KC0KC, Box 753, Shawnee Mission, Kansas 66201.

A letter received from Mac VK9NI on Norfolk Is., takes issue with June "A.R." being incorrect. He says there are three, not one, of the Amateur fraternity resident on the Island and it is a Radio Amateur's paradise; anyone using the bands when open can expect a pile-up. The other two are of course VK9JA and VK9RII. Incidentally, VK3JF worked from Norfolk Is. from 23rd May to 6th June and greatly enjoyed his visit. I gather he worked s.s.b. and c.w., obtaining W.A.C. on both and experiencing very courteous pile-ups on c.w. He also said that a VK3 reckoned VK9 Norfolk Is. was not DX! John used a 14AVQ and reckons 4/5 weeks delay must be allowed for the issue of the licence.

For S.w.l's comes a note that the EDP system will introduce a change in the S.w.l. number by the addition of a 0 between the State numeral and the existing three numeral personal number: Thus SWL-L7777 will become SWL-L70777. This assumes that the EDP system has been fed with the correct number. So there could be some changes in the numbers which, I am told, the EDP processing boys wish to avoid particularly where S.w.l's have had cards printed.

Are you anti-list, pro-list or don't care? It seems there are demonstrators against everything if the performance on the afternoon of 10th June is any criterion. This probably resulted in ZK1MA going QRT, much to the chagrin of an enormous pile-up of Ws awaiting their turn to be called in by K6UFT as MC. The demonstrator, a VK2, did not work ZK1MA then either. He was too busy calling to hear the Ws having a quick conference agreeing to let him in. Most DX chasers deplore any kind of financial list and any rare DX station working to such a list would soon be in dire trouble. Most listeners who had heard the enormous pile up on ZK1MA's fixed frequency would not have fallen into the error of believing that was any financial listing —far from it. The old story of too many chasing too few.

If a rare DX spot is activated it would take it a year every minute of every day at 10 contacts per minute to work the other half million licensed Amateurs in the world. To work every licensed VK station it would take nearly three days without a break at the "leisurely" rate of 100 QSOs per hour! Fortunately, not every Amateur is active, not everyone chases DX and not all are on the h.f. bands, but even so, the phenomenal pile-ups which occur for a rare one must be heard to be believed.

The good operator of the rare station works off his own frequency (much to the annoyance of the transceiver mob) and proceeds to peel off the layers with a professional touch. He wastes no time listening to stations busily calling out his own call sign. If you are in there he assumes you are after him. He likes the quick clear call, your own call sign, just once. This saves time and QRM. To be called in by him and then start telling him about your rig, name, antenna and general rag-chewing aggravate all the other hopefuls in the queue.

Come along now. How about some news? What about c.w.? What about r.t.t.y.? What has happened to our old faithfuls?

★

FEDERAL AWARDS

COOK BI-CENTENARY AWARD

The following additional stations have qualified for the Award:

Cert. No.	Call	Cert. No.	Call
1356	W9RCJ	1360	W6BDI
1357	WB2JGO	1361	AX2AXL
1358	WB2IEC	1362	PA0KGS/W2
1359	AX3TE	1363	AX3YQ

V.h.f./U.h.f. Section

Cert. No.	Call
28	AX4ZAM

W.I.A. V.H.F.C.C.

New Member:

Cert. No.	Call	Confirmations 52 MHz.	144 MHz.
80	VK4ZIM	594	—

W.I.A. 52 MHz. W.A.S. AWARD

New Member:

Cert. No.	Call	Additional Countries
95	VK5ZKW	1

VHF

Sub-Editor: ERIC JAMIESON, VK5LP
Forreston, South Australia, 5233.
Closing date for copy 30th of month.
All Times in E.S.T.

AMATEUR BAND BEACONS

VK0	53.544	VK0GR	Antarctica.
VK3	144.700	VK3VE	Vermont.
VK4	144.390	VK4VV	107m. W. of Brisbane.
VK5	53.000	VK5VF	Mt. Lofty.
	144.800	VK5VF	Mt. Lofty.
VK6	52.006	VK6VF	Tuart Hill.
	52.900	VK6TS	Carnarvon.
	144.500	VK6VE	Mt. Barker.
	145.010	VK6VF	Tuart Hill.
	435.000	VK6VF	(on by arrangement).
VK7	144.900	VK7VF	Devonport.
VK9	144.600	VK9XI	Christmas Island.
ZL2	145.200	ZL2VHF	Wellington.
ZL3	145.000	ZL3VHF	Christchurch.
JA	51.995	JA1IGY	Japan.
W	50.091	WB6KAP	U.S.A.
HL	50.100	HL9WI	South Korea.
ZK	50.100	ZK1AA	Cook Island.
KH6	50.101	KH6EQI	Hawaii.
	50.015	KH6ERU	Hawaii.

No notified changes to beacon list this month although it would appear from a report in the Geelong Amateur Radio Television Club Newsletter that Phil VK0PH (ex VK3FF) is running a beacon on a 24-hour basis on 53.440 MHz. with the keyed c.w. call sign of VK0PH. Phil listens daily on 6 metres between 1900 and 2000 hours.

These notes are being prepared whilst on holidays in Alice Springs in VK8. They may therefore of necessity be incomplete and any correspondence arriving at the end of the month would be excluded from this issue. The weather is great, warm sunny days and cool nights. So far have not tracked down any v.h.f. activity here, but may be able to do so before I leave. At the last minute I decided against taking v.h.f. equipment with me owing to the weight and bulk of the gear required. When one considers the equipment needed would include complete 6 and 2 metre tx's and associated power supplies, converters, rx and at the least two yagi antennas of reasonable size, masts, etc., and these to be transported over 800 miles of generally rough unsealed roads, the task assumes some magnitude, and at this time of the year the chances of any contacts whatever are so remote on either band that it takes the bloom off the whole operation. Therefore I have contented myself with bringing a small compact 40 mx rig lent by John VK5JQ and which has provided some d.s.b. contacts over distances of 1,000 miles from about 10 watts.

METEOR SCATTER

Rod VK2ZQJ sent a further brief note to advise having successfully worked VK4RO on s.s.b. by M/S on 10th June. This came as Rod's reward for diligently sticking to a sked with David VK8AU in Tennant Creek which did not bear fruit. While on the subject of M/S, in a very round-about way from Rob VK3AOT comes news that Wally VK5ZWW has added another State to his score for M/S by working George VK3ASV during June. Congrats, Wally, but what about some notes of your general activity in this direction please.

From the pen of Bob VK3AOT, my most earnest scribe from VK3, comes advice that the first VK3 field day for the coming season will be held to correspond with the VK5 v.h.f. field day on 25th and 26th September. This is welcome news as it may help with general activity. (Incidentally, it is rumoured that the successful winning team of the past three VK5 field days—Bob VK5ZDX and Wally VK5ZWW—are this year splitting up and will be entering as respective contestants; wonder if they will each be using the same site? Bob has indicated that during every field day to be held this year in VK3 he will be operating on 144, 432 and 576 MHz. from Mt. Buangor, near Ararat, with special emphasis on getting through to Tony VK5ZDY on 576, thus taking the 576 MHz. record from John VK5QZ.

Melbourne Channel 1 repeater on f.m. has been shifted from Carlton to Dunn's Hill, near Mt. Dandenong. The service area is now expected to be about 100 miles with the possibility of some enhancement from tropospheric effects. The new site has also improved the coverage of the Melbourne area.

George VK3ASV in Morwell continues to be up at the front in v.h.f. activity and has now successfully transmitted and received Amateur TV to Brian VK3BBB in Traralgon. Peter VK3TR and David VK3ABC, both of Sale, are building a.t.v. gear, while Dave VK3YEC has an excellent closed circuit a.t.v. set-up working, and is currently developing a 432 MHz. tx-rx set-up for a.t.v.

Bob further advises increased activity in Mildura where there are now at least seven stations operating on six metres. This is good news as their activity during band openings in the DX season will give an indication of the shortening of skip conditions, indicative of a rise in the MUF and signifying the possibility of useful 2 mx contacts. Other 6 mx activity of interest includes contact between Kerry VK5SU at Ceduna and VK6ZCM in Perth on 12th June. Leigh VK6WA continues to operate nightly on 52.156 at 1900 and beaming east.

David VK8AU in Tennant Creek sends a letter advising having worked JA0JEC and JR1NP on 12th May. His DX log for May and June should be of interest:

15/5—0630—VK8KK on forward scatter.
16/6—1715—JR1MUZ F2.
22/5—0600—VK8KK forward scatter & M/S.
5/6—0600—VK5ZWW M/S.
0630—VK8KK F/S and M/S.
6/6—0700—VK8KK F/S and M/S.
8/6—0630—VK4RO M/S.
0700—VK5ZWW M/S.
0715—VK5DX M/S.
9/6—0630—VK4RO M/S.
0700—VK5ZDX M/S.
9/6—1830—VK9ZAP Sporadic E.
2055—VK5ZDX M/S.
10/6—0700—VK5ZDX M/S.
11/5—0700—VK5ZDX M/S.

David goes on to say "As you can see, 6 mx is never really shut. The signals from VK-5ZDX were really good, considering the fact he was running 80 watts p.e.p. input and a 6 element yagi. The modis-operandi between Bob and I was to call alternate five minutes using break-in s.s.b. In this way, if a reply was obtained, signal reports could be immediately exchanged. It is remarkable the amount of information that can be exchanged on a five-second burst using this technique. I occasionally hear good bursts from the VK5 beacon VK5VF on 53.000 MHz.

"Present indications are that for very high power stations (5kw. p.e.p. e.r.p.) a maximum range of 1,300 miles is feasible. Signals rapidly improve below this distance to where 300-400w. p.e.p. e.r.p. is useful in the 800 to 1,100 mile region. Below this range, power requirements tend to get more stringent again as we move out of the M/S region into the forward scatter area where pure brute force is necessary. Below 300 miles again, power requirements drop off.

"It is not easy to generate 400 watts. p.e.p. output at 52 MHz. as most linears tend to run at only 50% efficiency once you get above about 30 MHz. Antenna gain figures also tend to be on the optimistic side too, and feedline losses are ALWAYS more than quoted. VK8KK and I both use heliax on our 6 mx antennae." Thanks David for your letter and the interesting observations contained therein.

144 MHz. BAND PLAN

The following information has been supplied by George VK3ASV of Morwell and is a **band zoning report** by the Eastern Zone of VK3. It is submitted for the interest of all those concerned with 144 MHz. activity in particular. Being in Alice Springs at the moment and with a shortage of other news, it seems an appropriate time to give this information an airing. Your thoughts on the matter would be gratefully received by me, and if of sufficient general interest could be included in "Amateur Radio" for others to consider.

"The Eastern Zone last year set up a group to study a 144 MHz. band plan or segment, results outlined and discussed at recent general meetings on 19th Sept., 5th Dec., 1970, and 28th Feb., 1971. This plan has now started to take shape (March 1971).

"In the report the group recommendation is that Eastern Zone 2 mx stations will transmit on spot frequencies between 144.406 and 144.496 MHz., thus 16 working channels at 6 KHz. separation. This decision should not be too restrictive on the individual operator, he may still v.f.o. off his working frequency outside the zone segment to net on or to work Es. rare DX or c.w., and special modes such as moonbounce, meteor scatter, aurora, back scatter and/or record attempts, etc.

"First consideration, is band planning necessary? If so, we would have to consider New Zealand as they are currently considering the same thing. Also, near-by countries in case of in-band translators on orbiting or stationary (sync.) satellites. Should we have a conference at Federal or National level to formulate such a plan?

"In drawing up a plan, thought would have to be given to existing services as well as future ideas, covering:—

144.000 to 144.1—C.w. and DX, international moonbounce experiments, aurora and back scatter.
144.1 to 144.5—Free operation, perhaps with some zoning for regions.
144.5—National a.m. mobile net frequency.
144.5 to 145.0—DX and experimental beacons.
145.0 to 147.0—F.m. simplex nets (national 146.0), repeaters and translators (linear and hard limiting).
147.0 to 148.0—Experimental cross-band translators.

"The rest of the band not specifically allocated, this being a testing area. Note in New Zealand, 144.65 to 147.75 is used as civil defence and A.R.E.C. nets similar to our W.I.C.E.N., leaving the upper portion for free operation except during emergencies. We should therefore use this portion if we don't want to lose it to commercial land-mobile radio-telephone services.

"Finally, the a.m./s.s.b. or lower portion could be further divided regionally where necessary. England has had this for 20 years, in which the whole country followed a band plan supported by the v.h.f. committee of the R.S.G.B. Their plan was reviewed and simplified into four zones 12 months ago. Here in Australia and New Zealand this sounds attractive until one considers the impractibility of having large unused portions in most areas with the possibility that where there is a large population density it would be overcrowded. In a small state like Victoria such a zone plan can be commonsense."

— . . . —

REPEATER NEWS

A new F.R.S. report was prepared during June and sent to those who received the first issue report released during February. Anybody who would like a copy of the report may obtain one by writing to the Federal Repeater Secretariat, P.O. Box 342, Crows Nest, N.S.W., 2065.

It has been announced that the proposed beacons for Sydney will be installed at VK2WI Dural and will operate on 52.2 and 144.2 MHz.; a 6 metre beacon for Townsville (VK4) will operate on 52.4 MHz. when licensed.

New Zealand has been working on a 2 metre band plan for the country. In the draft plan we received, they have made provision for all modes of operation. There are f.m. simplex channels every 50 KHz. from 145.8 to 146.2 MHz. with 145.85, 146.0 and 146.15 MHz. as the prime channels, 146.0 MHz. to be first. On the f.m. repeater side they have allocated four channels on 700 KHz. spacing. A pity, as it does not make them compatible to Australia. Inputs on 146.3, .35, .4 and .45 with the outputs on 145.6, .65, .7 and .75. The three-channel a.m. repeater systems have inputs on 144.6, .65 and .7 with the outputs on 145.725, .775 and .825. 144.8 MHz. is set aside as a r.t.t.y. net frequency. The beacons are on the "hundred" equal to the call area, e.g. ZL1 on 145.1, ZL2 on 145.2, ZL3 on 145.3, and ZL4 on 145.4 MHz. The segment 144.0 to 144.1 MHz. is set aside as DX and experimental working. 144.1 to 144.5 MHz. is a general working segment.

Our thanks to the various groups who have completed and returned the recent questionnaire which will enable us to up-date our records.

The American magazines ("73" in particular) have stepped up f.m. articles and advertising in their recent issues. F.m. has really arrived in the U.S.A. In a recent issue of one magazine you can even buy a complete ready-to-go Amateur repeater which is commercially made. There have been plenty of articles in all the issues. There is a good short article in the March 1971 issue of "Ham Radio" by VE7ABK entitled "Plain Talk About Repeater Problems". It deals with intermodulation and desensitisation and discusses some of the solutions. In the ads., with the increasing number of local and Japanese f.m. transceivers being offered for sale, competition is forcing many of them to be fitted with several crystals on the major national frequencies. Also being offered for sale are continuously scanning monitor receivers for watching all the repeater channels in an area.

The May issue of Region 1 I.A.R.U. news lists some 18 two metre f.m. repeaters operating in Germany. Most of them are on 144.75 MHz. in and 145.85 MHz. out, with tone calling for access. There is also a list of some 63 beacon stations in Region 1 on the 14, 28, 50, 70, 144 and 432 MHz. bands.

Note.—The details on page 13 of June "A.R." under the heading Project Australis will require revision according to the latest information to hand.

—Federal Repeater Secretariat.

W.I.A. D.X.C.C.

Listed below are the highest twelve members in each section. Position in the list is determined by the first number shown. The first number represents the participant's total countries less any credits given for deleted countries. The second number shown represents the total D.X.C.C. credits given, including deleted countries. Where totals are the same, listings will be alphabetical by call sign.

Credits for new members and those whose totals have been amended are also shown.

PHONE

VK5MS	319/343	VK2APK	288/295
VK6RU	316/342	VK4FJ	286/307
VK3AHO	310/326	VK4TY	284/288
VK4KS	307/322	VK4UC	278/278
VK6MK	303/324	VK2AAK	274/279
VK5AB	296/314	VK3ZE	273/270

Amendments:

VK3TL	270/277	VK4RF	213/213
VK3JW	250/251	VK3TD	180/184
VK3AMK	232/232	VK4FH	165/172
VK2AHH	218/228	VK4SD	123/124

C.W.

VK2QL	303/326	VK3NC	273/300
VK3AHQ	300/315	VK3XB	270/287
VK4FJ	289/315	VK3ARX	270/279
VK3YL	286/303	VK6RU	266/289
VK2APK	284/292	VK4TY	259/272
VK2AGH	282/296	VK3TL	255/260

New Member:

Cert. No.	Call	Total
97	VK4FH	100/105

Amendments:

VK3RJ	248/262	VK2AHH	137/145
VK4RF	188/200		

OPEN

VK6RU	317/343	VK6MK	303/324
VK4SD	315/330	VK2APK	302/314
VK2AGH	314/334	VK2EO	301/325
VK2VN	309/328	VK3ARX	299/308
VK4KS	308/327	VK4UC	298/298
VK4TY	306/321	VK4FJ	297/323

New Members:

Cert. No.	Call	Total
134	VK5EJ	107/108
135	VK3LV	102/102

Amendments:

VK3TL	286/293	VK2AHH	234/248
VK3NC	274/298	VK4FH	187/196
VK4RF	251/263		

Wireless Institute of Australia
Victorian Division

A.O.C.P. THEORY CLASS

commences

MONDAY, 16th AUG., 1971

Theory is held on Monday evenings from 8 to 10 p.m.

Persons desirous of being enrolled should communicate with Secretary, W.I.A., Victorian Division, P.O. Box 36, East Melbourne, Vic., 3002.

(Phone 41-3535, 10 a.m. to 3 p.m.)

SILENT KEYS

It is with deep regret that we record the passing of—

VK2NP—C. F. L. Fryar
VK3VX—A. G. Pither.
VK6XG—C. W. C. Sirl.
VK7ML—M. L. Loveless.

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Minimum $1 for forty words
Extra words, 3 cents each

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Advertisements under this heading will be accepted only from Amateurs and S.w.l's. The Publishers reserve the right to reject any advertising which, in their opinion, is of a commercial nature. Copy must be received at P.O. 36, East Melbourne, Vic., 3002, by 5th of the month and remittance must accompany the advertisement.

ANTENNA for Sale: Ten element widespaced Yagi on two metres, on fifty foot rotable mast (Hills type), whose guys consist of 80, 40, 20 metre dipoles. Plus all feed lines and co-ax. Prefer not to separate. The lot for $30. John Storey, VK3AOO, Zig Zag Rd., Eltham, Vic. Ph. 439-8804.

FOR SALE: A.m. Pye Bantam, all transistorised portable, output ½w., suitable for 52 or 144 MHz. Excellent condition with leather case and mike, $80. VK5ZEI, 24 Seafield Ave., Kingswood, S.A. Phone 7-4671.

FOR SALE: Antenna Rotator—Stolle rotator; the rotator with the transistorised, automatic control unit. The gear box has been modified and strengthened by the replacement of the die-cast teeth of the final output wheel by a hardened mild steel ring gear securely bolted to the body of the wheel. Accurately meshes with the final worm drive. Beautiful job by a skilled machinist. Rotator now ideally suited for quad, X beam or even larger antennas. Price $40 o.n.o. VK7KB, Darling St., Port Sorell, Tas. Phone 28-6133.

FOR SALE: Complete s.s.b. station including: Heath SB101 Transceiver $380, Heath SB640 external v.f.o. $100, Heath SB600 loudspeaker $20, extra heavy duty power supply $85. Will accept $550 for the complete outfit, but I am not interested in offers at these bargain prices. The equipment is as new and can be viewed in operation by appointment. Phone T. Dineen VK3TD Melb. 783-9611 or 787-1407 A.H. or write C/o. P.O. Box 256, Frankston Vic.

FOR SALE: Dummy load. Heath HN31 50 ohm non-inductive dummy load. Has diode rectifier and filter to measure power output with a standard multimeter. In can, filled with 1 gallon of transformer oil. Price $15. VK7KB, I. R. Pearson, Darling St., Port Sorell, Tas. Phone 28-6133.

FOR SALE: Estate late Dale West, VK4EJ. Trio Transceiver type TS510 with crystal calibrator. Matching Power Supply type PS510. Instruction booklets for both units. Dynamic Microphone DM10. $380 the lot or nearest offer. Contact VK4IK, 6 Cassia St., Edgehill, Cairns, Qld. Ph. 070-53-2082.

FOR SALE: Hallicrafters SX-117 triple conversion Receiver and Hallicrafters HT44 Transmitter Matching pair. Will transceive. All modes. All facilities. Complete station, with manuals. Transceive and all other cables, power supply, speaker and 500w. 110 volt transformer. $495 o.n.o. R. Vickary, VK4VX, 20 Inglis St., Grange, Qld., 4051.

FOR SALE: Hills heavy duty three-section Telescopic Tower, 72 ft., three sets guys, turnbuckles, etc., top set insulated for 40 mx and 80 mx inverted vees. TH6DX Tribander, BN-86 Balun, TR-44 Rotator with supporting cage, co-axial and control cables. $495. Webster Bandspanner $30. VK2AQW, 24 Ramsay Ave., West Pymble, N.S.W., Phone 449-3538.

FOR SALE: K.W. Vespa Mk. I., s.s.b./c.w./a.m., 90w. p.e.p., 160-10 mx. tx and h.b. p.s.u. $180. Lafayette HA500 Rx, a.m., bands 80-6 mx, xtal cal., $85. Both $260. Codar AT5 a.m./c.w. Tx (8 x 5 x 4 in.), 14w. i./p., 160-80-40 mx, 240v. a.c. p.s.u./c.u. 12v. d.c. p.s.u., remote c.u., s.w.r. mtr./dummy load, a.t.u., r.f. meter, $80. Tavasu Mobile Whip Ant., 160-10 mx. $25. Full specs. on receipt s.a.e. VK7MT, 186 Punch Bowl Rd., Launceston, Tas., 7250. Phone 44-1392.

FOR SALE: Pye Mk. 3 Transceiver, 53.032 MHz., complete, 240v. a.c. operation, $35. Also, h.b. A.R.R.L. Linear Amplifier, 80-10 mx, capable of 1 kw. p.e.p., forced-air cooled, g.g. parallel 4-400As, fully metered and safety protected, $200. Contact R. Wyllie, VK3BBZ, Ph. 399-1311 ext. 454, or 12 Balmoral St., Laverton, Vic., 3027, a.h.

FOR SALE: Pye Mobile Communication System (30 KHz.), Model PTCA 8750 (A.R.O.) For inspection contact Mr. Rogers, Ph. 69-0220. Michaelis Bayley, 150 Buckhurst St., South Melbourne, Vic.

FOR SALE: Yaesu FT2F, new, with Channels A, B, C, R1 and R3 xtals, $195. MR20 2-Channel Tx-Rx with a.c. supply for base use, no xtals, $45. Creed Tape Distributor 6S5, $50. Phone 437-1811 (Melb.), VK3IZ.

FOR SALE: Yaesu Musen Transceiver FT200. A1 condtiion electrical and mechanical. Original packing box. $320. K. Hoffmann, 10 Druce St., Toowoomba, Qld., 4350.

FOR SALE: 67 ft. Galvanised Telescopic Wind-up Tower, comp. with TH3 Mk. 2 Beam and rotator motor control unit, TH3 balun co-ax., motor feeder, etc. Guides and rigging incorporating balun-fed 80-40 mx Inverted Vee Ant. with separate co-ax. feeder. Complete coverage 10-15-20-40-80 metres. Phone Gosford 411903, VK2NI, or write A. B. Nyhuis, 240 Burge Rd., Woy Woy, N.S.W., 2256.

FOR SALE: 240 watt SSB Transceiver, 20/40/80 mx, $175.00. 900v. Power Supply for same, $85.00. Microphone, $10.00. Folded Dipole Antennas, with 300 ohm feeders, $10.00 and $15.00. 300 ohms to 75 ohms low-loss Baluns, $1.00. HRO-060 Communications Receiver, 1.7 to 30 MHz., SSB/AM/CW, as new, $495.00. Swap new 807s for two new 6V6GTs and one 6SN7. VK3TD, C/o. P.O. Box 256, Frankston, Vic. Phone Melb. 787-1407 A.H.

SELL: Vibroplex "Vibro-Keyer" plus professionally wired U.S.A. manufactured Digi-Keyer. Both used few hours. Selling at landed cost, $40. Bargain for discriminating c.w. operator. Also six volumes professionally bound "QST" 1968, 1969 and 1970, $30. Roth Jones, 1 Albert Road, Melbourne, Vic., 3004.

SWAN 500 Transceiver, home brew heavy duty Power Supply, vox, mic., $470. Noel L. Martin, Wallace St., Bell, Qld., 4408.

WANTED: Band-change motors and L-R indicator drive transformers to suit 24 volt Bendix MN26 Radio Compass sets. Transformers are marked T16 or A15064. State price required. Also Vintage Radios complete with Horn Speaker, early 1920's, good price paid, send details. O'Brien, Edgar Rd., San Remo, Vic., 3925. Phone 107.

WANTED.—Galaxy V. DC. DC power supply and mobile mount. Power required, 800v. DC at 400 mA. 10% regulation, 350v. DC at 200 mA. 10% regulation, negative 100v. DC at 35 mA. G. Howard, VK3XD, Eltham North, Vic., 3095. Ph. 439-9862.

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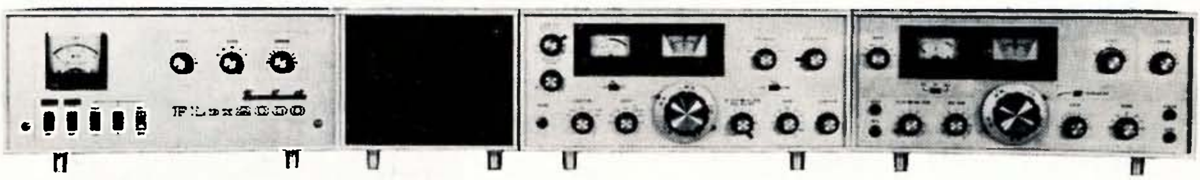

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Western Aust. Rep.: **H. R. PRIDE, 26 Lockhart Street, Como, W.A., 6152.** Telephone 60-4379

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Members of the W.I.A. should refer all enquiries regarding delivery of "A.R." direct to their Divisional Secretary and not to "A.R." direct. Two months' notice is required before a change of mailing address can be effected. Readers should note that any change in the address of their transmitting station must, by P.M.G. regulation, be notified to the P.M.G. in the State of residence; in addition, "A.R." should also be notified. A convenient form is provided in the "Call Book".

CONTENTS

FEDERAL COMMENT:

CUSTOMS DUTIES

The Commonwealth of Australia sets a customs tariff rate of 45% on the f.o.b. value (or in some cases, the current domestic value) of nearly all Amateur equipment originating in countries other than the United Kingdom and certain other Commonwealth countries. In the case of these preferential countries, a rate of 27½% is applicable. To these Customs Duties must be added sales tax, the general rate being 27½%, which is payable on the sum of the customs value plus the customs duty plus 20%.

For many years the Wireless Institute of Australia has believed that these duties and taxes are far too high and the Federal Council has repeatedly reaffirmed the Institute policy to seek a reduction in both Customs Duties and Sales Tax.

Over the years numerous attempts have been made to obtain reduced rates. These attempts to date have been totally unsuccessful, though occasional by-law applications have been successful. I would refer you to the article on customs duty that appeared on page two of the September 1967 issue of "Amateur Radio". This details the case put forward at that time to the Minister and the various matters that were taken into consideration.

At that time it seemed that the Institute was on the verge of success. Unfortunately this application was again rejected.

During 1970 various individuals submitted cases to the Minister in respect of isolated importations and a number of ad hoc concessions were granted under the by-law provisions of the customs tariff. Some of these individuals have co-operated with the Federal Executive through their Divisions by making available copies of the relevant materials relating to their individual cases. The Federal Executive has devoted a considerable amount of time since these ad hoc decisions were made to the question of customs duty, as it seemed from them that the time was again right for the submission of a general case.

There is sometime, I think, some misunderstanding on the application of the customs tariff and the imposition of sales tax. In this issue there is an article by Peter Dodd, VK3CIF, the Federal Manager, outlining the mechanics by which customs duties are imposed and setting out the present position in this country.

In the past the Institute's case has been directed to the application of the by-law provisions. Because one manufacturer of s.s.b. equipment has maintained that he could produce Amateur equipment, our case has failed. It seems to me that the law in this area is less than satisfactory for the Customs Department does not seem to be required in any case to make a value judgment of the legitimacy of the assertion made by the local manufacturer when opposing by-law entry. In the case of the manufacturer to whom I have referred, it would appear that his commercial interests are directed to other channels. He has never, to my knowledge, advertised the availability of Amateur Radio equipment manufactured by himself. I believe that this manufacturer has, over the years, not changed his position either in relation to opposing by-law admission of foreign manufactured Amateur equipment, or, in manufacturing Amateur equipment himself. It is significant that in the period 1966-1967, when the Institute investigated the claims of numerous local manufacturers of electronic equipment, no manufacturer except this one, purported to offer anything for Amateur use. This manufacturer did, in fact, give a quotation at a price that was so high that one could fairly assume that it was for the production of a single piece of equipment.

Earlier this year it appeared as if a breakthrough had been achieved by a local importer, for he advertised significantly reduced prices. It may be reasonable to assume that this importer received a by-law concession, though, noting the lack of follow up advertising, it is also reasonable to assume that this concession was withdrawn.

The Federal Executive has made further enquiries and believes that the manufacturer to whom I have referred to above, again blocked the attempts by suppliers of overseas manufactured equipment to Amateurs to secure concessions.

Very relevant in this context is that a second local manufacturer is about to produce and release on the Australian market, commercially designed Amateur Radio equipment. We do not know, of course, the price structure of this equipment, or indeed when it will be delivered. No doubt, however, this manufacturer would claim to have a legitimate objection to the admission under by-law of foreign made equipment in competition with his equipment.

Whatever are the claims of a local manufacturer for protection, the Institute firmly asserts that the present customs tariff and sales taxes imposed on Amateur equipment are too high.

The Institute believes that the Amateur market (which is a relatively small market in any event) can justify special concessions by the very nature of the Amateur Service itself. The loss of revenue involved would be infinitesimal and the Institute believes that it has a proper case to put in this area.

We are given heart in our present efforts by the apparent change in attitude to the tariff rates evidenced by various press statements made in recent times by the Minister for Customs and others. It seems from these statements that many people believe that the present protective rate platforms are too high. If these investigations enter the field of electronics, probably the main concentration will centre on broadcast and television receivers and the various items of mobile equipment used commercially. No doubt severe pressure can be expected to maintain existing levels in the face of overseas price levels for these types of apparatus. Whatever the result in the commercial field, the Institute maintains that Amateur equipment does, and should, fall into a separate category justifying substantially reduced rates of duty and tax. The Institute, on behalf of all Amateurs, will ensure that the best possible case will be submitted.

—MICHAEL J. OWEN, VK3KI.
Federal President, W.I.A.

HOME STATION ANTENNA FOR 160 METRES

Part Five—Inverted "L" and Sloping Antenna

J. A. ADCOCK, M.I.E. (Aust.) VK3ACA*

In general this type of antenna will produce mainly vertical polarisation and a little horizontal polarisation. It will produce more horizontal polarisation than an antenna with a balanced top. This type of antenna has been dealt with last as some of the conclusions depend upon earlier results.

For the purpose of discussion we will consider the antenna shown in Fig. 18. Consider the vertically polarised component of Fig. 18a. The form factor of the current on the vertical section = 0.9 (Fig. 7).

From equation (6)

$$R_R = 98.75 \times (0.5 \times 0.9)^2$$
$$= 20 \text{ ohms.}$$

Considering the horizontal section. the form factor in relation to the base can be worked out as follows:

$$F = \frac{\text{Average Current}}{\text{Base Current}}$$

From Fig. 6

$$F = \frac{1 - \cos a}{\text{radian } a \times \text{sine } (a + b)} \quad (13)$$
$$= 0.373$$

The radiation resistance of the top section at the base of the antenna will be:—

$$R_R = 98.75 \times (0.5 \times 0.373)^2$$
$$= 3.44 \text{ ohms.}$$

This resistance will be reduced by the presence of a perfectly conducting ground by a factor of 0.42 (Fig. 15).

$$R_R = 3.44 \times 0.42$$
$$= 1.45 \text{ ohms.}$$

Above a perfectly conducting ground, considering horizontal radiation as loss,

$$\text{Vertical efficiency} = 20 \div 21.5$$
$$= 0.93 \ (93\%)$$

From Part Four, the resistance, including radiation and loss, is equal to the free space resistance above a lossy ground, then—

$$\text{Vertical efficiency above a lossy ground} = 20 \div 23.4$$
$$= 0.855 \ (85.5\%)$$

The above, of course, are maximum efficiencies and do not include antenna loss. The proportion of horizontal radiation to vertical radiation in both cases is—

$$1.45 \div 20 = 0.072.$$

Comparing the inverted "L" with the "T" it is obvious that the radiation from the top in both cases is small. The horizontal component and the loss from the top will be greater in the case of the inverted "L". The inverted "L" top will have a greater capacitance load for a given total length than the "T" (Fig. 9).

For example, in the case in question as an inverted "L" X_C = 600 ohms, in the case of a "T" with the same length top X_C = 700 ohms (not a large difference). It can therefore be considered that the top section in both cases is only a load and not a radiator.

Consider the sloping antenna in Fig. 18b and take the vertical component first. The current distribution on the effective vertical component of the antenna will be the same as that of an antenna equal in length to the whole wire (sinusoidal), but the effective height will be equal to that of the end of the antenna. In this case, from Fig. 7, form factor = 0.635.

From equation (6):

$$R_R = 98.75 \times (0.5 \times 0.635)^2$$
$$= 10 \text{ ohms.}$$

The radiation of the horizontal component without considering ground loss (this is a hypothetical situation since a horizontal monopole with a horizontal ground plane is impossible):

$$R_H = 98.75 \times (0.866 \times 0.635)^2$$
$$= 30 \text{ ohms.}$$

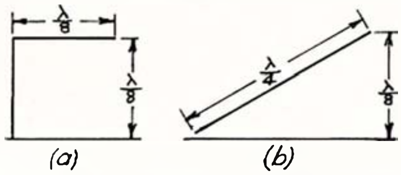

Fig. 18.—The "inverted L" and the "sloping antenna" referred to in the text.

The actual reduction in resistance of the horizontal component by the presence of the ground plane would be great. Unfortunately its effect cannot be simply determined by applying the graphs since the antenna is sloping and since the highest current portion is closest to the ground, the actual radiation resistance will be very small. If as suggested, the reduction of radiation resistance is mainly loss above a lossy ground, the efficiency of such an antenna would be very poor. Only considering the vertical component, the efficiency of a lossless antenna above a perfectly conducting ground is as follows:

Estimated radiation resistance for the horizontal component in the presence of a perfectly conducting ground, assuming the average effective height of the antenna to be one-third of the end height:

$$\text{From Fig. 15, } R_R = 0.052 \times 30$$
$$= 1.6 \text{ ohms.}$$

Useful vertical radiation resistance was 10 ohms.

$$\text{Vertical efficiency} = R_R \div \text{total resistance.}$$
$$= 10 \div 11.6$$
$$= 0.86 \ (86\%).$$

If the ground was completely lossy, then:

$$\text{Vertical efficiency} = 10 \div 40$$
$$= 0.25 \ (25\%)$$

These results do not include losses due to series resistance.

In both cases the proportion of horizontally polarised radiation to vertically polarised radiation would be:

$$1.6 \div 10$$
$$= 0.16$$

It would appear that a sloping antenna is not very efficient.

CONCLUSION

Considering these antennas for receiving they would give some horizontally polarised pick-up as well as vertically polarised. This would have the effect of making audible signals which contain little vertical polarisation, however they would not have the advantage of a completely balanced horizontal. Used as a vertical, the inverted "L" would be comparable in performance with a "T" of the same dimensions.

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ANGLE MODULATION

LECTURE No. 14C

C. A. CULLINAN,* VK3AXU

● Continuing the series of lectures by C. A. Cullinan, VK3AXU, at Broadcast Station 3CS for students studying for a P.M.G. Radio Operator's Certificate.

PHASE MODULATION

Major Armstrong's original f.m. transmitters used phase modulation in order to obtain frequency modulation.

Phase modulation is still used in some high-quality f.m. transmitters and is used extensively in mobile transmitters.

In order to understand phase modulation it is necessary to understand the meaning of the word phase.

In electrical engineering the word phase is usually taken to mean the difference in angles between the current and voltage in an a.c. circuit. If the current and voltage each reaches the maximum and minimum in each cycle the current and voltage are exactly in phase, but if the current lags or leads the voltage then there is a phase difference.

However, the word phase may also mean the time difference between two or more currents in the same a.c. circuit. For instance in a three-phase alternator three lots of current are produced with each revolution of the alternator rotor and these currents are spaced 120° apart in time and they remain spaced this amount irrespective of the speed of the alternator rotor. Fig. 2c illustrates this.

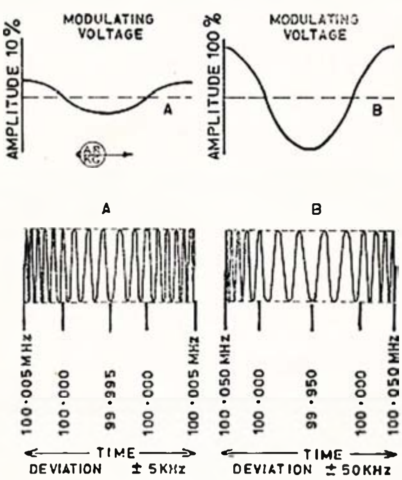

FIG. 2

It has been stated earlier that a change in phase is also a change in frequency and to illustrate this let us visit a power station and watch the operator bring an alternator from rest and connect it to an a.c. power grid.

It does not matter what is the nature of the primary source of power, i.e. steam from a wood burning boiler, coal, cil, atomic energy or falling water.

As the alternator is at rest it is disconnected from the a.c. mains. Before it can be connected to the mains its rotor must be rotating at the correct speed for the particular mains frequency and if it is to deliver power then the current it will produce must be in exact phase with that in the a.c. mains.

Alternators used in power generation are of the synchronous type.

Amongst other things this means that they will not commence rotation (as a motor) if they are connected to the a.c. mains.

However, if they are rotating at sufficient speed to be very close to the mains frequency they will "pull-in" to the correct speed if the incoming mains are applied.

It must be remembered that one of the factors governing the frequency at which an alternator works is the speed of rotation of the rotor.

One of the problems in the generation of a.c. power and its distribution is that the power factor of the total load is most likely to be inductive and for this reason it is common practice, particularly in direct turbine driven plants, to operate one or more synchronous alternators as a motor, letting the turbine impellor rotate in air. The alternator then appears to be a capacitive reactance, so tends to correct the power factor. Such an alternator is known as a "synchronous condenser".

As said earlier, in order to produce power satisfactorily, the alternator must be running at the correct frequency and phase.

In the power station the operator will bring the alternator slowly up to speed, with a small amount of excitation so that a little power is produced. This may be only a few watts, and is used to operate indicating instruments.

By watching a frequency meter, the operator can bring the alternator up to the correct speed (frequency) to match the frequency of the a.c. mains within the tolerance of the frequency meter.

Now, even if the frequencies of the alternator and the a.c. mains are exactly the same (50 cycles per second in most of Australia) there is no guarantee that the phases are identical. In point of fact the phase of current being produced by the alternator may be 180° out of phase compared to that of the a.c. mains. Now, if in this condition, an attempt was made to switch the alternator to the a.c. mains it would appear as a short-circuit across the mains and considerable damage could ensue. (This has actually happened.)

Obviously then, the operator has to synchronise the **phase** of the alternator current to that of the a.c. mains current and we can deduce from a.c. theory that when this has been done the alternator also will be exactly in frequency.

There are several methods which may be used to achieve synchronism. Three of these are the use of three lamps connected in a special circuit, a meter device known as a synchroscope, and a cathode-ray oscilloscope.

Let us assume that the operator is using a synchroscope. This is a meter device in which the pointer can revolve continuously in either direction or stop still. It is fed with a small amount of power, both from the incoming a.c. mains and from the alternator, and compares the phase of the alternator current to the phase of a.c. mains current and when the pointer points to 0°, if the circular dial is calibrated 0-360°, then there is no phase difference between the alternator and the a.c. mains.

Let us assume that the synchroscope shows a phase difference, say 180°, as this is about the worst condition. The operator will slowly alter the speed of the alternator, usually to speed it up, so that the alternator phase will slowly increase and as soon as the synchroscope reads 0° phase difference, the operator will close the mains switches to connect the alternator to the mains. If at the time this is done the phase difference is a few degrees the alternator, being synchronous, will pull into phase and frequency. The operator then increases the alternator excitation anl primary drive so that the alternator produces power to feed **into** the a.c. mains.

Now, from our viewpoint, the most important part of all this is that whilst the operator was altering the phase of the alternator he was changing the frequency as well because the only way he could change phase was to alter the speed of the alternator, and alteration of speed means an alteration of frequency.

However, as soon as synchronism was obtained the phase ceased altering, as did the frequency and the alternator frequency would remain constant.

This description has been made to show that during the time that the phase was changing in the alternator the frequency also was changing and that as soon as the phase stopped changing the frequency stabilised at the a.c. mains frequency.

This is the basis of phase modulation.

The amount of frequency modulation which can be produced by phase modulation depends on the amount of phase shift and the **rate of change of phase.**

Any shift in the phase of an r.f. carrier will cause the effective frequency of the carrier to change **whilst the phase is changing**. Moreover, as soon as the phase stops changing, the carrier frequency will return to its original frequency.

In the earlier discussion on frequency modulation it was stated that the frequency deviation was determined by the amplitude of the modulating audio frequency voltage and the rate of deviation is governed by the frequency of the modulating voltage.

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In phase modulation the faster the phase is changed, then the greater is the frequency shift. When the phase is changed at an audio frequency rate, then the change is greater at the high frequencies than at the low frequencies, i.e. a frequency of 10,000 cycles in one second has varied 100 times as fast as a frequency of 100 cycles.

For a given amount of phase shift, the amount of frequency modulation increases directly in proportion to the modulating frequency. This rate of affairs would not enable satisfactory f.m. to be received from phase modulation, therefore the audio frequency modulating voltage is pre-distorted (from a frequency viewpoint) by the insertion of a simple resistance-capacity filter in the audio frequency input to the phase modulator. This filter makes the frequency modulation independent of the audio frequency and proportional only to the amplitude of the modulating voltage. The filter causes the amount of phase modulation to decrease, linearly, as the modulating voltage frequency rises, thus giving a true frequency modulated signal.

Probably the greatest advantage that phase modulation has over direct methods of producing frequency modulation is that it is possible to use a quartz crystal as the frequency determining element, thus having the inherent stability of the quartz crystal in holding constant the carrier centre frequency.

However, there is a penalty to be paid in that the amount of f.m. that can be produced by phase modulation is very small and considerable multiplication must be used to obtain the necessary deviation at the carrier frequency, whereas it is possible, in 1970, to produce direct carrier f.m.

As mentioned previously, the first practical wide-band f.m. transmitters were developed by Major Armstrong and it may be relevant here to give a brief description of one of these transmitters.

A very stable quartz crystal, oscillating at about 200 KHz., was used to generate the fundamental radio frequency. The output of this oscillator, at a low power output, was fed simultaneously to a linear amplifier then to a balanced modulator. The output from the balanced modulator was a double sideband suppressed carrier signal at the quartz crystal frequency. By re-combining the carrier and sidebands in the proper phase, a small phase shift was produced.

In order to prevent excessive distortion, the audio frequency modulating voltage was pre-distorted as described earlier and the effective phase shift was kept to not more than ±30° = ±0.524 radian; the maximum frequency change was only ±24.4 Hz. at the frequency of approx. 200 KHz.

In order to produce a frequency swing of ±75 KHz. at the final carrier frequency of 43.2 MHz., a multiplication of 3,072 times (in round figures, 75 KHz. ÷ 24.4) was needed.

However, the small amount of deviation, at the quartz crystal frequency, would not permit full modulation of the lower audio frequencies, so it became necessary to use a new centre frequency of 10.8 KHz. (43.2 MHz. ÷ 3072) in round figures.

To do this the original 200 KHz. phase modulated signal was multiplied 64 times to give a frequency of 12.8 MHz. ±1562 Hz. (200 KHz. × 64) ± (24.4 Hz. × 64).

This was then heterodyned in a mixer, against another quartz crystal on 11.9 MHz.

Remember that a multiplier will multiply not only the radio frequency but the deviation as well, but heterodyning changes only the radio frequency.

The frequency difference of 900 KHz. was selected, 12.8 — 11.9 MHz. = 900 KHz.

Thus the output of the frequency mixer was 900 KHz. ± 1562 Hz. This was then multiplied 48 times to give a final carrier frequency of 43.2 MHz. ±75 KHz. (to nearest significant figure).

Also note that direct multiplication of the 200 KHz. quartz crystal frequency by 3072 times would not produce the correct output frequency, but by multiplying 64 times, heterodyning and then multiplying by 48 (total multiplication 3072) both the correct output frequency 43.2 MHz. and deviation of ±75 KHz. were obtained. This is a good exercise in frequency multiplication and heterodyning.

This method of obtaining phase modulation can be described briefly in this manner. Phase modulation may be derived by amplitude modulating a constant frequency carrier-wave, removing the a.m. sidebands thus produced from the carrier, shifting the phase of either the carrier or the sidebands by 90° and re-combining the sidebands with the carrier so that a 90° phase shift has occurred.

Phase Shift Exciter

Here are details of a practical phase shift exciter designed along the above lines.

Let a quartz crystal oscillator use a 6C4 valve with a shunt-fed balanced tank. This tank is to excite two 6BE6 valves in push-pull. The centre tap of the tank will go to earth through a grid bias resistor. The plates of the two 6BE6 valves are to be connected in parallel.

Because the grids are in push-pull and the plates are in parallel, there will be no r.f. output at the plates if the input r.f. signal is exactly 180° out of phase between the two grids, and the valves are perfectly balanced.

As this condition is almost impossible to attain, there will be a slight amount of r.f. signal get through.

The No. 3 grids of the 6BE6s should be fed with an audio frequency signal, which is in push-pull (through a resistance-capacity filter as described earlier).

The output of the pair of 6BE6 valves will now be a double-sideband suppressed carrier signal.

The next step is to connect a resistor and small condenser in series across the oscillator tank circuit. The reactance of the condenser must equal the value of the resistance so that at their junction there will be a phase shift of 90° between this point and earth.

Following the pair of 6BE6s should be a class C r.f. amplifier used for isolation. This can be a 6AU6 valve. Its grid is fed from the junction of the phase shift network whilst its plate (tank circuit) is connected to the paralleled plates of the 6BE6s.

In this manner the carrier is re-inserted into the sidebands 90° out of phase with its original phase, and the signal in the tank circuit of the 6AU6 valve has become a frequency modulated signal.

The two 6BE6 valves are part of a circuit known as a balanced modulator.

A reactance-valve modulator may be used to phase modulate a constant carrier by connecting it across a tuned circuit. The variation in reactance of the reactance valve-modulator will produce a phase shift and a small change in phase shift across a tuned circuit also makes a frequency change, hence frequency modulation occurs.

A reactance valve modulator may be placed across a quartz crystal oscillator to produce phase modulation. However, there will be some amplitude modulation as well and this may be removed by passing the resulting signal through one or more limiters (these are valves which pass f.m. but reject a.m.).

SERRASOID MODULATION

During World War II. Major Armstrong developed another method of producing phase modulation through the generation of a saw-tooth wave form. This method was named Serrasoid from the Latin "serra" for saw.

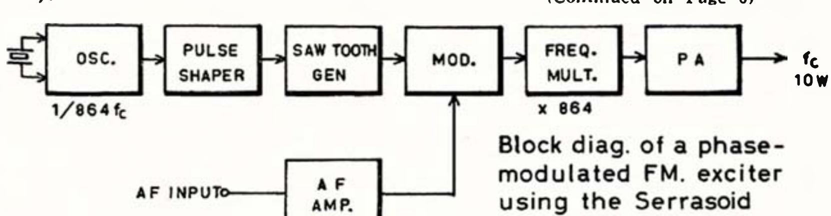
This is a very complicated system but has the great advantage that much less frequency multiplication is required than in other forms of phase modulation for a given frequency deviation.

The basic oscillator is quartz crystal controlled and operates at 1/864th of the final carrier frequency.

The oscillator drives a buffer stage, for isolation to give a constant load on the oscillator. This isolator feeds a pulse shaper which triggers a saw-tooth oscillator. The saw-tooth wave goes into a modulator, which is essentially an electronic switch and this produces a square wave at its output.

Application of an audio frequency voltage causes the leading edge of the square wave to be slightly advanced or retarded in phase.

(Continued on Page 6)



Block diag. of a phase-modulated FM. exciter using the Serrasoid system.

ANGLE MODULATION

(Continued from Page 5)

This small change in phase is also a small change in frequency. A number of frequency multipliers steps up this small change in frequency to the desired deviation as well as bringing up the original crystal oscillator frequency to the desired carrier frequency. The usual "pre-distorter" filter is used to obtain frequency modulation.

ANGLE MODULATION

In this lecture on angle modulation we will compare now the two general systems of generating angle modulation.

Phase Modulation

Advantage is that the transmitter can be crystal controlled, thus the centre frequency can be very stable.

Disadvantages: very little deviation is produced so that a large amount of frequency multiplication is required.

Direct Frequency Modulation

Advantages: It is possible to frequency modulate the carrier at the output frequency (up to 108 MHz. at least), hence the large number of multiplier stages are not required. However, rather elaborate means must be employed to keep the carrier centre on frequency.

As mentioned earlier, the majority of American manufacturers (1970) of f.m. broadcast stations use some form of direct f.m.

However, the majority of manufacturers of communications f.m. systems prefer phase modulation because with the small deviation which is permitted, the system is simpler than with direct f.m.

Finally, mention should be made that because of the difference in noise in angle modulation and amplitude modulation it is possible to add pre-emphasis to the high audio frequencies in transmission and equivalent de-emphasis in the receivers and obtain about 10 dB. of noise reduction at 10 KHz. This is not practicable in amplitude modulated systems.

REFERENCES

This lecture has been concerned with angle modulation as a transmission medium and the following references are recommended for further study:

1. The F.M. System (R. F. Dannecker), "Amateur Radio," Dec. 1969. An excellent theoretical article.
2. A.R.R.L. Handbook, section on F.M. is very good.
3. Frequency Modulation (A. W. Keen), Pitmans. An exceptionally good text book.
4. Radiotron Designer's Handbook.
5. N.A.B. Handbook (price is about $40). American F.C.C. regulations and descriptions of F.M. transmitters are included in this huge book.
6. Sound and Television Broadcasting (Sturley), Iliffe, B.B.C. training manual. Section on F.M. is very good.

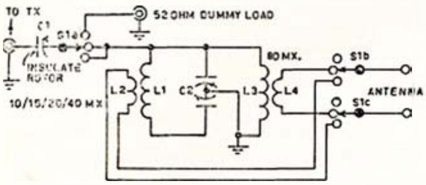
THE "Z" MATCH

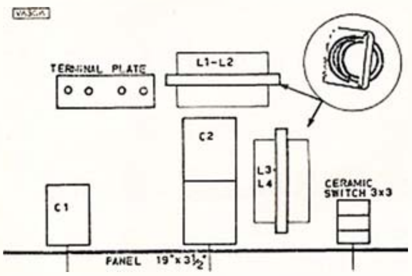
RON HENDERSON, VK3ARV*

A centre fed antenna, being balanced to ground, obviously requires a balanced feed-line, which is not the case when co-ax is used and hence high s.w.r. often results to the detriment of output valves. Imbalances and high s.w.r's often result in severe interference to nearby receivers. Using a tuner, however, reduces this and helps to peak the antenna for the band in use. The Z match is the only tuner found at this QTH of reducing the s.w.r. to acceptable levels on all bands.

Construction is simple. Use a three-position **ceramic** switch (from a 609 tx, etc.) for: (a) Z match, or (b) dummy load, 52 ohms. The dummy load consists of 3-watt carbon resistors of 18 ohms and 15 ohms in series/parallel (two legs of 104 ohm) immersed in a gallon tin of transformer oil.

The ability to switch from 80 metres to higher bands without changing antenna terminals is very handy; 10 to 40 metre band tuning is done on one position of one coil, and 80 metres on the larger coil.





Tuning capacitor gangs were from an 1154 tx. In the diagram, C1 comprises two gangs, approximately 180 pF., connected in parallel. The whole unit is one piece of the old tx panel with added-on sides. Coils are mounted on the back of the gangs and at right angles to one another.

Coils are as described in the R.S.G.B. Handbook, Section 13 (Z Match article). Home-made coils were first wound on cardboard forms, then removed and with a screwing action the wire is fed through holes in perspex [polystyrene is better—Ed.] sheets (two pieces 4" x 3½") and cemented on each hole. Coils are 14 s.w.g. wire. L1 consists of 5 turns, 2½" diameter; L2 is 5 turns, 3" diameter equally spaced over L1. L3 is 8 turns and L4 is 6 turns spaced centrally over L3—same diameters as for L1/L2.

Capacitor C1 can be a single of 350 pF. and C2 is 250 pF. dual stator; good insulation, preferably ceramic. Short leads result when the coils are mounted on the capacitors. PL259 connectors were used—4¾" spacing for 600 ohm feeders.

The antenna in use is a standard size 3.5 MHz. dipole (468/F MHz., or 133 ft. 7 in. long), fed with 90 feet of 600 ohm open-wire feeders (14 s.w.g. wire, spaced 4¾"), high in the air and clear of obstructions.

See you on the DX bands, especially 20 metres.

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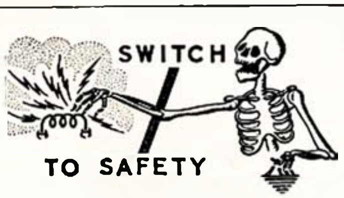

OBSERVATION POST

By H. F. EVERTICK

Communications — the key to our hobby.

It was amazing to read the other day the high percentage of school children who cannot communicate in English. Right here in Australia. Would you believe it—children! Older migrants set in their ways, yes. But school kids!

What would Amateur Radio communications be like without English as a common language? Luckily, we have taken over so much formalised material —the Q code, N.A.T.O. phonetics, c.w. abbreviations. To this we have added bits of own own, "My receiver is double conversion, transmitter is 100 watts, aerial is dipole 15 metres high, wx is cold and rainy, please QSL." Do we understand this may be the limit of the English spoken? Or do we think they sign off for fear of entering fields of discussion, perhaps verboten? In fact the first is nearer the truth. Evidence elsewhere points to language being the barrier to further conversation.

How many of us could converse in their language? Even to the minimum extent to qualify for a QSO? How many of us could understand call signs in Spanish, French or anything except English?

A few of us, even from the older brigade, are busy learning a foreign language—Italian, Japanese, Portuguese maybe. Others of us can converse in English and a "mother tongue"; Dutch, German, French, Polish even. But would you believe it, there is even an Amateur Radio interpreter book. Pick your language, listen on the bands and practice your pronunciation. Do it yourself in fact.

Some other areas come to mind where interests can be channelled. There are some migrants on the periphery of Amateur Radio in Australia who cannot pass the exam. because their English is inadequate. Can we rally round to make them at least feel at home in Amateur Radio here? Are they in sufficient numbers to warrant short technical English classes by groups or individuals? Would the multi-choice answer type of exam. solve these problems? What price reciprocal licensing? Then there are overseas students here. Kindly Amateur Radio acts could recruit potential Amateurs or ambassadors in countries where the hobby is not flourishing. Perhaps our efforts now could affect the voting in a future Space Conference because someone highly placed knows what Amateur Radio is and does.

Do we exercise patience and tact when we hear Amateurs struggling on the DX bands to express themselves in unfamiliar English? Maybe these are from near neighbours of ours for whom we discuss "Aid" in other fields. Here is one area of aid.

Further elaboration seems pointless in this language affair. What a wonderful way to meet others half way.

Auf wiedersein, au revoir, tot siens, kwa heri, 73.

SPACE CONFERENCE REPORT

Notes on a talk given by Mr. Tom Clarkson, ZL2AZ, on his attendance at the W.A.R.C. (Space Conference) of the I.T.U. in Geneva in June/July, 1971, as the representative of I.A.R.U. Region 3 Association.

Tom Clarkson said he had been part of the I.A.R.U. team in Geneva headed by I.A.R.U. President Bob Denniston, W0DX. This team included John Huntoon, W1RW; Dick Baldwin, W1RU; Noel Eaton, VE3CJ; and Win Dalmijn, PA0DD. In addition, Dr. Perry Klein, K3JTE, of AMSAT had attended for part of the time. Many other Amateurs were discovered in the Delegations, including Roy Stevens, G2BVN (Secretary, I.A.R.U. Region 1), who was known beforehand to be part of the U.K. Delegation. Tom had found his status as an Amateur and a volunteer extremely useful.

At the Conference were 91 official country Delegations, 2 private organisations, 5 United Nations agencies, and 17 international organisations including I.A.R.U. A total of about 700 participants. The I.A.R.U. team was, of course, present in the observer role in common with most of the other organisations. The work of the Conference was channelled through various committees. Many of these committees were further split up into working groups. In some instances there were 90/100 participants in the working groups.

Of particular interest to Amateurs was Working Group 5C. This was part of the Allocation 5 Committee. Group 5C dealt with Meteorological, Earth Resources, Time Signals and the Amateur Service. There were points of interest for Amateurs in other committees as, for example, the Technical and Regulations Committee, and attention therefore had to be paid to the work going on elsewhere.

At the outset it became clear that an influential European policy of some rigidity had been formulated in advance and the Delegates concerned were well briefed. At the core of this was the fear of possible interference with other services and frequency requirements for such items as television, broadcasting, other satellites, radio astronomy and so on. The existing alliance on a shared basis between the Amateur Service and radio location proved sound despite later failures. A prepared Amateur Service's paper was read out at an early stage of the Plenary and at all times good mileage was made out of the origins of Oscar 5.

In the Regulations Committee new definitions came into being. These included the "Amateur Satellite Service" as "a service using satellites to carry on a service with the same definition as the Amateur Service". The latter is an existing definition. Some doubts exist about the technical requirements affecting the Amateur Satellite Service which can only be resolved when the final documents of the Conference come to hand. These questions raised problems of considerable complexity although the launching country appears to be the responsible authority for the life of the satellite. It appears that the general provisions affecting the use of satellites will also apply to Amateur Satellites.

The report of Working Group 5C merely recorded that the principle of the Amateur Service to possess satellite operating rights in the shared bands could not be agreed. Surprise and dismay were expressed at the intensity of the opposition. The use of the exclusive Amateur bands for the Amateur Satellite Service was accepted though not without some discussion. It was towards the end of the sessions of this Working Group that a proposal came up that 435 to 438 MHz. might be set aside for Amateur Satellite Services on a world-wide basis. This proposal was made some time after the Chairman had permitted I.A.R.U. to present a statement justifying the demonstrated practicability and previous experience of command procedures in Amateur Satellites.

The stage was set therefore for further discussions on the subject in the main committee. As events turned out, the voting of the Working Group was merely recorded. Almost no discussion was permitted. The situation therefore appeared hopeless because the Plenary merely rubber-stamps Committee Reports.

On the very last day (15th July) of the Conference the Agenda listed papers for discussion which had been ruled out at the committee stages. In this atmosphere considerable support came out for the 435-438 MHz. counter proposals previously ignored. In the voting, 63 were in favour and only 3 were against. This is the story of a small victory against massive odds.

Observers on behalf of the International Amateur Radio Union, at the World Administrative Radio Conference for Space Communications held by the International Telecommunication Union at Geneva, Switzerland, June-July, 1971.

Left to right: Roy F. Stevens, G2BVN, Secretary I.A.R.U. Region 1 Division; John Huntoon, W1RW, Secretary I.A.R.U.; Thomas R. Clarkson, ZL2AZ, Director I.A.R.U. Region 3 Association; Robert W. Denniston, W0DX, President I.A.R.U.; Wijnand J. L. Dalmijn, PA0DD, Honorary Treasurer I.A.R.U. Region 1 Division; Noel B. Eaton, VE3CJ, Treasurer and Member Executive Committee I.A.R.U. Region 2 Division; Richard L. Baldwin, W1RU, Assistant Secretary, I.A.R.U. This group was joined for the latter part of the Conference by Perry I. Klein, K3JTE, as Adviser, not present in this photograph.

The photograph was taken in front of the I.A.R.U. stand at the Telecom 71 International Exhibition held in Geneva at the time of the Space Radio Conference.

In relation to the higher frequencies, although we did lose the 21 GHz. band we gained an exclusive segment from 24 to 24.05 GHz. inclusive of the Amateur Satellite Service and 24.05 to 24.25 GHz. shared with Radiolocation. The Conference dealt with the frequencies up to 275 GHz.

Drawing conclusions about the Conference illustrated a minor success at the eleventh hour which demonstrated that the Amateur Service could not be so easily disposed of. The presence of the I.A.R.U. team was vital despite the loss of satellite rights on the other shared bands. A useful number of the Government Delegates previously in opposition now have been compelled to re-orientate their ideas. The absence of results achieved by certain other services with only one or two observers was particularly noticeable.

It is understood that the effective date of the final conclusions of the Conference will be 1/1/73. At an early stage some discussions took place on the administrative use for experimentation of frequencies for satellites under Regulation by sympathetically inclined authorities, as for example Reg. 115 in relation to 10 metres for AO5. The need to follow up this matter did not arise.

Many authorities appeared to believe that the next International Conference would be held about three or four years' time. This is admitted as being overdue at the present time.

The results of this Conference provide considerable material for consideration in connection with trends in the Amateur Service during recent years. The usefulness of the service in providing training and encouragement is a sine qua non. To make our own apparatus and to communicate are two additional essentials. The latter should obviously encompass communal services such as field days to keep ourselves in readiness for emergencies notwithstanding the existence of other experts in the field. A stage where the Amateur is unable to service his own equipment has been reached elsewhere and this appears unlikely to be in the best interests of the Amateur cause. Some re-thinking on the 3rd Party prohibition might be desirable for scattered communities lacking in other communications.

Finally, the Oscar programme seems essential to our cause.

SUMMARY

The **Amateur Satellite Service** is authorised to operate in the bands:—

7.0-7.1, 14.0-14.25, 21.0-21.45, 28.0-29.7, 144-146, 435-438 MHz. and 24.0-24.05 GHz.

Secured 24.05-24.25 GHz. in lieu of 21-22 GHz.

All Amateur bands, except 21 GHz., remain unchanged for terrestrial use.

CUSTOMS IMPORT DUTIES

Customs Duties along with Excise Duties form the major part of a group classed as indirect taxation. Income Tax forms the larger part of the direct taxation group. Customs Duties are charges levied on the importation of goods for home consumption. Excise Duties are imposed on certain locally produced goods for domestic consumption. These are broad definitions.

Customs Duties are charged according to rates set out in the Customs Tariff which forms a part of the general legislation pertaining to Customs and Excise. In order that the charges may be levied in a uniform manner at the same rates when goods are imported through any port or by air or parcel post, it is essential that all articles of commerce are adequately and precisely classified.

In the very early days Customs Import Tariffs were based more or less on rule of thumb principles. For example, tobacco goods, alcoholic beverages and certain other kinds of goods were listed and rates could be applied uniformly. All other imports would then come under a "rag bag" or "blanket" item.

As international trade continued to develop the national tariffs became more and more complicated. This began to create anomalies since it is an axiom that the greater the number of words used in a legal definition the greater will be the possibilities of differing interpretations.

Various efforts began to be made to introduce classification lists divorced from those produced solely for purposes of rates of customs duties applications. Several other factors also began to emerge more strongly, such as statistics, trade agreements, protection to local industries or production and so on.

A classification listing of goods on an international level called the S.I.T.C. was devised mainly for statistical purposes and was taken over by many countries for their Customs Tariffs. This classification was (and is) based on the principle of sections beginning with the simple raw materials and working through to the more complex manufactures more or less on the basic ingredient or material.

However, for a number of reasons this kind of listing was found to fall short of Customs requirements and another kind of classification was devised in Europe under the auspices of the Customs Co-operation Council in Brussels. This, produced in the early 1950s (was known as the B.T.N. or Brussels Tariff Nomenclature, and came out in the English and French languages. This B.T.N. began to be adopted by more and more countries until today over 100 countries use it, including Australia, although the statistical codings still conform to S.I.T.C. which has now been keyed to it. The latter is a United Nations "enforcement" for the compatibility of World Trade Movements.

You will ask why so much time is devoted to the classification history. The answer is comparatively simple. It enables local officers of Customs to classify goods with reasonably uniform precision without simultaneously having to consider (in general) if a different classification might result in a higher or lower duty charge. In other words, the applications of various duty ratings become more and more a matter for centralised policy decisions. It also enables, or should enable, the importer to calculate in advance the rate and amount of duty he will have to pay on his imports and he should know that his competitors will have or should have the same applied in their case also.

The present over-all Australian Customs Tariffs procedures do not, however, completely achieve these results despite an enormously complex system. The reason stems not only from the Tariff itself, but from the By-Law provisions which have grown up as a byproduct of protectionism.

You see, it works this way—in much simplified terms. It may be submitted to the government by a manufacturer or group that the radio and electronics industry cannot flourish against imports of cheap radios or t.v. receivers. The government agency concerned — normally the Tariff Board—examines the facts revealed from an investigation made by them. It may then decide that certain rates of import duty are desirable in order to give the local manufacturer a fair chance to compete on the local market. These rates of duty, if approved by parliament, then are applied and become protective duties and may be slightly higher or very considerably higher than the rates of duty which would normally have applied solely for revenue producing purposes.

Unfortunately, further complications begin to manifest themselves. This applies not only to protective duties which are imposed to protect an existing industry, but also to duties which might be imposed to encourage the establishment of a new industry or to allow an existing industry to expand into other manufacturing fields. The protective umbrella may, therefore, be a small one or a very large one.

ELECTRONICS INDUSTRY

Let us have a closer look at the size of this Australian umbrella for the electronics industry by going back to classification again.

In the B.T.N. Tariff, radiotelephonic and radiotelegraphic transmission and reception apparatus are classified under heading (or item) No. 85.15. In all the B.T.N. Tariffs the various headings are sub-divided in accordance with each country's individual requirements. Thus, one country might want to separate out broadcast receivers for one rate of duty and all the other goods of that heading for another rate; thus you would see "85.15.01 (or 85.15A) radio broadcast receivers 50%, 85.15.99

(or 85.15B) other 20%". In another country they might require more sub-divisions such as "b.c. rx, t.v. rx, other" which, because of subsequent legitimate attempts by importers to circumvent high rates of duty, might later become "b.c. rx, chassis complete or incomplete, t.v. rx, t.v. rx assemblies with tube, valved receivers, portable receivers and other". So the complexity increases and fragmentation grows. But there is a practical limit to the fragmentation which can be incorporated into a Customs Tariff. Even now, the Australian Customs Tariff is a massive document over 2,000 pages.

Yet a further complication arises. It might be decided to protect b.c. receivers with a high rate of duty and this high rate would be carried through to components because otherwise somebody would by-pass the protection by importing complete receivers in knocked-down parts for local assembly (Meccano fashion) to undercut high duties on complete radios. Components for b.c. rx classified in other headings (or items) of Chapter 85 in the B.T.N. (e.g., valves and transistors fall under 85.21). So all the rates in all these headings (items) must be aligned.

But when this is done, the very industry requiring protection would have to pay duty on the components which it must import because they are not manufactured locally. It would be quite impossible to fragment every appropriate Tariff Item into "Parts for XYZ Co. Ltd.—Free" and "other 50%" in order to rectify this position since, over a period of time the list of companies would grow like Topsy, apart from other reasons why this kind of fragmentation is unsuitable (e.g., XYZ Co. Ltd. selling free of duty parts to the public). Hence some other device must be resorted to if the situation is to be rectified.

Some countries restrict the size of the umbrella to bare essentials, others allow "parts for industry" at lower duty rates; yet others use Ministerial discretion to overcome these problems. Australia uses the last mentioned procedure which is set out legally in the following two main forms:

"19. Goods, as prescribed by by-law, being goods a suitable equivalent of which that is the produce or manufacture of Australia is not reasonably available. 7½% Free."

"20. Goods, as prescribed by by-law, being goods a suitable equivalent of which that is the produce or manufacture of Australia, or the produce or manufacture of the United Kingdom, is not reasonably available. Free. Free."

(Under the Treatment Code these are listed as "707" and "700" respectively with the numbers 717 and 710 for ad hoc by-laws.)

This is a practical way out of the difficulty. Furthermore, it permits discretion to be exercised for low rates of duty in respect of main apparatus (e.g. certain kinds of b.c. tx) which cannot be or are not produced locally. In addition, such discretion could be exercised in favour of specific organisations or classes of organisations (e.g. ship marines), companies, or products.

So we have the By-Law provisions and the supplementary By-Laws. These green paper publications are well over 3" thick and the regular re-printed pages of revisions can run into thick wads of paper. These are published and are available for anyone to peruse in the right places. The provisions of these By-Laws and Supplementary By-Laws apply to all ports of importation. Some of the provisions include a security clause whereby end usage is restricted under official control.

But these two sets of published By-Laws are by no means the end. An additional series of Ministerial ad hoc decisions are exercised in favour of specific importers for imports through a specified port in respect of specified goods (sometimes restricted over a period of time). These are not published and are, therefore, known only to the Customs, the importer and the importer's customs agent. It is a customs maxim that the affairs of one importer are not revealed to any other importer.

And, as importers who enjoy concessionary import rates of duty do not ordinarily discuss their "advantages" with other people, it is not known who can get what at any particular time. No criticism is levelled at officials, but the system itself appears to merit closer examination. It is this system which has caused so much confusion in Amateur Radio circles.

EXAMPLES OF DUTY

Turning now to the size of the umbrella used for protection under Tariff Item 85.15 (and associated spare parts and components items), the present sub-divisions extend to six sub-headings which, briefly, are:

85.15.100—		
Radio b.c. receivers	45% + $10 ea.	27½% + $10 ea.
85.15.200—		
T.v. receivers	45% + $50 ea. + 12½% on pict. tubes	27½% + $50 ea.
85.15.300—		
T.v. chan. tuners	45%	30%
85.15.400—		
T.v. camera pick-up heads	Free	Free
85.15.500—		
Parts for goods in 85.15.100/200	45%	27½%
85.15.900—		
Other	45%	27½%

The second of the two columns of duties (the preferential column) refers to the goods of the origin of the United Kingdom, Canada, N.Z. (except Trade Agreement items), T.P.N.G. (This is a generalisation but is correct for 85.15.) The first column refers to goods of any other country of origin. The same applies to the By-Laws previously quoted herein. "Origin" is, of course, closely defined and must conform to a minimum country content if preferential rates of duty are claimed by the importer.

It so happens that our ordinary Amateur Radio transceivers and transmitters are classified under Item 85.15.900. This is a high rate of duty. When coupled with Sales Tax of 15%, the tax man takes a good pound of flesh. But this does not end here. Importers must base their selling prices on landed costs which, of course, include duties and taxes, freights and other on costs.

Finally, in a short article of this nature it is possible only to have a look at the wording of the discretion allowed to the Minister. The criterion is that a suitable local equivalent is not reasonably available. The decision rests with the Minister. This is based on the submissions made by an applicant and the comments put up by the official experts. The Minister's discretion has not hitherto been exercised where a local manufacturer states he is in a position to supply the goods concerned from his own production. This is where there is considerable room for manoeuvre by local manufacturers.

Officialdom endeavours to analyse all such claims but there is a limit. It is, therefore, quite obvious that pressures from manufacturers on the one hand (whether or not truly justified in terms of actual production at any given moment in time) are offset against pressures from importers on the other hand. If the manufacturer wins, we pay more for the apparatus concerned. If the importer wins, we pay less.

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LICENSED AMATEURS IN VK

APRIL 1971

	Full	Lim.	Total
VK0	11	1	12
VK1	84	29	113
VK2	1404	474	1878
VK3	1322	656	1978
VK4	521	197	718
VK5	522	232	754
VK6	368	139	507
VK7	160	66	226
VK8	37	12	49
VK9	92	10	102
Grand Total	4521	1816	6337

MAY 1971

	Full	Lim.	Total
VK0	11	1	12
VK1	84	29	113
VK2	1418	484	1902
VK3	1319	661	1980
VK4	519	202	721
VK5	519	231	750
VK6	366	139	505
VK7	158	66	224
VK8	38	12	50
VK9	91	11	102
Grand Total	4523	1836	6359

NEW CALL SIGNS

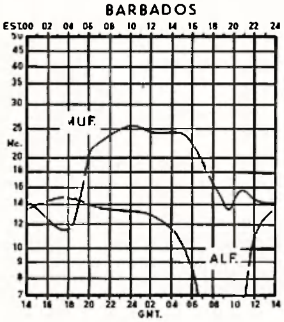
MAY 1971

VK1MP—R. Miles, 34 McCawley St., Watson, 2602.
VK1ZVT/T—D. S. Thomas, 23 Fox Pl., Lyneham, 2601.
VK2KJ/T—K. L. Finney, 1 Hill St., Baulkham Hills, 2153.
VK2VC—D. Kelly, 3/99 Leyland Pde., Belmore, 2192.
VK2AFI—P. E. Stayte, 19 Balaclava Rd., Berowra, 2081.
VK2AWT—W. R. Taylor, "Yarrawonga," Mac's Reef Rd., Sutton, 2581.
VK2BCO—G. J. Cohen, 1/16 Boyle St., Balgowlah, 2093.
VK2BDR—D. Richardson, 7 Brisbane Pl., Cromer, 2099.
VK2BES—J. L. Morris, 8 Gipps St., Kiama, 2533.
VK2BHB—B. R. Hartley, 39 Bramsen St., Bellambi, 2518.
VK2BJD/T—B. J. Dwyer, 4 Erie Pl., Seven Hills, 2147.
VK2BMQ—R. Miles, 1 Boomerang St., Terrigal, 2260.
VK2BSV—S. I. Shimell, 120 Maxwell St., Turramurra, 2074.
VK2BTJ—J. E. Townsend, M072 Henderson Rd., R.A.A.F. Base, Williamtown, 2301.
VK2BVK—T. J. Van Kerk Cerle, 561 Brown St., Lavington, 2641.
VK2BVS—S. Voron, 60B Dutruc St., Randwick, 2031.
VK2BWP—1st West Peakhurst Boy Scouts Association, 21 Johnstone St., Peakhurst, 2210.
VK2ZHX—H. Hendriks, 21 Edmondson St., Wagga Wagga, 2650.
VK2ZKC—R. G. Kaufmann, 64 The Avenue, Heathcote, 2233.
VK2ZMP—D. J. Menneke, 7 Rhoda Ave., Wagga Wagga, 2650.
VK2ZOE—A. Matthews, 162 Victoria St., East Maitland, 2323.
VK2ZPG—P. Glusa, 21 Rodd St., Birrong, 2143.
VK2ZQN—P. Lenehan, 6 Currawong Ave., Lane Cove, 2066.
VK2ZQU—R. H. Boyd, 67 Eastview Ave., North Ryde, 2113.
VK2ZQV—R. Perkuhn, 7 Enmouth Rd., Dapto, 2530.
VK2ZSZ/T—E. Southwick, 55 Duntroon St., Hurlstone Park, 2193.
VK2ZTX—T. Atkins, 12 Dewrang St., Carss Park, 2221.
VK2ZXL—P. M. Schulz, 42 Judd St., Cronulla, 2230.
VK2ZYY—J. Pages, 62 First Ave., Berala, 2141.
VK3KX—S. R. Coleston, 15 Oakhill Rd., Mt. Waverley, 3149.
VK3AHT—A. R. Webb, 17 Caldwell Rd., Vermont, 3133.
VK3AYX—T. J. Stacey, "Enterprise," Springvale, 3171.
VK3BDK—D. K. W. Bradbury, 1 Shrimpton Crt., Box Hill North, 3129.
VK3BFM—J. H. Miller, 16 Omaroo Rd., Frankston, 3199.
VK3BFN—S. D. C. Tovey, 10 Clare St., Mordialloc, 3195.
VK3BFO—A. M. Preston, 2 Pynsent St., Horsham, 3400.
VK3BFQ—R. E. Simmons, 183 Mitcham Rd., Mitcham, 3132.
VK3BGS—G. C. Studd, 1536 High St., Glen Iris, 3146.
VK3BHS—U. H. Shaw, 29 Cecil St., Benalla, 3672.
VK3BIB—I. J. Wicks, 3 Clarke St., Blackburn, 3130.
VK3YFL—B. L. Dunkley-Smith, 62 Rowe St., Ballarat, 3350.
VK3YFQ—J. W. Williams, 107 Ontario Ave., Mildura, 3500.
VK3YFT—A. Horan, 35 Ropley Ave., Balwyn, 3103.
VK3YFU—R. J. Dickson, 7 Vaynor St., Niddrie, 3042.
VK3YFV—A. J. Crane, 4 Palm Crt., Lower Templestowe, 3107.
VK3YFW—W. G. McDermott, 1 Dwyer Ave., Reservoir, 3073.
VK3YFY—P. R. Barker, 22 Beauford St., Huntingdale, 3166.
VK3YGB/T—G. C. Brown, 18 Hedderick St., Essendon, 3040.
VK3YGD—I. D. Gardiner, 5 Venice Crt., Glen Waverley, 3150.
VK3YGM—G. V. E. Mason, 3 Mason Crt., Highett, 3190.
VK3ZDN—L. A. Maschette, Station: 95 Blythe St., Altona, 3018; Postal: C/o. Victoria Barracks, St. Kilda Rd., Melbourne, 3004.
VK3ZTC—A. N. Richardson, 38 Aberdeen Rd., South Blackburn, 3130.
VK3ZWP—B. B. Hocking, 45 Wallace St., Morwell, 3840.
VK3ZYA—R. D. Young, 28 Walbundry Ave., North Balwyn, 3104.
VK4LS—L. B. Simpson, 8 Adams St., Wynnum, 4178.
VK4PN—P. R. L. Dunbar, Box 37, Scout Rd., Petrie, 4502.
VK4QB—B. D. Bannister, Lee Long St., Atherton, 4883.

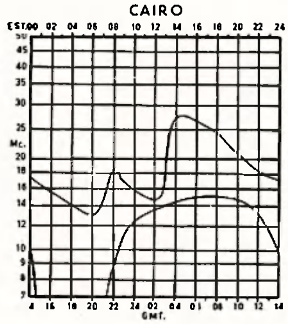
PREDICTION CHARTS FOR SEPTEMBER 1971

(Prediction Charts by courtesy of Ionospheric Prediction Service)

BARBADOS



CAIRO



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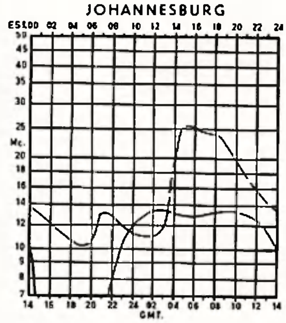

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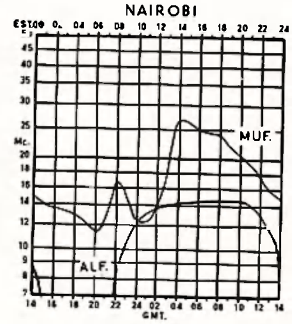

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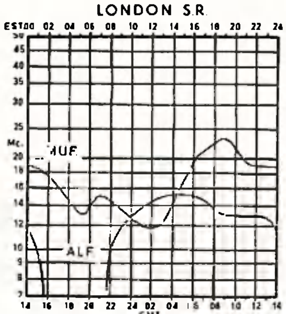

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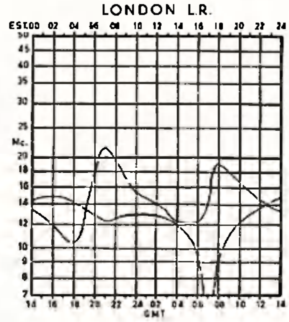
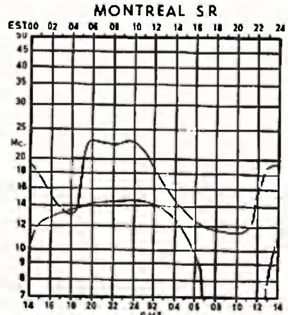


MONTREAL S.R.



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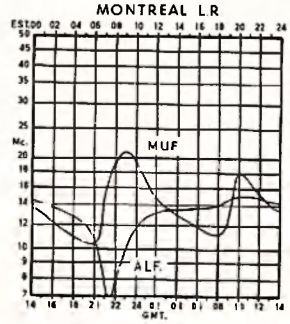
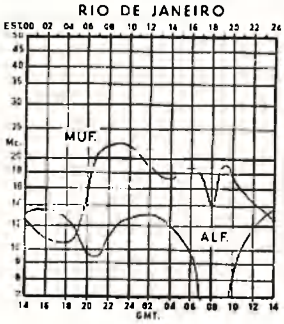
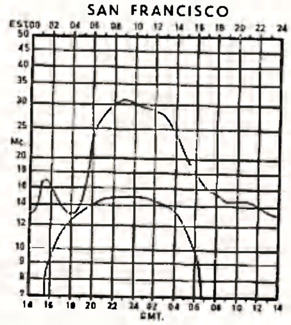


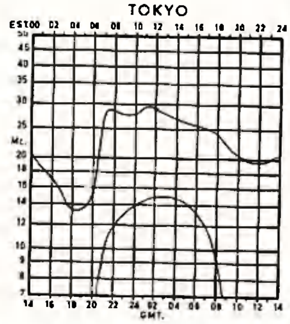
RIO DE JANEIRO



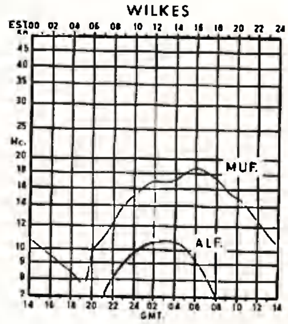
SAN FRANCISCO



TOKYO



WILKES



VK4YG—E. G. Gabriel, 3 Corkhill St., Freshwater, Cairns, 4870.
VK4ZGC—G. C. Lovell, 42 Jolly St., Clayfield, 4011.
VK4ZJM—J. A. Moores, 6 Thomas St., Wilton, 4051.
VK4ZMI—M. A. Clarke, 8 Kefford St., Kingaroy, 4610.
VK4ZNM—N. M. Langley, 3 Zephyr St., Aspley, 4034.
VK4ZNZ—C. B. Howard, 42 Mylne St., Chermside, 4032.
VK4ZRU—R. J. Rush, 21 Angelina St., Sunnybank, 4109.
VK4ZTU—K. W. Collins, Station: Portable; Postal: 15 McLean St., Goondiwindi, 4390.
VK5ZCV—C. V. Rohlach, 9 Coronation Ave., Tanunda, 5352.
VK5ZFZ—G. T. Dicker, 12 Mulcra Ave., Park Holme, 5043.
VK5ZMM—M. J. W. Mitchell, 3 Morehead St., Burra North, 5417.
VK5ZTD—T. M. Dixon, 36 Coppleridge Dr., Elizabeth Vale, 5112.
VK5ZXY—J. R. Waller, 99 North Tce., College Park, 5069.
VK6KO—J. K. Olsen, 23 Dallas Cres., Wanneroo, 6065.
VK6WE—W. T. Widmann, 1 Learmonth St., Exmouth, 6707.
VK6ZBV—J. E. McKenna, 111 Lyndon Cres., Dampier, 6713.
VK6ZEK—J. P. Hughes, 182 Coode St., Como, 6152.
VK8AX—P. D. Robinson, P.O. Box 10, Alice Springs, 5750.
VK9DC—D. R. Colvin, Station: Ukarumpa, N.G.; Postal: C/o. S.I.L., Ukarumpa, E.H.D., N.G.
VK9DP—J. P. Jonasson, Station: Air Corps Rd., Lae, N.G.; Postal: C/o. Box 168, Lae, N.G.
VK9ZLC—C. R. Ludewig, C/o. D.C.A., P.O. Box 2087, Konedobu, P.

ALTERATIONS

VK2TQ—T. T. Tatham, 38A Holmes St., Turramurra, 2074.
VK2AKT—L. M. Le Breton, 90 Lone Pine Ave., Umina, 2257.
VK2AXQ—J. F. Irvine, 22 Holly St., Castle Cove, 2069.
VK2ZBA—J. S. Adkins, 8/42 Muston St., Mosman, 2088.
VK2ZQZ/T—S. M. Garnham. Addition of /T.
VK3BM—B. R. Mann, 9 Connell St., Swan Hill, 3585.
VK3DF—M. Dalton, 28 Prospect St., Mt. Waverley, 3149.
VK3LL—M. V. Busch, 42 Goold St., Bairnsdale, 3875.
VK3MM—M. P. Marschall, 2 Parker St., Preston, 3072.
VK3SE/T—S. E. Widgery, 409 Grant St., East, Ballarat, 3350.
VK3UK—V. E. Marshall, 5 Rendlesham Ave., Mt. Eliza, 3930.
VK3AHO—W. R. Hempel, Station: "The Elms," East Wangaratta, 3677; Postal: 33 Krichauff St., Page, A.C.T., 2614.
VK3AIR—K. B. Ireson, 11 Carn Ave., Ivanhoe, 3079.
VK3AJC—J. R. Edwards, 2/48 Spray St., Elwood, 3184.
VK3AVX—O. T. Lucas, 2 McKenzie's Rd., Cowes, 3922.
VK3BBA—I. R. Ampt, 4 Champion St., Doncaster East, 3109.
VK3BBH—A. F. W. Haddrell, Station: Smiths Gully Rd., Smiths Gully; Postal: C/o. P.O. Smiths Gully, 3760.
VK3BEJ—R. C. Lile, 371 Park St., Carlton, 3054.
VK3CCA—R. J. Linsket, 4 Sale Crt., Broadmeadows, 3047.
VK3YBX—D. M. Hunt, 1 Courtney Pl., Epping, 3076.
VK3YCQ—K. E. Purchase, Lot 25, Gordon Ave., Tecoma, 3160.
VK3YDD—W. Yunker, 747 Glenferrie Rd., Hawthorn, 3122.
VK3YDH—A. N. Campbell, Lot 126, Mont Albert Dr., Campbellfield, 3061.
VK3YDN—J. F. Bear, 28 Farleigh Ave., Burwood, 3125.
VK3ZRM—M. J. Richardson, 23 Avalon Rd., Rowville, 3178.
VK3ZTS—P. J. Tyers, 7/674 Inkerman Rd., Caulfield North, 3161.
VK3ZUR—L. Janes, 10 Barclay Close, Tullamarine, 3043.
VK4ZDR—D. R. McLean, 22 Tianby St., Biloela, 4715.
VK5TP—T. Roberts, Station 538 South Rd., Kurralta Park, 5037; Postal: P.O. Box 29, Brooklyn Park, 5032.
VK5ZAY—K. R. Bone, Station: Jervois, 5259; Postal: P.O. Box 20, Tailem Bend, 5260.
VK6JX—J. A. Large, 51 Lionel St., Kalgoorlie, 6430.
VK6PK/T—P. C. Kloppenburg, Flat 20, Tuckeys Holiday Flats, Carnarvon, 6701.
VK6ZGF—J. A. Hassell, Station: 55 Birdwood Pde., Dalkeith, 6009; Postal: 15/381 Barker Rd., Subiaco, 6008.
VK7BP—B. W. Proudlock, 11 Watkins Ave., West Hobart, 7000.

CANCELLATIONS

VK1JT—J. E. Townsend. Now VK2BTJ.
VK1ZMR—R. Miles. Now VK1MP.

VK2ZAX—L. A. Maschette. Now VK3ZDN.
VK2ZMR—R. Miles. Now VK2BMG.

VK3IM—Q. N. Porter. Not renewed.
VK3MW—S. G. White. Not renewed.
VK3UV—L. E. Martin. Transferred to N.G.
VK3XI—H. G. Duggan. Not renewed.
VK3ADE—R. D. Edwards. Not renewed.
VK3AES—J. L. Morris. Now VK2BES.
VK3AHP—J. M. Hamilton. Not renewed.
VK3AHY—J. Vogel. Transferred to W.A.
VK3AVH—V. W. Hercus. Not renewed.
VK3AXK—S. R. Coleston. Now VK3KX.
VK3AXL—J. A. Ferguson. Transferred to W.A.
VK3BBJ—J. Gruber. Not renewed.
VK3BDZ—V. W. Harrison. Not renewed.
VK3YBB—J. E. McKenna. Now VK6ZBV.
VK3YEY—S. D. C. Tovey. Now VK3BFN.
VK3ZBV—J. Quigg. Not renewed.
VK3ZCX—C. R. Emery. Not renewed.
VK3ZGG—R. G. Rowlands. Now VK3AFS.
VK3ZHY—A. R. Webb. Now VK3AHT.
VK3ZKR—M. J. Howden. Not renewed.
VK3ZLC—J. L. King. Not renewed.
VK3ZNF—P. E. Carless. Not renewed.
VK3ZSY—R. L. Baker. Not renewed.

VK4EM—E. B. Mars. Not renewed.
VK4KG—K. G. Avery. Not renewed.
VK4OA—J. P. Baker. Not renewed.
VK4VA—V. F. Burman. Transferred to A.C.T.
VK4XF—J. F. Russell. Transferred to S.A.
VK4ZGJ—G. J. Richardson. Not renewed.
VK4ZPU—P. S. McWhinney. Not renewed.

VK5GJ—L. M. McGrath. Not renewed.
VK5GR—H. E. A. Gehrke. Deceased.
VK5SV—K. E. Pledger. Transferred to W.A.
VK5ZBJ—J. H. Johnston. Not renewed.
VK5ZFY—F. Richelme. Not renewed.
VK5ZIC—I. R. Clayton. Not renewed.
VK5ZJC—J. C. Vayne. Transferred to Vic.
VK5ZJL—C. D. Lill. Not renewed.
VK5ZMC—L. N. Coventry. Not renewed.

VK6CG—R. C. Crowe. Not renewed.
VK6HA—H. A. Wood. Not renewed.
VK6KP—F. W. Paulist. Not renewed.
VK6CID—L. W. Hoobin. Deceased.
VK6ZCB—C. B. Howard. Now VK4ZNZ.
VK6ZGC—B. A. Coghlan. Not renewed.

VK7RF—D. E. Briggs. Not renewed.
VK7TC—Hobart Teachers' College Electronics Club. Not renewed.
VK9AN—A. D. Hunt. Returned to mainland.
VK9JR—J. Rutherford. Not renewed.
VK9KJ—K. L. Finney. Now VK2KJ/T.

OVERSEAS MAGAZINE INDEX

ANTENNAE: 2, Fan Dipole for 40; 3, Review, Hy-Gain 400 rotator; 4, Practical Design of Mobile Aerials (h.f., v.h.f., u.h.f.); 5, Another Man's Whip (helical type); 7, Special Antenna issue—Driven vs. Parasitic Elements, Three Element Quad for Two Metres, Weather Balloon Vertical (half-wave vertical presented as having a feed impedance of 50 ohm when fed from one end—more likely to be 5,000), Tuning Mobile Antennae, Practical 40 mx DX Antenna (the Bruce); 8, The Heli-Rope Antenna, a 42 ft. Crank-up-fold-over Tower (hinged at ground level); 9, The Conical Monopole; 10, Housing an a.t.u. (plastic container), Odd Shaped Antennae (square, rectangular, triangular, etc.); 11, Quadruple Quad for Two Metres.

ACCESSORIES: C.w.—1, Another IC Keyer (Part 2); 3, The Side-Bridge C.w. Monitor, Inexpensive Electronic ($7) Keyer. A.m./S.s.b. —3, The Garden Patch. Other—8, R.t.t.y. first steps in, Motor Speed Control for Hand Tools; 9, Transistorised T.U. for r.t.t.y.; 11, S.w.r. and Cable Attenuation.

BEGINNER & NOVICE: 8, New Life for the "All-American" Five (using an old b.c. rx as part of a short wave receiving system).

RECEIVING: 2, Universal Solid State Preselector/Converter for S.W. Bands; 3, Analytical Approach to Mixer Spurious Evaluation, Reducing Spurious Responses in V.h.f. Converters; 6, Two Metre FET Converter (re-print from V.h.f. Communications); 8, High Performance Two Metre Converter; 9, Cheap General Coverage Receiver, Part 2 (Mod. R1155); 11, A Modular Receiver System.

TRANSMITTING: 7, VFO-ing the Two'er; 9, Versatile Sub-Modulator with Speech Compression using ICs; 10, Discussing the KW-2000B (Review, very thorough); 10, Two Metre Portable Transistor Tx; 11, A 2 Mx Walky-Talky; 11, 28-432 MHz. Converter with FET Mixer.

TEST EQUIPMENT: 1, R.f. Bridge; 2, S.w.r. Bridge with Signal Source (all h.f. bands); 4, 20 MHz. Frequency Counter, FET Tester; 7, I Built a Counter (17-yr.-old builds Heath IB-101 Capacity Decades); 11, Stripline Reflectometers for 144 and 432 MHz.

EQUIPMENT MODIFICATIONS: 2, Ham-M Rotator; 7, Mods to Heath H.W. Transceivers.

POWER SUPPLIES: 7, Low Cost Transistor Supply.

KEY (all issues 1971)

1. "Break-In"—June.
2. "CQ"—June.
3. "CQ"—August.
4. "Radio Communication"—July.
5. "Radio ZS"—June.
6. "Radio ZS"—July.
7. "73"—June.
8. "QST"—June.
9. "S.W. Mag."—May.
10. "S.W. Mag."—June.
11. "V.h.f. Communications"—May.

OBITUARY

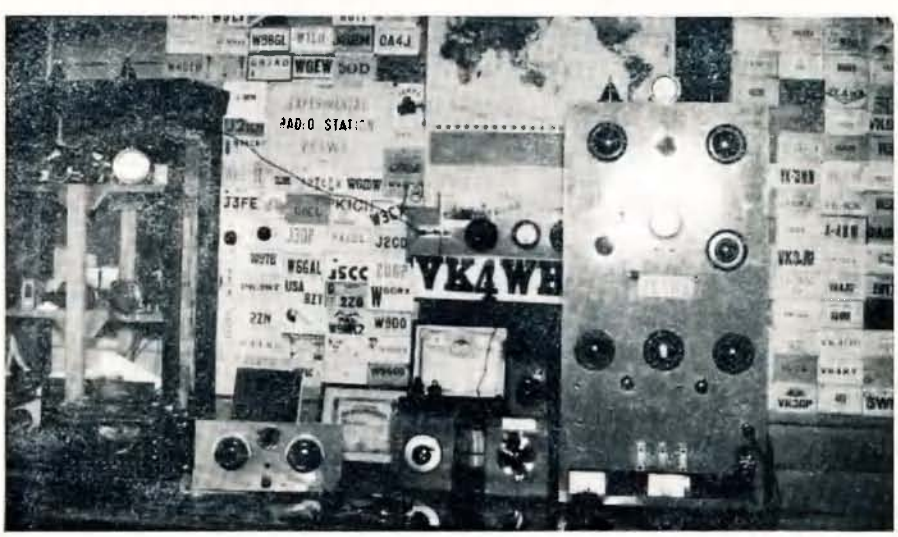
W. E. (EDDIE) HAGARTY, VK4WH

A link with early Amateur Radio in North Queensland severed with the recent death in Townsville of Mr. William Edward (Eddie) Hagarty, VK4WH, who died at the age of 66 years.

He was licensed at an early age in Longreach and experimented extensively with all types of receiving and transmitting equipment. He was credited with a few "firsts" in radio while at Longreach.

He was a keen supporter of the Townsville Amateur Radio Club and held the position of Secretary and Treasurer for many years.

Active throughout his years in Townsville, I am sure many Amateurs in Australia and overseas will remember Eddie Hagarty.



DIVISIONAL NOTES

NEW SOUTH WALES

This marks the re-introduction of Divisional Notes in "Amateur Radio". Club Secretaries and Publicity Officers are reminded that these notes (and material for the Calendar) should reach the sub-editor at the VK2 rooms on or before the general meeting night. Deadline for Nov. "A.R." is Sept. 24.

VK2AJE has tendered his resignation from Council, but remains as Hon. Solicitor. His place has been taken by Mike Farrell, VK2ZNA (awaiting his full call). Mike is active on 6 and 2 mx as well as Sec. V.h.f. Group.

At Sept. 24 gen. meeting we hope Mr. C. Allan can give us a lecture on Civil Defence Communication. The Division is collecting equipment suitable for use by Amateurs in Indonesia. While complete equipment is preferred, parts suitable for constructional use would be acceptable. Please leave gear at the rooms; further details available from the Admin. Secretary.

Tender submitted recently for high-band f.m. units was unsuccessful.

Since the robbery at the Divisional Station VK2WI, Dural, in Oct. 1969, the communication needs of the VK2 Division have been conducted from our Atchison St. Station (VK2AWI). While this site has provided fair v.h.f. signals, the h.f. coverage has been deteriorating for many months, usually in ratio to the increasing high rise development in the Atchison St. area. A few months ago an 80 mx transmission was added to the broadcast system to supplement the 40 mx signal.

In the meantime, work has proceeded at Dural to install the new h.f. transmitters, power wiring and control equipment. At first, transmissions will be on our usual frequencies on 40 and 80 mx a.m. and the 6 and 2 mx nets as at present. Once we have operation on our main frequencies, a 160 mx a.m. transmission and s.s.b. facilities for 80, 40 and 20 mx will be added. On v.h.f., beacons will be installed on 6 and 2 mx (intended frequencies 52.2 and 144.2 MHz.). On u.h.f., a 70 and 23 CM. tx will be installed. We hope the new h.f. tx's will provide better coverage to southern VK2 where currently our signals are being overridden by the closer Interstate stations.

The VK2 V.h.f. and T.v. Group is handling the ZL 2 mx Converter (produced by the Christchurch V.h.f. Group) which sells in Australia for $9 postage paid. Based on an R.S.G.B. design, it ends up as a very neat 1¼ x 3⅞ inch p.c. board. For full details write to the Secretary, V.h.f. Group, via the rooms.

Loan of Equipment: The VK2 Division has a number of 50w. f.m. base stations suitable for simplex operation on 146 MHz. nets. We also have a limited quantity of duplex units suitable for conversion for repeaters. We are prepared to loan these to member clubs on an indefinite loan arrangement. Please note these are available to **VK2 Member Clubs Only** and applications from individuals will not be considered. For further details please write to the Secretary, W.I.C.E.N. Committee, via the rooms.

Morse Instruction: Bill VK2LH has taken over from Doug VK2AVC, to whom our grateful thanks for past efforts. Operators are always required, so if you can help please contact Bill or VK2 Council. Tapes from Max VK2BMK at small charge plus post, beginners to 20 w.p.m. in 5 inch spools and C90 series cassettes—loan period two months.

St. George Radio Society (V.-Pres., VK2AAC, phone 587-0406 evenings; Sec., VK2BMM, Mike McKenzie, 16 George St., Penshurst, 2222) meets in School of Arts, Short St., Carlton, from 1915 hours. (Check St. George "net" Tues. 14100 KHz. s.s.b. 2030 hrs.) Formed in May 1971 for everyone interested in Amateur Radio.

Illawarra Branch: Construction of Moonbounce Project tx is virtually complete (testing to dummy load to be done). Final phase of circularly polarised feed system installation should also be completed soon. Dapto site and buildings are being repaired ready for installation and operation of the equipment.

(Supplied by Sub-Editor, Tim Mills, VK2ZTM)

SOUTH AUSTRALIA

Jubilation in the Div. Council room greeted the news of the re-appearance of Div. Notes and I was the unfortunate "volunteer". My first task is to pay homage to my predecessor, Warwick ("Pansy") Parsons, VK5PS, who produced those eminently readable notes for many years. Without a ready network of spies, there may be a little difficulty in meeting printing deadlines for the next few months, so these notes may be confined to general topics pro tem.

To introduce myself, I was first licensed in 1960 with a Z call, followed by the full call in 1962. My main interests are v.h.f., constructing gear and management. I hope it will be possible in future issues to highlight interesting local events and personalities. Please let me have your South Australian news and views not later than a week before the end of the month. Thank you and 73.

(Supplied by Bart VK5GZ.)

(Ed.—Bart's notes continued with items which have been taken out into the Div. Directory and Calendar.)

DIVISIONAL DIRECTORY

NEW SOUTH WALES

Rooms: 14 Atchison St., Crows Nest, N.S.W., 2065. Mon.-Fri. 10-12, 13-15 hrs. (15-21 on 4th Fri.); Admin. Sec., Mrs. Judy Deans, phone 02-43-5795; Gen. Mtgs. 4th Fri. (Dec. 3rd Fri.); Council Fri. before and Thurs. after Gen. Mtg.; V.h.f. Group 1st Fri. (Chair. VK2ZGW/T, Sec. VK2ZNA); S.w.l. Mtg. 3rd Fri.; Theory Classes 2 nights weekly; Correspondence Course, VK-2IR; Y.R.C.S. Supervisor, VK2BSJ; W.I.C.E.N., VK2GN; Disposals, VK2ZIM (store at rooms open 1st, 2nd and 4th Fri. and 2nd and 4th Sat., 1330-1600 hrs.); Box 1734, G.P.O., Sydney, N.S.W., 2001, for QSL Bureau VK1/2.

VK2AWI: Sun. 1100 hrs., 3595 KHz. a.m., 7146 s.s.b., 52.525 MHz. f.m., 53.866 a.m., 145.08 a.m., 146.0 f.m.; Sun. 1930 hrs., 52.525 MHz. f.m., 53.866 a.m., 145.08 a.m., 146.0 f.m., 432 a.m. relay; Comm. Off. VK2AXJ, phone 02-798-9021. Hunter Branch: Mon. 1900 hrs. 80 mx.

Morse Code: VK2BWI nightly 3550 KHz., 1930 hrs. and frequently on 2 mx a.m. by VK2ARF as VK2BWI on 2000 hrs. Wollongong Tues. on 53.982 MHz. a.m. For Morse tapes contact VK2BMK.

VICTORIA

Rooms: 478 Victoria Pde., East Melbourne, Vic., 3002, Mon.-Fri. 10-15 hrs.; Admin. Sec., Mrs. Enid Bellairs, phone 03-41-3535; Gen. Mtgs. 1st Wed.; Council, 4th Mon.; V.h.f. Group, 3rd Wed. (Chair. VK3AUI, Sec. VK3AOT/T); S.w.l. Mtg., 2nd and last Fri.; Theory Classes two nights weekly Mon. & Tues. (VK3ATP, VK-3AUJ); Correspondence Course, VK3ZZP and VK3AOH; Y.R.C.S. Supervisor, VK3ZDK; W.I.C.E.N. VK3TX; Disposals VK3AS (Box 65, Mt. Waverley, Vic., 3149); Inwards QSLs to rooms or Mr. E. Trebilcock, 340 Gillies St., Thornbury, Vic., 3071; Outward QSLs to rooms or VK3XM (stickers $1.50 per 100).

VK3WI: Sun. 1030 hrs., 1825 KHz. a.m., 3600 s.s.b., 7146 a.m. (7135 after 1100 hrs.), 53.032 MHz.$ a.m., 144.5 a.m., 146.0 f.m.; Chair. B/C Com., VK3AUI, phone 03-288-2794. (Call back 1st Sun of month by a Zone station on roster.)

Morse Code: Lessons at rooms, Thurs. by VK3JL.

QUEENSLAND

Address: P.O. Box 638, G.P.O., Brisbane, Qld., 4001; Mtgs. at Qld. Motor Sporting Car Club, 23 Boyd St., Bowen Hills; Gen. Mtgs., 4th Fri.; Council, 1st Thurs.; V.h.f. Group, 3rd Fri. (VK4ZHA); Y.R.C.S. Supervisor, VK4EV; QSL cards to above address.

VK4WI: Sun. 0900 hrs., 3580 KHz., 7146, 14342, re-broadcast by VK4IO on 52.4 MHz. and VK4IE on 146.0 MHz.; B/C Off., VK4HB.

Morse Code: Tues.-Fri. 1930 hrs. 3580 KHz.

SOUTH AUSTRALIA

Address: P.O. Box 1234K, G.P.O., Adelaide, S.A., 5001; Mtgs. at Master Builders' Assn., 47 South Terrace, Adelaide; Gen. Mtgs. 4th Tues. (except Dec.); Council, 3rd Fri.; V.h.f. Group, 1st Thurs. at Goodwood Boys' Tech. High School (classroom on N. side), Lily St., Goodwood (Chair. VK5QH, Sec. VK5QZ); Y.R.C.S. Supervisor, VK5OD; QSL cards, VK5RX.

VK5WI: Sun. 0930 hrs., 1825 KHz. a.m., re-broadcast by VK5KF on 7146 a.m.; B/C Off., VK5XY.

WESTERN AUSTRALIA

Address: P.O. Box N1002, G.P.O., Perth, W.A., 6001; Mtgs. at Science House, 10 Hooper St., West Perth; Gen. Mtg., 3rd Tues.; Council, last Fri.; W.A. V.h.f. Group, 4th Mon. in D.C.A. Workshops Canteen, 86 Guildford Rd., Maylands (Sec. VK6ZAF); Y.R.C.S. Supervisor, VK6LO; W.I.C.E.N., VK6DD; QSL cards, VK6RU.

VK6WI: Sun. 0930 hrs., 3600 KHz. s.s.b., 7080 s.s.b., 52.4 MHz. a.m., re-broadcast on 2 mx; Sun. 1730 hrs., 14100 KHz. s.s.b.; B/C Off., VK6HP, phone 092-60-4379.

TASMANIA

Address: P.O. Box 851J, G.P.O., Hobart, Tas., 7001; Mtgs. at 147 Liverpool St., Hobart; Gen. Mtgs., 1st Wed.; Council, 2nd Mon.; V.h.f. Group, 3rd Wed. (Pres. VK7ZLH); Y.R.C.S. Supervisor, VK7KK/T; Equipment, VK7ZMK; QSL cards to Box 371B, G.P.O., Hobart, Tas., 7001.

VK7WI: Sun. 0930 hrs., 3672 KHz. s.s.b., 7130 a.m., 53.032 MHz. a.m., 144.10 a.m. (146.0 f.m. approval awaited), 432.6 a.m. (temp. discontinued); B/C Off., VKs 7FM, 7BJ, 7CT, 7OM and 7AL.

OTHER QSL BUREAUS

QSL Bureaus for VK8, VK9 and VK0, S.w.l's and unlisted calls only, see 1971 Australian Call Book, page 55.

DIVISIONAL OFFICERS, 1971-72

Presidents: VKs 2ACV, 3CDR, 4NP, 5UL, 6HD, 7ZAS.

Vice-Pres.: VKs 2YB, 3YQ, 4MU, 5TY, 5ZKK, 6DD, 6HP.

Hon. Sec.: VKs 2ZTM, 3BAG, 4QF, 5KF, 6ZDK, 7CL.

Treasurers: VKs 2ZIA, 3AXC, 4UC, 5TL, 6EU, 7MD.

Fed. Councillors: VKc 2GN, 3TX, 4ZGL, 5TY, 6ZDK, 7EJ.

Div. Council members, extra: VKs 2AXJ, 2APQ, 2YB, 2ZIM, 2ZGW, 2ZNA, 2GN; 3IZ, 3TX, 3AJV, 3AUI, 3AUJ, 3ZCK, 3ZWN; 4AK, 4EV, 4HB, 4RL, 4XX, 4ZBJ, 4ZGM, 4ZHA; 5GZ, 5WN, 5XY; 6DA, 6LO, 6PG, 6ZK; 7EJ, 7JV, 7VK, 7ZMK.

All times quoted are local times; all meetings are at 2000 hours unless otherwise stated.

Membership fees and Federal officers will appear in a later issue.

ZONE AND CLUB DIRECTORY

See also 1971 Australian Call Book, page 58.

VK2: Blue Mts., 3rd Fri.; Gosford, 1st Fri. (business), 3rd Fri. (general); Nepean, 1st Wed.; Newcastle, 1st Fri. (except Jan.); Wollongong, 2nd Mon.

VK6: Carnarvon Am. Radio Club, as reqd.; Ockley Radio Club, VK6ZBT.

DIVISIONAL CALENDAR

Listen to Divisional broadcasts also.

NEW SOUTH WALES

Sept. 10: "Open Day" at Sydney Technical College, School of Applied Electricity from 1000-1700 hrs. Exhibits in class rooms in Building 20 (old Syd. Tech. College, off Harris St., Ultimo) and Building 38, second floor (ex Marcus Clarke) opp. pedestrian crossing at Railway Square.

Sept. 22: 2 mx Fox Hunt.

Sept. 26: Nepean District Am. Rad. Club Annual Field Day at VK2WI, Quarry Road, Dural, 0930 to 1615 hrs.

Oct. 1: "Members Built It" night, Hunter Branch in Room 6, Cleg Bldg., Newcastle Tech. Coll., Tighes Hill, from 2000 hrs.

Oct. 2/3: South-West Area Convention (Area 5) at Grong Grong. Dinner in Grong Grong Hall on Sat., at 1830. Sun. Field Day. Write W.I.A., Box 10, Grong Grong, N.S.W., 2593, for details. (Courtesy VK2AEC).

Oct. 17: Hunter Branch Annual Field Day at Marmong Point Park from 1000 hrs.

Oct. 22: 2 mx Fox Hunt.

VICTORIA

Sept. 19: V.h.f. Group Rally at Gembrook Sports Ground 0900 to 1630 hrs. (VK3AOT, phone 277-8295).

Oct. 2: Eastern and Mt. Districts Rad. Club Spring Social at Ferntree Gully National Park.

Branch and Club Secretaries are invited to write to the Editor for special advertising rates for W.I.A. activities listings. Future insertions of the Calendar will have to be severely restricted in length.

CORRESPONDENCE COURSES

The VK2 Course Supervisor reports that **Stage 2** of the Correspondence Course has been re-written and considerably improved upon. Therefore, all affiliated Clubs who have been previously issued with complimentary copies for their own internal classes are requested to write to the Course Supervisor via the VK2 rooms advising the approximate date on which they received their first copies. On receipt of such advice, a new copy will be despatched. **Stage 3**, first section has been similarly updated and is also available. **Stage 1**, very much in need of substantial editing, is now being put to stencils and will be available later in the year. (C. Bardwell, Course Supervisor)

R.D. CONTEST

Have you sent in your Log?

VHF

Sub-Editor: ERIC JAMIESON, VK5LP
Forreston, South Australia, 5233.
Closing date for copy 30th of month.
All Times in E.S.T.

AMATEUR BAND BEACONS

VK0	53.544	VK0PH, Casey.
	53.032	VK0TM, Macquarie Island.
VK3	144.700	VK3VE, Vermont.
VK4	144.390	VK4VV, 107m. W. of Brisbane.
VK5	53.000	VK5VF, Mt. Lofty.
	144.800	VK5VF, Mt. Lofty.
VK6	52.006	VK6VF, Bickley, Perth.
	52.900	VK6TS, Carnarvon.
	144.500	VK6VE, Mt. Barker.
	145.010	VK6VF, Bickley.
VK7	144.900	VK7VF, Devonport.
VK9	144.600	VK9XI, Christmas Island.
ZL1	145.100	ZL1VHF, Auckland.
ZL2	145.200	ZL2VHF, Wellington.
ZL3	145.000	ZL3VHF, Christchurch.
JA	51.995	JA1IGY, Japan.
W	50.091	WB6KAP, U.S.A.
HL	50.100	HL9WI, South Korea.
ZK	50.100	ZK1AA, Cook Island.
KH6	50.101	KH6EQI, Hawaii.
	50.015	KH6ERU, Hawaii.

There are some changes to the beacon list this month. Two letters this month concern operations in the Antarctic region. Firstly, Mike VK3ASQ advises that the Casey beacon originally known as VK0GR has now been taken over by Phil VK0PH and operates under that call sign, using keyed c.w. at 5 w.p.m. Transmitter runs 120 watts d.c. input to a pair of 6146 valves, antenna 3 el. yagi 20 feet high, and operates for 23 hours per day. Phil listens between 1900 and 2000 hours daily, and also operates on 14.120 MHz. at 1900 Monday, Wednesday and Friday.

Also from Mike comes word of a further beacon, VK0TM, on Macquarie Island, operated by Fred, 53.032, using a Lafayette HE55B transceiver, running 15 watts c.w. Phil reports hearing this beacon late in April, a distance of about 1,100 miles. So the possibility exists of the first VK0 to VK0 QSO on 6 metres in the future. As a matter of interest, the VK0PH beacon will shortly be voice modulated using a tape loop. (Whilst there is some merit in this, I do feel that keyed c.w. is the best method for beacons, being a mode more suited for difficult conditions. A mixture of voice and keyed c.w. may be a compromise to be considered!—VK5LP)

Also on the subject of the "cold country" beacons is a letter from Roger VK3ZRY, ex-VK0GR 2nd op. He reports the location of Casey Base as being Lat. 66 degrees 17 minutes South, Long. 110 degrees 32 minutes East. This heading is also suitable for South Africa from the southern States, and a Great Circle path running through Mawson and Casey very nearly coincides with Melbourne. People living between Albany and Fremantle can aim their beams just West of South and will be very close.

Roger goes on to say that he has brought back the log of VK0GR and would be grateful if people could assist him by sending any reports, HEARD or NOT HEARD, and details of the times they listened, equipment details, beam heading, etc. The beacon was first put into operation on 6th January, 1971.

Some equipment details: Transmitter consists of 6AC7 crystal oscillator, 6L6G doubler/driver and two 6146s in push-pull. The driver was run from an electronically regulated supply. The keyer was later modified and a keying relay keyed from a contact wheel. Some trouble was experienced with the 3 el. yagi. Designing and building an antenna to survive 60-plus knots blizzards presents a few problems!

Being very interested in propagation to and from Antarctica prompted Roger to build the beacon, particularly as the amount of sporadic E which extended to the higher frequencies as recorded on the ionosonde equipment confirmed his interest. Any help you may be able to pass on to Roger would be greatly appreciated.

Thank you chaps for your information on Antarctica, it has filled a gap standing for some time. The coming summer months may well be a time for confirmed contacts between Antarctica and Australia, particularly if you bear in mind that Macquarie Island is about 700 miles south of Tasmania and could be good for single hop from the mainland.

THE VICTORIAN VHFer

Congratulations to the editor and other helpers on the production of a fine journal covering the v.h.f. scene in VK3. There is plenty to read in the 18 pages presented in the first issue, which arrived on my desk recently. Pleased to note the South-East area of VK5 rates a mention and it is to be hoped this segment will be a regular feature. There's an interesting letter from VK3AFW on a proposal for two metre band planning, quite thought-provoking and worth reading. George VK3ASV describes a mobile antenna (5/8 wavelength whip) which loads and works well on both 6 and 2 metres! George also gives details of the Eastern Zone 2 metre band plan; and so it goes. My copy from Mr. Cook, VK3AFW, and I hope there will be items of national interest which I can select for "A.R." from time to time.

BEACON FREQUENCIES

The idea of having an exclusive beacon allocation appears to be gaining in popularity, and I believe has much to commend it. Present thoughts seem to be from 144.500 to 144.700, which is nicely placed for the second 500 KHz. tuning segment of the average s.s.b. transceiver when using the 28 MHz. band for v.h.f. tuning (and most people do!). It will also mean that the average yagi, say 10 elements, will still have useable gain in that segment even when cut for near the band edge. It also keeps the beacons, which must be considered DX, in an area free from usual high activity interference. It would be nice in any changes being made in the future to beacon frequencies to have them in some better order, perhaps 144.510 for VK1, 144.520 for VK2, 144.530 for VK3 and so on. However, I don't believe this is as important as ensuring all beacons are left uncluttered by other signals, and for this reason alone it would be well worth getting them together somewhere on the band. What do you say? A final thought, capital city beacons could be between 144.500 and 144.600, out-of-town (country) beacons in areas like Eastern Zone of VK3 could be in the segment 144.600 to 144.700. Agree?

ZL OPERATION ON 6 METRES

A letter from Geoff VK3AMK advises that "ZL2BFR will be operating at 1200 feet a.s.l. east of Palmerston North during a 6 metre contest on 26th Sept., 1971. Operation will be 0800 to 1200 E.S.T. with four 1-hour periods. Power approx. 30 watts to 3 el. yagi. He will be looking for possible VK contacts. Modulation will be a.m." Geoff realises it might be a bit optimistic for the time of year, but one never knows. He mentions also that it is unfortunate many ZLs tend to operate just below 52 MHz., which makes it very difficult for those areas subject to Channel 0 trouble, with their sound carrier on 250 KHz. below.

I agree Geoff, it is a problem, but it is little use the ZLs moving amongst our crowded lower end of 52 during DX openings, and their antenna gain will start dropping off seriously if they move up towards the latter half of 52 MHz., as their antennas are more likely to be cut for about 51.5 MHz. So it seems New Zealand stations looking for contacts into VK3 or VK4 should operate nearer 51 MHz. than 52 MHz. to give the VK operators a chance. Geoff himself will be active on both 2 and 6 metres this coming season on s.s.b. Thanks for the letter.

S.E.R.G. CONVENTION

Colin VK5DK reports from Mt. Gambier of another very successful Convention during the June holiday week-end. Total attendance, about 150 people with 66 Amateurs or S.w.l's registering. Five VK7s came over by plane, which shows there are some keen types around, and speaks well for the reputation of the Convention. A couple of points of interest in that a perpetual trophy has now been awarded for the Amateur showing the most outstanding success at the Convention. It is a 4CX10,000A tube suitably mounted and inscribed, with the winner's name on a small shield. This year it was won by Kevin VK3ZYP.

The "sniffer hunt" was somewhat different from last year. Colin VK5ZHJ had the tx tucked in his pocket while walking along with the "hunters". There were some very puzzled people with their beams giving queer readings and being omni-directional! The 80 metre hidden tx hunt, run for the first time this year, was a tragedy for the h.f. operators, as the first three places went to Z calls!

QSL CARDS

I have received several pleas from writers asking can I help to get a better return of QSL cards from various v.h.f. operators. I can't really help other than to appeal to operators to at least send a QSL upon receipt of one from another Amateur. After all, he may be needing cards for VHFCC, WAS, etc. You may have the award, perhaps he hasn't!

BAND ACTIVITY

Band activity generally has been quiet and portion of the past month of course I was away on holidays. Lindsay VK4ZIM on 6 mx came through briefly on 1st August in the middle of the VK5 Intra-State Contest, noticed Mitch VK5ZHM working him. Wally VK5ZWW and Bob VK5ZDX have both been active on MS to David VK8AU, and I am hoping for a report on their latest activity as a stop press item.

No other news has come to hand for the moment and I hope to get the "Meet the Other Man" segment running again soon. In the meantime, news must end at that point, with the thought for the month: "If you can give your son only one gift, let it be enthusiasm." Until next month, 73, Eric VK5LP.

REPEATER NEWS

The current VK2 Repeater position is a Channel 4 in Sydney, and a Channel 1 in/Channel A out system operates at Orange in the Central West. A Channel 4 application is awaiting approval for Newcastle. Channel 1 applications are being prepared for Gosford, Wollongong and Wagga by the Repeater Sub-Committee of those areas.

Dural: From Sept. 20 last year, Sydney Channel 4 Repeater has been operating from Dural. Present system uses A.W.A. valve equipment. A new m.c.w. identifier in form of IC keyer will replace previous mechanical system. Future plans include a solid state tx and rx, leaving the present system to become the stand-by available on a remote changeover. (VK2ZTM).

Wollongong: Being rapidly assembled by rep. sub-com. members and others. Repeater experts from Sydney attended a recent sub-com. meeting and much was gained from their comments. A request has been made for manned operation on Channel 1 and it is hoped that P.M.G. permission on a test basis will soon arrive. Call sign—VK2AMW/R. (VK2ALU)

VK7, Mt. Barrow: A new application has been submitted for Northern Tasmania, using Channel 1.

Melbourne: The Channel 1 system has been moved to the Dandenong area which has provided improved coverage.

CORRESPONDENCE:

NOVICE LICENSING

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers.

Editor "A.R.," Dear Sir,

I am very impressed with the letter from VK3RN which you published in "Amateur Radio" for July. Ron is not happy about the lack of balance in the published correspondence. This is right and his first column on page 26 is a very sound statement of facts.

I would like to suggest that the people who are in favour of Novice licensing have listed countries like France, Germany, England, Italy, Switzerland and Sweden as being without Novice licensing and therefore backwards technically, when in fact they would not condone the idea.

Let us not be carried away by statistics which state that Australia is somewhat retarded (as far as Amateur Radio is concerned) because about 1 in 2,000 of population hold an Amateur licence. The object of urgent importance should be to make all these people members of the W.I.A., then worry about increasing the ratio of Amateurs per head of population. The attitude of the office-bearers and members of the W.I.A. should be to make membership more attractive so that that dreadful deficiency which exists between the number of licence holders and members of the W.I.A. is reduced to nil. By doing this almost ALL of the problems listed in appendix "D" can be solved.

The sub-committee has suggested that if we had Novice licence holders, they should be accepted as Associate members of the W.I.A. We all know that this fee is insufficient to swell the finances of our W.I.A. and a full member is the type we must foster.

I think Ron has put the finger on the spot when he suggests that the Radio Inspectors' Branch would have to further increase licence fees very considerably to cover the administration of Novice licences and I don't have to remind you about the increase in b.c.i. and t.v.i. The latter is usually caused by lack of experience and who could be less experienced than a Novice?

The reference to school boys taking an interest in Amateur Radio as an extra activity is fine and more boys should be in it, but you don't need a Novice licence of lower standard to encourage the boys to sit for the Amateur certificate. Let me state that I know of a number of boys who in the course of doing their Leaving or Matriculation course at a high school have sat for the A.O.L.C.P. and passed without any preparation whatsoever if they were doing physics at school. Any intelligent boy who is accustomed to doing examinations during his schooling can sit for the A.O.C.P. and pass if he learns Morse, and the Regulations can be learned in one evening prior to the examination.

With reference to the 160 metre band, let me tell you that there are many "old timers" who are fostering DX on this band and enjoying excellent results.

The reference to handicapped persons has been adequately covered many years ago by the Radio Inspectors' Branch and I fail to understand why the sub-committee even lists this point.

Finally, Sir, please allow me to offer my congratulations to Ron Higginbotham, VK3RN, through your correspondence columns, for a long and very informative letter in favour of NO NOVICE LICENCE and commend his pearls of wisdom to the sub-committee and all Amateurs.

Supposing you are not a member of the W.I.A. and resent the suggestion of introducing Novice licensing to Australia, why not then join the W.I.A. and fight for your rights?

—Ivor Morgan, VK3DH
(Licensed, March 1930)

Editor "A.R.," Dear Sir,

I have heard a lot of emotional argument on Novice licensing and think that a rational look at the broad situation would help.

I feel that any changes to the existing "set up" should follow two basic principles:

(a) Be of significant (measurable) benefit to the Australian Amateur Service.
(b) Have no possibility of doing any harm to the Australian Amateur Service.

Doubt has been cast as to whether Novice licensing would bring any benefit.

If we (the W.I.A.) support Novice licensing, then let us suggest a trial period of, say, 3 to 5 years, after which if promised benefits do not result, then it can be cancelled.

Why further carve up existing bands? Let us ask for an extra 25 KHz. on selected bands as a condition of Novice licensing. This would benefit everyone and eliminate the very real possibility of losing band portions allocated to Novices if the system does not work.

I am not yet committed but do lean a little towards the "NOES" until I am convinced the two principles mentioned can be met.

—M. N. Oburtill, VK3WW.

Editor "A.R.," Dear Sir,

As I cogitate upon the pros and cons of the proposed N.L. scheme, I'm struck by the fact that the same old fragmented situation exists, as it does in most of man's structured affairs. In this case, those who will be affected most and worst, by the introduction of N.L., so far have hardly been mentioned. These are the c.w. men, who because of their comparative minority, will have the least say—or probably no say, at all—in the allocation of N.L. frequencies. DX men use the low end of all bands, simply because that is where most of the rare stations appear from time to time. Now we have the Investigation Committee suggesting frequencies for those at the c.w. periphery, without understanding the true state of the art on this part of the bands.

My objection to what is set out in Appendix "B" in the Report, is that the frequencies allocated will not be in the best interests of the Novice, the Advanced C.w. Op., or the International Scene generally. Novice operation on 3505, 7010 MHz. will cause considerable QRM and conflict with International DX.

The N.R.R.L. at the 1969 I.A.R.U. Region 1 Conference in Brussels introduced an amendment (because of the aforementioned trouble—QRM) that the first 10 KHz. of 80 metres be preserved exclusively for Int. DX. After discussion, this was agreed upon (I.A.R.U. Newsletter No. 13). This agreement made at the Conference concerns only those Hams in Region 1, but it is in the interests of all to co-operate as much as possible.

A similar situation exists on 40 metres, where the first 15-20 KHz. are used, primarily, by those seeking DX. The N.L. committee in its report on frequency allocation states, and I quote: "There is very little c.w. activity on this band" (7 MHz.). During daylight hours this is correct, but for the period of darkness this statement is entirely incorrect. This band, and to a lesser extent, 80 metres, is simply packed with DX from Asia, Europe and U.S.A., particularly during the Spring, Summer and Autumn months.

I can imagine the comments and strife among locals where a Novice is calling CQ on 3505 or 7010 when these bands are wide open to other Continents. The practical result will be that some good DX QSOs are lost and the Novice annihilated. Now, let's be sensible and shift the l.f. edge for N.L. to 3510, 7020, 21060, 28080 MHz. This will allow smoother, conflict-free operation all round and not deprive the Novice in any way—rather, it will enhance his chances to work DX. If the F.E. wants to increase the drop-out rate in Novices, then it should adopt the frequencies (low side) as set out in Appendix "B". To do so, will be to throw the Novices to the wolves.

The N.L. committee, in Appendix "C" of its report, lists ten overseas countries which permit Novice operation. Four of these countries have had the foresight to keep the Novice out of the International DX zone; the other six, have not. Japan is in this latter group and bears a mention. The JA Novices are now so numerous, and the QRM so bad, it is often impossible to work DX because of their incessant calling—something to ponder on, for A.R's future. It would be safe to say that Japan's Novice frequency allocations are not popular, nor do they work in the best interests of International DX.

It is some considerable time since I listened on the top band, but I feel that those who go to the trouble to build gear and erect special antennas in an effort to work DX on 160 metres should have the privilege of a few KHz. at the low end to themselves. We are approaching a period of low sunspot activity, which means that the LF's will be in big demand by DXers.

My above remarks may be interpreted by some as claiming undue rights for the advanced c.w. operator. Yes, I do feel these chaps should have some consideration in this regard, but it is equally important also that the Novice, with his QRP 10 watts, does not have to compete with undue QRM.

The strong anti-N.L. stand taken by VK3RN calls for a comment, or two. Mr. R. Higginbotham raises one or two very pertinent points, which the F.E. could profitably examine further, viz. the method of N.L. examinations and the surveillance of their subsequent operations. In general, though, I feel his article in "A.R." July '71 is over-reactive and few of the bogies raised would ever come to pass. Also, to predict N.L. trend in VK from figures obtained from A.R's immediate past history in the U.S.A. is, for me, too assumptive and hypothetical.

However, if F.E. accepts as a fair proposition the nitty gritty nub of VK3RN's argument, that Novices will form approx. 8½% Ham population in VK and that the relatively small number of 136 will become W.I.A. members (this figure of 136 would be valid for one particular year only), it might rightly give thought to dropping the scheme altogether.

Is there any sound basis for the assumption of 8½%? I hardly think so! The U.S.A. has six classifications of licensing—we would have only three. N.L. in U.S.A. is established—our proposed scheme is yet to come into effect. It may be that initially there will be a rush of Novice applicants before things settle down. Then, and only then, can any real evaluation be made.

On the question of N.L. examination costs to the P.M.G.: the latter might consider a scheme which works well, in some countries (I am told) whereby tests of this primary level are carried out by a panel of voluntary examiners drawn from the ranks of the W.I.A. As far as operating standards on the bands are concerned, this, surely, is up to us to keep our own house in order by setting up "Assistance Groups" to help the newcomers.

Finally, may I make a few short comments on further points made by R.H. VK3RN: Code at 5 w.p.m.; yes, a little slow, but acceptable, rather than complicate procedures. Most ops. soon go from 5 to 10 w.p.m. in a matter of a few weeks.

Re exam. jitters and the lack of ability to communicate via the written or oral words: This is common to all examinations and not peculiar to A.R. in any way.

Why do Argentine, Canada and N.Z. show better Ham-to-population ratios than VK? One possible reason is climate; more indoor pastimes in colder countries.

Why the variance in Ham-to-population in VK States? This is not unduly abnormal. Some States are small, others large, each have different populations; some have large cities concentrated in small areas, others have smaller towns widely dispersed with poor communication. Hams become Hams, partly by their own efforts and initiative but also by the influence of others. However, I do agree with VK3RN that the VK2 ratio needs looking into.

Will a Novice xtal-controlled on 10w. cause more BC/QRM than the full licensee on 300 p.e.p. input? No.

What will the drop-out N.L. do with his gear? Same as the full ticketed Ham does, when he quits.

School studies of teenage would-be Novices might suffer, if they become too involved, fiddling with A.R. I doubt if there is any foundation for such a premise. Ye gods, any hobby that keeps lads interested and off the streets must be deemed well worth while. A.R. exists for the purpose of encouraging the study of electronics and to give aid, advice and instruction to those interested.

My vote on N.L. is YES with the above reservations and the suggestion that it be undertaken on a 5 or 7-year test period. Then, if unresolvable snags persist, the scheme can be scrubbed without finger-pointing and in the knowledge that it had a fair trial.

—Al Shawsmith, VK4SS.

Editor "A.R.," Dear Sir,

I have read with considerable interest the Novice Licensing Report in the Federal Convention Minutes and am in general agreement with the concepts and decisions as far as they have gone. In particular, I like the idea of modernising the A.O.C.P. theory exam. to a more accurate and searching form.

—John Anderson, VK7ZFO.

Editor "A.R.," Dear Sir,

I am against Novice type licensing as is generally being proposed, however I am for some type of licensing for the beginner.

To lower the present theory standard would take a necessary fundamental from the Amateur Service. Alternatively, if c.w. becomes a pass to Novice licensing on tenancy basis, imagine the persistent influx of pirates after a few years.

(continued overleaf)

It seems to me that we have a communicability gap. We refer to Amateur Radio as a hobby; to the layman it is a vocation for technicians and intellectuals. If our "layman" is employed on the production line of a motor assembly plant, or wherever, chances are that he will never enter the Amateur Service. If our friend is engaged by an electronic industry he will receive the basic grounding in electrical theory and practice so necessary as a background to Amateur Radio. How many lads employed by the P.M.G's Department operate their own stations?

In short I am convinced that there should be some legal and easier way for all persons interested in radio communication to become Amateur operators of some designation.

Okay, so I've heard the argument, "If you fail the theory, sit again and again," and so on.

The writer is an acquaintance of two television servicemen who are proprietors of two very successful businesses. Each has sat for the A.O.C.P. and failed; one is adept at c.w. This happened some years ago. These people often become reticent and regrettably end up by dropping the whole idea or worse perhaps, by mildly pirating. They are often bachelors or conversely, dedicated family people with little time to spare.

With the right encouragement they would contribute to Amateur Radio with their resources, ideas and activity.

Most of us are aware of the illegal use of Amateur and other frequencies. I believe the existing legislation to be the greatest contributing factor to this problem. How many Hams pushed the button before gaining their tickets?

Wayne Green, editor-publisher of the popular "73" magazine, came up with an idea last year to encourage radio as a hobby for all and a stepping stone to full licensing. I believe it will work! An Amateur Hobby Class licence on part of 420-450 MHz. or perhaps part of 144-148 MHz. Base stations only up to 25w. of f.m. or a.m. emission; beams giving operators extra range and interest to design and construct v.h.f. and u.h.f. antennas, etc.

No code or theory but a rigid test on station operation, regulations and safety. Good quality u.h.f. transceivers are now available for around $300 and within a few years there will be good used rigs on the market at prices the beginner can afford; v.h.f. rigs are always available at reasonable prices. All station equipment would have to be P.M.G.-approved. A Call Book would give the hobbyists respectability, therefore the Service would be self policing for the most part. Doesn't Commercial Radio work this way? The restricted power and higher frequencies would encourage the intelligent operator to study for the A.O.C.P. to make use of the DX bands.

American C.B. operators rarely try for their full ticket because they have the use of the "skip" frequencies, hence the term given them by the Hams, "appliance operators". When the American business fraternity realised that the u.h.f. frequencies wouldn't "bend", they influenced the F.C.C. to lower the C.B. band to 11 metres. The results are well known to most of us; we can learn from their mistakes.

I would be pleased to see the Wireless Institute get behind these proposals. I realise that International Agreements have to be considered with respect to the code if this proposed Service is to come within the jurisdiction of the Amateur Service, however as the u.h.f. bands are generally incapable of DX work, code should not be of any consequence. If the Australian Post Office, for instance, establish a Citizens Band type service in the h.f. or v.h.f. bands we will have failed to take the initiative by not campaigning earlier for a similar service within the Amateur frequencies.

It should be obvious that this type of service can be better controlled within the Amateur bands and would bear more fruit for Amateur Radio and the Institute.

The present 11 metres handphones will have to remain for essential services such as boating safety, limited business and so on, but the new licence should draw off most of the illegal users from the handphone band.

The writer has experienced the sincere cooperation from Amateurs to interested newcomers; I have no doubt that the Hobby Class licensees would gain much from fraternisation with the "old hands". It follows that there would be a natural progression out of the ranks of hobbyists to higher class licensing; those who remain can carry on rag-chewing or whatever, much in the same way as the short range two metre enthusiasts.

To quote Mr. Rex Black, VK2YA, Chairman of the Novice Investigation Committee and founder of the Youth Radio Scheme, "There are certain people of my own acquaintance who will NEVER attain the examination techniques to pass the A.O.C.P. test, but who have definite skills in practical aspects of radio and certainly could turn into effective and reliable operators."

In my opinion the mathematics of radio theory and the music of code do not appear to be within the capabilities of the majority.

For the record, the New Zealand Post Office has provided a means for those interested in radio communication by the introduction of a Citizens Band licence. They have 7 channels from 26.425 to 26.575 MHz. and 1 channel on 465 MHz. Transmitter power runs from ½-3w. with a.m., f.m. and p.m. emissions and external antennas provide added interest. A reliable source informs me that the ZLs conduct their C.B. stations very well indeed and their Hams are quite happy with them.

I am confident that my proposals are a further improvement on the New Zealand scheme and I feel that they should be at least considered at executive level.

Some folk think we need both Novice and Citizen Bands, but I am convinced that an Amateur Hobby Class licence, if carefully conceived, can fill all needs. I believe it to be inevitable.

Let us be prepared to change, renew and rejuvenate ourselves and our interests.

—M. R. Morris.

Editor "A.R.," Dear Sir,

This is to express my favour of Novice licensing.

I have considered the facts, both for and against, and my feelings are that any problems which do arise can be overcome with the help of both the P.M.G. and the Amateurs themselves.

If the majority are for the issue of the Novice licence, I wish the W.I.A. every success with its task.

—J. W. McCulloch, VK3BEQ.

Editor "A.R.," Dear Sir,

I was somewhat relieved to read VK3RN's correspondence in the July issue regarding Novice licensing.

I have read with unsettled interest many recent articles on this subject and also found they were all in favour of this type of licence. Thinking I was "odd man out," I have suppressed my views perhaps like many others. I also found Mr. Higginbotham's views, which are undoubtedly the result of a considerable amount of research, most enlightening and thought provoking.

It would appear to me there are quite a number of the Amateur fraternity who look upon Novice licensing as inevitable, to whom I would ask, look again and find a realistic answer to these questions:

What is the expected cost of Novice licensing in dollars alone for the P.M.G. Dept., excluding manpower (of which they are already in dire need) and what bearing will these costs have on future licence fees?

Will the status Amateurs now enjoy be decreased with the introduction of a lower standard of examination, not forgetting the possibility of an increase in t.v.i. and b.c.i.?

What is the real purpose of Novice licensing? If for the sole purpose of increasing the Amateur population, what alternatives are there?

Again I would ask all Amateurs to take a long look at the whole aspect of Novice licensing NOW and ensure the outcome, whatever that may be, will be the right one.

—B. R. Hartley, VK2FE.

TARIFF ON TRANSCEIVERS

Editor "A.R.," Dear Sir,

You recently gave publicity to the lifting of tariff on Amateur band s.s.b. transceivers, and to the fact that tariff was hastily re-imposed by the Customs people at the request of Australian firms who claimed that they were producing "goods" and required tariff protection.

Enclosed is a letter from one of the firms involved, quoting the price of their locally produced "efforts". This letter reveals a Gilbertian situation, with the Duke of Plaza-Toro handing over some of his home-grown Toro produce on a plate to our Customs authorities.

Note that even with 45% "protective" duty imposed on the imported product, the local firm's prices are still 300% to 400% higher than that of the imported article.

Words fail me!

—J. R. Elms, VK6BE.

Extract of a Letter from . . .

20th July, 1971.

Dear Sir,

We acknowledge receipt of your letter regarding amateur band high frequency transceivers.

The units that we manufacture are made to P.M.G. specification RB 209, and can be supplied with or without 1 or 2 VFOs.

The receiver is fully solid state and the transmitter is solid state to the final stage. The prices are as follows:

100 watts PEP — $1,340.00
500 watts PEP — $2,320.00

Thanking you for your enquiry,

. . . .

"DX-PEDITION WITH THE ACITRON TO BY"

Editor "A.R.," Dear Sir,

According to "A.R.," July, Acitron SSB-400 is the first Australian rig to hit the market.

With the snow-balling thaw in China, what a wonderful opportunity it would be for Australia to be in first before Swan, Heathkit, Yaesu and the rest?

We have heard many Chinese commercial stations, but never a BY—assuming they will be given the same opportunities as UA in good time. Why not start now and encourage a VK team to demonstrate by way of a DX-pedition with the Acitron to BY? The time to plan is NOW.

—Jack Dunne, VK3AXQ.

☆

9M8 LICENSING

Applications for a licence to operate in Sarawak should be addressed to: Telecommunications State Headquarters (Tabatan Tali-Kom), Were Road, Kuching, Sarawak, East Malaysia.

A photocopy of the current VK licence should be enclosed.

The licence fee is 30 Malay dollars and official clearance through the Sarawak Tourist Association, Box 887, Kuching, appears to be necessary. United States citizens appear to have had few difficulties in obtaining a reciprocal licence. There is no reciprocal licensing arrangements between Australia and Malaysia.

—H. F. Evertick.

DX

By H. F. EVERTICK
C/o. P.O. Box 36, East Melbourne, Vic., 3002
(Times are in G.M.T.)

Czechoslovakia (courtesy VK4SS): Three prefixes have been in use. OM only in 1968 to celebrate 50th year of Independence and the two current series of OK and OL. Club stations (about 500 out of the 3,000 licensed stations) carry three-letter suffixes beginning with K, O or R. Foreigners on reciprocal licensing must use call sign of station being operated and their own call signs, thus OK-2BAA/SP1AA. The numerals in use indicate locality or speciality, thus OK1 Bohemia, OK2 Moravia, OK3 Slovakia, OK4 mercantile marine shipboard, OK5 and OK6 special occasional, OK7 non-Amateur experimental and OK8 foreigners.

PX Hunters ("CQ" Mag. Aug.): KQ0NEB Sept. 1-9 all bands c.w. and s.s.b., by Lincoln Nebraska Am. Radio Club for 1971 Nebraska State Fair.

Ryuku Islands (KR6) (ISWL): When these islands revert to Japan in Jan. 1972 IRCs will be useable. At present these are not exchangeable except by operators using them to send elsewhere.

Sark (Tnx Eric L30421): From Don G3HZL comes news of a Sark Island DX-pedition profected Sept. 15-21 continuous, c.w. and s.s.b., 1.8 (2000-0500z) to 28 MHz. Various call signs from GC3HZ, GC3VUQ, GC3YCQ, GC5ATJ and another GC5 (DJ5PN reciprocal call not yet known). Skeds arrangeable via Don. GC5ATJ may be active spasmodically for an additional two weeks.

Sark is the most central of the independent Channel Islands group between France and England, is hilly with precipitous seaside cliffs, motor vehicles banned and served by hydrofoil service from St. Peters Port in Guernsey.

QSL Information (Long Is. DX Assn. Bulletin, D.O.T.M., and ZL4NH):

CR3ND—CT1BH	VK3CIF—W2GHK
CT2AK—K4EVY	YJ8BL—W6NJU
C3IAZ—F9UX	3A0FN—WA4WME, DL4VA
C3IDP—ON5TO	3C1EG—OH2NB
FB8ZZ—F8US	5X5NA—G3LQP
PX0AR—F2GTE	

Awards ("QST"): DXCC endorsements—VK5MS 340.

Contest Diary: Oct. 2/3 VK-ZL-Oceania (see July "A.R." p. 19); Sept. 11/12, European DX; Oct. 9/10, R.S.G.B. 21/28 MHz. phone.

Willis Island (courtesy The Bairnsdale Advertiser): John Martin, VK3JW, of Wy Yung, one of the group with Larry Pace, VK4CGB, who recently activated Willis Is. among the millions of chattering birds is pictured here whilst operating on the island. The postponed trip to Mellish (caused by bad weather) might eventuate later in the year.

John Martin operating at Willis Island

Contest Results ("CQ" Mag.): 1970 "CQ" W.W. DX (phone) Contest—(a) Single Op., all-band, AX6HD, 2 181 240 pts.; AX6RU 1 121 952; AX2APK 607 128 (won by KV4FZ 4 961 551 pts.); (b) Multi-Op. single tx, AX2APX/Lord Howe Is. 640 156.

WPX Endorsements: VK3AHQ 850 (c.w.); (W4OPM at top with 1050).

Clubs (from Radio Newsletter 10th July): 29 DX Club of Western Aust., VK6II, affiliated to R.S.G.B.; meets monthly 4th Tuesday (?), Sept. at QTH of L60101; Oct. at VK6DD; Nov. at VK6KK.

Old Timers' Club (courtesy VK2ADE): Licensed Amateur operator for 40 years and over, formed 1947 in U.S.A., adherence to a Club Creed which is sensible and contains a clause to gather historical data, issues "Spark Gap Times" bi-monthly, and a "Blue Book". The Secretary is W6MLZ, 1300 members world wide and include VK2ADE, 2NS, 3CB, 3LC, 4VR, 5JT and 6KK.

Quarter Century Wireless Association: Licensed Amateur operator for 25 years and over, formed in 1947, issues Year Book and QCWA News quarterly, about 5,000 members world wide with 48 Chapters. The Sydney Chapter is the only one outside the U.S. and Canada, was formed 1969 and meets second Wed. each month at a local club for dinner and lecture or talk. Members include VKs 2ADE, 2AGO, 2AND, 2DA (chairman), 2DI, 2EN, 2IJ, 2OI, 2OJ, 2PF, 2RA, 2VN, 2WD, 2XT, 2YP, 2ZH/T, 2ZQ and 4MY.

Boundaries of I.T.U. Region 3: (Approx.) S. Pole up 60 deg. E. Lat. to Iran, thence E. to include Iran, Afghanistan, mainland China, Korea and Japan to an oceanic point S.E. of the tip of Kamchatka, thence south-eastwards to a point 10 deg. S. 170 deg. W., thence along Lat. 10 deg. S. eastwards to 120 deg. W., thence back to S. Pole.

Darlene 3B9DK, writing from Rodriguez Island on 13th July, said in the three weeks she had over 2,500 QSOs in 135 countries with the Swan 500C to an inverted vee, up 70 ft. She gave a thumbnail sketch of the island as about 5 miles by 7 miles, rather mountainous, rocky, volcanic origin and almost entirely surrounded by a coral reef. Population about 25,000, including 20 Europeans, of whom about half are missionaries.

Her future plans appear to include return to Mauritius late in July, air trip to Dares Salaam for touring in 5H3 and 5Z4, followed by a flight to Mahe to Jack (VQ9XX) and Maureen (VQ9YL) Roberts cruising round the world in a Chinese junk "Intrepid Dragon". It seems they plan a trip from the Seychelles to Aldabra and possibly Comoro, thence to Beira. Darlene may then go on to JY on invitation about late Sept. before her European safari which might include a DX-pedition to 3A in November if DL7FT can organise a licence for her.

Sun's X-Rays to be Mapped

A daily x-ray map which will show the source and level of x-ray activity on the sun is one major objective of a satellite package being developed by Lockheed Missiles and Space Co.

X-ray activity on the sun can be associated with solar flares and sunspots, which have a profound effect on radio transmission. These phenomena are indicators of great energy storms on the sun. But even more, a study of how and where these x-rays are generated, and their energy levels, could lead to a new knowledge of the physical nature of the sun.

Described as a "mapping x-ray heliometer," the package is being prepared under contract to N.A.S.A's Goddard Space Flight Centre for flight aboard OSO-1 (Orbiting Solar Observatory, Mission "eye"), which will scan the sun.

General objectives of the mapping x-ray heliometer experiment are to make detailed observations of x-rays emitted by the sun. These studies are aimed at:

- Determining more about solar behaviour, including how frequently x-rays arise from particular regions of the sun.
- How such x-ray activity may correlate with optical and radio observations.
- What makes x-ray activity rise and fall.
- How soon x-rays can be detected after sunspots appear.

The satellite studies will be correlated with research being conducted at Lockheed's Rye Canyon Solar Observatory.

"These objectives in themselves are not new," says Dr. Loren W. Acton, of Lockheed's Palo Alto Research Laboratory, and principal investigator on the heliometer experiment. "But in the past, experimenters have been limited by detection systems with less resolution and sensitivity. Now with this new flight package—and with the increased sophistication of the new OSO itself—we will be able to achieve far more definitive results. Translated into a daily x-ray map, these observations could be highly informative."

The Lockheed heliometer consists of three independent x-ray detection systems, and a data accumulator and processor, which prepares the collected information for the OSO transmission system. The detectors are mounted within the flight package on the rim of a wheel, which slowly scans the sun.

X-ray pulses from each of these three detection systems will be fed into 15 energy channels which span the range of x-ray energy being measured—in this case, from two to 30 KeV (thousand electron volts).

An analysis will be made of these pulse heights so as to compute the x-ray spectrum and intensity emanating from defined areas on the sun.

Because a better understanding of the sun's x-ray activity is of great interest to the scientific community, the production of a daily x-ray map by OSO-1 will be a valuable instrument for researchers. These maps will be distributed to other solar research groups, and to solar forecasting centres, providing an additional means for correlated solar studies.

The mapping x-ray heliometer is being developed under a three-year contract by Lockheed's space astronomy organisation, headed by Dr. Acton, staff scientist at the Research Laboratory. The experiment will make use of a number of previous studies conducted by this organisation.

OSO-1, scheduled for launch from Cape Kennedy in 1973, will look at the sun from an earth orbit of 300 miles. It is one of N.A.S.A's new Orbiting Solar Observatory series. Previous OSO satellites had pointing accuracies of 1/120th of a degree (30 arc seconds). The new series of OSO's will have pointing accuracies of 3 arc seconds—10 times better. OSO-1 will carry six other experiments in addition to the Lockheed mapping x-ray heliometer.

I had hoped to publish the rules relating to membership of the Key Section in this issue of "A.R.," but there are still one or two details unresolved. It will therefore have to wait a little longer. We have made some progress, though, as the little picture at the head of the column shows.

The local contact-man for the Key Section will be the Divisional Co-ordinator. The State Co-ordinators appointed so far are:

Bill	VK2YB
Ivor	VK3XB
David	VK4DP
Pete	VK5FM
Lon	VK7LJ

VK6 are still working on the problem of finding someone. Ivor is being assisted in Victoria by Rus VK3KX. Bill is being assisted by VK2ANY and VK2ZNA.

So now you know the K/S has not vanished wholly into limbo, I will QRT until next time when I hope I can tell you what the whole thing is all about. 73, Deane VK3TX.

— • • • —

FEDERAL AWARDS

W.A.V.K.C.A. AWARD

The following Amateurs have received this Award during the period 1/7/70 to 30/6/71:

Cert. No.	Call	Cert. No.	Call	Cert. No.	Call
423	ZE1BP	445	WA2HSX	466	LA9CE
424	K4RDU	446	HP1JC	467	JA1SJV
425	OK1AHI	447	CR7IC	468	JA1AFF
426	ZS5LB	448	JA2CPD	469	F9MD
427	UW9PT	449	JA4CNS	470	JA6BRV
428	UB5WE	450	ZL2ACP	471	ZL2BCX
429	YV1KZ	451	VE3DEB	472	JA8ADQ
430	JA3IVA	452	JA3APV/1	473	ZL1AIZ
431	HB9AAA	453	JA1KYV	474	JA2EG
432	JA1HBC	454	K6GKU	475	K6SSN
433	ZL4OP	455	W3HQU	476	UA9BE
434	9Y4VV	456	W1EGT	477	VE3HJ
435	F3AT	457	UB5DW	478	JA8AWH
436	JA0AZE	458	UA4CD	479	JA3AAW
437	G3BDS	459	UW0IE	480	OE1MEW
438	6W8DY	460	UA3FF	481	VE6MJ
439	UB5ES	461	ZL2AYI	482	CT1UA
440	UA0IK	462	JA3HZT	483	F2NB
441	UA0MI	463	JA2ADH	484	K8YBU
442	KA9JC	464	JA2HNP	485	DL9TJ
443	F9LX	465	WA5KPL/HR1		
444	JA6CUX				

COOK BI-CENTENARY AWARD

The following additional stations have qualified for the Award:

Cert. No.	Call	Cert. No.	Call	Cert. No.	Call
1364	AX2BFD	1370	G3AEU	1375	AX5ZU
1365	G3JVJ	1371	AX8DI	1376	G3ILO
1366	AX3ABR	1372	3B7DA	1377	AX5MF
1367	JA4BEX	1373	OK2OQ	1378	AX2ASD
1368	CR7IK	1374	W0MLY	1379	AX2BYC
1309	G2AYQ			1380	AX3AER

Any persons still wishing to apply for the above Award are reminded that no further applications will be accepted after 31/12/71. The forwarding of any outstanding applications as soon as possible would be greatly appreciated.

W.I.A. 52 MHz. W.A.S. AWARD

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Cert. No.	Call	Additional Countries
96	VK7ZNR	—

W.I.A. V.H.F.C.C.

Amendments

Cert. No.	Call	Confirmations 52 MHz.	Confirmations 144 MHz.
44	VK3AMK	174	—
46	VK3ZNJ	275	—
47	VK3ZNJ	—	302
73	VK3AMK	—	122

SILENT KEY

It is with deep regret that we record the passing of—

VK4WH—W. E. Hagarty

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WANTED for Y.R.C.S. (Victorian Division): Out-of-date A.R.R.L. and R.S.G.B. Handbooks or similar publications for new Clubs that have been formed. This can assist potential Amateurs, so please clean out those dusty book shelves and forward to: K. J. McLachlan, Victorian Supervisor, Y.R.C.S. of Aust., P.O. Box 39, Mooroolbark, Vic., 3138, or freight collect, Mooroolbark Railway Station, Vic.

WANTED: Murphy British Naval VLF Receiver or similar type tuning down to 10 KHz. or lower. R. F. Fisher, VK3BAO, 241 Royal Pde., Parkville, Vic., 3052. Phone (business hours) 340-5931.

WANTED: Receiver. Please state age, condition, price and any relavent details. Also Pye Mk. IIIA mobile transceiver converted to 6 mx for sale, best offer. G. Hambling, VK5AS, 39 Tapleys Hill Rd., North Glenelg, Sth. Aust., 5045.

WANTED: Yaesu FT50 Transceiver. Full details to VK3ZN, J. McDonnell, 38 Herbert St., Parkdale, Vic., 3195.

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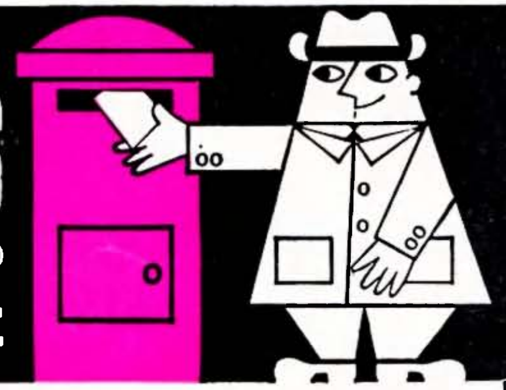

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Vol. 39, No. 10

OCTOBER, 1971

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THE "SENTINEL"

(or what you can do with your semiconductors)

I. E. HUSER, VK5QV*

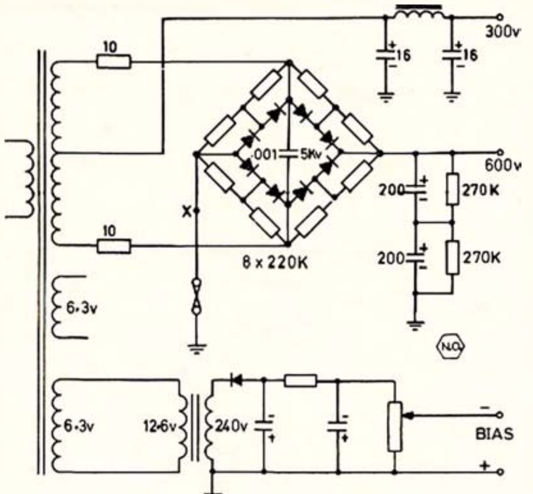


FIG 1

Much has been written in "Amateur Radio" and other publications about the design and construction of power supplies. It is not my intention, therefore, to go into the actual details of the power supply since this would only amount to a duplication of material already available.

The black box dubbed the "Sentinel," was designed originally to afford a certain amount of protection to a linear amplifier. However the basic idea could be adapted for use with other equipment.

The power requirements for the linear amplifier concerned are as follows:

600 volts at 400 mA. (peak)
300 volts at 30 mA.
100 volts negative bias.
6.3 volts.

This can be achieved with a minimum of components by using a circuit similar to that in Fig. 1.

The fact that two high tension voltages can be obtained from the one transformer makes this type of circuit an attractive proposition.

Circuits of this type, however, suffer from certain disadvantages.

Firstly, the use of semiconductor diodes allows high tension to be applied to the equipment before the valve filaments have reached operating temperature. This is undesirable and should, if possible, be avoided.

Secondly, if for any reason. bias to the valves is lost, then damage could result before the fuse blows.

Thirdly, if the fuse does blow, it will be found that the high tension does not reduce to zero. A check with a voltmeter will reveal that there is still something in the region of 300 volts at the 600 volt terminal.

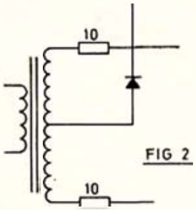


FIG 2

This can readily be overcome by the inclusion of another diode in the centre tap of the transformer, as shown in Fig. 2. If now the fuse blows, then both the 600 volts and the 300 volts will be completely removed.

By incorporating a switch or relay at point X in Fig. 1, it is now possible to switch both high tension voltages with one pair of contacts without interrupting the supply to the filaments of the valves.

If we arrange this switch to have a time delay of approximately 30 seconds, and at the same time, interlock it with the negative bias in such a way that the high tension voltages are removed if the bias is lost, then the disadvantages of the circuit in Fig. 1 will have been overcome.

Fig. 3 shows the circuit of a simple arrangement which allows the high tension to be interlocked with the bias voltage without the use of a relay or switch.

The high tension is switched by an SCR in the negative return of the bridge rectifier circuit. This SCR requires a continuous signal on the gate to maintain conduction. As soon as the signal ceases, the SCR is switched off and the high tension is thus removed.

The signal for the SCR is obtained from a UJT relaxation oscillator controlled by transistor Q2 which senses the bias voltage applied to the linear amplifier.

With the bias voltage present, Q2 is forward biased, thus completing the charging circuit, allowing the timing capacitor C1 to charge. When the voltage across the capacitor reaches the intrinsic stand-off ratio of the UJT, it is quickly discharged through the UJT and the transformer primary, causing a pulse to be applied to the gate of the SCR. The windings of the transformer are phased so that the pulses to the gate are positive in relation to the cathode.

The OA91 diode across the secondary of the transformer ensures that only positive pulses are applied to the gate.

The RC time constant of the oscillator has been chosen to provide a signal high enough in frequency to trigger the SCR early in each half cycle and maximum output from the power supply thus obtained.

'X' SEE FIGURE 1

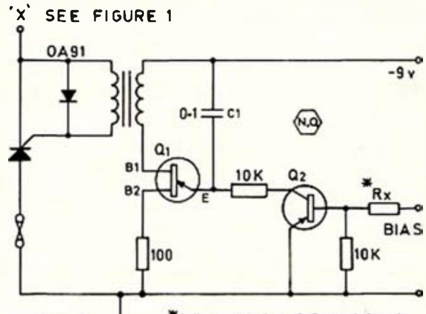


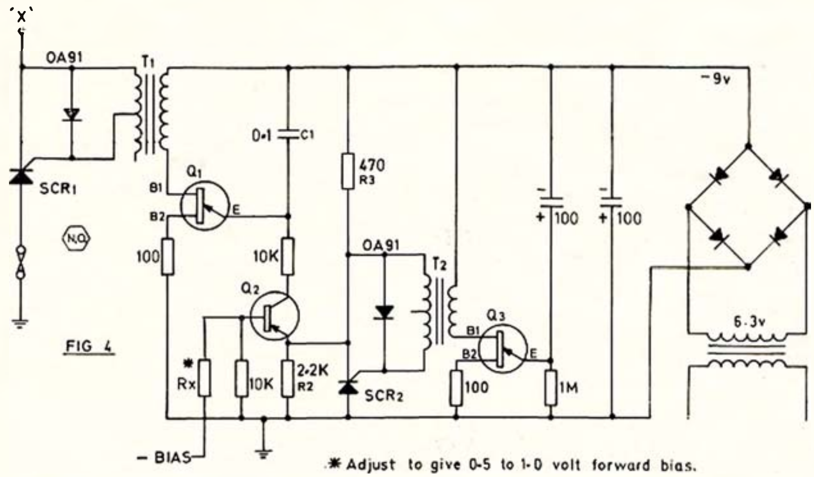
FIG 3

*Adjust to give 0-5 to 1-0 volt forward bias.

The 9 volt supply for the unit could possibly be obtained from the negative bias supply via a resistor and a zener diode. If this is done, and a rectifier having an indirectly heated cathode is used for the bias supply, then a measure of delay will have been achieved.

I can see no reason why this idea could not be used in practice. The circuit in Fig. 3 could be incorporated in existing power supplies with little effort, or in new equipment if there is no objection to using a valve to give the time delay.

In my case, however, I wanted the power supply to be completely solid



* Adjust to give 0-5 to 1-0 volt forward bias.

* 72A Fifth Avenue, St. Peters, S.A., 5069.

state, and after further development, the circuit in Fig. 4 was evolved.

A spare 6.3 volt winding on the transformer was pressed into service, thus enabling a bridge rectifier to be used. The output from this rectifier is filtered by a single 100 μF. capacitor and applied to the control circuit.

Transistor Q3 and its associated components provides the initial delay. The actual delay time can be varied by changing the time constant of the RC network in the emitter circuit of Q3. The 1 meg. 100 μF. combination in the original unit gave a delay time of 28 seconds. This may vary considerably, depending on the intrinsic stand-off ratio of the actual UJT used.

If a variable delay time is required then the 1 meg. resistor could be replaced by a potentiometer and a fixed resistor in series. A 500K potentiometer (linear taper) and a 500K resistor gives a delay which is variable between approximately 15 and 30 seconds.

The control transistor Q2 is initially biased off by the voltage across the 2.2K emitter resistor. This voltage is obtained from the 9 volt supply via the 470 ohm resistor R3, and being greater than the forward bias obtained from the negative bias supply, the emitter-base junction of Q2 is therefore reverse biased.

After the required time has elapsed, a positive pulse is applied to the gate of SCR2 via the coupling transformer T2. This pulse triggers the SCR which remains conducting since the current through it exceeds the holding current.

With SCR2 now conducting, the emitter resistor of Q2 is effectively bridged, allowing Q2 to be forward biased. This condition allows a continuous signal to be applied to the gate of SCR1, thus switching on the high tension.

Should the bias to the linear amplifier fail, then the high tension is automatically removed. If the bias returns, then high tension is once again applied to the linear amplifier. Thus if desired, the negative bias to the linear amplifier could be used to control the high tension.

SCR1 and SCR2 could both be of the cheaper 400 volt type such as the C106 Y1 or BT100A 500R. SCR2 need only be of low voltage rating and a BTX18 100 or CR1 051 C would be suitable. It is suggested, however, that any SCR with the required ratings which may be on hand could be tried.

The control transistor Q2 can be either silicon or germanium and of almost any type. A silicon type BC178 and a germanium type OC74N have both been tried in this unit with success. 2N1671 type UJT transistors were used in this circuit, but other types could be tried.

Transformers T1 and T2 in the original unit were 600 ohm c.t. to 8 ohm output transformers of the type used in transistor radios; T1 using only half of the tapped winding. However, before using this type of transformer in the position of T1, it would be advisable to check the primary to secondary insulation.

If necessary, the transformers could be wound on ferrite pot cores. The size of the pot core is not important and transformers have been wound successfully on 18 mm. and 20 mm. cores.

A turns ratio of approximately 1:3 was required for T1 and 1:10 for T2. It may be necessary to experiment with the turns ratio depending on the actual components used.

A starting point for T1 would be 100 turns and 300 turns of the largest gauge of enamel wire which will fit on the bobbin. Similarly, 100 turns and 1,000 turns could be tried for T2.

To test the "Sentinel," the value of the series resistor Rx must first be chosen to give between 0.5 and 1 volt across the 10K resistor in the base circuit of transistor Q2. For 100 volts bias, Rx would be approximately 500K. With the unit switched on, and resistor R2 bridged out, SCR1 should trigger and high tension obtained from the power supply. If no output is obtained, T1 may be incorrectly phased and either the primary or secondary connections should be reversed and the unit tried again.

Once the triggering of SCR1 has been achieved, the bridge can be removed from R2 and the time delay checked. Once again, if the time delay is found to be inoperative, then it is likely that the phasing to T2 is incorrect.

It is recommended that the bias control voltage for the unit be obtained from a point on the linear amplifier itself rather than from the power supply. Thus if a fault develops between the power supply and the linear amplifier, it is sensed by the unit and the high tension is quickly removed.

Layout is not critical and the unit can be constructed to suit individual taste and the amount of room available on the power supply chassis.

NOTES ON THE R.F. BRIDGE

Modifications and Tips on Building the R.F. Bridge

See page 12 of "Amateur Radio," July 1971

I was so pleased with this article, and having used noise bridges in the past, I built this one straight off. However to make the device work satisfactorily in this country there are a number of tips which should be passed on fairly quickly so that the dustman will not be removing loads of defunct transistors from the VK Amateur shacks.

Briefly, I recommend changes as follows:—

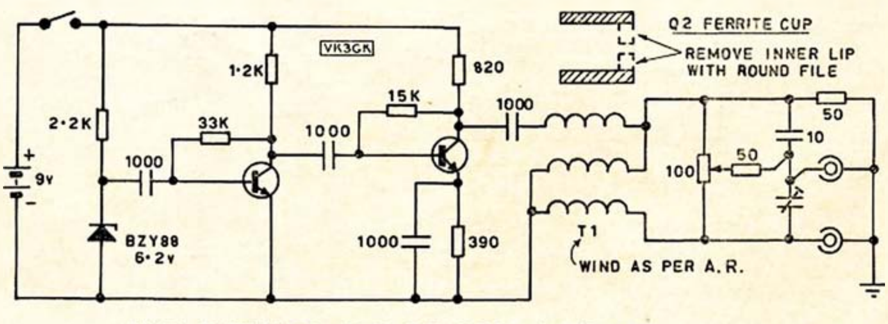
1. Revise the amplifier circuit to use capacitive coupling between the transistors.
2. Increase the collector load resistance to 1.2K for Q1, and 820 ohms for Q2. This gives more gain from the amplifier. The 47 ohm load on Q2 in the original, I think, is a mistake.
3. Q2 is biased with 14K from collector to base.
4. Coils may be wound on modified Q2 material ferrite cups designed to go around Neosid miniature slug tuned coil formers which are readily available in Australia for less than 5 cents each. Simply file out the internal lip at the top, leaving a uniform cylinderical torroid. The resultant transformer is wound as per the article and works from 1.8 to 50 MHz.
5. 1000 pF. coupling capacitors were used to improve the output on 1.8 MHz.
6. A locally available BZY88 — 6.2 volts rating — was used with a 2.2K resistor to give adequate noise output with a 9-volt battery.

With the above modifications, the device draws 10 mA. from the battery —originally it took over 200 mA., which damaged two 2N3563s and flattened the battery—$3 worth of damage.

As a general rule, directly coupled transistor circuits as shown in the article by Nelson in "Ham Radio" are to be avoided, particularly when substitution of types is contemplated. I used 2N3563 transistors as specified, but any silicon NPNs with F_T of 400 MHz. should work just as well in a simple wideband noise amplifier.

Finally, although I have been somewhat critical of the circuit, the end result is very pleasing. To all those people now struggling with s.w.r. meters I thoroughly recommend the noise bridge. Setting up a G5RV with Z-Match to operate on all bands, to present 70 ohms to the transmitter on any nominated frequency is so quick and easy that the other methods are obsolete. The same G5RV is now fed against earth on 1.8 MHz. and for the first time in history now looks like 70 ohms on 1815 KHz.

—Phil Williams, VK5NN



THE REVISED R.F. BRIDGE CIRCUIT

A BIT OF LIGHT NONSENSE

J. L. SINCLAIR, VK8ZSJ*

Does the atmosphere affect light in the same way as it causes "reflection" of v.h.f. signals? Obviously the atmosphere does affect light quite markedly at times, hence mirages, but the problem is to decide whether the action is the same in both cases.

Some time ago I lived in a spot that had been selected for its view, an expanse of Adelaide's southern suburbs and Gulf waters with Yorke Peninsula some times visible on the horizon. It was a good spot for v.h.f. DX, too, although I must admit I did not make full use of it. I had often wondered whether the atmosphere would affect light in the same way as it caused "reflection" of v.h.f. signals. Obviously the atmosphere does affect light quite markedly at times, hence mirages, but my problem was to decide whether the action was the same in both cases.

Preliminary thought about the subject led me to several conclusions, such as:

(a) Propagation of v.h.f. is not normally a reflection?

A true reflection will have the characteristics of the normal h.f. bands such as skip zones, propagation over long distances with very little loss, and fading due to multi path working. The normal v.h.f. signal exhibits none of these characteristics and so I venture to suggest that most so called DX working (150-300 mile range) is by a type of refraction in the lower atmosphere rather than by the more commonly accepted theory of tropospheric inversion layers. I have no doubt that inversion reflections do occur, but they account for the very much rarer path of 400 to 800 miles.

(b) Weather conditions that cause mirages occur much too rarely to be the same effect as causes v.h.f. DX but it was possible that a bending effect may be observable that could be correlated with radio propagation over a particular path.

(c) The exact nature of refraction had to be understood. I had to sit down and explain it to myself along the following lines:—

(i) Hugyens Principle says in effect that a wave motion will always travel at right angles to the plane of the wave front.

(ii) Refraction occurs when a wave hits a medium of different density at an angle and is therefore slowed on one side of the wave front more than the other. In fact when you work it out light does not really travel in straight lines so much as it passes between any two points along the path that takes the least time.

(iii) A definite surface is not really necessary for refraction, a wave front travelling in a medium with any sort of uneven slowing effect will be refracted so long as it is not travelling exactly at right angles to the graduation.

(iv) Such a graduated medium exists in the atmosphere merely by the fact that air pressure is greatest near the ground and shades off eventually to nothing. A wave travelling parallel to the earth's surface will be retarded more by the denser air near the ground and so will always normally have a tendency to dip towards the surface of the earth.

(v) What is important is the pressure gradient which is sometimes less marked than normal, but quite often, more than normal at very low altitudes (up to 200-300 ft. above ground level). The books say that on cloudy, windy nights the gradient is least because the atmosphere is all more or less at the same temperature and on still sunny days for instance the pressure can change quite rapidly with heights for the first few hundred feet.

This was where my perch on the hillside started to appear useful. It seemed to me that the horizon we saw 40 odd miles away should move up and down very slightly with changing weather conditions.

I used the rifle sight principle to prove that it did in fact happen that way. One "sight" was a bolt on the t.v. aerial (it shows the "monster" is useful for something!), and the other was a graduated scale I attached to my antenna tower 50 odd feet away. Graduations were to the nearest minute of arc and I found a variation of up to 10 minutes between maximum and minimum readings. Later I moved the sight to a pair of posts the same distance apart because the t.v. aerial seemed to be a bit too flimsy for such a thing, but got substantially the same results.

After taking readings of the position of the horizon for most of one summer, I went looking for radio signals to compare them with. Two series of records of real use that I found were contacts between Mick VK5ZDR and Herb VK3NN, and signals from Mick and George VK5GG to Jim VK5ZMJ. Several other people round the Adelaide area were able to give me reports that filled in gaps in the series. From the figures I was able to prepare graphs of:—

(a) Height of the horizon on each day;

(b) Signal strength over the path VK5ZDR to VK3NN on each day;

(c) Signal strength over the path VK5ZDR to VK5ZMJ.

Since VK5ZDR had been by far the most consistent, I used other peoples' reports to fill in gaps that occurred, reducing all reports to the signal strength that VK5ZDR would most probably have given in the circumstances.

Gaps in the graphs were many and varied, but there were about 40 points in the western path and about 20 points in the northern path that could be used to test my theory that v.h.f. radio and visible light would be similarly affected by day to day weather conditions.

With a book of instructions on statistical methods in one hand and a pencil in the other, I started preparing tables and testing the coefficient of correlation of each set of figures. My first try was to compare signal strengths on one path with that of the other. It yielded the disappointing figure of —0.093, which was not significant. Correlation coefficients are a measure of the chance of one quantity varying in step with the other; they vary between +1 and —1, the figure of +1 indicates that both quantities will always be in step, —1 means that as one gets bigger the other will always get smaller, and 0 or low numbers mean that the two are not really related to each other.

Since the weather in South Australia comes from the west and moves to the east, I reasoned that the reports from the northern path may correlate better with reports from the eastern path at a later time, so I tested a series of tables with respective time differences of 12, 24, 36 and 48 hours. The results I got were:—

Time Difference	Correlation Coefficient
0 hours	—0.093
12 „	+0.255
24 „	+0.066
36 „	—0.001
48 „	+0.079

The best estimate I can make of these figures is that all except the 12-hour difference figure are not related and the 12-hour figure is only slightly probable. None of the results showed a high enough correlation to allow me to combine the two sets of results.

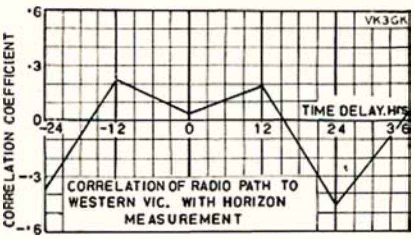
My next sets of figures concerned a comparison between the path to VK3NN and the horizon measurement. In this case there were several occasions when Mick had recorded contacts on 432 MHz. as well as on 2 metres. In this case, I wished to give some weight to the 432 MHz. conditions so I divided the "S" number given by four and added it on to the "S" number recorded for 144 MHz. The graph I made was of this composite "S" number with some other minor changes when conditions were obviously exceptional. In the same way as before I worked out cor-

* C/o. H.F. Broadcast Project, P.M.G. Dept., Darwin, N.T., 5790.

relation coefficients for the two for a number of different time delays and obtained the figures as follows:—

Time Difference	Correlation Coefficient
Signal 24 hours before h.m.	—0.378
„ 12 „ „ „	+0.236
„ at same time as „	+0.028
„ 12 hours after „	+0.186
„ 24 „ „ „	—0.469
„ 36 „ „ „	+0.040

(Without abbreviations: Radio Signal 24 hours before horizon measurement.)

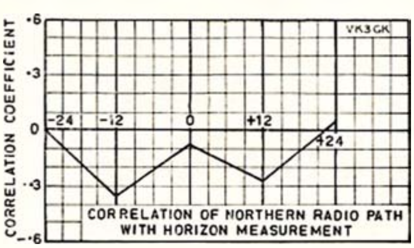


I worked the same procedure with contacts to VK5ZMJ although in this case there were no contacts on 432 MHz. and no other really unusual circumstances. The figures I obtained were:—

Time Difference	Correlation Coefficient
Signal 24 hours ahead h.m.	+0.007
„ 12 „ „ „	—0.357
„ at same time as „	—0.081
„ 12 hours behind „	—0.269
„ 24 „ „ „	+0.042

(Without abbreviations: Radio Signal 24 hours ahead of horizon measurement.)

The book had directions for testing the significance of these results and to the best of my knowledge it seems that most of the results are not significant, but a few of the higher ones probably are. The highest figure (—0.469) was only possible by chance once in about 200 to 300 times. The accuracy of the result increases with increasing numbers of trials and in this case there were 35 reports that could be compared. Other figures were:—



(a) When the western radio path was compared 24 hours before horizon measurement it gave a figure of —0.378 with 31 comparisons which had one chance in twenty of being random occurrence;

(b) When the northern path was compared 12 hours before horizon measurement it gave —0.357 in 18 trials which could have happened by chance once in about five times.

All the other measurements were less significant and therefore not worth talking about as they stood.

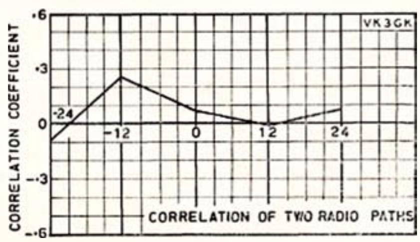
There was, however, one other trick that I tried. I made graphs of correlation coefficient in each case against time difference. The results shown elsewhere looked to me like a sine wave with a heavy second harmonic content so I attempted to fit them to such a thing. In the case of the graph concerning the western path, I found that by moving every sound point a distance of 0.4 in the positive direction, I got a promising fit to a curve of about 2½ days' wavelength and a peak to peak distance of 0.48. I then calculated closer approximations and ended up with a quite presentable graph.

I use an electrical analogy to make it mean something to myself along the following lines. Taking the state of certain yes (correlation +1) as one volt positive, and the state of certain no (—1) as one volt negative, I find that the curve has three components:

(a) A d.c. component of 0.035 volts negative;

(b) An a.c. component with a wavelength of 24 hours and amplitude 0.383 volt peak to peak;

(c) An a.c. component with wavelength 56.5 hours and amplitude 0.508 volt peak to peak.



In this case the errors of the respective points are:

1st	point	0.020 (20 millivolts)
2nd	„	0.000
3rd	„	0.001
4th	„	0.000
5th	„	0.000
6th	„	0.024

In the graph of the northern path, the figures are small for accurate calculation to be meaningful, but roughly it seems to me like a composite of:

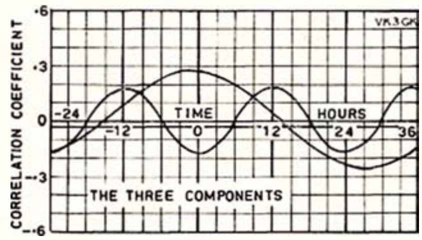
(a) A d.c. component in the range of 0.1 to 0.2 negative;

(b) An a.c. component of 24 hours wavelength, amplitude of 0.247 peak to peak;

(c) An a.c. component of 55 hours wavelength, amplitude 0.18 peak to peak.

After having done all these calculations I am left wondering just what, if anything, I have discovered. I had expected that the graph of correlation against time difference would have shown a strong positive peak in one spot at about 12 hours delay instead of the negative peak found. This would have tallied fairly well with the movement of weather patterns across South Australia.

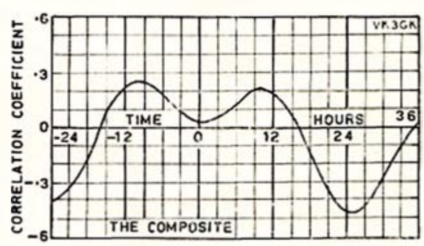
I also wonder whether I am justified in making graphs of graphs and calculations as I have done, or whether the whole thing is just so much high sounding nonsense. I would like someone of good mathematical authority to pass judgment on this point and also the significance of my method of fitting the correlation graphs to a pair of sine waves. One point I am fairly sure of is that the figure —0.469 is too high to have occurred by pure chance and requires some explanation, but just what it means has me tricked.



There was another thing I noticed. A smokey line on the horizon about a quarter of a degree wide and up to half a degree above the actual horizon. I believe it could have been some sort of mirage of the sea and it was recorded on the following dates: 23rd October, 1966, 18th February, 1967, 19th February, 1967, and 12th March, 1967.

My records show exceptionally good radio conditions on 23rd October and 18th February, unusually poor but not hopeless on 19th February and average on 12th March. I am not sure what it was in each case that caused me to record exceptional conditions on these days, but it was such things as VK7s worked into Adelaide or stations working westward from under the shadow of the Mt. Lofty ranges, all effects I regard as probably due to tropospheric reflection.

The dates on which such events occurred are also of interest, they were: 23/10/66, 15/11/66, 25/12/66, 7/1/67, 9/1/67, 20/1/67, 18/2/67, 7/3/67, and 29/3/67.



The time intervals between them are respectively: 23½ days, 40 days, 12½ days, 2½ days, 10½ days, 29 days, 17 days and 22 days. There appears to be a suggestion of repetition in these figures of a time period about 20 days or a little longer, or may be two trains of events at 40-day intervals, for instance, 10½ and 29 make 39½ days, 17 and 22 make 39 days, and one 40-day period occurs. I think what I am suggesting is that weather patterns conducive to v.h.f. DX are capable of persisting long enough to make a complete circuit of the globe and take either twenty or forty days to do it (I am not sure which). The circumference of the earth at the latitude of Adelaide is 20,480 miles, which means that a speed of 500 to 1,000 miles per day would be required. Of the two,

(Continued on Page 11)

The Solar Link*

R. A. HAM, F.R.A.S.

INTRODUCTION

The sun, like many other stars, is a nuclear furnace consuming enormous reserves of fuel and radiating energy in many forms. The apparent yellow disc on its surface, the photosphere, has a temperature of around six million degrees, and it is surrounded by a gaseous atmosphere, the corona, which extends a million miles into space and has a temperature of one million degrees. Periodically, dark patches appear on the photosphere; these are called sunspots and are some 2,000° cooler than the surrounding photosphere. Some sunspots are scarcely visible and have a short life, while others are measured in thousands of square miles and can survive a full 27-day solar rotation. Radio energy from the sun may be detected by a radio telescope; when the sun is "quiet" the radio noise detected is of thermal origin and will get stronger as the observational radio frequency is increased from 30 to 10,000 MHz., and the sun is classified "active" when sunspots are present.

The latter are usually accompanied by solar flares that look like great arches of flame when seen through special optical instruments. Very large flares are called prominences, and in July 1946 an event like this raged across 500,000 miles of the sun. Solar flares can be heard on earth with radio instruments 8.3 min. after they originate on the sun, but the particles that are ejected at the time of the event can take up to 40 hours to reach our planet. The radio frequency for detecting solar bursts and noise storms is between 30 and 300 MHz., with a peak around 150 MHz.

The sun can develop a spot at any time and produce the activity which goes with it, and the prime object of this article is to show how the sun can disturb the earth's atmosphere and consequently the earth's radio communication. Another object is to emphasise the need to record the effect of natural manifestations which take place and to send reports on them to R.S.G.B. and other organisations.

OBSERVING SOLAR ACTIVITY

The author's radio telescope was established on 1st June, 1968, to observe the midday sun from 1130 to 1330 GMT daily, using a frequency of 136 MHz. with a bandwidth around 10 KHz. The observations are recorded at a high chart speed of 30"/hour so that detailed information can be gathered from the 5 ft. of chart used during a normal midday observation.

The radio telescope can observe the midday sun whether the sky is overcast or not, and the author's XYL checks the solar image for sunspots daily if the sky is clear by projecting the sun through a 7 x 50 mm. gunsight and producing drawings as shown in Fig. 2. (**Warning**: never endanger your eyesight by viewing the sun directly through any optical instrument, always project the image.)

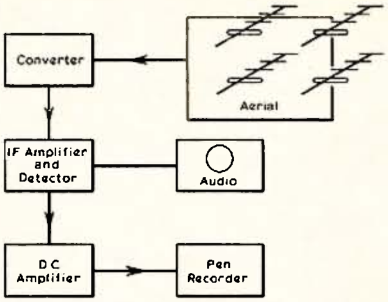


Fig. 1.—Block schematic of the author's radio telescope. The aerial is a home-built 4 by 4 element Yagi mounted on a 10 ft. x 6 ft. wood frame ½-inch wire mesh reflector.

The converter, mounted on the aerial reflector, is also home-built, transistorised, and operates from 12v. supply. R.f. BF180, mixer AF139, xtal osc. 36.666 MHz. and multiplier to 110 MHz., both AF139. I.f. output is 26 MHz.

The i.f. amplifier is an AR88 communications receiver tuned to 26 MHz., which also provides detector and audio output.

The d.c. amplifier is a 709 integrated circuit, powered by 9-0-9v.

The pen recorder is an Evershed & Vignoles 0.5 mA.

It was obvious from the very early recordings that the instrument would distinguish between the individual solar burst which may last a few minutes and the continuous noise storm lasting several days. As time went by this ability to separate and identify the two events proved most valuable when making reports to the British Astronomical Association and the R.S.G.B.

An individual solar burst, illustrated in Fig. 3, is less likely to strike the earth's atmosphere because of the time lapse between the origin of the event and the particles reaching the earth, by which time the earth has moved further along its orbital path. On the other hand a long series of individual bursts or a continuous noise storm lasting several days must bombard the earth's atmosphere somewhere. Contact with the earth's atmosphere by a huge stream of solar particles can cause an aurora at either of the earth's polar regions, and a particle stream can also disturb the Appleton layer of the ionosphere and cause a temporary total loss of h.f. band radio signals, known as a Dellinger fade-out.

The author has observed many examples of solar activity and the consequent disturbance to the earth's atmosphere and has selected two of these examples from his records.

Solar recordings for 1st March, 1970, showed several large individual bursts which sent the pen full scale, plus a slight increase in the general noise level. Solar recordings for the 2nd and 3rd were similar to those of the 1st, but with a lower burst amplitude; by the 4th a full scale noise storm was in progress which died down on the 5th. Many individual low amplitude bursts were recorded on the 6th and 7th. The climax of this period of solar activity was the great aurora on 8th March which was fully reported by Ray Flavell in the September 1970 issue of "Radio Communication" and by the author in "Electronics Weekly" of 29th April, '70.

The second example came when a mammoth sunspot appeared on the photosphere around 11th November, 1970, and remained there until the solar rotation carried it out of view on the 21st. On the 12th the radio telescope showed a marked increase in the solar noise level and the polar diagram of the telescope aerial could be seen on the chart. By switch-on at 1130 GMT on the 13th, a noise storm was raging on the sun, getting stronger on the 14th and giving almost full scale deflection on the 15th. The solar noise was so strong on the 16th that the pen was at full-scale deflection for the whole period of the observation, and this was repeated on the 17th and 18th. On the 19th the noise was three-quarter scale; on the 20th down to half scale; and on the 21st a few tiny bursts above the receiver noise level. The earth's atmosphere was bathed for 10 days in solar ejected matter and according to reports there were three Dellinger fade-outs on the 15th and 16th—from the author's observations the atmospheric noise level was very high after sunset on the 16th.

Two examples do not do justice to the value of a solar radio telescope, but they will explain what happens at the time of solar activity and the events which can follow.

THE IONOSPHERE AND THE TROPOSPHERE

Terrestrial radio communication relies upon two regions of the earth's atmosphere named the troposphere and the ionosphere, the former occupying the first 10 miles above the surface and the latter extending from 40 to 200 miles above the earth. (See propagation section of the Radio Communication Handbook for details of atmospheric reflection of radio signals.) The Heavyside (E) layer of the ionosphere forms at sunrise and disperses at sunset, but sometimes solar activity will cause the E-layer to form or break up into patchy clouds of dense ionisation. This latter phenomenon, called Sporadic-E, will be known to the users of the 4 mx band when its normal peace is disturbed by Continental broadcast stations which use the band nearly 1,000 miles away.

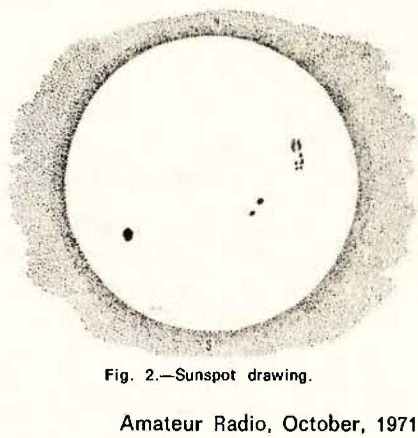


Fig. 2.—Sunspot drawing.

* Reprinted from "Radio Comm.," August 1971.

Although Sporadic-E is rarely evident above 100 MHz., on 4th July, 1965, an extensive cloud of dense ionisation centred over Europe influenced the 2 mx band, and it was fortunate that a 2 metre contest had just started and many U.K. contestants were able to work the Hungarian station HG5DKQ-/P and gain the points for a 900-mile contact. Had it not have been for the contest this rare Sporadic-E opening might have gone unrecorded.

A typical large Sporadic-E occurred on 6th July, 1970, when at 0700 GMT a considerable number of Continental stations could be heard between 30 and 50 MHz. By midday the E-layer disturbance had spread its influence to the B.B.C. f.m. broadcast band and at 1430 GMT the author counted 14 Continental broadcast stations audible between 88 and 98 MHz. At 1900 GMT there was the usual interference to B.B.C. band 1 television and a large number of long distance sync. pulses around 50 MHz. The 4 mx U.K. Amateur band was impossible to use owing to the strength and bandwidith of the Continental broadcast stations. At 2045 GMT the reflecting E-layer made another change and the prevailing chaos stopped abruptly. Suspicious about this sudden end to an E-layer disturbance, the author turned his 4 mx beam north-west and for the following hour heard the 599 signal of the Icelandic beacon TF3VHF on 70.275 MHz.

Line-of-sight v.h.f. signals above 100 MHz. rely for their path on the prevailing conditions within the troposphere, which is the home of the earth's weather and this can be very hostile to v.h.f. radio signals. Apart from the attenuating effect of the weather itself, there is the thunder static which can ruin reception.

The accepted range of a v.h.f. signal under normal tropospheric conditions is between 50 and 100 miles, but under abnormal tropospheric conditions this range can be multiplied by 10. The reason for this has been the subject of many articles in "Radio Communication," and over the years the author has noticed that when the atmospheric pressure is above 30 in. and then rises again, there is a good chance of a tropo opening at the point when the pressure starts to fall. Typical examples of 2 mx openings coinciding with the pressure falling are the contests on 4th-5th March, 1967, when the band was open from GW to DJ, and on 20th November, 1967, when a two-day opening brought signals from OZ to the south of England. There was a four-day tropo opening in March 1969. In May 1970 a sudden pressure drop in the final hour of a 2 metre contest brought up the signal of HG9AEN/P. Another large tropo opening took place in November 1970.

The author conducted a three-month experiment starting on 1st June, 1969, during which the atmospheric pressure and the signal strength of GB3GW, 130 miles away, were recorded three times a day. A graph at the end of the observation showed that the signal strength of the R.S.G.B. Swansea beacon came up just before the pressure was due to fall.

The troposphere can change its condition at any time, so it is vital to have a permanent signal to observe, and the R.S.G.B. has fulfilled this need by providing several 2 metre beacons. With knowledge of the terrain between himself and the beacon an observer can tell the extent of the prevailing tropo openings, and without the beacons the v.h.f. bands for some periods would be written off as unusable. Two metre contests are very important to tropospheric studies; in addition to the personal satisfaction gained by the entrant, the contest logs are a record of v.h.f. activity and when analysed can have considerable scientific value.

SOLAR ACTIVITY AND THE WEATHER

The routine work at the author's station includes checking the 4 and 6 metre bands for ionospheric disturbance, recording the atmospheric pressure, noting the prevailing weather and checking the 2 metre band for tropospheric openings. As the daily records of solar, atmospheric and weather events were accumulated it became apparent that a new factor was emerging from them. It was seen that a relationship existed between certain types of solar activity and severe weather conditions.

Until recently the author, like many other people, was sceptical about the sun disturbing the earth's weather, despite scientific literature quoting climatic changes at the time of peak sunspot activity. But general opinion suggested that a positive connection between the sun and the earth's erratic weather had yet to be found.

To look for this connection in the station's records it was necessary to extract the solar and weather information, and to get a definite meaning into the extracted data the author decided to classify both the daily solar and weather observations into two states, **active** or **inactive**, and make a comparative table from the results. The sun was classified as **active** if some form of solar output appeared on the daily recording charts, while the weather was classified as follows:

Inactive: Sunny, cloud, overcast, fog, frost, mist.

Active: Wind, rain, gale, snow, blizzard, thunder.

The classified sun/weather log kept from 1st June, 1968, to 30th April, 1971, produced the following set of figures:

Observation period: 1,064 days.
Sun **active**: 610 days.
Local weather **active**: 402 days.
Sun and weather **active**: 253 on the same day.

Taking a general view of this 1,064-day period one can see that the coincidence of the sun and weather being active on the same day is 253 out of 402 (62.9 per cent.), which from these figures one could expect. It is obvious that when other factors, such as solar activity outside the author's observation time and national plus international weather reports, are taken into account the percentage scale would alter considerably. However, the author believes that the type of weather classified in his records as **active** and observed from his station is representative of weather over a much larger area.

Major weather events reported by the national news media (not included in the station weather log) were noted when possible, and one can be sure that if they made national news they were something big. A closer study of the actual solar condition which coincided with these major weather upheavals revealed that a solar noise storm lasting several days was the main culprit, as the following four examples will show:

November 1970. A month of activity from both sun and weather. During the first five days many small bursts and a few large ones lasting several minutes were recorded, while the weather on the 2nd, 3rd and 4th was wind and rain. For the next six days both the sun and weather were intermittently active until the 12th when a severe solar noise storm started and carried on until the 21st. The local weather was wind and heavy rain from the 12th to the 19th, and the rainfall, checked by the XYL, was: 13th, 1.33"; 14th, 0.83"; 15th, 0.62"; 17th, 0.39"; 18th, 0.82"; and 19th, 0.11", making a total of 4.1" for the six days which coincided with the solar storm. The national news carried the story of the severe flooding in East Pakistan, and this again coincided with the solar storm.

December 1970. The first 16 days saw little activity from the sun or weather; the radio telescope recorded a few bursts and the calm weather was interrupted by occasional rain. On the 17th a solar noise storm developed and lasted until the 23rd, and on the 17th the weather went **active**. Wind and rain developed into a white Christmas with its snow, blizzards and extreme cold. The news media reported severe blizzards in Europe and that some countries had seen snow for the first time.

January 1971. The cold weather from December was carried into the new year. The end of the cold weather came on the 6th-7th, and a few days of wind and rain prevailed. The thaw coincided with the start of a solar noise storm which lasted until the 13th.

(Continued on Page 10)

Fig. 3. Isolated solar bursts.

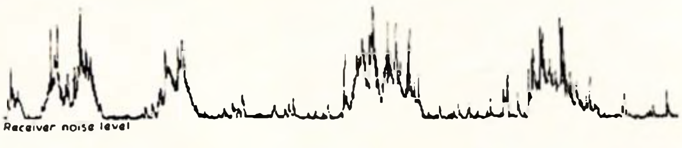


Fig. 4. Continuous solar noise storm.

THE SOLAR LINK

(Continued from Page 9)

Around the peak of this solar storm the news reported freak mild weather on the 10th throughout the U.K. with record January temperatures. The sun and the weather were unsettled for the five days which followed the solar storm, and on the 19th another noise storm started and continued until the 25th. During this solar storm the weather developed, providing heavy wind and rain, severe gales, and a whirlwind in south-east England; and on the 21st the atmospheric pressure recorded by the writer was down to 973 mb. A further solar noise storm broke on the 28th and ended on the 31st,, and with it came very active weather. A windy day on the 28th preceded a calm 29th, but on the 30th wind, rain and snow prevailed throughout England and Wales. The news services reported floods in Poland and severe floods in Mozambique; Australia had 9" of rain in one day, and the River Thames was in risk of flooding owing to severe gales in the North Sea.

April 1971. There were two solar noise storms during the month. The first started on the 9th and ended on the 17th during which period the new U.K. to China h.f. telephone link was delayed by "atmospheric disturbance". The news service announced on the 13th that the monsoon in East Pakistan had started a month early. A B.B.C. news report on the 21st May about the Mount Everest expedition said that the weather on the 16th-17th April on the mountain had been the worst for 72 years. From the 18th to 24th there were a few solar bursts and the weather was mainly fine apart from rain on the 23rd. On the 25th the second solar noise storm started, and on the 26th there was rain, sleet and snow across southern England with roads blocked in the West Country. The news media reported the coldest April day since records started in 1940.

ACKNOWLEDGMENTS

The author would like to make acknowledgment to the R.S.G.B. for the beacon service and to the beacon keepers who ensure that a permanent signal is transmitted 24 hours each day. A word of praise also for the members who enter the v.h.f. contests, especially the portable stations that provide signals from exotic sites which are compared with prevailing atmospheric conditions; for the valuable work of members of the Scientific Studies Committee who ponder and advise on the observers' reports; and for Jack Hum who in Four Metres and Down in "Radio Communication," reports on v.h.f. activities.

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ANOTHER A.O.C.P. THEORY CLASS

Owing to demand, the Victorian Division of the W.I.A. plan to commence another theory class, to be held on Saturday mornings from 9-11 a.m.

Anyone interested in enrolling should contact the office, 478 Victoria Parade, East Melbourne, or phone 41-3535 during office hours.

Development of an All-Band Vertical*

H. S. BROWN, G3RFG

On arriving at his present QTH the author found that the ground space available for the erection of aerials measured only 30 x 10 ft. and another restriction was that nothing that looked like a t.v. aerial was allowed. In order to get on the air a self-supporting mast that could be raised or lowered easily by one person was erected and it has since been used during many aerial experiments. As a result of these experiments it became obvious that what was required was an all-band vertical that produced low impedance at its base for all bands, and the result is shown in Fig. 1.

The aerial is made up of three lengths of aluminium tubing 12 ft. long, with 1/16" walls, and of 1", ⅞" and ¾" diameter respectively. One end of each of the two thicker tubes is slit down for several inches and the three lengths are then spliced together, the joints being secured by two Jubilee clips. A triangular piece of thick Perspex is fitted between the top two clips, and three lengths of thin nylon cord are connected to it as guys to prevent movement of the top section of the aerial. An 8 ft. 3 in. length (quarter-wave on 10 metres) is cut from the lower 1" diameter section and the two resulting lengths are secured to the mast, one above the other and 2" apart, by stand-off insulators.

The 2" break in the aerial is then linked and a check made for resonance on the 40 and 15 metre bands. The link is then replaced by the coil and the taps adjusted for resonance on 20, 80 and top band. If an impedance bridge is used it will be found that it will indicate approximately 25 ohms on 40 metres and 35 ohms on 15 metres. It was decided to use two lengths of 75 ohm co-axial cable in parallel to provide the best match on 15 metres because of the greater output power on 40 metres from the author's transmitter.

On 10 metres the aerial can be used as a normal vertical; by removing the base feeder and connecting a length of 75 ohm co-axial cable to the junction it becomes a vertical dipole; and by earthing the lower section and feeding the junction with 50 ohm co-axial cable it becomes an elevated-feed three-quarter-wave vertical.

The earthing system consists of as many earth rods as possible connected together with thick seven-stranded copper aerial wire. It was also found that t.v.i. could be decreased if a length of this earth-wire was run parallel with the feeder from the base of the aerial right back to the Z Match. The author's feeder is run underground as far as is possible.

Over a period of two years this aerial has proved a winner and it is only necessary to stand on a step ladder in order to change bands; by inserting the link or connecting the appropriate fly-leads from the coil which is attached to the mast by stand-off insulators.

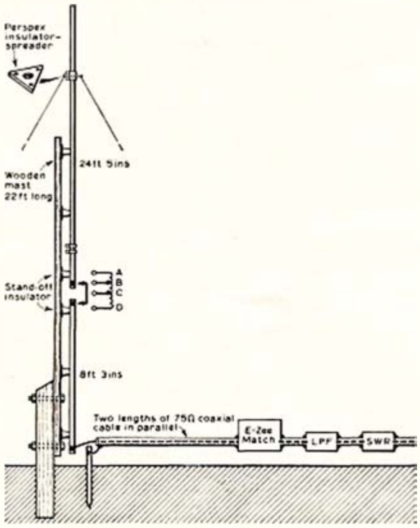

Fig. 1.

COIL DETAILS

It is recommended that anyone who constructs this aerial should use a g.d.o. to find the exact taps on their coils for resonance on the various bands, but the following coil construction details are supplied as a basis. A ribbed ceramic former of 2" diameter is wound with 55 turns of 20 s.w.g. tinned copper wire. The first 40 turns are spaced 1/10" apart, and the bottom 15 turns are close wound and enamel covered. Fly-leads are connected to the top, 22 turns down (for three-quarter wave on 20 metres), 29 turns down for 80 metres, and at the bottom for top band.

		S.W.R.
Link out, Coil out	$\frac{1}{4}\lambda$ on 10 mx*	1:6
Link in	$\frac{1}{4}\lambda$ on 40 mx	1:1
Link in	$\frac{3}{4}\lambda$ on 15 mx	1:4
Coil in, A to B	$\frac{3}{4}\lambda$ on 20 mx	1:2
Coil in, A to C	$\frac{1}{4}\lambda$ on 80 mx	1:4
Coil in, A to D	$\frac{1}{4}\lambda$ on 160 mx	1:4

* On 10 metres the aerial can be used in two other ways:

(a) Disconnect the base feeder and use a 75 ohm feeder connected to the junction. This is now a vertrical full-wave dipole. S.w.r. is 1:6.

(b) Earth the lower section and connect a 50 ohm feeder to the junction to make an elevated feed three-quarter wave vertical. The s.w.r. is 1:4.

* Reprinted from "Radio Comm.," August 1971.

A BIT OF LIGHT NONSENSE

(Continued from Page 7)

the smaller, corresponding to a 40-day period, is fairly close to the actual rate of progress of weather across the State.

There are no really definite conclusions to be drawn from all this. I don't regard the job as finished, but as a pointer to more exact experiments with better control of conditions. I think it not silly to say that if taken far enough it could lead to information as valuable as that on which the Ionospheric Prediction Service relies for its work. The subject should be an ideal one for somebody who wants material for a thesis and could be expanded to include comparison of propagation of different bands. As a first step, I should think the correlation would be very much higher for signals of different frequencies over the same path. Another refinement of interest would be to measure path loss against distance to find whether better conditions cause stronger signals over short distances at the same time as they cause the maximum distance of usable signals to be increased.

In conclusion, I offer my thanks to all who allowed me to search their log books and wish good hunting to anyone who can take this project a step further.

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PROJECT AUSTRALIS REPORT

A.M.S.A.T. have now advised W.I.A. Project Australis that the frequencies to be used for the A-O-B Satellite are as follows:—

(a) **VK Translator System:**
Uplink— 145.80, 145.85, 145.90, 145.95 MHz
Downlink—435.10, 435.15, 435.20, 435.25 MHz

(b) **DJ Translator:**
Uplink— To be decided.
Downlink—145.90 MHz.

(c) **A.M.S.A.T. Translator:**
Uplink— 145.90 MHz.
Downlink— 29.50 MHz.

The Australia-wide f.m. Repeater and Simplex channels in the 2 metre band are:

Repeaters—		In MHz.	Out MHz.	
Channel	1	146.1	145.6	Secondary
,,	2	146.2	145.7	Future
,,	3	146.3	145.8	,,
,,	4	146.4	145.9	Primary
Simplex—		MHz.		
Channel	A	145.854		
,,	B	146.000	Primary	
,,	C	146.146		

The possible solutions to these frequency conflicts proposed by the Australis Group are:

(a) Changing the satellite channels.
(b) Changing the VK repeater channel frequencies.
(c) Turning off the VK repeaters during each pass of the satellites.

Solution (c) would appear, at this stage, to be the only practical way of solving the problem, as the satellite frequencies are an optimisation of frequency conflicts all over the world.

A modified "demonstrator" version of one channel of the VK translator is being sent to A.M.S.A.T. for testing on 20th August. If A.M.S.A.T. are satisfied that it meets N.A.S.A's rigid performance specifications, the Australis Group will begin construction of the flight units.

The flight units of the A-O-B 60-channel r.t.t.y. telemetry system and the 35-channel command system are nearing completion and should be shipped to A.M.S.A.T. in Washington next month.

The launching of the A-O-B satellite will take place, it is hoped, about the middle of 1972.

—Richard Tonkin, Chairman,
W.I.A. Project Australis.

(All comments on the frequency conflicts listed above should be sent in the first instance to the Federal Repeater Secretariat, C/o. Tim Mills, VK2ZTM.—Ed.)

Getting to know your Neighbour

HOWARD RIDER VK3ZJY*

On Sunday, 27th June—having been in Djakarta for two days—I decided it was high time that I met some of the Amateur fraternity. Armed with a single name—K. W. Kwik—who lived at Djalan Maluku 52, which, according to my map, was close to the hotel in which I was staying, I set out not quite knowing where I would finish.

Finding the house was not as difficult as I had expected. A notice proudly stating this was the home of YB0CJ was well in evidence. In a very short time I was seated in the lounge room sipping tea and discussing common and specific interests of Amateur Radio with Kwik and his wife. The latter was not only interested but very knowledgable in this field.

I learned of the general operation, various regions, regulations and examination procedure which will be described later. Besides being QSL manager for the Djakarta region (YB0), Kwik was also one of the Examination Officers, so my start could not have been at a better place.

A phone call and I was taken out to meet the President of the group—Suwondo (Wondo) YB0AT. He added to my already extensive set of notes and I learned that I had just missed an old friend, I. N. Dar (VU2BX), with whom I had spent many an enjoyable hour when living in New Delhi.

Many miles further on we visited the home of R. A. J. Lumenta Kaklum, YB0BY, whose call sign is a very well known one. I was a little surprised to learn that his wife was Secretary of the local group and more still when I found that she was YD0HV (Erica). Sidik (YC0DH) was also a visitor, so we all sat down together and had supper.

Coffee naturally was served in the "shack" where a couple of contacts were made with YB2AJ and a JA. This was an important occasion as they would be the last ones to be made in this country for fourteen days. Because of the advent of National elections, the Amateurs had decided to maintain radio silence from one week before to one week after this period. This was not requested by the government but was a voluntary decision.

As the evening wore on we talked further of the peculiarities and problems common to both countries, particularly with regard to distances. Two VKs were already well known—Heabie VK2AQK and Ron VK3AHJ. Beautifully bound copies of many issues of "Amateur Radio" and an Australian electronics magazine were produced, giving further evidence of unseen friends in VK-land.

Some six hours after my initial meeting with Kwik and his wife I was driven back to my hotel. During this whole period I had found great warmth and generosity in the friendliness and hospitality offered to me, remembering that I had arrived unannounced and unexpected.

What then constitutes the Indonesian Radio Amateur? During the evening I had met people ranging from a Major-General in the Air Force, a retired businessman, an engineering manager, a housewife to an odd-job man—proving that in this country also Amateur Radio is not for the chosen moneyed few but for all who have an interest and the ability to learn and pass the examination.

The examination is not an easy one, in many respects harder than ours. It is divided into three graded levels:

(a) **Preliminary Level.** — A knowledge of local and international regulations, theory, practice and Morse at 5 w.p.m. will gain a limited licence (YD), enabling crystal controlled operation between 3.5 and 3.9 MHz. at 10 watts maximum input.

(b) **Intermediate Level.**—An increased knowledge of the above plus Morse at 8 w.p.m. and an ability to understand the English language will allow for a limited licence (YC) with crystal controlled operation in the h.f. (except 14 MHz.), v.h.f. and u.h.f. bands at a maximum of 75 watts input.

(c) **Advanced Level.**—Further knowledge of the above plus Morse at 12 w.p.m. will allow a full licence (YB) on all bands at a maximum input of 500 watts.

It is interesting to note that Morse code is a requirement in all levels and a good working knowledge of English in the higher two sections. Part of the practical test is the actual building of a transmitter by the applicant.

Although the Indonesian Government has considered and approved regulations and technical qualifications needed by an operator and his station (1967/68), it has for the moment delegated the authority of examination procedure to the Regional Groups of which there are nine. As can be expected, these Groups keep a very tight rein on those wishing to obtain a licence and the operation when actually on the air because they do not wish to lose any of the advantages given to them.

Even so, there are over 2,000 Amateurs in the whole of Indonesia (approximately 250 in Djakarta). Why then do we not hear more of them on the air? The answer is mainly a monetary one. Most rigs are on the 3.5 MHz. band and are a.m. types. Those owning commercial s.s.b. equipment in the country total fifteen (excluding expatriates) of which I had seen three in one evening.

Unlike many other countries, Indonesia is radio minded. A few years ago Kaklum (YB0BY) started teaching four persons the fundamentals once a week of about two hours duration. Early this year he had to give up this undertaking because of a change in his work plus the fact that the group had grown to more than 130 per session. Five other Amateurs have taken over this important task.

While all that I have mentioned so far gives a very promising future for Amateur Radio in Indonesia, it must not be thought that there are no problems. In fact, the reverse is the case and the problems are great. While there are people like Kwik, Wondo, Kaklum and Erica, plus many more I have yet to meet, these problems will slowly be overcome. There is much that we, through the W.I.A. and personally, can do to help the movement in this rapidly developing nation.

It is obvious that my life in YB-land, which will last at least a year, will become a very interesting one radiowise as my main work will take me to all regions and to Amateurs whose total income per year is less than the average Australian gets per week.

* 232 Cumberland Road, Pascoe Vale, Vic., 3044.

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JAPANESE TRANSISTORS

Through the courtesy of Peter Williams, VK3IZ, "A.R." now possesses specifications and ratings of a number of Japanese FETs, v.h.f. and p.a. transistors. He believes that many Amateurs possessing Japanese equipment may be interested in these ratings if replacements are required at any time. The lists run into several pages, mixed in with Japanese caligraphy and are by courtesy of the "CQ" (J.A.R.L.) Handbook.

If any reader is interested in any of this information, would he please write to the Editor giving type number so that in a future issue it may be possible to extract data of the more popular varieties for publication in "A.R."

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ERRATUM

Re the article "Angle Modulation", Lecture 14B, in "A.R." August 1971, page 3. The author has pointed out that a few lines have been omitted from the first paragraph under the heading Frequency Modualtion in column 1. The paragraph should read:

When using an audio frequency voltage to produce f.m. it is the amplitude of the voltage which causes the carrier frequency to shift or deviate symmetrically from its assigned frequency. By international agreement the maximum deviation is ±75 KHz. for sound broadcasting with an audio frequency pre-emphasis of 75 micro-seconds. However, in Australia for television sound the maximum deviation is ±50 KHz. and audio frequency pre-emphasis of 50 micro-seconds.

REPEATER SECRETARIAT

We have been advised from VK2 that additional repeater systems are being developed at the moment and some have been lodged with the P.M.G. for approval.

Central Coast, Gosford. To serve the area north of the Hawkesbury River, south of Lake Macquarie and east to the coast from the Pacific Highway. The equipment is to be installed at the local clubroom site, which is about 4 miles south-west of Gosford on a ridge of high ground. To avoid interference in Sydney to the expected strong signals from Wollongong, the antennas will have reduced gain in the southern direction. It will be a Channel 1 system.

Central West, Orange. This system has been operating for some years and is located on Mt. Canobolas. At the moment it is a Channel 1 input with a Channel A output.

Illawarra Branch (Wollongong) of the N.S.W. Div. is to establish a Channel 1 repeater some 60 miles south of Sydney. It will serve parts of Sydney, Wollongong, the south coast towards Batemans Bay, inland towards Canberra, which will cover much of the Hume Highway from Liverpool to Goulburn and on towards Yass. The repeater will be tested in the Wollongong area first and later it is hoped to install it on the high ground west of Kaima near the local t.v. station. There is also a plan to establish a 6 mx beacon in the Wollongong area.

Hunter Branch, Newcastle. Permission has been granted to establish a Channel 4 system for this area on Mt. Sugarloaf. It is to be installed at the local t.v. tower site.

Sydney. The Channel 4 system for this area is currently using an A.W.A. tx in place of the previously advised S.T.C. unit. The original beacon facilities have not been included at this stage. Identification is by a voice tape loop, but will be replaced by an IC keyer.

Wagga Radio Club is to establish a Channel 1 system to serve the eastern Riverina. At the time these notes were compiled the final site was not known to us. The equipment is expected to be low powered and solid state.

Another problem area is Melbourne and possibly Sydney where several repeaters are (or will be) operating. The original 3-channel concept of Wodonga (1968) was for Channel B simplex and Channels 1 and 4 for repeaters. The reason behind this was to ensure that all "service" repeaters (like the present f.m. system) were developed on the minimum number of channels so that the maximum of people would have the required crystals and accordingly be able to use the system no matter what part of Australia one travelled to.

The problem has arisen in Melbourne where they have Channel 1. To the east in Gippsland and to the south-west at Geelong there are Channel 4 systems. It will not be long perhaps before a system could be required to the north. The Channel 4 systems both have good coverage into Melbourne with the result that one is often able to trigger both units. The question to be resolved is: (a) should there be additional channels? (b) should the coverage of overlapping systems be reduced to limit interference? (c) or put up with the problem, if not too severe, so as to preserve the two-channel concept? What do you think?

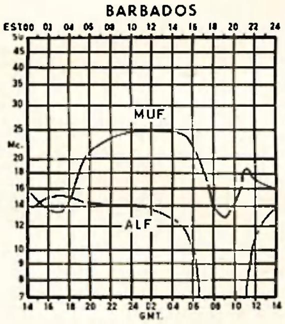
The F.R.S. Report mentioned in recent "A.R's" was delayed in publication, but should be in circulation by the time these notes come out. The Federal Repeater Secretariat is a committee of three members who act on behalf of F.E. in co-ordination of v.h.f./u.h.f. matters with repeaters, beacons, nets and satellites, etc. The postal address for the F.R.S. is C/o. P.O. Box 342, Crows Nest, N.S.W., 2065.

Looking forward to hearing Amateurs' views on the points covered in this report, but please bear with us if we are a little slow in the reply, we usually have trouble in rounding up a good one-fingered typist.

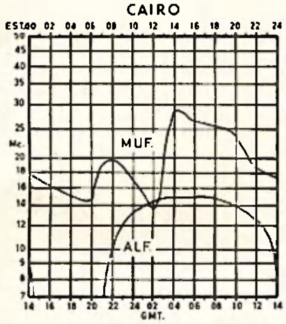
PREDICTION CHARTS FOR OCTOBER 1971

(Prediction Charts by courtesy of Ionospheric Prediction Service)

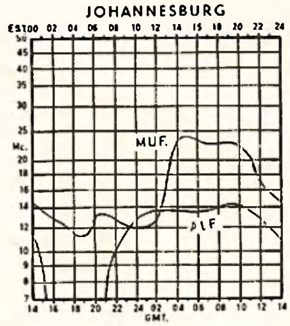
BARBADOS



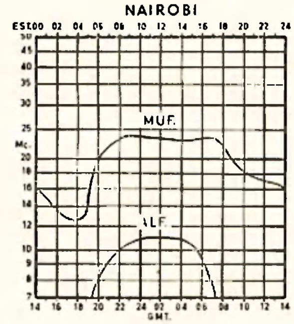
CAIRO



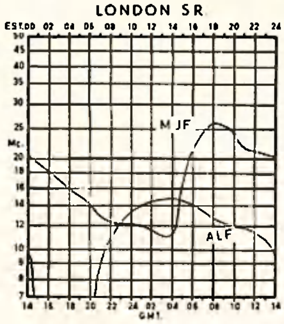
JOHANNESBURG



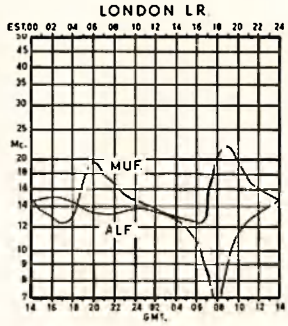
NAIROBI



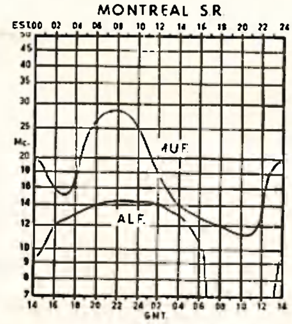
LONDON SR



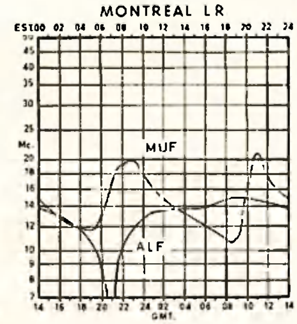
LONDON LR



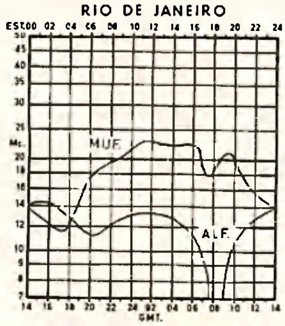
MONTREAL SR



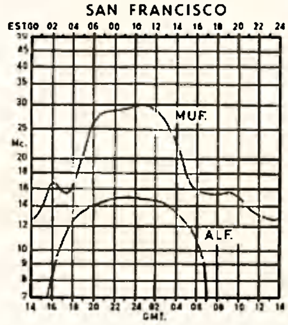
MONTREAL LR



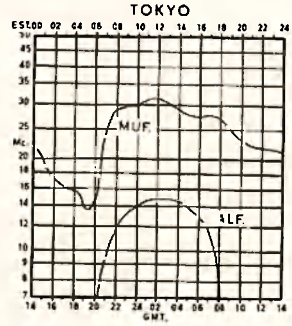
RIO DE JANEIRO



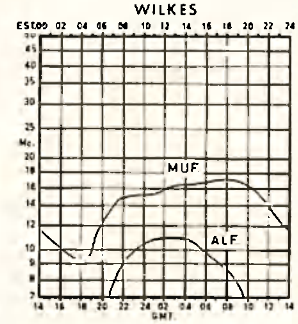
SAN FRANCISCO



TOKYO



WILKES



OBSERVATION POST

By H. F. Evertick

"There is more in heaven and earth, Horatio, than is dreamt of in your philosophy."

How many times have you read a reason d'etre for Amateur Radio? When frequencies come up for discussion there are always people who are ready to say Amateur Radio is finished, washed up, kaput.

They say the shiny black box has killed the art.

They believe that a number of Amateurs today cannot even service their shiny black boxes; and, even if they could, they would not dare do so for fear of depreciating the re-sale value.

Others come up with the argument that commerce is way ahead of us and what's more will become even further ahead as the result of research and exploitation of new techniques.

Stop a moment. Has it really been any different? Were all the pioneers of electricity and electronics Amateurs? Did an Amateur invent and develop the semiconductor?

And what about all those old time sets? I can remember many an old time piece of commercial gear. I must admit though that the percentage of home-brewing was higher yesteryear. But set against this, the number of Amateurs was very considerably less. How many Amateurs were licensed in 1938 compared with today—a tenth, maybe.

Yes, you will say, in those days we did all our own metal bashing. This was after the breadboard went out of favour and components began to be constructed with wire connections instead of screw-type connectors. The hook-up wire per se disappeared. Commerce developed the gimmicks, you will say, and we Amateurs merely followed suit. Along came disposals gear which we merely adapted to our own purposes. We followed the techniques of printed boards; many of us have thrown out the valve except possibly for r.f. power amplification because it is cheaper.

Now we need slim fingers, pencil point soldering irons and a magnifying glass for constructional work. Heavens above, I do believe we even buy printed circuit boards all made up ready to solder in the appropriate components. Before long, we might hook up a row of ICs and hey presto, there is a receiver ready to go. No need to bother with modules even.

Yes, I do not doubt the facts. Rather than becoming pessimistic about all these trends, however, I feel a little optimism coming on. It is good that the commercials go ahead and become ever more specialised. What a splendid thing this is for us.

Make no mistake. We Amateurs are still the only mob who not only communicate around the globe, but, to a large extent, can hopefully keep our gear pushing out the watts and our receivers bringing in the intelligence under all kinds of adverse and difficult conditions. The specialist must ever strive beyond his horizon but nevertheless must keep his feet on the ground. What better way for him to keep in touch with ordinary mortals than through Amateur Radio which is a blending of a whole range of skills, specialised and ordinary. Amateur Radio is unique and limitless as someone said the other day.

It is not solely a question that the world needs people to do something for no cash reward. Without the Amateur Service and its influence the electronics business might not be where it is today. There is constant feed back between the two. By definition the specialist concentrates on one field of activity. By his achievements in many diverse spheres of activity is the Amateur known.

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LICENSED AMATEURS IN VK

JUNE 1971

	Full	Lim.	Total
VK0	11	1	12
VK1	85	30	115
VK2	1420	487	1907
VK3	1310	661	1971
VK4	523	204	727
VK5	519	227	746
VK6	367	138	505
VK7	156	65	221
VK8	37	12	49
VK9	88	11	99
Grand Total	4516	1836	6352

THE SOUTHERN CROSS AWARD

The Southern Cross Award was instigated on 1st July this year to promote more activity on all Amateur bands. The Award is prominently Australian by its name, the colours being green and gold.

Conditions of Award: Australians and New Zealanders to work 15 members of the Eastern and Mountain District Radio Club. DX stations to work five members of the Club, or three members of the Club plus VK3ER—the official Club Station, which counts as two contacts.

This Award is open to all Amateurs and S.w.l's. Band and mode endorsements are available.

Australian Amateurs must forward the sum of 50c with their application. Overseas applicants must enclose eight IRCs. This Award is free to the legally paralysed or the blind.

Applications are by an extract of the log only, countersigned by two other licensed Amateurs, being sent to the Awards Manager, Eastern and District Radio Club, P.O. Box 87, Mitcham, Vic., 3132.

As this Award follows the Certificate Hunters Club conditions it will count for C.H.C. credits.

VK3ER is active on all h.f. bands, 144 MHz, a.m. and f.m.

DISTANCE TABLE FOR ROSS HULL MEMORIAL V.H.F. CONTEST

Computer Great Circle distances with first order corrections for non-spherical earth shape. Accuracy ± 2 miles.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	0	1172	828	2019	1001	596	1905	1636	1827	394	722	644	408	236	768	1328	1075	720	1198	2003	698
2	1172	0	1235	3141	2133	1760	2939	1756	2817	1486	1665	1642	1515	1286	1940	239	2116	1891	2074	3071	1867
3	828	1235	0	2586	1219	1217	2589	809	2550	1179	1534	1445	1175	1061	1260	1241	1057	1262	888	2647	1264
4	2019	3141	2586	0	1434	1434	472	3207	658	1659	1508	1509	1634	1860	1331	3328	1719	1344	2088	302	1352
5	1001	2133	1219	1434	0	599	1571	1773	1770	901	1126	1032	864	1018	395	2248	313	471	684	1569	508
6	596	1760	1217	1434	599	0	1375	1959	1333	327	535	437	290	496	223	1924	830	150	1122	1447	116
7	1905	2939	2589	472	1571	1375	0	3292	192	1515	1274	1307	1500	1707	1347	3147	1880	1332	2254	190	1326
8	1636	1756	809	3207	1773	1959	3292	0	3280	1973	2332	2239	1965	1868	1946	1654	1506	1968	1168	3321	1981
9	1827	2817	2550	658	1770	1333	192	3280	0	1434	1161	1205	1422	1617	1337	3031	1916	1312	2285	383	1300
10	394	1486	1179	1659	901	327	1515	1973	1434	0	360	266	39	200	549	1669	1085	478	1319	1621	443
11	722	1665	1534	1508	1126	535	1274	2332	1161	360	0	103	374	490	732	1873	1364	656	1639	1409	617
12	644	1642	1445	1509	1032	437	1307	2239	1205	266	103	0	275	418	641	1843	1264	564	1536	1431	526
13	408	1515	1175	1634	864	290	1500	1965	1422	39	374	275	0	229	512	1695	1051	440	1287	1602	405
14	236	1286	1061	1860	1018	496	1707	1868	1617	200	490	418	229	0	707	1469	1156	642	1339	1817	611
15	768	1940	1260	1331	395	223	1347	1946	1337	549	732	641	512	707	0	2090	665	77	996	1506	116
16	1328	239	1241	3328	2248	1924	3147	1654	3031	1669	1873	1843	1695	1469	2090	0	2198	2047	2114	3273	2026
17	1075	2116	1057	1719	313	830	1880	1506	1916	1085	1364	1264	1051	1156	665	2198	0	731	375	1871	765
18	720	1891	1262	1344	471	150	1332	1968	1312	478	656	564	440	642	77	2047	731	0	1052	1385	39
19	1198	2074	888	2088	684	1122	2254	1168	2285	1319	1639	1536	1287	1339	996	2114	375	1052	0	2245	1081
20	2003	3071	2647	302	1569	1447	190	3321	383	1621	1409	1431	1602	1817	1506	3273	1871	1385	2245	0	1385
21	698	1867	1264	1352	508	116	1326	1981	1300	443	617	526	405	611	116	2026	765	39	1081	1385	0

1—Adelaide
2—Albany
3—Alice Springs
4—Auckland
5—Brisbane
6—Canberra
7—Christchurch
8—Darwin
9—Dunedin
10—Geelong
11—Hobart
12—Launceston
13—Melbourne
14—Mt. Gambier
15—Newcastle
16—Perth
17—Rockhampton
18—Sydney
19—Townsville
20—Wellington
21—Wollongong

ROSS HULL MEMORIAL VHF/UHF CONTEST, 1971-72

The Federal Contest Committee of the Wireless Institute of Australia invites all Australian and Overseas Amateurs and Short Wave Listeners to participate in this annual Contest which is held to perpetuate the memory of Ross Hull whose interest in v.h.f./u.h.f. did much to advance the art.

A Perpetual Trophy is awarded annually for competition between members of the W.I.A. in Australia and its Territories, inscribed with the name and life work of the man whom it honours. The name of the winning member of the W.I.A. each year is also inscribed on the Trophy. In addition, this member will receive a suitably inscribed certificate.

We welcome proposals (in writing) to improve this Contest.

OBJECTS

Australian Amateurs will endeavour to contact as many other Amateurs in VK Call Areas and Foreign Call Areas under the following conditions.

DATE OF CONTEST

From 0001 hours E.A.S.T., **11th December, 1971**, to 2359 hours E.A.S.T., **23rd January, 1972.**

DURATION

Any seven calendar days within the dates mentioned above, not necessarily consecutive. These periods are to be at the operator's convenience. A calendar day is from 0001 hours E.A.S.T. to 2359 hours E.A.S.T.

RULES

1. There are two divisions, one of 48 hours duration, and one for seven days. In the seven-day division, there are four sections:—
   - (a) Transmitting, Open.
   - (b) Transmitting, Phone.
   - (c) Transmitting, C.w.
   - (d) Receiving, Open.

2. All Australian and Overseas Amateurs may enter for the Contest whether their stations are fixed, portable or mobile.

3. All Amateur v.h.f./u.h.f. bands may be used, but no cross-band operating is permitted. Operators are cautioned against operating transmitting equipment on more than one frequency at a time, particularly when passing cyphers. Cross-band operation to assist contest working is prohibited.

   Such operation will be grounds for disqualification. Cross mode contacts will be permitted.

4. Amateurs may enter for any of the transmitting sections. The seven-day winner is not eligible for the 48-hour award.

5. Only one contact per band per station is allowed each calendar day.

6. Only one licensed Amateur is permitted to operate any one station under the owner's call sign. Should two or more operate any particular station, each will be considered a contestant and must submit a separate log under his own call sign.

7. Entrants must operate within the terms of their licences.

8. **Cyphers**: Before points may be claimed for a contact, serial numbers must be exchanged. The serial numbers of five or six figures will be made up of the RS (telephony) or RST (c.w.) report plus three figures, commencing in the range 001 to 999, for the first contact, and will then increase in value by one for each successive contact. When a contestant reaches 999 he will then commence again with 001.

9. **Entries must** be set out as shown in the example, using only one side of the paper. Entries must be post-marked not later than **7th February, 1972,** and clearly marked "Ross Hull Contest" and addressed to **Federal Contest Manager, Box 638, G.P.O., Brisbane, Qld., 4001.**

10. **Scoring** for all sections will be based on the attached table. Approx. distances to be shown in the log entry as shown in the example. Failure to make this entry will invalidate the particular claim. **Operation via active repeaters or translators is not allowed for scoring purposes.**

11. **Logs**: All logs shall be set out as in the example and in addition will carry a summary sheet showing the following information:

    Name.............................Call Sign.....................
    Address.........................Division.........................
    ....Claimed Score...........
    Operating Dates.......................(7 cal. days)
    Highest Score over a 48-hour period was.......................points.
    Operating period:
    from..........hrs. E.A.S.T. ....../....../7....
    to..........hrs. E.A.S.T. ....../....../7....

    Declaration: I hereby certify that I have operated in accordance with the conditions of my licence and abided by the Rules of the Contest.
    Signed.......................................
    Date.......................................

12. Entrants not abiding by the Rules of this Contest will be disqualified.

13. The ruling of the Federal Contest Committee of the W.I.A. will be final. No dispute will be entered into.

14. **Awards**: Certificates will be awarded to the winners of each section in each VK and Overseas Call Area. The VK contestant who returns the highest score in the transmitting section and who is a financial member of the W.I.A., will have his name inscribed on the Trophy which will be held by his Division for the prescribed period. A Certificate will be awarded to the contestant who shall not be the Trophy winner, and who returns the highest scoring log covering a period of any 48 consecutive hours.

    Also, Certificates will be awarded for operating in the Ross Hull Contest and breaking any Australian v.h.f./u.h.f. distance record.

SCORING TABLE

Distance in Miles	52 Mc.	144 Mc.	420 Mc.	576 Mc.	Higher
Up to 25 Miles	1	1	2	5	10
26 to 50 „	1	1	5	10	25
51 to 100 „	5	5	15	30	50
101 to 200 „	10	10	25	50	100
201 to 300 „	25	15	50	150	250
301 to 500 „	20	25	100	250	300
501 to 1000 „	10	35	200	300	350
1001 to 1500 „	15	100	250	350	400
1501 to 2500 „	25	125	300	450	500
2501 to 3500 „	35	200	400	500	600
3501 to 5000 „	50	300	450	550	650
5001 and over	100	400	500	600	700

RECEIVING SECTION

1. Short Wave Listeners in Australia and Overseas may enter for the Contest, but no transmitting station may enter this Section.

2. Contest times and logging of stations on each band are as for the transmitting sections, however there is no 48 hour sub-section.

3. To count for points, logs will take the same form as for transmitting sections, but will omit the serial number received. Logs must show the call sign of the station heard (not the station worked), the serial number sent by it, and the call sign of the station being worked.

   Scoring will be on the same basis as for transmitting stations, i.e. on the distance between the Listener's station and the station heard. See the examples given. It is not sufficient to log a station calling CQ.

4. A station heard may be logged only once per calendar day on each band for scoring purposes.

5. **Awards**: A Certificate will be awarded to the highest scorer in Australia or Territories.

EXAMPLE OF TRANSMITTING LOG (Brisbane Station)

Date/Time E.A.S.T.	Band Mc.	Emission Power	Call Sign	RST/No. Sent	RST/No. Rcvd.	Dist. Miles	Points Claim.
24th Dec. 0100 E.A.S.T.	52	A3(a)	VK7ZAI	59001	59004	1110	15
0110 E.A.S.T.	52	A3(a)	VK4NG	58002	57051	330	20
0230 E.A.S.T.	144	A3	VK5ZK	56003	55043	990	35
0235 E.A.S.T.	144	A3	VK3ZJO	45004	46021	850	35

EXAMPLE OF RECEIVING LOG (Perth S.w.l.)

Date/Time E.A.S.T.	Band Mc.	Call Heard	RST/No. Sent	Station Called	Dist. Miles	Points Claimed
2nd Jan. 1000 E.A.S.T.	52	VK5ZDX	59221	VK8KK	1330	15
1025 E.A.S.T.	52	VK2ZCF	58195	VK6ZAA	2040	25
1110 E.A.S.T.	432	VK6ZDS/6	57061	VK6LK/6	60	15
3rd Jan. 0500 E.A.S.T.	144	VK5ZHJ	44102	VK6ZCN	1330	100

CORRESPONDENCE:

NOVICE LICENSING

Editor "A.R.," Dear Sir,

I would like to make some comments regarding the proposed W.I.A. approach on Novice Licences. Many excellent comments against the Novice licence were given in a letter in the July "Amateur Radio," and I can do no more than agree with them, except that it is doubtful if the Novice would cause an increase in t.v.i. The main cause of the increased t.v.i. from Amateur stations, in most cases, is the use of high-power linear amplifiers for s.s.b. The plain fact is that high power, and suburban living, just do not go together. It seems to be a sign of prowess these days to exceed the legal limit, and t.v.i. is the result. Low powered c.w. operation very seldom causes t.v.i., even if the local t.v. sets do have broken ribbon, poor contacts in their tuners, and so on. Amateurs must accept that many t.v., and high-fi sets are less than perfect, and if the only way to continue the operation of the station without violent arguments with the neighbours is to reduce power, then low power it has got to be. However, I digress.

The first comment regarding Novices is that I do not see why a Limited licensee should have Novice privileges on passing a slow c.w. test. He is not a Novice; he proved that by passing a higher standard licence examination. I would like to see Limited licensees allowed to use c.w. on v.h.f. I do not see what harm it could do, and it would certainly allow them much needed practice for the full exam. It would also allow them to work v.h.f. DX, which is often available, if only the apparently weak carriers were keyed, instead of being modulated.

I also do not see any great need for Novice licensing if a change was made in the form of the exam. Multiple choice questions, such as used by I.B.M. in their preselection exams., would enable persons to pass the exam., who are presently hampered by their inability to express themselves on paper. Furthermore, a multiple choice answer system enables the examiner to set more questions, and thus get a far better idea of the standard of knowledge of candidates than the setting of a few essay questions.

The other points against Novice licensing, such as P.M.G. control, possible piracy after the expiry of the licence, etc., are all valid, and make a convincing argument against Novices. Our present exam. is not really very hard, when compared with other Commonwealth countries; and in any case, what does Amateur Radio want? Quantity or quality in its members?

Finally, I must protest most strongly at the proposed frequency allocation for Novices. They are, of course, going to be accommodated in the "c.w. bands", or at least, those portions of the bands traditionally c.w. by Gentlemen's Agreement. Thus the poor c.w. operator, already limited in his operating to approximately quarter or less of each of the bands in the h.f. spectrum, will now have to battle Novices as well as the odd phone operator who slips down for a quiet spot to work in. What is worse, the proposal would give Novices on 3.5 and 7 MHz. prime spots in the normal DX sections of the c.w. bands, that is, near the low ends. By the time we take out commercials in the 7 MHz. band, the c.w. DX operator would find he has nowhere to go there and virtually nowhere to go on 3.5 MHz. On 3.5 and 7 MHz., 3525-3550 and 7025-7050 would be more acceptable; assuming we have Novices, which, of course, I hope we do not.

Finally, it may perhaps be pertinent to point out that it appears that W.I.A. members are very much divided on Novice licensing, and that much of the pressure for it comes from small groups. When taken as a percentage of the total licensed Amateurs of Australia, these people are very much in a minority; as I understand that the W.I.A. membership is somewhere between 50 and 60% of all licensees.

If Novice licensing is proposed to the P.M.G., I for one, will raise my voice against it, by writing to the P.M.G., and putting the case for the many non-members whose voice, for and against Novices, has a right to be heard. However, I think that there will be no need for this, for, with a few revisions in the present system of exams. and licensing privileges, all parties could be satisfied without Novice licensing.

—John H. Smith, VK3IQ.

P.S.—It may also not be out of place to point out that in the U.S.A., on 3.5 and 7 MHz., there is much more room for Novices, seeing that the bands there are 3500-4000 KHz. and 7000-7300 KHz.

Editor "A.R.," Dear Sir,

As the subject of Novice licensing is with us and is still open to plenty of discussion (and opinion), I felt urged, and to a degree motivated by VK3RN's well set out letter, to give my opinion on the subject.

The fact that I am going against introduction of Novice licensing in its present form was not due entirely to the abovementioned letter, but some of the points raised are well worth deeper thought before we accept or reject Novice licensing.

I want to base my argument on fairly practical aspects. Currently a person may obtain a Limited/Full licence at the age of 15, certainly quite old enough to be in the position of operating equipment capable of spanning the globe and communicating without supervision, in a proper manner. Whatever, Limited or Full licence, a 15-year-old boy is at a pretty important stage of his schooling, and I would venture without some "parental controls" would get involved to the detriment of his studies if left on his own.

On the equipment side, there are boundless possibilities. Dad may have a station that son can operate. The boy might be able to talk Dad and/or Mum into a secondhand rig (or new), mono or triband, for Birthday or Christmas and so we go. Then some means of radiating and receiving. Some frequency standard, whether crystal calibrator or frequency meter. All in all, you must admit, a reasonable outlay is involved to get our new 15-year-old "on the air". Be that as it may, our Boy is off to communicate with all and sundry, with all the enthusiasm of a beaver building a new lodge. The argument that Amateur Radio interferes with studies is old, but is as valid now as it ever was and I'll wager there are many who will agree with me.

I commend to you that the situation is just the same for a proposed Novice, but the problem is aggravated at each stage. The 14-year-old has one year to: (a) build up a suitable transmitter—simple yes, but time is required to do the job properly if he is to learn about the problems of layout, tune-up, soldering correctly, winding coils, getting bits together, etc.; (b) receiver okay, we can, if lucky, get away with the old 3-band ex-loungeroom receiver—can all Novices get hold of one working well enough—some modifications will be required, more time; (c) aerial, a long wire will suffice or a little better, a dipole, the question is which band, what about somewhere to anchor it—will Mum and Dad be happy with it here or there? etc.

Somehow the Novice is on the air, then let's just assume he has a year (i.e. he managed to scratch together the required gear beforehand) to operate in his spare time. Most young boys of this age have too much energy not to be engaged in some sport at week-ends, football in winter—cricket and swimming in summer. Then there are school projects, homework which must be done. Unless our Novice is prepared to make a few sacrifices the regular operation required to get the speed up is not going to be there. I think I need continue no further along these lines. I am referring here to all proposed Novices generally. I'm quite sure that someone could easily come up with a young lad flying through school and just as good at Amateur Radio. Anyone can come up with an individual situation to suit an argument.

Other points I would like to raise are (1) How will our young operator get experience talking properly by the use of telephony if he is confined to c.w.? The ability to "talk" to the other operator is just as important as good c.w. Have a listen around and you'll see.

Finally, who will inspect his equipment to see that it is safe to use and not able to be "doctored" once on the air for Novice operation?

This letter has turned out much longer than I anticipated, but if we think about it, I do not think that the number of Novices we would get out of this, to become Full licensees will anywhere near justify the scheme, because even an enthusiastic boy needs to be fed "a little bit at a time" to maintain his enthusiasm. I have a suggestion that could be worth kicking around, and for those who have come thus far, here goes.

Let us base our Novice on the 14-year-old. The Novice licence be as suggested and for one year. However, instead of having a lot of Novices with their own little bits of gear, etc., I suggest all Novices become members of a Y.R.C. where they continue along as before, but with allowance to operate the Y.R.C. station on their own. Restrict them to 25 KHz. for c.w., but give them telephony practice too.

As far as the other members of Y.R.C. not Novice, the advantage of seeing some of these members actually operating the station will be the incentive they need. Many problems are eliminated—(1) Parent-child relations improved (no aerials or equipment about the home); (2) Novice can get regular operation at meeting times already existing—have a roster if you must but something could be worked out; (3) P.M.G. would be much happier in the knowledge that the Novices will be all operating from certain given areas, under supervision, and (4) under this method those lagging a bit could be spotted and pushed along.

I believe this way, that the returns from Novice licensing would be much higher and having been members of Y.R.C. would be more likely to become members of W.I.A. I honestly believe we would achieve a lot more success but I guess some Y.R.C's could be overloaded, there might be a few problems. Y.R.C. night could become two separate nights and so on.

Personally, I think too many of us have forgotten the elation we felt when we passed the exams. for Full ticket and, I think, a lot more could be done (very little is required) to get our Novice standard up to Full licence standard and wouldn't we be better off? There would be no need for Novice licensing in the first place. Obviously, along the way, in writing this letter, I have missed a point or two, or failed to elaborate completely a point made, but the basic idea is there, and I hope clear enough to understand.

—Peter P. Morrow, VK2BMP.

Editor "A.R.," Dear Sir,

I have found that the letter I wrote to "Amateur Radio" on 26th July has been photostat copied and sent on to Mr. Rex Black, VK2YA, Chairman of a Novice Licensing Committee. On the 11th August I received a long three-page letter from Rex in reply to my comments. I am not retired, like Rex, and have limited time available for letter writing, therefore I have no intention of commencing a private correspondence series with him, and his letter is enclosed, along with my reply.

This letter refers to Rex Black's letter and others in "A.R.," so would you be good enough to publish a copy of the letter from Rex to me, also?

In para. 2, Mr. Black questions my comments about countries which do not have Novice licensing. I want to refer him to Mr. Higginbotham's letter in July "A.R." where he points out that the Committee infers that: "these countries are technologically retarded as they have no Novice licence"—unquote. This is correct and Mr. Black has missed the point by writing that: "It is easier to obtain a licence in England and New Zealand because the standard is lower than Australia (50% for a pass) so they can get adequate numbers of Amateurs with their lower standard." Surely this is a negative attitude, for are we not concerned with the poor 52% of licensees (in VK3) who are members of the Institute?

The latest count shows nearly 4,000 in VK2 and VK3 combined, out of a total of slightly over 6,000 for Australia; this is a good number and our object is to obtain a higher percentage of these licensees as FULL members of the W.I.A. I have stated in my last letter, we urgently need to make the W.I.A. more attractive, such as the State Convention held at H.M.A.S. "Cerberus," Crib Point, on Saturday, 24th July. Thanks to Dr. S. J. Lloyd, VK3CDR, the Vic. Div. President and his assistants, an enjoyable day was had by all. This kind of attraction can bring the members together under convivial circumstances and make the members feel that they belong, and by having a series of pleasant gatherings, give the member something to look forward to.

There is no need to create a new batch of "low standard Amateurs," to quote Mr. Black.

Paragraph 3. We do not have a steady stream of resignations in VK3, so I have to again say, this is a negative attitude. Let us look at some fees and compare, since there is a general increase in all places:—

Combined T.V. & Radio Licence	$26.50
Amateur Licence	$6.00
I.R.E.E. (low grade)	$15.00
Bowling and Tennis Club	$20.00
W.I.A.	$11.00

Paragraph 4. Mr. Black seems to imagine that all the new multitude of Associate members would automatically happen. We would have "Instant Associates," as soon as a Novice licensing arrangement was launched. How does he propose to make sure that 100% of the Novice licensees are going to join the W.I.A.? Perhaps his scheme could be applied instantly to get that 48% of present licensees to join the W.I.A. as FULL members.

Paragraph 5. Condemning Novices because the P.M.G. may increase the fee is not the point, the extra burden is objectionable and makes the Amateur Service an extra nuisance as far as the Radio Inspectors' Department is concerned. The Committee's idea for an examining committee is an excellent idea, but what is your point? The examination is no problem —you can issue a Novice licence at say 50% pass, but the administration of all these extra licensees is the nuisance.

Paragraph 6. Mr. Black has set down a complex series of examination details in parts A and B to ensure that the Novice has to be near perfect in his answers to part A. This paints a beautiful picture of a Novice in his shining white armour with Morse key built in, but I am sorry to dispel this vision. Why is he any different from a regular A.O.C.P. student? Mr. Black is going to test the Novice with: "Special stress on t.v.i. and b.c.i. and key clicks and spurious radiations, so any suggestion that a Novice would be incapable of satisfactory operating after such a test would be negatived"—unquote. I presume Mr. Black will personally guarantee that none of his Novices will ever cause any of the above QRM. The latter part of the paragraph sounds sad and I am sorry that you have had such a high percentage of "dropouts" at your Gosford Radio Club. Down here in backward Melbourne I found that anyone who is really keen will gain an A.O.C.P. no matter what his profession or work happens to be.

George Thompson, VK3TH, and I started the W.I.A. A.O.C.P. classes, on a business basis, in November 1933. George was manager, Bob Dalton, VK3UI, Morse instructor, and I was theory and regulations instructor. We considered a maximum of 40 per class and at the end of the lectures the number usually was down to 25, but they were keen and we usually obtained 80% passes. Each pupil was automatically made a student member of the W.I.A. and received all privileges and the magazine "A.R." for one year.

The members who operated on the broadcast band in those days were granted permission by the Radio Inspectors' Department, to advertise the A.O.C.P. classes and we were always fully booked up. I have forgotten the fees charged, but I think it was about five guineas including a copy of the A.R.R.L. Handbook and "somebody's" electricity and magnetism.

I had to resign in December 1936 to take a country broadcast station appointment. The present A.O.C.P. classes are a continuation from these days, 38 years later, and still very satisfactory.

Paragraph 7. The school boy I can quote is my elder son, VK3ZFM, who did as I said.

I have not been trained, like Mr. Black, as a school master, but all the information I have quoted is accurate and you might do some research into the days of the W.I.A. when the VK2 men were called "The Association of Radio Amateurs (N.S.W.)"—later to become the VK2 Division.

Further on your reference to how hard it is to pass the A.O.C.P.—I know from vast experience in this field that if you are keen enough you can do it—you sit on the tram and read all the advertisements as they pass, in Morse—and you write the formulae on cards and carry in your pocket so that you can glance at them at any time through your working day.

You say that you cannot recall a Gosford Club trained member ever having a c.w. QSO. Well, is it not the prerogative of the A.O.C.P. holder to use any mode of communication within the regulations that he favours? You say that: "Had they had a Novice licence first they would have gained and retained Morse skills which they certainly do not have now." This is not true, if a student can pass a 5 w.p.m. test and is keen to get an A.O.C.P., he can raise his speed to 10 w.p.m., it is much more difficult to raise speed to 20 w.p.m. and many c.w. men operate at this speed, so what is the point? The speed is controlled by the slowest operator of a group. I think your argument is the same be it Morse skill or theory and regulations skill, the person who has just passed the A.O.C.P. and is not engaged in the business of telegraphist or electronics engineer is at a considerable disadvantage to the man in the field—until he gains some considerable amount of experience.

I did not say that school physics covers the A.O.C.P. syllabus, but can you not see that the student is prepared for the A.O.C.P. examination by school work?—he is conditioned by the school training and examinations are easier than to a mature person who has left school 20 or 30 years ago. The student only needs to study the A.R.R.L. Handbook or attend the W.I.A. classes. You are splitting hairs about the regulations.

Paragraph 8. Mr. Black says that 160 metres is not used adequately in VK2 and he proposed that Novices could use 1800 to 1860 KHz. This is rubbish—the whole band?—why don't you poor misguided people have a listen on this band, to the W, KL7, etc., etc., signals coming through? I will concede that there are times when the DX does not come through and you could put Novices on for local practice, but how could you police it? Or supposing the band is open, the 10 watt Novices would give up under the 150 watt stations. You have so many restrictions on the Novice licence that you sound like a "Police State". None of my friends would be interested in such regimentation of frequencies and hours of operation. Referring to restricted hours applied by the Radio Inspectors' Department, to many stations to avoid t.v.i. and b.c.i.—what a negative attitude to adopt, why not fix the interference?

Paragraph 9. It is good to hear that the Novice Committee is prepared to bring to the notice of the Federal Executive, the subject of special treatment for handicapped persons. It has been my experience as a member of the W.I.A. for 42 years that the Superintendent Radio Branch has always made every effort to make it possible for a handicapped person who is very keen to gain the A.O.C.P. to do so with special consideration in accordance with the circumstances, and no genuine case has ever been refused.

You must realise that no set format could ever be drawn up to cover all situations. I agree the Institute should appoint a committee to do research on this subject. You suggest that: "Stepping up the W.I.A. assistance for a handicapped person would make the government authorities who are responsible for caring for these people, regard this programme with favour and the W.I.A. would gain allies in its efforts to retain our allocated frequencies, which are threatened by lack of usage and envious eyes of commercial interests"—unquote.

Why do you and many other members of the W.I.A. keep repeating that "old hat" story about "lack of usage" and "use our bands to greater advantage"? There is too much talk and no action! If everyone who says or even thinks that the bands are not being used, would make it their business to immediately get on the air, this mythical problem would disappear!

Take the common popular five bands from 3.5 to 30 MHz., which most transmitters and receivers will cover, and I promise you a QSO can be made any minute of the day or night, on one of them.

I do not have as much time to be on the air as I would like, but my log shows 40,263 contacts since 1930. Since I was not on the air from September 1939 to December 1945 (and I hope you were not), that is an average of nearly three QSOs per day and anyone can do this and I know people who make more.

Paragraph 10. Re Mr. Black's letter in "A.R." for February 1971—it is all very well to make reference to people not taking the trouble to submit their opinions to the Committee immediately. Didn't you know that the people who are still engaged in normal active business life would not be able to have a reply to your letter in "A.R." by about the 5th of the month, when "A.R." arrives on about the 3rd?

Ron Higginbotham's long study on the subject of NO NOVICE LICENCE was printed in July "A.R."—this is reasonable in consideration of the trouble he went to, to research all the "timid" points that the Committee put forward.

I take the subject of Novice licensing very seriously because of the repercussions which I know would take place and Mr. Black will only convince me about his claim of 10.4% anti-Novice, when he publishes in "A.R.," ALL the statements submitted to the Committee prior to the compilation of the Novice report. You say that the Novice Committee is not biased in favour of Novices, but I detect a note of sarcasm in your statement: "Most of the anti-Novice arguments submitted were pitifully weak and were not backed up by any logical reasoning."

I take it that Ron Higginbotham's and my letters fall into this category?

Paragraph 11. Congratulations Rex on getting an FT200 transceiver and I hope to speak with you very soon.

Paragraph 12. It is the logical thing to continue the activity of the Novice Committee and let them submit a later report because until the 1970 Federal Convention, little or no publicity had been given to the subject and no discussion amongst W.I.A. members, in this State, took place.

The Novice Committee produced its report on 1st April, 1971, one week before the 1971 Federal Convention, but, Mr. Black's letter to "A.R." was in the February 1971 issue. So is it not rather obvious that there was not sufficient time to receive considered opinions in the correspondence columns of "A.R." before the report was made up?

Mr. Higginbotham's report was published in July 1971 "A.R." So I suggest that the gentlemen in the Committee were busy making up their report WITHOUT any real arguments from the members of the W.I.A. in other States.

Paragraph 12 (continued). Mr. Black, you must remember now that you are retired and no longer a school master, therefore refrain from speaking to me as though I am one of your young Novices! You have "directed" me to send my "for and against" arguments to my Divisional Councillor, Dr. Deane Blackman. Instead, I am sending this to the Editor "A.R."

I agree Dr. Deane Blackman, who is engaged by our Company (Herald-Sun T.V. Pty. Ltd., Ch. 7) for all the Apollo Missions, performs an excellent service and is enjoyed very much by the public.

Many thanks for your long letter, you went to a lot of trouble, but this subject is not one to be taken up by individuals corresponding with each other, it has to be on the open forum of our "A.R." magazine.

Finally, I wish to make some comments on Mr. Michael J. Owen's "Federal Comment" in June 1971 "A.R." under the heading of "Novice Licensing Again"—Report of Basis:

Item 1. In these days when matriculation is definitely a more difficult examination than it was at the beginning of its introduction. Qualifications for entry to the I.R.E.E. are higher. Standards of examinations necessary to obtain a B.Sc. are much more complex than in my day. Why, for Heaven's sake, talk about lowering the standard of the theory examina-in order to issue a third rate A.O.C.P., called a Novice?

2. No comment.
3. If you are keen enough you can practice to 10 w.p.m. instead of 5; this is unnecessary.
4. Too restricted.
5. No comment.
6. This needs to be qualified. Would the certificate be cancelled at the end of one year? I don't believe this would be practical. It would be unacceptable to most people. I have found that more A.O.L.C.P. holders remain as such and the few who go from A.O.L.C.P. to A.O.C.P. would have gained the A.O.C.P. if we were not blessed with the A.O.L.C.P.
7. No comment.
8. Naturally.
9. Naturally.
10. Too restricted. How do you police it?

—Ivor Morgan, VK3DH.

[Following is Mr. Rex Black's letter in reply to Mr. Ivor Morgan's first letter in Sept. "A.R." Mr. Black's paragraph's have been numbered so that readers can refer to Mr. Morgan's comments.—Editor.]

Mr. Ivor Morgan, VK3DH,
Dear OM,

The Secretary-Manager of the W.I.A. has sent me a batch of photostat copies of letters to "A.R." on the subject of Novice licensing. I must thank you, therefore, for taking sufficient interest to put your ideas on paper and for contributing to the debate on this interesting topic.

2. I do not think that anyone would agree with the proposition that France, Germany, etc., could be classed as technically backward because they do not have Novice licensing in their Amateur Services. However, keep in mind that it is easier to get an Amateur "ticket" in Britain than it is here in Australia. The examination is conducted not by the G.P.O. but by the City and Guilds Institute and the exam. pass mark is only 50% compared with our 70% pass. Under such circumstances it is doubtful whether Britain and New Zealand (also 50% pass) need Novice licensing, as they can get adequate numbers of Amateurs with their lower standard.

3. The matter of getting a greater percentage of VK Amateurs into the W.I.A. is—I agree—of immense importance, but I cannot see much hope. With the increase of fees there is a steady stream of resignations. After all, the W.I.A. is not like a trade union which one must join. It is purely voluntary membership and it is hard to exert pressure on Amateurs who do not see any advantage in belonging. Problem is how to convince them. I think the figure at present is about 53% of licensees as Institute members—as you state, a "dreadful deficiency"—and I just don't know the answers. There is an economic problem with current inflation trends and some people with families find that there are priorities in their spending and Institute membership is a luxury that some cannot afford.

4. Ron Higginbotham quotes the fact that Associate members are not worth as much to the W.I.A. as are Full members, as Associates pay lower fees. Therefore, if we get Novices, they should be Full members. The Committee gave a lot of thought to this point. I can assure you, and we felt that more conservative members would resent having only equal status with the Novice group. On the other hand, in U.S.A. the A.R.R.L. accepts Novices as Full members. Anyway, whatever recommendation we made would have found someone to criticise from one side or the other, so we decided that the probable wishes of the older and established members should be considered—hence the idea of Associates.

5. I doubt whether there is any real reason for condemning the whole idea of Novices just

because the Radio Branch **might** (unproven) find itself compelled to increase licensing fees. After all, the scale of fees is set down in a table and Amateur Service stations are only one of a long list. If the Administration is going to state that Novices will create an unnecessary burden on the R.I. Branch, the W.I.A. could readily offer to assist in the examination and Morse testing. As I stated before, the British licence written (theory and regs.) is set and marked by the City and Guilds Institute and the whole Radio Amateur exam. set-up is administered by a Committee on which the R.S.G.B., the G.P.O., the City and Guilds, and the Ministry for Science and Education are represented. Thus, there is a precedent in a British country for the examining body to be different from the licensing authority. A similar type of offer might be made here to form an examining committee comprising reps. of P.M.G., W.I.A., I.R.E.E. and Tech. Education Dept.—no problem at all if the P.M.G. authorities can be made to see a reasonable offer when it is presented. The whole burden would not fall on the Radio Branch, **nor** on the W.I.A.

6. Re t.v.i. and b.c.i., I think this fear is more apparent than real. You ask "who could be less experienced than a Novice?" The answer is—a Full A.O.C.P. licensee who has just struggled through a blackboard and chalk type of course and just managed to gain a minimal 70% pass without any real Radio background. There are plenty of these and I could point a finger or two if required. One's opinion could be coloured by the lack of detailed information on the Novice proposals. The Novice is **not** merely a chap who has enough money to buy a black box and get on the air. According to the concepts of the Committee a Novice will be just as well trained and examined in theory covering up to c.w. equipment as the Full A.O.C.P. candidate. If we regard the A.O.C.P. theory course as comprising (say) 30 topics from basics to s.s.b. and sophisticated equipments, then the Novice would have covered all the basics and c.w. transmitters and t.v.i. and b.c.i. and key click filters and aerial design up to the stage where he could handle that part of the Amateur station. We envisage that the possible "new-style" Amateur exam. would involve two parts. Part A would be the section where all Novice licence candidates would be required to answer all questions and the questions would cover the topics mentioned before. Part B would be completed (as well as Part A) by candidates for A.O.L.C.P. and A.O.C.P. and would include questions on modulation, etc., right up to s.s.b. In other words, the Novice would be tested at A.O.C.P. standard on a limited range of topics with special stress, we feel, on t.v.i. and b.c.i. and clicks and spurious radiations appropriate to his mode of transmission, which would be c.w. only. So any suggestion that a Novice would be incapable of satisfactory operating after such a test would be negatived. We hope that the Radio Clubs would take a major part in the training of Novices and in supervising and helping them to get on the air after constructing, calibrating, testing their transmitting and ancillary equipment under club instructors' supervision. I have had a fair bit of experience in the matter of Radio Club instructing of A.O.C.P. candidates and am certain that the Novice licence as a more immediate incentive would help to prevent dropout rates which, under present conditions of instruction and examination are too high. There are plenty of mature and responsible men who start A.O.C.P. courses and then find that the course is too extensive and is incompatible with job and family responsibilities. We lost a high proportion of potential Amateurs at Gosford Radio Club for this very reason. The students were not in the radio or electrical business and while very keen just had to abandon the project, not because they were lazy or indifferent but other pressures of quite valid natures made them give up.

7. I do not go along with you on the schoolboy issue. Having just retired from teaching after almost forty years in secondary schools, tech. colleges and evening colleges, I just do **not** believe that school physics courses will enable a lad to sit for an A.O.C.P. theory examination "without any preparation whatsoever". No secondary school physics syllabus covers the A.O.C.P. syllabus, although some electronics topics are included, together with some elec. and mag. and Ohm's law. I am not at all convinced that the regulations could be covered and learned adequately in an evening prior to the examination. At the Gosford Radio Club we went through the regulations course over a period and made sure that the material was well learned and understood—and that was certainly not possible in one evening. We ran regular regulations tests for a long time before the actual A.O.C.P. examination and there was need for revision and correction and discussion over a period of weeks. Perhaps the N.S.W. people might not be so mentally acute as those enjoying the bracing cool VK3 climate! Anyway, the chaps who **did** succeed in passing the A.O.C.P. under the Club conditions are unanimous—repeat **unanimous**—in their opinion that a Novice licence would have benefited them earlier in the course. They have also indicated that in their opinion more chaps would have stuck with Amateur Radio and become active Club and Institute members if they could have enjoyed the earlier incentive of Novice operating. Furthermore, I cannot recall any of the Club-trained A.O.C.P. men who has ever had a c.w. QSO—at least in the Gosford area. They stood on tiptoe to get their 12 w.p.m. exam., then threw away their keys and operated solely on phone. If they could have come in via the Novice (c.w. only) gate to Amateur Radio there is no doubt that they would have gained and retained Morse skills which they certainly do not have now. I often wonder just what would happen if the P.M.G. ever decided to call in all Amateurs to take a repeat c.w. test. As an ex-Army and ex-R.A.A.F. op., I'd have no trouble, but what about all those who have come in with only audio oscillator and key experience with a Club or A.O.C.P. class? Makes me think a bit! In U.S.A. the comments that appear in "QST" about Novice c.w. contests make the c.w. only condition sound like a pretty good thing—**not** that I think every VK Amateur should be required by the P.M.G. to undertake a Novice apprenticeship—far from it, but the opinion of Mr. Huntoon, manager of A.R.R.L., supported by other American opinions indicates that a chap who gains his General (equal to A.O.C.P.) licence after Novice experience is a far better operator in Morse and general know-how than the fellow who swots hard and enters directly at General class level. Remember, too, as a matter of interest, that the U.S.A. Novice passmark is 74%.

8. Re the use of 160 mx band. The list of frequencies attached to the Novice Committee's Report was designed to attract comment and helpful criticism. The opinion here in VK2 is that 160 mx is not used adequately in this State and that there would be room for some Novices thereon. A further point is that Novices could be required to observe restricted operating hours. After all, the Novice system would —we hope—produce more School Radio Clubs with licensed members so that there could be inter-school contacts on 160 mx during hours when the majority of Amateurs are either at work or on the way home. Perhaps Novices might be allowed to work on 160 mx till (say) 5 p.m. or so. The principle of restricted operating times is well established, as many Amateurs have had such conditions applied by the Radio Branch from time to time in order to avoid b.c.i. and t.v.i. In any case, why should the competent Novice be debarred from enjoying the DX which the old-timers appear to be enjoying on 160 mx. After all, the A.O.C.P. holder with his 150 watts will almost certainly make the 10 watt Novice operate elsewhere. Again, assume that an experienced Novice builds up his Morse skill to (say) 20 w.p.m., well above the average A.O.C.P. man. Isn't he entitled to get some of the good things that Amateur Radio offers?

9. Re the handicapped persons business. I insist that the Committee had every right to bring this matter to the Federal Executive's attention. This is an area where the Amateur movement could do far more than it has ever done before. I know that there are some isolated cases where handicapped people have enjoyed Amateur Radio, but the "thing" has never been attempted on any major scale as an Institute policy. We have lost much of our public service functions as Civil Defence and other services have moved into the emergency fields of communications and here—in helping handicapped persons as Institute policy—we have a means of gaining real goodwill for the W.I.A. and the Amateur Service in general. The training of handicapped people to Novice level would be far easier than attempting to bring them to Full A.O.C.P. standard. Hence, we could create a wider coverage than the present licensing system affords. Also, the government authorities who are responsible for caring for handicapped people would, undoubtedly, regard any such programme with favour. The W.I.A. would gain additional allies in its efforts to retain the allocated frequencies, which are threatened by lack of usage and envious eyes of commercial interests. In this statement I am merely repeating what has already been stated by our W.I.A. leaders in "A.R." and elsewhere and not presenting some VK2YA crackpot idea.

10. While the Committee resents some of Ron's "cracks" suggesting that we may have suppressed some anti-Novice statements—which is certainly not true—we have found some really useful points for discussion in his letter. It is a pity that he and others of anti-Novice persuasion did not take the trouble to submit their opinions to the Committee in response to my letter in "A.R." asking for statements **for** and **against** Novice licensing. You may be interested to know that of all the statements submitted to the Committee either in writing or verbally prior to the compilation of the Novice Report—only 10.4% were anti-Novice. The remainder were in favour of the introduction of this form of licence. Some of these pro-Novice statements were submitted by Radio Clubs and therefore may be regarded as multiple-votes on the "for Novices" side of the argument. Most of the anti-Novice arguments submitted were pitifully weak and were not backed up by any logical reasoning. We have been accused of presenting a Report biased in favour of Novices. What else could we have done when only 10.4 of the statements opposed the Novice principle? Your own Federal Councillor—a very bright young man indeed—stated (according to the minutes of the Brisbane Convention) that he found the Report to be less biased than he thought it would be.

11. My word, I **have** filled up some space, haven't I? Put it down to youthful exuberance and excessive enthusiasm. I have just retired on medical grounds from the teaching service with the State Education Department and am slowly feeling the strain drift away. It is a hard job under present conditions in our schools and things will be worse in 1972. However, I am now in a position where I can contemplate some Amateur Radio, after being off the air for about five years. I have ordered a s.s.b. transceiver (a FT200) and should take delivery on 16th of this month. It will be pleasant to chat with old—and new—acquaintances on the air and to exchange ideas.

12. I have just been advised by the Secretary-Manager of the W.I.A. that the Novice Committee is to be re-activated and will be expected to make a Supplementary Report based on submissions received since the original Report was submitted to Easter Convention. It is now up to **both** sides to let me have all the arguments possible—**for** and **against**—not just bald statements but well-reasoned arguments of debating quality. As this is a committee set up by F.E., I presume that the correct channels would be via the Divisional Councillors, in your case, Dr. Blackman. Did you see his t.v. broadcast re the Apollo Moon Landing? Very well done. One of the fascinating things about Amateur Radio is the wide range of types involved—from bright young men like Deane Blackman to aged and wornout school teachers! I note with interest your date of licensing. Beat me by two years, but I'll bet you have had a lot more operating time than I have! Regards and thanks again for your contribution.

—R. C. Black, VK2YA,
(Chairman, Nov. C'ttee)

Editorial note.—Future correspondence on Novice licensing should be short and succinct to achieve publication.

A CASE FOR A LOWER GRADING OF AMATEUR LICENCE

Editor "A.R.," Dear Sir,

Much has been written of late on the subject of Novice Licensing. It is not desired to restate what has already been said in regard to details such as frequencies and power, but rather to emphasise reasons why a lower grade of licence should be made available.

There are four main reasons for promoting further Amateur activity—a valuable leisure pastime, a national training ground for electronic personnel, the continuation of researches which have been conducted by the Amateur fraternity over the years, and to justify the holding of frequencies in the face of commercial needs for additional space.

There is a need in Australia, not so much for more highly trained theoretical engineers, but for a large body of versatile, technically competent people which Amateur Radio significantly helps to foster.

Australia faces a competitive situation in South-East Asia. As an example, Japan has encouraged basic licensing, no doubt realising its value in basic training. Japanese figures now show approximately three times as many Radio Amateurs on a comparative population basis as compared with Australia. It is not suggested that we in Australia should be a "slave to fashion" and follow the examples of other countries, but that we constructively weigh the pros and cons of a lower grade of licence as it would affect our circumstances here.

The Australian need is to be in a position to compete in a world where technology is largely related to electronics. It is essential that Australia be not only a country which supplies raw materials for processing elsewhere, but has enough technical ability to "row its own boat".

A need exists particularly for young experimenters, to have contact with more experienced persons to avoid time wasting situations that they cannot handle, and to encourage at least a proportion of these into professional electronic careers.

A sub-committee of the Eastern Zone of the Victorian Division of the W.I.A. wishes to encourage a class of licence to provide a step, filling the large gap between the raw beginner and the existing high standard expected of the present A.O.C.P. holder.

The term "Novice Licence" has been commonly used, but it is unfortunate in that it implies a low standard—an alternative name should be investigated, such as "Restricted Licence", the reasons for this will be clarified below.

An examination for Restricted Licence should ensure that the holder is proficient to the normal standard, but only in those fields that he will use in his Amateur activities. It is suggested that the A.O.C.P. examination paper be in two sections. The first involving perhaps one and a half hours, to include power supplies, crystal controlled c.w. transmitters, simple receivers for c.w. operation, and aerials. Restricted applicants would only attempt this first section. The normal A.O.C.P. applicant would also be required to do this section, and in addition follow on with a further section covering the more advanced technical topics until the time of two and a half hours had elapsed.

To prevent Novice sections of the bands becoming areas of low standard operation, there seems to be little merit in restricting frequencies, other than from band edge to the generally accepted frequency at which phone operation normally commences.

The question of pirate operation looms as the largest cloud on the horizon in the minds of many, wherein cancellation of a short-term licence will leave functional transmitting equipment in the hands of an unlicensed operator. However, this committee favours making a Restricted Licence a continuing one. The standard of the examination should equip the Restricted licensee to operate competently from a technical viewpoint on c.w., whereupon there is no justification for a time restriction. Older persons or students should not be forced into full A.O.C.P. standard by a time limit on their Restricted licence tenancy.

Restricted licensing should encourage constructional work by reason of the simplicity of equipment involved, thereby discouraging the growing and disquieting trend towards commercial packages, the internals of which the operator may have negligible understanding.

With a firm foundation of Restricted licence operation, there would be adequate incentive for most persons to proceed to A.O.C.P. standard.

—Victorian Eastern Zone, W.I.A., Novice Licensing Committee.

T.V. PIONEERS

Editor "A.R.," Dear Sir,

I have just heard of the death of Tom Elliott, VK4CM, and I am sad at his passing.

He was indeed a pioneer amongst Amateurs and he will be well remembered for his accomplishments.

However, over the years he has been credited with transmitting the first television images in Australia in 1935; in fact, a bronze plaque on the Observatory in Wickham Terrace, Brisbane, used to attest to this.

In view of recent publications on the subject, the Brisbane City Council, on advice from the Historical Society of Queensland, have changed the wording on the plaque from "The First Television Transmission in Australia" to "The First Television Transmission in Queensland".

This is now in accordance with the facts as there is ample evidence that the first public demonstration of television in Australia took place in Melbourne on 10th January, 1929.

At that time I was operating Amateur station 311 and was also in charge of the development of the equipment and the picture transmissions, so my efforts predate Tom's by almost six years.

My interest today is to pay tribute to a true pioneer and at the same time set the records in order.

—Gil Miles, VK2KI.

LIMITED LICENSEES

Editor "A.R.," Dear Sir,

In the August issue of "A.R." was a reply by the Federal President of the W.I.A. to an anonymous letter concerning Limited licensees. The most noticeable thing about this reply was the rather puerile repetition of the title "Mr. Anonymous Letter Writer". If a person wishes to make a point while remaining anonymous, that is his prerogative. In fact, the desire to do so must be taken at least partly as a reflection on the organisation to which he is writing.

Having criticised the manner of Michael Owen's reply, I would like to disagree with its matter. If the Institute is so interested in Limited licensees, why does it deliberately discourage them from participating in the R.D. Contest? The rules of the Contest are such that the v.h.f. operator cannot help his State's score more than by making the five contacts needed to enter a log. In VK5, at least, considerably less stations on six metres wasted a week-end this year to score 20-odd points. I wonder how many of these will bother next year?

—Alan Jamieson, VK5ZFJ.

[The 1971 Federal Convention dealt with changing the rules of Contests and to the transfer of the Federal Contest Committee. The former referred to repeat contacts after specified periods, the latter formalised the transfer of the Federal Contest Committee from VK6 to VK4. It is reasonable to assume that future 24-hour contests will include these provisions. —Ed.]

R.D. CONTEST, 1971

Editor "A.R.," Dear Sir,

Was I wrong or was this year's Contest among the best yet as far as friendliness is concerned?

One always meets old friends in the R.D. Contest, to my mind the best Contest I have experienced as an Amateur, both of one's own State and further afield, and I was not disappointed this year.

Brisbane and further north areas operators were not very happy about 80 metre band conditions as the band was virtually not usable because of QRN. Several storms were over S.E. Queensland soon after the Contest started and I quit with lightning around the antennas.

I did not hear any 10 metre signals from my QTH, but logs will tell the story on this band.

On 15 metres, VK9 was going great guns with southern States that I could not hear late Sunday morning.

Should we nominate a calling time for the 10 metre band? Say, late Sunday morning.

To those who entered to win, for themselves or their State, I wish you good luck and good scoring. To those who came on to help make it a good Contest, thanks a lot, your efforts are appreciated. Let your Federal Councillor, or me, have suggestions for making this Contest better.

I hope to hear you next Remembrance Day Contest and spare a thought for those who are not with us.

—Peter Brown, VK4PJ.
Federal Contest Manager.

OBITUARY

W. ("SKIPPER") SCHOFIELD, VK6WS

In Perth on 4th August, 1971, William ("Skipper") Schofield, VK6WS, aged 96 years, a very old timer, passed away.

His interest in radio commenced in 1925 when he purchased the then newly released Cossor kit-set broadcast receiver, and successfully completed its construction. He later joined the W.I.A. as a student member, attended the A.O.C.P. classes, and, then in his sixties, secured his Amateur licence with the call sign VK6WS. He participated in the administration of the W.A. Division for a number of years, and was also a leading light in the Subiaco Radio Society, later the Radio Society of W.A.

Although blind for the latter years of his life, he remained an active operator with the assistance of Amateur friends who maintained his equipment in safe and operational order, until two years ago, when infirmity prevented further activity.

He was also a prominent yachtsman and a member of Royal Freshwater Yacht Club, hence the affectionate soubriquet "Skipper". Many W.I.A. members have happy memories of week-end excursions on his ocean-going cruiser.

To his relatives, the members of the W.A. Division extend their sympathy.

BOOKS BOOKS BOOKS

For the Radio Amateur for study — reference — up-dating

Write to your Division for latest lists or send an enquiry to Federal Executive, P.O. Box 67, East Melbourne, Vic., 3002

A MEMBERSHIP SERVICE

NEW CALL SIGNS

JUNE 1971

VK1VB—V. F. Burman, 140 Badimara St., Waramanga. 2611.
VK1ZAF—A. F. Blight, 1 Praed Pl., Garran, 2605.
VK2ATX—N. G. McAlpin, 156 Hull Rd., West Pennant Hills, 2120.
VK2BSZ/T—E. K. Southwick, 55 Duntroon St., Hurlstone Park, 2193.
VK2ZDR—G. C. Dunkley, 8 Chambers St., East Maitland, 2323.
VK2ZGT—R. C. McGregor, 44 Koola Ave., Killara, 2071.
VK2ZJG—J. C. Young, 18 Vernon St., Hunters Hill, 2110.
VK2ZMI—M. K. Morris, 69 Rous St., East Maitland, 2323.
VK2ZOY/T—J. M. Young, 5 Grant St., Tamworth, 2340.
VK2ZQW/T—D. M. Badcock, 17 Helen St., Cardiff South, 2285.
VK2ZWG—G. J. West, 17 Huntleys Point Rd., Huntleys Point, 2111.
VK2ZYP/T—G. R. Beech, 146 Harrow Rd., Auburn, 2144.
VK3CC—R. S. Pearce, 115 Plenty Rd., Bundoora, 3083.
VK3QZ—J. G. Colley, Station 28 Charles St., Traralgon; Postal: P.O. Box 115, Traralgon, 3844.
VK3WI/R1—Wireless Institute of Australia, Victorian Division, Station: 140 Neil St., Carlton; Postal: 478 Victoria Pde., East Melbourne, 3002.
VK3AAV—C. J. Dodd, 8/18-20 St. George's Rd., Armadale, 3143.
VK3BDH—D. G. Dunn, 3 Allfrey St., East Brighton, 3187.
VK3YFZ—M. D. Daly, 9/105 Willesden Rd., Oakleigh, 3166.
VK3YGP—L. T. A. Pearson, "Jubilee Cottage," Main Rd., Campbell's Creek, 3451.
VK3ZJV—J. C. Vayne, 1299 Heatherton Rd., Noble Park, 3174.
VK4JD—J. M. Donnini, 33 Alice St., Atherton, 4883.
VK4QS—R. Sayers, 6 Robinson St., Belgian Gardens, Townsville, 4810.
VK4RC—Redcliffe Radio Club, 12A Savannah St., Redcliffe, 4020.
VK4UZ—A. H. Burton, 11 Rocks Rd., Oxley, 4075.
VK4WI/R1—Wireless Institute of Australia (Queensland Division), Station: Mt. Mowbullan; Postal: Box 638, G.P.O., Brisbane, 4001.
VK4WI/R2—Wireless Institute of Australia (Queensland Division), Station: 31 Haig St., Pimlico, Townsville, 4810; Postal: Box 638, G.P.O., Brisbane, 4001.
VK4ZBL—A. H. Blake, 15 Kilsby St., The Gap, 4061.
VK4ZCG—C. Gladstone, 51 Wambool St., Bulimba, 4171.
VK4ZPJ—P. J. Evans, 118 Alura St., Ekibin, 4121.
VK5LW—G. E. Thomas, 115A Angas Rd., Westbourne Park, 5041.
VK5OQ—M. Wolcott, 27 North St., Collinswood, 5081.
VK5ZAM—A. J. McKenzie, 319 Esplanade, Henley Beach, 5022.
VK6KG—J. A. Ferguson, Station: Cr. Kilaney and Moyson Sts., Kalgoorlie; Postal: P.O. Box 888, Kalgoorlie, 6430.
VK6SV—K. E. Pledger, C/o. T.V. Station, Koolan Island, 6733.
VK6ZE—F. W. Bird, Flat 5, "Kalinya," 5 Welshpool Rd., Bentley, 6102.
VK6ZKG—K. H. Gates, Station: O.T.C. Tracking Station, Carnarvon, 6701; Postal: P.O. Box 348, Carnarvon, 6701.
VK7RD—R. G. Reid, 20 Elboden St., South Hobart, 7000.
VK7ZNR—A. N. Richardson, 69 George Town Rd., Launceston, 7250.
VK8VJ—C. M. Smith, 3530 Byrne Circuit, Moil, Darwin, 5794.
VK9HL—R. R. Hooper, P.O. Box 251, Lae, T.P.N.G.

ALTERATIONS

VK2WC—W. M. Cavanagh, 3 Hastings St., Wauchope, 2446.
VK3BV—I. H. Fitzpatrick, 4 McIntyre St., Hamilton, 3300.
VK3FO/T—C. R. K. Gibson, Spring St., Maldon, 3463.
VK3II—F. A. J. Forse, 8 Merrick Cres., Glen Waverley, 3150.
VK3QO—D. T. Bellair, Flat 8, Debondy Crt., Lower Plenty, 3093.
VK3SL—M. L. Brane, 43/6 Williams Rd., Windsor, 3181.
VK3SZ—S. I. Zeunert, Lot 274, Swift Dr., Glen Waverley, 3150.
VK3XU—J. R. Oxley (Rev.), 48 Suffolk Rd., Surrey Hills, 3127.
VK3AHF—R. Morton (Dr.), 152 Hearn St., Colac, 3250.
VK3AJH—J. R. Handley, 35 Bulla Rd., North Essendon, 3041.
VK3AJO—J. R. O'Halloran, 67 Macedon St., Sunbury, 3429.
VK3AJS—D. J. Slade (Capt.), Lot 80, Michelle Ave., Watsonia North, 3087.
VK3AKQ—K. J. Echberg, 18/77 Alma Rd., St. Kilda, 3182.
VK3ASO—Midlands Experimental Radio Club, Station: Flora Hill, Bendigo; Postal: Bendigo Institute of Technology, McCrae St., Bendigo, 3550.
VK3AZM—D. L. Godfrey, 122 Nelson Pl., Williamstown, 3016.
VK3BBE—E. C. Bick, 80 Moga Ave., East Keilor, 3042.
VK3YAP—R. E. Proudlock, 26 Stuart St., Armadale, 3143.
VK3YBA—M. Skop, 12/68 Alma Rd., East St. Kilda, 3182.
VK3ZDQ—B. J. Treloar, 4 Ash Crt., Mulgrave, 3170.
VK3ZGT—L. N. Tate, 6 Bindi St., Wantirna South, 3152.
VK3ZHA—E. P. Blake, 10 Sheffield St., South Caulfield, 3162.
VK3ZKL—A. Slamin, 72 Carronvale Rd., Mooroolbark, 3138.
VK3ZVK—N. Hull, 4/444 Glenferrie Rd., Kooyong, 3144.
VK4CN—J. W. J. Jackson, 12 Colleen St., Lawnton, 4501.
VK4HY—H. H. Varnes, 13 Empress St., Toowoomba, 4350.
VK4ZAM—A. A. S. Millard, 15 Murray St., Red Hill, 4059.
VK4ZDM—D. W. McGrath, 4 Stanton Tce., Townsville, 4810.
VK4ZHE—J. W. Heares, 1/30 Russell St., Townsville, 4810.
VK4ZKT—K. H. Tietze, 1420 Gympie Rd., Aspley, 4034.
VK5AL—K. S. Harris, 26 Offler Ave., Bellevue Heights, 5050.
VK5FQ—B. A. Palk, Bradbury Rd., Mylor, 5153.
VK5OT/T—M. D. Sobels, 86 Valiant Rd., Holden Hill, 5088.
VK5PC—D. A. Greig, 3/80 McDonnell Ave., West Hindmarsh, 5007.
VK5ZEU—N. G. Scott, P.O. Box 455, Loxton, 5333.
VK6DE—A. W. A. Storm, 123 Hastings St., Scarborough, 6019.
VK6JL—J. L. Lewis, C/o. Government School, Yuna, 6532.
VK6TR—T. W. Reed, 26 Roche Rd., Sorrento, 6020.

CANCELLATIONS

VK2ZEZ/T—J. L. Jones. Transferred to S.A.
VK2ZIT—S. R. Gregory. Transferred to Vic.
VK2ZMV—M. H. Adnams. Transferred to Vic.
VK2ZQE—L. N. Smith. Transferred to Tas.
VK2ZSZ/T—E. K. Southwick. Now VK2BSZ/T.
VK3BP—D. J. Terrill. Transferred to N.S.W.
VK3EB—J. E. Falkner. Not renewed.
VK3WU—J. Medlicott. Not renewed.
VK3XT—G. F. Millerd. Not renewed.
VK3AAK—H. A. McLachlan. Not renewed.
VK3AHC—H. N. Charles. Not renewed.
VK3AIB—A. I. Berry. Not renewed.
VK3AQA—R. W. Amos. Not renewed.
VK3AQW—L. Woolf. Not renewed.
VK3AQZ—J. G. Colley. Not renewed.
VK3ASB/T—S. B. Roberts. Not renewed.
VK3ASX—D. J. Grant. Not renewed.
VK3AUT—A. U. Magnus. Not renewed.
VK3BDT—R. D. Turner. Not renewed.
VK3ZDE—R. A. Ellis. Not renewed.
VK3ZTC—A. N. Richardson. Now VK7ZNR.
VK3ZTZ—D. M. Clancy. Transferred to N.G.
VK4EU—D. M. West. Deceased.
VK4PY—P. E. Barker. Not renewed.
VK4VV—Wireless Institute of Australia (Qld. Div.). Now VK4WI/R1.
VK4ZRS—R. Sayers. Now VK4QS.
VK5RV—J. P. Lysaght. Not renewed.
VK5UB—E. Garner. Not renewed.
VK5ZBK—E. J. Kenny. Not renewed.
VK5ZDQ—E. J. Patching. Not renewed.
VK5ZEM—I. C. F. Modistach. Not renewed.
VK5ZFI—G. E. Thomas. Now VK5LW.
VK5ZRM—R. W. McCarthy. Not renewed.
VK6DY—F. H. Smith. Left country.
VK6JV—J. Vogel. Transferred to T.P.N.G.
VK6ZAU—W. R. Cooper. Transferred to Fiji.
VK6ZJH/T—J. L. Harrison. Now VK6WA/T.
VK7BN—W. N. M. Nisbet. Not renewed.
VK7MB—A. C. McBurnie. Not renewed.
VK7TF—T. W. Firth. Not renewed.
VK7ZAB—P. E. Blundstone. Not renewed.
VK7ZOR—R. G. Reid. Now VK7RD.
VK8KN—R. W. H. B. Jones. Transferred to W.A.
VK9BT—R. D. Trickett. Not renewed.
VK9CQ—R. H. Mould. Not renewed.
VK9LB—J. B. Leibgold. Not renewed.

VHF

Sub-Editor: ERIC JAMIESON, VK5LP
Forreston, South Australia, 5233.
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All Times in E.S.T.

AMATEUR BAND BEACONS

VK0	53.544	VK0PH, Casey.
	53.032	VK0TM, Macquarie Island.
VK3	144.700	VK3VE, Vermont.
VK4	144.390	107m. west of Brisbane.
VK5	53.000	VK5VF, Mt. Lofty.
	144.800	VK5VF, Mt. Lofty.
VK6	52.006	VK6VF, Bickley, Perth.
	52.900	VK6TS, Carnarvon.
	144.500	VK6VE, Mt. Barker (Albany).
	145.010	VK6VF, Bickley.
VK7	144.900	VK7VF, Devonport.
VK9	144.600	VK9XI, Christmas Island.
ZL1	145.100	ZL1VHF, Auckland.
ZL2	145.200	ZL2VHF, Wellington.
ZL3	145.300	ZL3VHF, Christchurch.
JA	51.995	JA1IGY, Japan.
W	50.091	WB6KAP, U.S.A.
HL	50.100	HL9WI, South Korea.
ZK	50.100	ZK1AA, Cook Island.
KH6	50.101	KH6EQI, Hawaii.
	50.015	KH6ERU, Hawaii.

There are no changes to the beacon list this month. It is noted with interest that a beacon soon will be operating in Darwin, and that one has been licensed for operation in Townsville using the call sign VK4WI/2, probably operating on 52.4 MHz. This call sign is unusual to say the least, but I guess there are valid reasons for its use. However, don't make the mistake of thinking it will be operating portable from VK2! (Maybe a repeater, should be /R2—Ed.) Leigh VK6WA mentions that two solid state beacons to run 50 watts are being constructed in VK6 to replace their present beacons. It is proposed to locate them about 200 feet up the mast of TVW7, and will be about 1,000 feet a.s.l. with a good path east and west. The present 6 mx beacon in Perth is apparently running satisfactorily, but the 2 mx beacon is only giving a low power output at present.

Bob VK3AOT sends along his usual notes and the following are extracts from them: "By the time these notes are read, Ken Moore, of VK3, will have taken up residence in Albany, W.A., as an engineer with the P.M.G. Dept. He has indicated he will be very keen to work into the Eastern States on 144 MHz., and very willing to try to do the same on 432 MHz. He would use s.s.b. It will take him awhile to set up his station, so he may not be able to make it in time for the coming DX season, but could be someone to keep an eye on the following year. This makes good news for all of us, as it is quite obvious the path is open on 144 MHz. from west to east much more often than previously imagined, so with somebody keen to do business at the western end, there will be plenty of takers the other way.

"The Remembrance Day Contest was well supported on the v.h.f. bands in VK3. Bob himself scored 122 points, and he said there were quite a few with scores around 50 to 60 points. About 12 or so stations really tried this year.

"On the subject of Contests, a computer programming is being undertaken in Melbourne to establish a table of distances for use in compiling the scores for the Ross Hull V.h.f. Contest. This will be produced on the familiar square table format, and currently covering 49 Australian towns, and later expanding to 58 towns. This should help entrants to more readily ascertain the distances between many of the better known or more active areas. An advance copy is to be sent to VK5LP and it is hoped to publish same in 'Amateur Radio' for all to use.

"John VK4ZJB is now running the legal limit on s.s.b. on 144 MHz. from his home in Brisbane and will be looking for contacts to the south into VK2, 3 and 5 at least this coming DX season. This path has not been exploited very much of recent years due to lack of suitably equipped stations in VK4, but John may now be helping to overcome this situation. Although he has not mentioned it, it is possible John may be planning some meteor scatter experiments as well.

"For the benefit of stations planning portable operations this year, advance notice is given that Alan VK5BW proposes operating from Mt. Bryan, 112 miles N.N.E. of Adelaide, on Saturday and Sunday, 4th and 5th December, on 52, 144, 432 and 1296 MHz. plus h.f. for liaison purposes. This week-end is the date of the annual VK5 V.h.f. Field Day, and also coincides with a VK3 V.h.f. Field Day." Thank you Bob for your helpful information once again.

The second issue of "The Victorian V.h.f'er" has come to hand and is another excellent coverage of VK3 activities. Geoff VK3AMK, a very active v.h.f. operator, has a lengthy letter included covering his thoughts on the band planning ideas for 144 MHz. His table of band division is interesting enough to bear repetition here, and is as follows:

144.000 to 144.025—CW and FSK; for EME and MS.
144.025 to 144.100—CW; for CW only.
144.100 to 144.500—AM and SSB; exclusive voice allocation.
144.500 to 144.900—CW, AM, SSB, NBFM, MCW, FSK; general operation.
144.900 to 145.000—CW and FSK; for beacons.
145.000 to 145.500—CW, AM, SSB, NBFM, MCW, FSK; general operation.
145.500 to 146.500—FM; simplex and repeaters.
146.500 to 148.000—any permitted mode; general operation, satellite, experimental, etc.

Geoff makes the following points amongst others: "I consider that the idea of allocating parts of the first 500 KHz. or so on a zone or DX/city basis is really no longer valid. This may have had considerable merit in the days of almost exclusive crystal locked operation. However, with the ever increasing use of v.f.o. and/or transceive operation, most stations if not now, certainly in the near future, will operate on the frequency of the station they are working. This is much preferable to the split frequency idea as weak stations are definitely more readily heard on the frequency of the station they are calling, rather than being a faint signal perhaps anywhere within 1 MHz. or so. Calling on the stations' transmitting frequencies also solves the problem of the weak DX being QRM'd by other stations who are unaware of the presence of weak DX on or near their operating frequency.

1. A clear 25 KHz. for EME and Meteor Scatter only.
2. 75 KHz. for CW only. (This would be very valuable for serious long-haul DX work.)
3. 400 KHz. for AM and SSB only. (Free of NBFM and some of the not so narrow band FM!)
4. 400 KHz. for general operation up to 144.900.
5. 100 KHz. for beacons **exclusively**."

The full text of Geoff's letter may be read in the "Victorian V.h.f'er" but the above is a sufficient lead in to set you thinking on the matter.

From Brian VK5CA comes a very brief word of advice after a contact recently on h.f. with JA1RNJ to the effect that VK stations are being heard in Japan with much greater regularity on 52 MHz. than we seem to be giving credit, and suggests more observations with the beams pointing north may bring fruitful results. The next move is yours!

SCATTER SIGNALS

Quite a lot of interest has been centred on meteor scatter signals of recent times and the excellent article by Wally VK5ZWW in "Amateur Radio" August 1971 tied up the loose ends with the result more may try this form of operation in the future. However, there is another form of scatter signals which may interest those prepared to make the effort, and the following article will help to fill you in on the requirements. It comes from the V.h.f. News in "Break In" of the N.Z.A.R.T., issue July 1971:

"During the postwar period high power transmitting tubes and better receivers gave vastly increased capability to persons interested in providing reliable transmissions over long distances. An early experiment by the Collins Company showed that satisfactory signals were possible on 50 MHz. at distances up to 700 miles. Similar signals were also present at 100 MHz. The power used was higher than Amateurs use (20 kw.), but it is possible that present day receivers could make up the difference. These postwar experiments have led to the development of scatter communications.

"In this mode weak signals are present over long paths to give reliable communication independent of atmospheric and seasonable variations. The equipment required is the best possible receiver, the largest aerial and the highest permitted power.

"Depending on the frequency, there are two modes of scatter. On the low bands (less than 100 MHz.) the E layer is used. This lies below the 60-mile height and extends down to 40 miles. The slight reflections produced in this layer are sufficient to give usable signals at a distance of 500 to 2,000 miles. Because of the weak signals at the receiving end, various methods have been used to improve the links. These include low noise front ends to the receiver, high stability transmitters and receivers, dual diversity reception including both antennas and frequency.

"The scattering area is a variable parameter, this means that multipath reflections will occur and fading will result. All types of fading will be experienced. There will be short time and long term effects on the signal varying from 10 c.p.s. to several hours. Some distortion and frequency selective fading will be experienced. One paradox is that a large antenna shows a lower minimum signal than a smaller one, the maximum is higher however. The explanation is that the signal from a given scattering volume could be attenuated by a highly directive antenna if this was not correctly aligned compared to a less critical antenna with a broad pattern. With correct interception the signal is higher.

"In the case of tropospheric scatter in the u.h.f. region a similar situation exists. The scatter is occurring at a higher level and this gives a much shorter range. The maximum being between 100 and 500 miles in this case.

"All this appears to put the mode beyond Amateur scope. But there is one advantage that we have and this is the non-essential nature of our communication. This means that high reliability and 100% communication are not necessary. Because of this, the mode becomes possible providing one is prepared to lose some of the messages. Using statistical analysis, the following gives some idea of the possibilities. It can be shown that it is almost impossible to receive all of the signal. Likewise it is almost impossible to miss all the signal. This is particularly encouraging. By finding the average signal and comparing a fade with it the following will be observed, that the deepest fades are for the shortest time while the shallowest fades occupy the most time. To a large extent the signal can be made satisfactory by using diversity reception. For Amateur purposes FSK CW SSB should be satisfactory. Coding of signal reports as in moon bounce may be advisable.

"By using the graphs in Orr and Johnson as a guide what to expect it would appear that a receiver with a 3 KHz. bandwidth and a 3 dB. noise figure will give a range of 200 miles with a 5 element yagi at each end. When the antenna is in the 20 dB. range the distance increases to 350 miles and another 100 miles can be obtained if you have the de luxe model with several hundred elements.

"By applying a kilowatt to the feedline one can expect about 50 miles increase. This totals 500 miles. To get a further 500 miles only requires 15 dB. more signal at either the receiver or transmitter or combination. It can be thus deduced that a fully operational moon bounce station should be able to bridge the gap."

So there you are. The possibilities do exist. However, I would imagine one of the difficulties in a city area would be the rather high existing noise level, but then again, MS contacts have been made with prevailing noise levels. For those of you looking for something fresh to do, why not select a partner in another State and get moving!

COMING EVENTS

In an effect to keep the nation informed on forthcoming v.h.f. activity there seems no reason why a list of coming events on the v.h.f. bands cannot be included in the events Calendar printed elsewhere in this issue. Information to be included will be that of a national character, covering such items as V.h.f. Field Days, Contests and any special concentrated efforts by a person or group with a view to promoting activity over a wide area. Publicity officers of the various V.h.f. Groups and kindred organisations are invited to send to the Editor advance notice of coming events, with a brief outline of what the event involves. The first listing may show a little detail, subsequent listings in the months to follow up to the event will show only the date, what it is and where it is being conducted.

Information for inclusion in the general notes must be in my hands by the 30th of the month if to be included in the following issue. Please note that copy for the January issue must be available by 25th November, five days earlier than usual.

A reminder to those who have qualified for the Cook Bi-Centenary Award that your applications must be in the hands of the Awards Manager by 31st Dec., 1971. To save a last minute rush what about getting the job done now before the DX starts coming through!

That's all for this month. I leave you with this thought: "The greatest happiness of life is the conviction that we are loved, loved for ourselves, or rather loved in spite of ourselves." 73, Eric VK5LP, The Voice in the Hills.

DX

By H. F. EVERTICK
C/o. P.O. Box 36, East Melbourne, Vic., 3002
(Times are in G.M.T.)

The response to appeals for help in compiling this column are coming in well from old friends. More is needed though, please. Every effort is being made to make this column current and useful. If a rare DX-pedition comes up after this article is written but before it is read the only piece of useful information may be the QSL address.

ITALIAN PREFIXES

The A.R.I. advises that the prefixes now in use correspond approximately to the regions and are:—

- IP1—Piemonte, Liguria, Valle d'Aosta.
- I2—Lombardy.
- I3—Veneto, Trentino, Alto Adige, Friuli—Venezia Guilia.
- I4—Emilia.
- I5—Tascana.
- I6—Marche, Abruzzo.
- I7—Puglie, Basilicata.
- I8—Campania, Calabria, Molise.
- IT9—Sicily.
- I0—Lazio, Umbria.
- IS0—Sardinia.
- IA5—Tuscany Isles (Elba, etc.).
- IB0—Ponziane Isles (Ponza, etc.).
- IC8—Naples Isles (Capri, etc.).
- ID9—Eolie Isles (Filicudi, etc.).
- IE9—Ustica Isles.
- IF9—Egadi Isles (Favignana, etc.).
- IG9—Pelargic Isles (Lampedusa, etc.).
- IH9—Pantelleria.
- IL7—Tremiti group.
- IM0—Small Sardinian Isles.

However, existing licensees can retain their I1 (IT1 or IS1) calls.

Venezuela.—4M4 prefixes to mark 150th Independence to 31/12/71.

Rarer Calls (mainly s.s.b. 14 MHz.). VK-3AXQ finally worked Jim ZM7AG after seven months of dog-piles and in his lists included VK0TM (on Macquarie till Nov.), 9H1BG, a couple of 3V8s and 5X5NA. VK3JF worked Gan. Is. VS9MT and will have been looking out for 4J0BJ and 4J0DI DX-pedition on s.s.b. to Sakhalin Is. by UW3BJ on c.w. JD1ACE on Bonin Is. VK4KX mentions that ZL3PO/C will be on Chatham Is. until next Feb. working c.w. and s.s.b. most bands, that the 7 and 3.5 MHz. bands held his interest for long periods and a few of his more exotic ones (mainly on c.w.) included ZK2AF (Niue Is., South Pacific), 9G1FF, FO0TG, HB4FF. Murray also comments that Commonwealth Reply Coupons may go out of fashion with the increased postal charges this month. Most of these operators also worked some of the stations in the QSL list. George Cruickshank, VR4CG, on the Solomons (VK-2BCG at home), is looking for contacts on 14150 KHz. most evenings.

160 METRES

Ralph W1HGT will be on 1802 KHz., plus or minus 40 minutes of G.M.T. sunrise times stated on Oct. 10, 1051; Oct. 17, 1059; Oct. 24, 1108; Oct. 31, 1116; Nov. 7, 1125; Nov. 14, 1133 (VK-2BMS).

QSL INFORMATION

(Courtesy of VKs 3AXQ, 3JF, 2AXK, 4KX and 3AMP.)

F0CH/FC—HB9TL	VR1AA—K3RLY
HB0XUD—ON4QV	ZL3PO/C—ZL2AFZ
JY1—WA3HUP	ZL4OL/A—ZL2GX
PJ0DX—K3NPV	ZM7AG—K3RLY
UM8FZ—WA5EFL	3V8AF—F5ZK
VP2MF—VE3GCO	3V8ZK—F5ZK
VP2VAG—VE3GMT	4X4AE—WA3NOS
VQ9DK—VE6AKV	5Z4MF—G3AWY.

FK8KAA—Box 28, Noumea.
KX6DC—Box 997, A.P.O., San Francisco, 96555, Calif.
OD5ET—Box 4848, Beirut.
TI2AS—Box 1814, San Jose.
JY8XX—Montmarte, Port Vila.
5W1AK—Box 721, Apia.
5X5NF (Darlene)—VE6AKV.

QSL managers normally QSL via the Bureau although some will QSL direct against a self addressed envelope and IRCs enclosed.

DX-peditions. W7UXP/KM6 from Midway Is. from about 21st to 24th Oct. and again 1st and 2nd Nov. From 25th Oct. to 1st Nov. Kure Is. will be activated (but there will be some phone patch traffic). Operators are W7UXP/KH6HCM, KH6GMP and KH6HGP. Modes will be c.w. (14005, 21005) and s.s.b. all bands. QSL to KH6HCM with s.a.s.e. and usual IRCs, no cards via bureau (courtesy KH6BZF).

Other: Roy Jonasson, VK3ND, has QSYed for six months to Lae where he hopes to get on as VK9DP. QSL via VK3 Bureau (courtesy Eric L30042).

VK/ZL Contest results as printed on page 15 of June "A.R." amend JA2IY to read JA2IYJ and add JA2XLR with a score of 960 points. (VK6ZDK)

Awards. Balearic Islands (EA6 Radio Club, Box 34, Palma, Majorca). 10 EA6 contacts on two bands or 7 on 3 or more bands, c.w. or phone, QSL cards, contacts after 1/1/69, certified list and 10 I.R.C's (free to blind and paralysed ops.).

73 Award. 2-way c.w. or phone, any band from 1/1/53 with 21 JA7 prefix stations, list with QSL cards and 10 I.R.C's to N.J.D.X.C. Award Manager, Box 70, G.P.O., Sendai, Miyagi, Japan.

Venezuela Radio Club announces a diploma for five QSOs with 4M4 calls, any band and mode, logs to V.R.C., Box 510, Valencia, with 8 I.R.C's (or U.S.$1) before 31/1/72.

Most grateful thanks to all those who have assisted with information. Are there any volunteers please to take over this column?

COOK BI-CENTENARY AWARD

The following additional stations have qualified for the Award:

Cert. No.	Call	Cert. No.	Call	Cert. No.	Call
1381	AX5AX	1386	YA1HD	1390	JA1KRU
1382	3B8BL	1387	WA2BED	1391	AX2ZB
1383	AX3RZ	1388	G3MGF	1392	C21AA
1384	G3TKI	1389	PA0KA	1393	AX3QV
1385	PZ1AC			1394	AX5CY

W.I.A. D.X.C.C.

Listed below are the highest twelve members in each section. Position in the list is determined by the first number shown. The first number represents the participant's total countries less any credits given for deleted countries. The second number shown represents the total D.X.C.C. credits given, including deleted countries. Where totals are the same, listings will be alphabetical by call sign.

Credits for new members and those whose totals have been amended are also shown.

PHONE

VK5MS	319/343	VK2APK	288/295
VK6RU	316/342	VK4FJ	286/307
VK3AHO	310/326	VK4TY	284/288
VK4KS	307/322	VK4UC	278/278
VK6MK	303/324	VK2AAK	274/279
VK5AB	296/314	VK3ZE	271/274

New Members:

Cert. No.	Call	Total
119	VK5ZB	106/107
120	VK4QA	101/101
121	C21AA	113/113

Amendments:

VK4DO	236/248	VK3TG	185/189
VK3AMK	235/235	VK3JM	143/143
VK4RF	216/216		

C.W.

VK2QL	303/326	VK3NC	273/300
VK3AHQ	300/315	VK3ARX	271/280
VK4FJ	289/315	VK3XB	270/287
VK3YL	286/303	VK6RU	266/289
VK2APK	284/292	VK4TY	259/272
VK2AGH	282/296	VK3TL	255/260

New Member:

Cert. No.	Call	Total
98	VK3LV	101/101

Amendments:

VK4DO	193/210	VK4RF	192/202

OPEN

VK6RU	317/343	VK6MK	303/324
VK4SD	315/330	VK2APK	302/314
VK2AGH	314/334	VK2EO	301/325
VK2VN	309/328	VK3ARX	300/309
VK4KS	308/327	VK4UC	298/298
VK4TY	306/321	VK4FJ	297/323

New Member:

Cert. No.	Call	Total
136	VK5FY	109/112

Amendments:

VK4DO	251/269	VK3LV	106/106

DIVISIONAL NOTES

NEW SOUTH WALES

In order to assist the sub-editor, T. Mills, VK2ZTM, and to facilitate the preparation and submission of news to "A.R." for the VK2 column, Council has requested Mike Farrell, VK2ZNA, to organise a committee for the compilation of news. Mike requests members who would be interested in sitting on this committee, and especially from those h.f. and DX types, to contact him by either writing to the Institute or phoning him on 357-9332 during business hours.

Special General Meeting.—The Special General Meeting called for Friday, 27th August, was not held because of short notice given and was deferred until the September meeting night. The subject was reduced fees for student and pensioners.

Unfinancial Members.—Notices were included in the recent Divisional Bulletin advising unfinancial members of this fact. All members remaining unfinancial at 31st August were removed from membership. The present subscription rates are: $10 for Full members and $9.50 for Associate members.

Key Section.—Rules for the Brass Pounders or Key Section, as it is presently officially known, are expected to be promulgated shortly. Until the rules are available, little can be done to get things under way. Members of the N.S.W. Co-ordinating Committee are Bill Lewis (VK2YB), Kevin Collins (VK2ANY) and Mike Farrell (VK2ZNA).

Progress at VK2WI.—Progress on the re-equipping of VK2WI at Dural is continuing slowly. It is hoped to have h.f. signals before long. The limiting factor in the work is lack of helpers. Members willing to assist should contact any member of Council or the Dural Committee.

Inwards QSL Cards.—Among many items discussed at a recent meeting of Divisional Council was the accumulation of QSL cards in the Inwards Bureau. Many thousands of cards have accumulated for members and non-members who have shown no interest in collecting them. It was decided that all cards will be despatched in order to clear the Bureau. All cards subsequently received for non-members and for members who do not collect cards will be returned to senders.

Y.R.S. Broadcasts.—A news bulletin is transmitted monthly at 1500 E.S.T. on selected Saturdays as follows: 30th Oct., 27th Nov., and 11th Dec. The frequency is approx. 7050 KHz. a.m. from VK2AWI.

Jamboree of the Air.—Any person able to assist any Scout Group to aid the Scouts' Jamboree of the Air to be held in October should register with the Administrative Secretary (02-435795) and we will pass on your name to a nearby group.

Call Back Frequency.—As members will recall during the last Federal Convention, 7050 KHz. was set aside as a calling frequency. With this in mind, it has been decided by Council that it would be advantageous to move our call back frequency from 7050 KHz. When these notes were prepared no decision had been reached on the exact frequency that should be used, but members may have ideas of their own on this subject and we would very much like to hear comments on this during morning broadcasts, or in writing to Council. When making a decision on this, we must bear in mind that the following frequencies are used by other Divisions for their call backs: 7085, 7095, 7105, 7115, 7125, 7135 KHz. (VK2AXJ, Comm. Officer.)

VK2 Club Net.—It is intended to introduce a "Club Net" to enable all radio clubs to get together and exchange information and ideas amongst themselves. When these notes were prepared, no policy had been formed as to frequency, times, etc. Details are given in the Sunday morning broadcasts.

Hunter Branch.—The 1971 Westlakes Radio Club Field Day, held on 22nd Aug. at Teralba, attracted over 170 members and visitors. The 1971 Trevor Harris Memorial Prize was awarded to the most outstanding student of the year, David Crofts of Newcastle. Y.R.C.S. certificates were presented to 16 members of the club who had gained them in the past three months. A continual programme of events throughout the day kept the fox hunters busy.

Illawarra Branch.—Attendances at the monthly fox hunts held by the Branch have fallen of late, which has resulted in a change of venue. This will now be held on the Sunday after the monthly general meeting (which is on the second Monday of each month), and it is hoped that attendances will improve. The fox hunt, which is on 53.982 MHz., carries a perpetual trophy which was donated by Basil VK2AW. The August meeting was well attended to see the latest in Yaesu equipment by Stephen VK2ZSK and associated accessories. This display was well received. (VK2FE, Pub. Officer.)

Maitland Radio Club.—At the August meeting persons present witnessed a demonstration of the club's new slide projector equipment. The projector which is fitted with a lens of the correct focal length to produce a picture the size of the motion picture screen already installed in the club's theatrette is the first step made by the club towards the installation of visual aid training equipment. The first class to benefit from the visual aid training will be the new A.O.C.P. class which commenced on 24th Sept. This class will prepare advanced members of the club for the February A.O.C.P. examination. Any interested persons wishing to gain further information about the club may do so by writing to the Secretary at P.O. Box 54, East Maitland, 2323, or phone Maitland 33-7286. (VK2BLW, Pres.)

VICTORIA

40 Metre Tx for VK3WI.—Arrangements have been made to improve VK3WI's coverage on 40 metres by installing a higher power transmitter and a new antenna.

A.O.C.P. Classes.—Saturday classes in both the theory and the Morse are being arranged. A scale of fees favouring Institute members has been set. A special low rate has been introduced for Limited licensee members who undertake the Morse class.

Divisional Notes.—Items which could be used in these notes should be forwarded to P.O. Box 36, East Melbourne, 3002, by 25th of the month. Please mark all items "Divisional Notes." (VK3AUI)

QUEENSLAND

Redcliffe Radio Club, VK4RC.—The club exhibited and demonstrated Amateur Radio activities at the Redcliffe Show on July 15-17 with an FT-DX-400 and a Swan 350 with one antenna, a G8KW multiband trap dipole. Next year it is hoped to improve on this and also go on v.h.f. Numerous interference problems were encountered and had to be overcome. We made 149 contacts with a total of 16 countries, gained five new members and created quite a bit of interest. It was a pity that the Brisbane T.v. Group was unable to come, but maybe next year we may rig up our own t.v. gear. (Anyone with a good camera c.c.t. for a.t.v.?) The club has now just over 50 members, varying in age from 12 to 61 years and including some family teams. One particular team, consisting of dad, two sons and one daughter, travel each Monday night 20 miles to attend the Elementary Y.R.S. classes. (John VK4QA)

SOUTH AUSTRALIA

The month of August saw the major contests. The VK5 Intrastate contest has now proved its popularity with good activity on all bands. The results should be known by the time of issue of these notes. The R.D. Contest this year showed the further advance of s.s.b. with the very few a.m. stations finding contacts very difficult to find. Operating standard was very good in general with only a few inferior signals. Vox operation enabled quite a few stations to make over 500 contacts, a feat impossible not so many years ago.

The August S.A. Division meeting was a display of members' equipment, which attracted a wide range of home constructed equipment of good standard. The main award was received by Graham VK5ZOF for his Amateur Television equipment. This complex solid state project included two cameras, video processor with waveform monitor, and converter which operated continuously throughout the meeting on the commercial monitor, was adjudged best. A very well constructed mobile s.s.b. transceiver from Les VK5NJ received an honourable mention. Other transmitting equipment exhibited were a s.s.b. tx from Ern VK5EN, a six metre linear amplifier from Wally VK-5ZWW, and a six metre transverter exhibited by Bob VK5ZDX. Other equipment and test gear included an a.c.-d.c. power supply from Eric VK5LP, a vox unit from Harry VK5HN, a 1296 MHz. solid state converter from David VK8AU, a forward and reflected power meter by Neil VK5WN, an antenna noise bridge by Phil VK5NN, and a FET g.d.o. and r.f. attenuator by Rich VK5ZFQ. Some of the construction ideas and short-cuts gleaned from viewing other equipment is the main benefit of these display nights, and this was no exception.

The main business part of the meeting received a short progress report from the Headquarters Building Committee, heard further suggestions about details of the Novice licensing scheme, and considered several other topics of interest. The October 26 meeting will be a Jumble Sale.

The August V.h.f. Group meeting was a round table discussion on receivers and covered a wide range of subjects from cross modulation problems, t.v.i. (from receiver oscillators), solid state, distribution of gain throughout the circuit, effect of gain and bandwidth on overloading problems and similar kinds of Amateur eyeball problems. Quite a stimulating exchange of ideas where everybody gained some help. The October meeting is to be a similar discussion session on antennas.

Would club secretaries and publicity officers desiring to include their activities please contact me at the general meetings or before the 25th of each month. (VK5GZ)

FEDERAL DIRECTORY

Rooms: 478 Victoria Pde., East Melbourne, Vic., 3002 (Mon.-Fri., 1000-1700 hours). P.O. Box 67, East Melbourne, Vic., 3002.

Federal Council: VKs 2GN, 3TX, 4ZGL, 5TY, 6ZDK, 7EJ.

Federal Executive: President, VK3KI; Vice-President, VK3QV; Editor, VK3AFJ; Members: VKs 3ADW, 3DM, 3AGZ (3ARZ).

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DIVISIONAL DIRECTORY

Please refer to August issue, page 15.

New South Wales: Delete references to "store" and "S.w.l. Mtg. 3rd Fri."

South Australia.—Delete all against VK5WI and replace with: VK5WI—Sun. 0930 hrs. 1815 KHz. a.m.; re-broadcast 3615 KHz. a.m. by VK5ZQ, on 7125 KHz. a.m. by VK5KF, on 14170 KHz. s.s.b. by VK5XV, on 52.150 MHz. a.m. by VK5ZDX, on 144.100 MHz. a.m. by VK5AWI, and in Mt. Gambier 2 mx by VK5DK, in Darwin 2 mx by VK8CM. B.c. officer VK5XY.

Queensland.—Add: Students' Classes Wed. 1930 hrs.

Divisional Officers, 1971-72.—Vice-Pres., add VK3TX. Div. Council members, add VK6TX.

Zone and Club Directory.—VK7: Northern Zone at 8 High St. (Room 10), Launceston, second Friday. North West Zone at Lakins Hall, Ulverstone, first Tuesday (Sec. VK7MX).

CALENDAR

Listen also to appropriate Sunday Morning Divisional Broadcasts.

Oct. 15/17—Scout Jamboree of the Air.

New South Wales

Oct. 10—V.h.f. Spring Field Day at Hoxton Pk.
„ 17—Hunter Branch Field Day, Marmong Point Park from 1000 hrs.
„ 22—General Meeting—Sydney.
„ 27—Sydney 2 mx fox hunt.
Nov. 5—Meetings: V.h.f. Group, Sydney; Hunter Branch, Newcastle; Central Coast, Gosford.
„ 21—Blue Mountains' Branch Field Day, at Lawson Swimming Pool—family picnic day (VK2BDC).

Victoria

Oct. 22—Annual Dinner at Village Green Hotel, Glen Waverley.
„ 23/24—Western Zone, 24th Convention at Warracknabeal (23rd) and Wyperfeld Nat. Park (24th)—VK3AQX.
Nov. 7—V.h.f. Field Day.
„ 21—Midland Zone H.f./V.h.f. Rally, Lake Eppalock.

Queensland

Nov. 5—V.h.f. Tx Hunt, Kangaroo Point.

BLIND OPERATORS

How many Amateurs have contacted VK-3AVI? Did you realise that the youthful voices whose owners may sometimes be heard clamouring more or less peacefully for a "go" at the mike are those of blind kids?

The writer paid a brief visit one night to the Burwood School of the Royal Victorian Institute for the Blind a few weeks ago and found the shack a hive of activity and excitement. Some members of W.I.A. have cheerfully rostered themselves for duty as operators at Burwood because the technical mysteries of Amateur Radio are beyond the age group which is attracted. Most of the participants attend the sessions in night attire and dressing gowns and are cheerfully oblivious of time differences occasioned by longitude. "He's silly, he said good morning" and similar comments are not infrequent.

It is a great game for the blind children each Monday night during the school term. A Galaxy transceiver is used under the supervision of the operator rostered for the night.

The most usual call from VK3AVI is "CQ DX 20" and the wall testifies to the results. Using a long wire in place of a beam aerial may not be the best nor yet the final arrangement for this station, but there are verifications aplenty including KL7, JA1, ZM1, YV1, UW0, HL9 to name a few, and when bedtime comes round—that's it for another week.

Not all activity on Mondays is centred on Amateur Radio, however, and in another room may be found Mr. J. A. Paterson's latest creation for the entertainment of those of the children who have some residual vision (blindness doesn't necessarily mean complete loss of sight!—a shooting gallery using a light beam to aim and register a "hit". Mr. Paterson is an electronics wizard employed by the S.E.C. and obviously enjoys his night with the children.

We watched while a young sharpshooter pressed the trigger of the "rifle" and manoeuvred the resulting spot of light on the target area. The diameter of the spot was generous compared with the area of the bulls-eye, but quite a challenge to someone with poor vision. To make it more of a challenge, a finite time of light-beam duration encourages the marksman to make up his mind quickly or else he will be left in the dark with no ammunition.

Matron Dunell is grateful for the interest displayed by W.I.A. members and others who make it possible for her small charges to derive pleasure and some measure of education during their leisure time. Incidentally, the lives the children lead are seldom dull and they can favourably impress visitors with the diversity of their achievements.

How about it? Any more bright ideas?

(Article from the Suptd. of Public Relations, Royal Victorian Institute for the Blind, 557 St. Kilda Road, Melbourne, Vic., 3004.)

SILENT KEYS

It is with deep regret that we record the passing of—

VK2ACT—W. L. Brook.
VK2AWD—A. W. Dever.
VK4CM—T. M. B. Elliott.
VK6WS—W. Schofield.

HAMADS

Minimum $1 for forty words
Extra words, 3 cents each

HAMADS WILL NOT BE PUBLISHED UNLESS ACCOMPANIED BY REMITTANCE

Advertisements under this heading will be accepted only from Amateurs and S.w.l's. The Publishers reserve the right to reject any advertising which, in their opinion, is of a commercial nature. Copy must be received at **P.O. 36, East Melbourne, Vic., 3002, by 5th of the month and remittance must accompany the advertisement.**

ALL must go! AR7 Rx with mains PSU, A-C-D-E coil boxes, all functions working, $45. AT5 Tx with Type S PSU, ACU, junction and control boxes, full manual, connecting cables to spare, AM/CW can be readily converted to DSB, $30. Pye No. 62 11w. Transceiver, 12v. DC, 1.6 to 10 MHz. AM/CW, manual and spares, headphones, key, mic, 100 ft. aerial in carry pack, $40. Heavy duty 66 ft. Tower in 11 bolt-together galvanised 6 ft. x 9 in. triangular sections, built-in ladder, $55. Realistic DX-150 Rx, as new in original carton, $175. Offers considered. Bob Lockley, VK6ZKL, 96 Waddell Rd., Bicton, W.A., 6157. Phone (092) 39-3929.

AR7 Receiver with P/S, no coil boxes, $38. Field Strength and Noise Meter (to 160 MHz.), 6v. DC-240v AC, $20. No. 19 Set, $10. 14 Lever Key Switches, with indicator lamps in laminex finish panel, new, $10. W. H. Walker, 23 Ashmore Rd., Forest Hill, Vic., 3131.

ATTENTION librarians and others. Pre-war issues of "OST" for sale. 1926: Aug. and Dec.; 1927, Jan. July, Aug., Sept., Oct., Nov., Dec.; 1928: Jan.; and a full run from April 1928 to Nov. 1939. Some of 1926-7 lack covers, otherwise in new condition. What offers? G. B. Ragless (ex VK5GR), 424 Goodwood Rd., Cumberland Park, S.A., 5041.

BARGAIN (see August Hamads): K.W. Vespa six-band Tx 160-10 mx, 90w. PEP SSB/AM/CW, H/B PSU, $150 secures or best offer over $120. 160-10 mx Mobile Whip, $20. Leson VOX/PTT two-stage Pre-Amp. Table Mic., $15. VK7MT, 73 Westbury Rd., S. Launceston, Tas., 7250. Tel. 44-1392.

COLLINS KWS-1 and 75A-3 combination for sale as am reluctantly leaving this great country. Extra valves and filters included. A beautiful SSB signal and winner of many DX Contests. $850 for the pair. Jack Phelan, VK1CD, Phone Canberra 95-6387.

FOR SALE: As new Trio TS510 Transceiver plus matching 240v. AC mains power supply and matching remote VFO 5D. All facilities provided and 160w. p.e.p. Suitable for VHF Transverter operation also. This is the latest Transceiver from Trio. Mic and desk stand, connecting leads, plugs, handbooks, alignment tool, spare relay and spare set of valves included. Priced for quick sale, $425. Phone or telegram Melbourne (03) 20-4329, VK3ZZX.

FOR SALE: DAK-3 Receiver with cables, wiring diagram and spare parts. ARB Comm. Receiver, with BFO. 100 ft. of copper aerial cable. Also many odd parts to interest the Amateur. Ring 520-8969 or write G. Harrison, 33 Cambrai Ave., Engadine, N.S.W., 2233.

FOR SALE: Estate late Jack Small, VK2EF. Home-brew single-band SSB Transceiver, 7 MHz. Complete, all tubes, Pye filter, etc. Tx pair 6146s. Power Supply and speaker in separate unit, $50. Contact: Bill Moore, VK2HZ, 29 Pitt St., Springwood, N.S.W., 2777. Phone Springwood 51-1724.

FOR SALE: Galaxy III, Transceiver, ex late VK2MW. SSB 20-40-80, good order with handbook, mic. (Ronette insert, D104 case), $160. AC Power Supply, local product, $50. Will sell separately. Also Class C Wavemeter, 240v. AC, $10. VK2HC, "Amaroo," Ourindi, N.S.W., 2343.

FOR SALE: New bench PSU, 3-15v. continuously variable, 1 amp., SC protection, $25. Nearly complete Pye 50w. FM 2 mx multi-channel Base Station, incl. Tx Xtals for Chans. A, B, C, $25. Base loaded Whip, readily adjustable for all h.f. bands, $15. Eddystone Bug, $12. Pye 9 MHz. SSB Xtal Filter incl. recommended matching amplifiers, USB, LSB, BFO Xtals, $25. 6-pole SSB Xtal Filter, 1.4 MHz., $15. Eddystone 898 Dial Assy., $15. Qty. 6146, T121 Valves. VFO 7.6-8.1 MHz., complete with 8 xtals gives 9 MHz. op. on all HF bands, $30. 20w. AM Xtal controlled 160 mx Tx incl. PSU, PTT relay circuits, 1030 KHz. xtal, $20. Large assortment transformers, PCBs, Relays, etc. VK-3BBV, 11 Catherine Pde., Frankston, Vic., 3199. Phone 783-1408.

FOR SALE: One ex-RAAF aluminium alloy ten-section Crank-up Tower, total height 110 ft., complete with guys and crank-up mechanism, 18 ft. tall in cranked-down position, weight 2,000 lbs., outer section 3 ft., innermost section 1 ft. square, excellent condition, original RAAF cost well over $10,000—designed by and built for Collins Radio, Dallas, Texas, for "portable" radar antenna use, a gift for $500. Available at 78 Chapman Pde., Faulconbridge, near Springwood, N.S.W. Arie Bles, VK2AVA, Tel. Springwood 511-394, A.H. 511-636.

FOR SALE: Shifting QTH. Yaesu FT101 with matching speaker and separate VFO, two months old, and incorporates CW filter, all recent mods, $630. TH4 Triband and 45 ft. rotating 3-section Telescopic Mast for removal, $65. MR20 2-channel Tx-Rx with AC Power Supply, no Xtals, $35. HRO dial and gear box, $15. VK3IZ, 35 Ingrams Rd., Research, Vic. Phone 437-1811.

FOR SALE: Star SR550 Communications Receiver, covers 160-6 metre Ham bands. Instruction manual and speaker. 240 volt in-built power supply. Mint condition. $150. J. P. Meyer, P.O. Box 181, Mundubbera, Qld., 4626.

FOR SALE: Yaesu FTDX400 with FVDX400 remote VFO. Condition as new, $375, no offers. VK2WD, 44 Avian Cres., Lane Cove, N.S.W., 2066. Phone 42-6080.

FOR SALE: Yaesu Musen FL200B SSB Transmitter, outstanding signal, $200. O. Sass, 12 Ruswell Ave., Warners Bay, N.S.W., 2282.

RX-TX Drake 2B, 80-10 mx, 2BQ speaker, Q multiplier, peak/notch, 2AC crystal calibrator, $240. Hammarlund HX50, 160-10 mx, crystal filter, SSB/CW/AM, 8236 final (6DQ5 with 50w. carbon anode), $170. Both plus 117v. transformer for $340. VK-3AKZ, 6 Duffryn Pl., Toorak, Melb., Vic., 3142.

SELL: Class C Wavemeter, complete, $20. Crystal Calibrator No. 10, $12. 3-inch CRO, $20. Two Pye Carphones, both converted 52.866, AC/DC, also a spare, $50 lot. Aswell Filter, SSB, $4. Geloso VFO with tubes, $4. Also Photo Developing Tanks. Phone Sydney 47-3089.

SELL: Swan 500C, new, AGC, ALC, latest 16-pole filter, Transceiver with power supply, all mint condition. FT2F 2 metre FM Yaesu Transceiver, with AC/DC supply, brand new. Phone A.H. 20-6135, Bus. 24-1231 (Melbourne).

WANTED: Band-change motors and L-R Indicator drive transformers to suit 24 volt Bendix MN26 Radio Compass sets. Transformers are marked T16 or A15064. State price required. Also Vintage Radios complete with Horn Speaker, early 1920's, good price paid, send details. O'Brien, Edgar Rd., San Remo, Vic., 3925. Phone 107.

WANTED: Circuit diagram, Handbooks or any information on Marconi Type CR150/3 Receiver. Will copy and return if desired. Bill Verrall, VK5WV, 7 Lilac Ave., Flinders Park, S.A., 5025.

WANTED: Collins 51J1-2-3 Receiver, Johnson Valiant Transmitter, CRO 5 MHz. bandwidth suitable TV servicing. Also general coverage Receiver, suit SWL such as Eddystone 640, S750, S680, 680X, Hallicrafters, Hammarlund, AR88, etc. A. C. Hawker, VK3IB, Box 35, Dimboola, Vic., 3414.

WANTED: DC-DC Converter, 12 volts input. Will exchange Nikkyo modulated oscillator T3B (to 30 MHz.). VK3EZ, 91 Roslyn St., Burwood, Vic., 3125. Phone 288-2217.

WANTED: Drake 2B Receiver in good condition, preferably with Q Multiplier. Also keyer paddle, normal or squeeze. Write giving full details and asking price. Andrew Davis, VK1DA, 32 Kalgoorlie Cres., Fisher, A.C.T., 2611. Phone Canberra (062) 63-3664, business hours.

WANTED: Murphy British Naval VLF Receiver or similar type tuning down to 10 KHz. or lower. R. F. Fisher, VK3BAQ, 241 Royal Pde., Parkville, Vic., 3052. Phone (business hours) 340-5931.

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FT-101 Dual Power Supply TRANSCEIVER

Perfect choice for car, caravan, boat, aircraft, field day activity, etc.

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- Built-in WWV 10 MHz. band
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External VFO .... Model FV-101
External Speaker .. .. Model SP-101
Mobile Mounting Bracket
CW Filter (600 Hz.)

SPECIFICATIONS
Maximum Input Power: 300W. speech peak SSB, 180W. CW, 80W. AM.
Sensitivity: 0.3 microvolt for 10 dB. S/N.
Selectivity: 2.4 KHz. (6 dB. down), 4.2 KHz. (60 dB. down).
CW Filter: 0.6 KHz. (6 dB. down), 1.2 KHz. (60 dB. down).
Frequency Range: 3.5 to 4, 7 to 7.5, 10 to 10.5, 14 to 14.5, 21 to 21.5, 27 to 27.5, 28 to 30 MHz.

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Frequency Stability: Less than 100 Hz. drift in any 30-minute period.
Antenna Impedance: 50 to 100 ohms - SWR 2:1 or less.
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Power Consumption: AC: Receive 0.5A., Transmit 3A.
DC: Receive 0.5A., Standby 5A., Transmit 20A. max.
Dimensions: 13½" wide, 6" high, 11½" deep.
Weight: 30 pounds.

All sets are pre-sales checked for operation on all bands, and covered by our 90-day warranty. Full facilities are available for after-sales service.

Latest model with factory-installed modifications, complete with power cables, plugs and P.T.T. noise-cancelling microphone.
Price $675 incl. S.T. (Price and specifications subject to change).

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South Aust. Rep.: **FARMERS RADIO PTY. LTD., 257 Angas St., Adelaide, S.A., 5000.** Telephone 23-1268
Western Aust. Rep.: **H. R. PRIDE, 26 Lockhart Street, Como, W.A., 6152.** Telephone 60-4379

amateur radio

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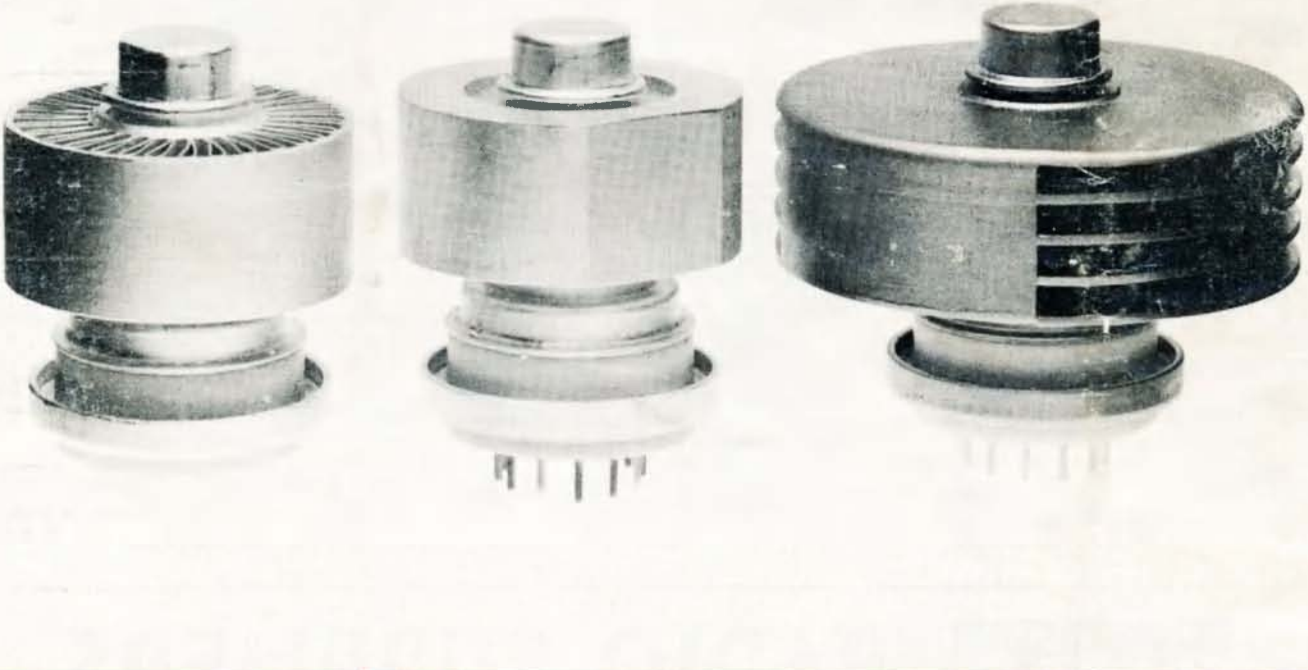

amateur radio

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CONTENTS

COVER STORY

The Eimac Division of Varian recently released three high-mu triodes—the 8873, 8874 and 8875. They are compact, external-anode, ceramic-metal triodes intended for use in zero-bias class B amplifiers in audio or radio frequency applications. Further details may be obtained from Varian Pty. Ltd., 82 Christie St., St. Leonards, N.S.W., 2065. (Additional descriptions appeared in "Ham Radio" for January 1971.)

FEDERAL COMMENT:

THE SPACE CONFERENCE–GENEVA 1971

In the long term the World Administrative Radio Conference for Space Telecommunications of the International Telecommunications Union held in Geneva from 7th June to 15th July, 1971, may be found to be one of the most significant events for the Amateur Service in recent years. In the September issue of "Amateur Radio" a report on the proceedings and outcome of the Conference was published. I think it is now appropriate to examine the results of that Conference and, at the same time, to offer some comment on the implications flowing from it so far as they relate to the Amateur Service.

Previously, the Amateur Service has been defined in the I.T.U. Radio Regulations as a "service of self-training intercommunication and technical investigations carried on by Amateurs, that is, by duly authorised persons interested in radio technique solely with a personal aim and without pecuniary interest". No alteration was made to this definition, but the Conference did adopt the definition of a new service, the "Amateur Satellite Service" in the following terms, "a radio communication service using space stations on earth satellites for the same purposes as those of the amateur service".

At first glance, this definition would appear to be an expression of convenience for use in footnotes. However, the significance of the adoption of this definition is far better than that. Many provisions of the Radio Regulations apply to the "Space Service" which is in turn defined as a "radio communication service". Therefore, as the Amateur Satellite Service is by definition a radio communication service, the doubt that has existed in the past as to the application of these provisions to Amateur Satellites is removed.

In my mind, even more significant than the result of the conference so far as it affected the Amateur Service was the opposition from so many countries to the Amateur Service. It is abundantly clear that the Amateur Service was supported by Australia as well as New Zealand, the United Kingdom, the United States of America, Canada, West Germany and other countries. The issue affecting the Amateur Service that produced so much opposition was the question as to whether or not Amateur Satellites would be permitted in the Amateur shared bands. The countries that vociferously opposed Amateur Satellites in shared bands included Sweden, Norway, France, Switzerland, Portugal, U.S.S.R., Mexico, Greece, Spain, Netherlands, Italy, India and other countries.

We are fortunate that we enjoy the support of our administration. Comparisons with certain other countries must lead us to the conclusion that the Amateur Service, at least in some of those countries, does not enjoy a similar rapport.

The proposal to permit Amateur Satellites in shared bands had been meticulously investigated and recommended by the C.C.I.R., the I.T.U's technical advisory arm.

Of course the W.I.A. was particularly concerned about the 2 metre and 70 centimetre bands—the two bands that it was planned that the A.O.B. translator project would use. Despite some opposition, the principle of the unrestricted use by the Amateur Satellite Service of the exclusive bands, was accepted by the conference. This, of course, covered the frequency band 144-146 MHz., the worldwide two metre allocation.

However, there is no Amateur allocation between 146 MHz. and 24 GHz. that is not a shared band. In the final outcome, use of the segment 435-438 MHz. by the Amateur Satellite Service is permitted, thanks to the excellent lobbying of the I.A.R.U. team which saved the day at the very last minute. For the sake of completeness, it is useful to restate the relevant footnote to that segment:

> "320A. In the band 435-438 MHz. the amateur satellite service may be authorised on condition that harmful interference shall not be caused to other services operating in accordance with the table of frequency allocations. Administrations authorising such use shall ensure that any harmful interference caused by emissions from amateur satellites is immediately eliminated."

Even this footnote was the subject of opposition from Indonesia, Singapore and to a lesser extent, Malaysia.

No doubt in a number of cases, the opposition to the use of the shared Amateur bands by the Amateur Satellite Service, can be ascribed to genuine fears of harmful interference, but no doubt there are many other reasons that influenced those countries that opposed the Amateur position. "It Seems To Us" in "QST" of August 1971 puts the matter very clearly: "In the first weeks of the Conference it became apparent that a number of societies in other countries had not done their 'homework' of liaison with authorities."

The fact that at the last Plenary Meeting, the footnote I have quoted above in relation to the segment 435-438 MHz., was inserted into the frequency table, may result, one ventures to suggest, in many administrations giving special scrutiny to the Amateur Service. In addition, other services which failed to achieve anything at all, or at best very little, such as the Maritime Service, which failed totally to secure any frequencies for space communications, may likewise decide to carefully examine the position of the Amateur Service.

In my view, the Amateur Service over the next few years, could face a questioning of its position and perhaps its very existence, by a number of administrations and other services. It is clear that the Amateur Service as a whole must be able to demonstrate the usefulness to which it puts its frequencies. This, in itself is a complete justification for the Wireless Institute of Australia continuing to foster activities such as Project Australis.

Furthermore, the irresponsible use by any Amateur of the frequencies allocated to the Amateur Service cannot be other than detrimental to the whole service in respect of its allocations and privileges. The final results of the Conference may be less than we sought but were the minimum for which we hoped. The result also may be that the Amateur Service will, in the eyes of many, be on trial. Each of us, by our support of those activities that are truly useful, and by the responsible use of our privileges, can ensure that we do not place the future in jeopardy.

MICHAEL J. OWEN.
Federal President, W.I.A.

(Also refer to page 9 of September "A.R." for previous details.—Ed.)

DRAKE 2-B RECEIVER ON TOP BAND*

NOTES ON A SIMPLE MODIFICATION

R. L. GLAISHER, G6LX

The Drake 2-B was first introduced in 1959 and although it has been superseded by later models, in the writer's view it is still one of the best of the post-war Amateur receivers for s.s.b. and c.w. use. In addition to coverage of the 3.5 to 28 MHz. Amateur bands, it has a built-in facility which permits, with the use of extra crystals, reception on five extra bands each 600 KHz. wide anywhere in the range 3 to 32 MHz. It is this facility which can be used to extend the coverage to include the 160 metre band.

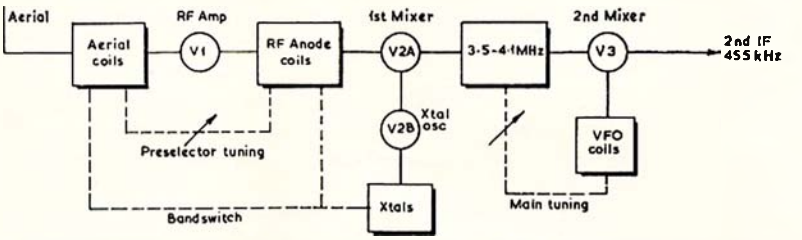


Fig. 1.—Block diagram of the Drake 2-B Receiver, showing r.f. and mixer arrangements—see text.

As will be seen by reference to the block diagram (Fig. 1), the receiver is a multiple-conversion superhet. having a basic tuning range of 3.5 to 4.1 MHz. A crystal oscillator and mixer stage is switched into circuit for the Amateur bands 7 to 28 MHz. and for the five extra bands in the spectrum above 4.1 MHz. The grid and anode circuits of the r.f. stage are tuned independently of the main frequency control by the use of a separate pre-selector control comprising L/C circuits which resonate at 7 MHz. ± 2 MHz. Coverage of the other bands and frequencies is obtained by the switching of capacitive or inductive shunts across the pre-selector coils to raise or lower their inductance.

To receive 160 metres, triple-conversion is used, as on the 7 to 28 MHz. bands. As the pre-selector circuits will only tune down to 3.3 MHz., it is necessary to add capacity so that they will resonate at 1.9 MHz. at mid-scale of the pre-selector tuning. This can be done by using the extra band "A" switch position to bring in capacitive shunts, which in conjunction with a suitable crystal fitted in the "A" socket, will provide the coverage required. By using band "A", the modification has no effect on the performance or the operation of the receiver on the other bands, as the shunts are only in circuit on 160 metres.

A total padding capacity of about 1500 pF. is required across each section of the pre-selector tuned circuits. This capacity is made up from a 0.001 uF. silver mica condenser in parallel with a 700 pF. compression-type mica trimmer. At first sight it might be thought that the addition of such a large capacity in shunt with the condensers already in circuit would have detrimental effects of the Q of the tuned circuits in the r.f. stage. In practice this was not found to be a problem as the pre-selector can be tuned over the frequency range required and more than sufficient gain is available from the r.f. stage to blanket the noise from the succeeding mixer stages.

CRYSTAL FREQUENCY

To convert the 1.8 to 2.0 MHz. signal frequency to fall within the range of the tunable i.f. (3.5 to 4.1 MHz.), the crystal oscillator has to operate between 1.7 and 2.1 MHz. for product mixing, or between 5.5 to 5.9 MHz. for difference mixing. At G6LX, a crystal frequency of 5.5 MHz. is used to obtain a coverage of 1.8 to 2.0 MHz. with the receiver tuned 3.7 to 3.5 MHz. Product mixing is not recommended, as apart from the problem of the oscillator being in the band in the 1.8 to 2.0 MHz. segment, there are difficulties with strong second-channel signals and in-band birdies. Using difference mixing, there are no obvious spurious or second channel signals within the 1.8 to 2.0 MHz. band. It is suggested that a crystal having an exact multiple of 100 KHz. be used as this will provide a direct frequency read-out on the main tuning scale.

PRE-SELECTOR MODIFICATION

It is first necessary to identify the two switch wafers that are associated with the pre-selector input and output circuits and the connections to the wafers that correspond to switch positions "A" and "80". These wafers are the first two looking from the front panel and as wired have a linking lead between the connections for "A" and "80" (see Fig. 2A). The modification consists of removing these leads and wiring in the padding condensers (C1A, CT1A, C2A and CT2A) as shown in Fig. 2B. While there is sufficient room to mount the extra components on short brackets attached to the chassis, this was not found to be necessary and the condensers and trimmers are wired directly between the switch contacts and the 80 metre shunts using short lengths of 18 gauge tinned copper wire. If brackets are used, it should be remembered that most types of compression trimmers are constructed so that one side is at earth potential and insulated spacers will be required between the trimmers and the mounting brackets.

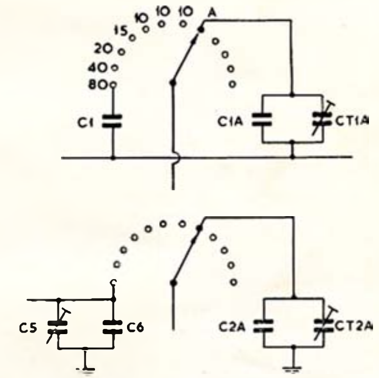


Fig. 2B.—The preselector modifications for Top Band in the Drake 2-B. C1A, C2A are 0.001 uF. silver mica. CT1A, CT2A 700 pF. compression-type trimmers—see text.

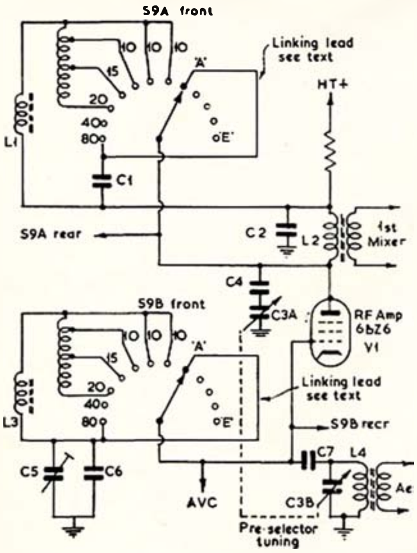


Fig. 2A.—Part of the r.f. stage circuit of the Drake 2-B before modification. Component values are as original—see handbook.

ALIGNMENT

Once the pre-selector modifications have been completed and a crystal of the correct frequency inserted into crystal socket "A", the only thing that remains is to adjust the trimmers CT1A and CT2A in order to resonate the pre-selector tuned circuits to 160 metres. This is a very simple adjustment which can be done without the use of a signal generator or other test equipment.

(Continued on Page 9)

* Reprinted from "The Short Wave Magazine," March, 1971.

ACITRON SSB-400 TRANSCEIVER

GENERAL DESCRIPTION

The Acitron SSB-400 Transceiver consists of the following modules:

1. **Band Switched R.F. Section**
   This is a large double-sided circuit board housing:
   Injection crystal oscillator,
   Injection balanced mixer,
   R.f. amplifier,
   Transmitter balanced mixer.
   This complete section is readily removable for maintenance purposes.
2. **I.F. Modem**
   A second relatively large printed circuit board houses:
   Receive balanced mixer,
   Transmit balanced modulator,
   9 MHz. filter and associated matching networks,
   Two i.f. amplifiers,
   A.m. and sideband detector,
   A.g.c. system.
3. **10-Watt Broad-band Driver**
4. **Frequency Counter and Digital Display.**
5. **6-5 MHz. VFO.**

The remaining modules are contained on separate plug-in boards. These are:

6. **10 Volt Power Regulator,**
7. **Audio Amplifier,**
8. **9 MHz. Carrier Oscillator,**
9. **Microphone Amp., Vox/Anti-Vox.**
10. **Digital Oscillator and Balanced Mixer,**
11. **100 KHz. Clock Oscillator and Logic Generator.**

All circuit boards are plated fibreglass using gold plated edge connectors, where applicable.

A.L.C.

The a.l.c. system uses the grid current of the final tube to generate a negative voltage which is applied to the first i.f. amplifier. Whilst the main function of the a.l.c. system is to prevent overdrive of the transmitter, it also performs the function of a speech compressor owing to its very fast time constant, thus allowing approximately 15 to 20 dB. compression to be incorporated on transmit, if desired.

TRANSMIT BALANCED MIXER

A hot carrier diode ring mixer is used to ensure a minimal radiation of spurious emissions. This is a broadband device using toroidal transformers, therefore, no tuning is required.

MICROPHONE AMPLIFIER, VOX/ANTI-VOX SYSTEM

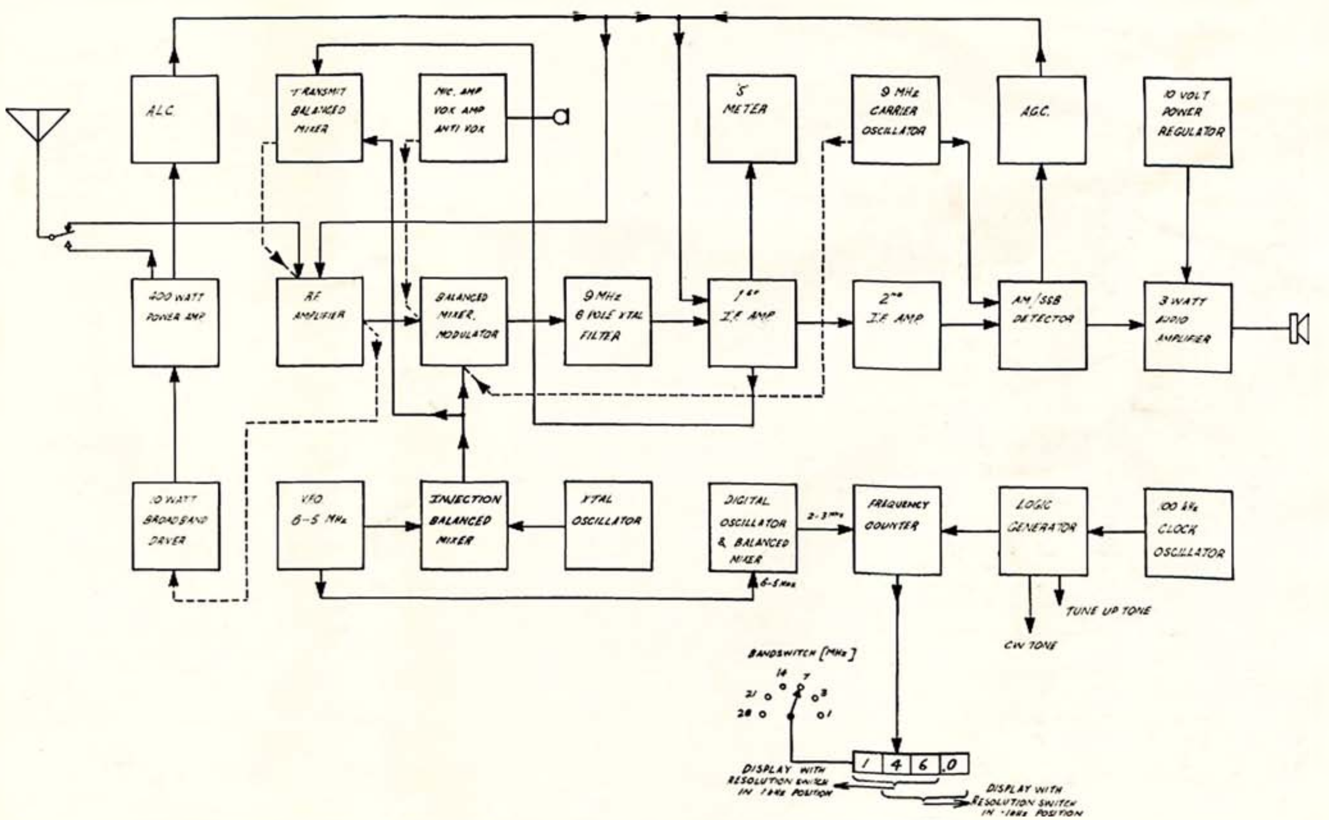
The microphone amplifier consists of a source follower driving an integrated circuit. The source follower input enables high impedance crystal to low impedance dynamic microphones to be used. The terminating resistor to suit the microphone is the only change required. There is adequate gain in the microphone amplifier to accommodate most dynamic, crystal and rocking armature microphones.

The vox amplifier consists of two transistors and a fast-acting voltage doubler deriving its input via the vox gain control from the output of the first stage of the microphone amplifier. The output of the voltage doubler is combined with the output of a second voltage doubler connected by the anti-vox control to the loudspeaker. These two voltages are out of phase and cancel prior to passing through a digital gating system and thus operating the vox relay. The vox delay is incorporated after the digital gating system which means it has no affect on the anti-vox operation. The system of vox/anti-vox gating used allows the vox to override the anti-vox, even when there is only a slight pause in the anti-vox signal, i.e. the pause between word syllables.

Four transistors, two integrated circuits, one FET and six diodes are used in this system which is self-contained on a single plug-in circuit board.

"S" METER

The "S" meter forms the dual function of "S" meter and transmit power monitor. On receive, the "S" meter is connected by a bridge circuit to the combined source voltages of the r.f. and first i.f. amplifiers. Both of these are a.g.c. controlled, giving a dynamic range on the "S" meter of approximately one microvolt to one volt. On transmit, the "S" meter is connected to a diode monitor on the transmitter r.f.



Block Diagram of the Acitron SSB-400.

output. A separate meter is used to indicate plate current of the power amplifier.

9 MHz. CARRIER OSCILLATOR

This unit consists of a series mode transistor oscillator and FET source follower. Diode switching allows the correct crystal to be selected when changing from normal to reverse sideband.

A.G.C.

The a.g.c. system uses a negative voltage derived from a voltage doubler and feeds in turn to the r.f. and first i.f. amplifiers, both units being dual gate FETs. This allows a large dynamic range prior to receiver overload and in actual practice the receiver will accept a signal from noise level to almost one volt before overload occurs.

10 VOLT POWER REGULATOR

The 10 volt power regulator supplies power to all stages of the transceiver with the exception of the audio output stage, transmitter p.a. and broad-band driver.

The supply consists of a two-stage emitter follower with short circuit protection supplied from a zener referenced voltage.

400 WATT POWER AMPLIFIER

The power amplifier consists of a YL1060 u.h.f. dual tetrode transmitting tube. This stage has a broad-band input and pi-coupler output. The valve is running approximately 800 watts p.e.p. in and delivering 400 watts p.e.p. out.

The power is slightly less on 10 metres. Approximately 1,800 volt (p.a.) and 400 volt (screen) supplies are used.

R.F. AMPLIFIER

This is a band switched r.f. amplifier consisting of a dual gate FET followed by an emitter follower. Tuning is electronically accomplished using diodes. The r.f. amplifier is used both on transmit and receive.

BALANCED MIXER -MODULATOR

One of the most interesting blocks in the transceiver is an integrated circuit balanced mixer which performs the dual function of receive balanced mixer and transmitter balanced modulator. While receiving, the input ports are connected to the r.f. amplifier and the injection balanced mixer. The output of the balanced mixer is fed via an emitter follower to the 9 MHz. crystal filter. On transmit, the input ports are changed over and the transmitter audio is fed to one port and the 9 MHz. carrier to the other. The unit then functions as a balanced modulator. The carrier suppression of the balanced modulator and filter combined is in the vicinity of 60 dB.

9 MHz. 8-POLE CRYSTAL FILTER

A 9 MHz. 8-pole crystal filter is used with a bandwidth of approximately 2.5 KHz. at the 6 dB. points, rising to only 4.1 KHz. at the 60 dB. points.

I.F. AMPLIFIERS

The first i.f. amplifier is used both on transmit and receive and consists of a dual gate FET. It has a.g.c. applied on receive and a.l.c. on transmit.

The second i.f. amplifier also consists of a dual gate FET.

A.M./S.S.B. DETECTOR

The product detector used is a diode bridge detector and one leg of the bridge is opened when operating in the a.m. mode. A source follower connected to the output reduces the impedance to drive the audio amplifier, via the volume control.

THREE-WATT AUDIO AMPLIFIER

The three-watt amplifier consists of a pair of TO3 transistors, transformer coupled to the loudspeaker and driven by two small signal transistors.

TEN-WATT BROAD-BAND DRIVER

The 10-watt broad-band driver consists of a transformer coupled pair of v.h.f. strip-line transistors. These are driven by a single v.h.f. strip-line transistor. The complete unit is broad-band, from input to output, delivering approximately ten watts of drive to the power amplifier. This unit is contained on a separate circuit board mounted on a heat sink and does not require tuning.

V.F.O. 6-5 MHz.

The v.f.o. consists of a permeability tuned FET Vacker oscillator followed by suitable buffering stages. The unit is completely enclosed in a metal box and is substantially free from vibration, making it particularly suitable for mobile use.

INJECTION BALANCED MIXER

The injection balanced mixer is once again an integrated circuit similar to the type used in the balance modulator. The input ports are connected to the 6-5 MHz. v.f.o. and the band-set crystal oscillator. The output of this is fed via broad-band tuned circuits (to reduce the possibility of spots on receive) to an emitter follower driving both the receive and transmit mixers.

CRYSTAL OSCILLATOR

This unit is a series overtone crystal oscillator followed by a FET source follower. The appropriate crystals being switched in when changing from band to band.

DIGITAL SYSTEM

As the v.f.o. is reverse tuning from 6 to 5 MHz., a balanced mixer is used to convert this to the 2 to 3 MHz. range. This is then applied to a conventional frequency counter. The 8 MHz. crystal used in the digital oscillator is diode switched when changing from upper to lower sideband and in some cases when changing from band to band (depending on whether additive or subtractive mixing is used). This is achieved automatically due to the logic system, enabling the digital readout to display the exact carrier frequency, rather than the centre pass band frequency.

FREQUENCY COUNTER

The frequency counter consists of eleven dual in line integrated circuits comprising complete count and memory facilities and it drives a three-digit seven-segment gallium arsenide display. It has the facility to scale down and read to one extra digit (100 Hz.).

LOGIC GENERATOR

The logic generator performs the functions necessary to generate the various gate, set and re-set pulses, etc., for the frequency counter. It also generates tones for c.w. transmission and tuning purposes. Eight dual in line integrated circuits and two transistors are used in this section.

100 KHz. CLOCK OSCILLATOR

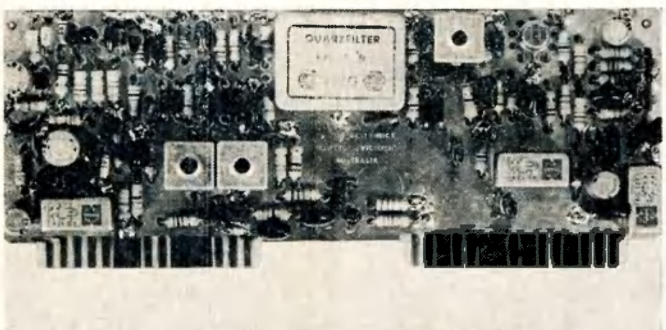
The 100 KHz. clock oscillator consists of a parallel mode 100 KHz. crystal. Twenty-one integrated circuits, five transistors and one FET are used in the complete digital readout system.

P.A. TUNING

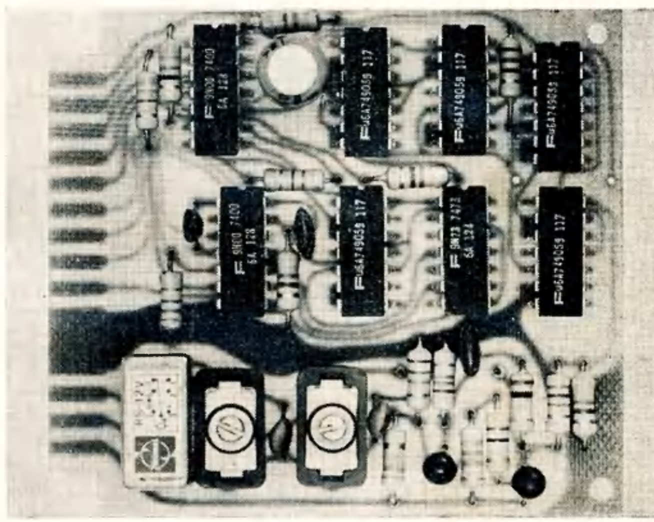
Before describing the tune-up system employed in the SSB-400, some comments are necessary on the tuning of s.s.b. transmitters in general.

It is a well known fact that an s.s.b. transmitter must be tuned at the full rated (p.e.p. value) input that it will be operating at on voice peaks in order

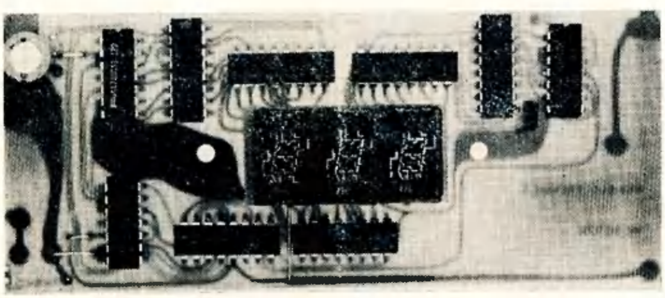
(Continued on Page 9)



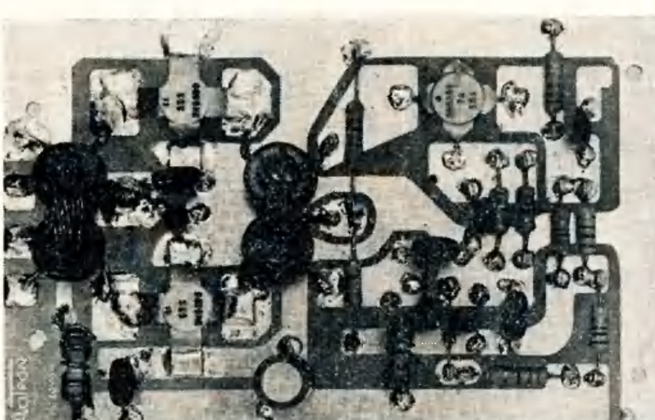
I.F. Modem.



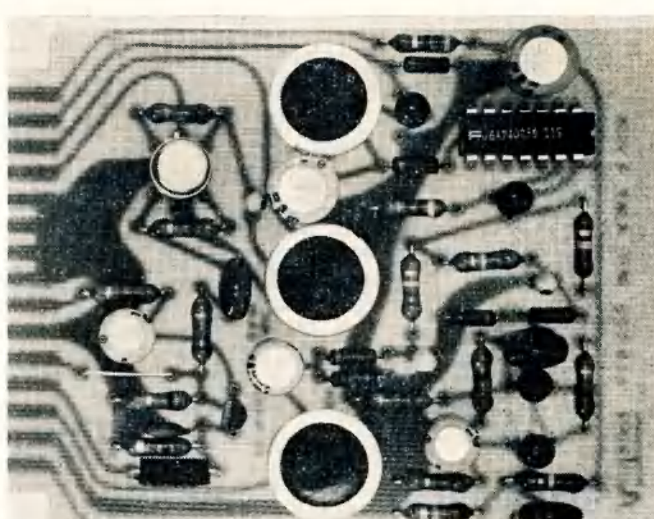
100 KHz. Clock Oscillator and Logic Generator module.



Frequency Counter and Digital Display Module.



10 Watt Broad-band Driver Module.



Microphone Amplifier. Vox/Anti-Vox Module.

A Tester for Field Effect Transistors*

A. G. THORBURN, G3WBT

The winter constructional programme at G3WBT included, for the first time, quite a few projects using field effect transistors, but because of a lack of knowledge and a lack of data on these devices, this FET tester was designed, constructed and found satisfactory in operation. This design is not the last word in FET testers, as simplicity and availability of parts in the stock (junk) box were important influences.

The design of such a tester should enable FET transfer characteristics to be ascertained so as to allow correct bias points to be determined and load lines drawn. From these, some understanding of FETs would be obtained and circuits using them could be laid out for efficient and effective use.

Further criteria of the design were ability to check N and P channel junction FETs, MOSFETs or IGFETs; depletion or enhancement modes, and the ability to attach the FET easily to the tester and accommodate the multiplicity of different orders of drain, source and gate connections.

THE CIRCUIT

Fig. 1 shows the circuit diagram, and Fig. 2 shows the front panel layout. The latter has three crocodile clips, not shown in the circuit diagram, to which the FET leads are attached; the correct connections for drain, source and gate being arrived at by insertion of the three miniature wander plugs in the appropriate sockets.

* Reprinted from "Radio Comm.," July 1971.

Switch positions in the circuit diagram are shown for N channel junction FETs where the drain has positive polarity and the gate is negatively biased from 0v. to —6v. by means of RV1 with the 6v. zener in circuit, or to 9v. with S5 open. S5 must be open when the tester is not in use otherwise the 9v. PP3 will take current through the zener and R1 despite S2 being in the off position.

RV1 can be of very high resistance, as the gate, being reversed biased, takes no measureable current. S5 closed also allows RV1 to be calibrated in volts, 0 to 6, so no meter is required to read gate volts. When S5 is open the full 9v. is available if required. With enhancement mode MOSFETs or IGFETs there may be no drain current until application of gate volts bias.

For N channel MOSFETs with drain positive, the gate will be positive, the drain current increasing with increased positive bias. P channel MOSFETs require negative bias for current flow.

Depletion mode MOSFETs have current flow with zero bias, the N channel type decreasing drain current with negative bias and increasing drain current with positive bias. In this way depletion mode MOSFETs can operate from zero bias on application of either positive or negative bias, i.e. from zero bias a change either way changes drain current. The B1 switching takes care of all these possibilities in conjunction with RV1.

In the model shown, B1 is external to the tester, as is the separate a.c. p.s.u. Fig. 1 shows B2 as 18v. from two PP9 or RR6 batteries in series. B2 and components to the right of the chain line in Fig. 1 can be built as a separate item as an alternative to the a.c. p.s.u.

OPERATION

To operate, all switches should be off and the wander plug positions checked that they are correct for the FET to be tested. S4 should be switched to the 500 ohm RV2 position, which should give 1.8v. maximum with an 18v. battery, and with a 30v. p.s.u. 3 v. maximum. For a junction FET, RV1 can be set half way and S3 meter switch

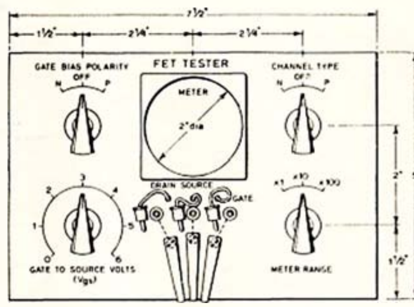


Fig. 2.—Front panel layout.

to 100 mA. For IGFETs a finger should be held across the gate and source crocodile clips to prevent any build-up of static until the bias is switched on. Switch on S2 before S1 so that bias is applied before drain-source volts. Increasing bias on junction FETs decreases drain current. The meter switch should of course be moved to ensure that some drain current is showing.

Manipulation of RV1, RV2 and RV3 in conjunction with S4, using the station multimeter to read drain to source voltage and tabulating drain current against drain to source volts at known gate to source bias volts, allows the FET's transfer characteristics to be plotted and curves filled in.

Fig. 3 shows results obtained on an N channel general purpose FET.

While 18v. should be all that is necessary for B2, as components were available in the junk box a variable p.s.u., 0-30v., Fig. 4, was made up. The

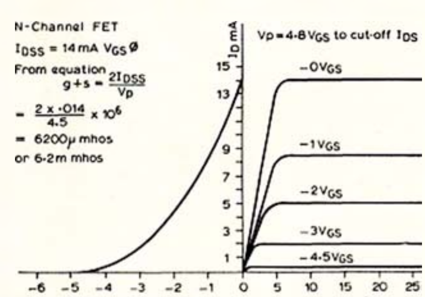


Fig. 3.—Transfer characteristics of N channel general purpose FET.

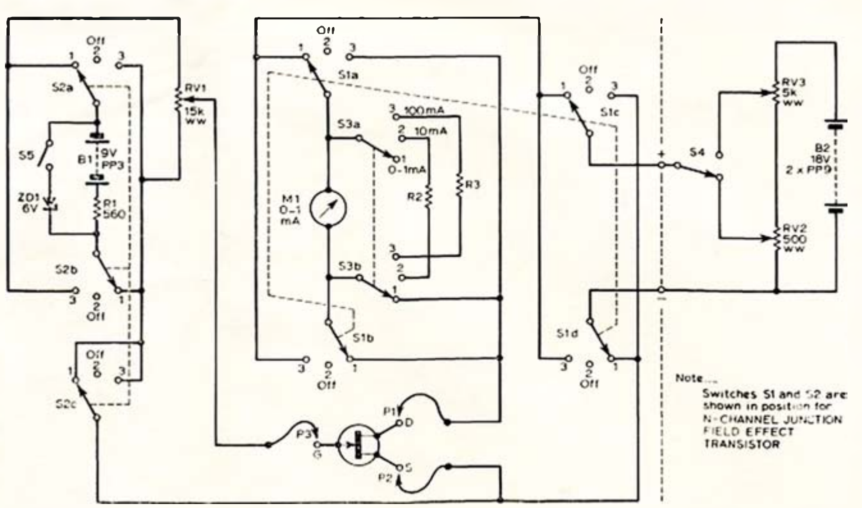


Fig. 1.—Tester circuit diagram. Switches S1 and S2 shown in position for "N" channel junction FET.

ZD1—6v. zener diode. Mullard BZY88-C6V2, AEI-LRG2 or similar.
R1—560 ohm carbon.
R2—Meter shunt to suit 10 mA. f.s.d.
R3—Meter shunt to suit 100 mA. f.s.d.
RV1—15K ohm wire wound potentiometer (can be 20K or 25K ohm).
RV2—500 ohm wire wound potentiometer.
RV3—5,000 ohm wire wound potentiometer.
P1, 2, 3—Radio Spares miniature plugs and sockets (wander type).
S1—4-pole 3-way wafer.
S2—3-pole 3-way wafer.
S3—2-pole 3-way wafer (or single-pole 3-way).
S4—Single-pole 2-way.
S5—On/off.
M—0·1 mA. f.s.d. meter, preferably 100 divisions scale.
B1—PP3 9v.
B2—2 off PP9 18v., or see simple p.s.u. circuit.

transformer was an ex-radio speaker output transformer for 15 ohm output. The 500 μF. capacitor is mainly to allow peak voltage to build up. Fig. 5 shows the voltage drop against current taken for this p.s.u., and is included as a matter of interest for those contemplating a similar type of p.s.u.

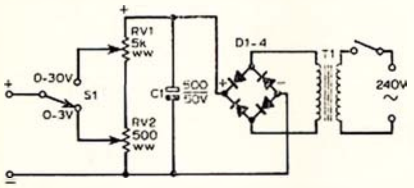


Fig. 4.—0-30v. p.s.u. circuit diagram.

C1—500 uF.
RV1—5K ohm wire wound potentiometer.
RV2—500 ohm wire wound potentiometer.
S1—Single-pole, 2-way.
D1-4—75v. p.i.v. silicon rectifier diodes.
T1—20v. miniature mains (Radio Spares).
Terminals or sockets—2 off.

CONSTRUCTION

The tester shown is constructed in a ½" wall wooden box with an ⅛" thick paxoline panel. After marking out and drilling, a sheet of substantial plain white paper is placed over the finished drilled panel and all holes rubbed in. Hole centres are easily found to allow the paper to be marked up, using a suitable pair of compasses and pen for all necessary inscriptions. The panel is then lightly gummed and the paper placed in position. After allowing a period for drying out, the author used 2" wide Sellotape to cover the papered panel and wrap a little around the edges. The large holes can be cut radially before folding inwards and the small holes pierced with pen or pencil.

Assembly of the switches, variable resistors, etc., can then take place, the Sellotape protecting the panel while wiring and soldering takes place. RV1 is a linear wire wound potentiometer and the panel can be pre-marked 0 to 6v. as the input resistance is constant. It is advisable to subdivide the 0 to 1 division into either 10 or 5 further divisions.

It is not possible to divide out the sweep of RV2 and RV3 as the load here is not constant, as can be seen by Fig. 5, which, in a way, simulates the varying load presented by the FET drain current. The station multimeter across B2 input to the tester when in use shows this up as widely varying voltages at identical positions of RV3.

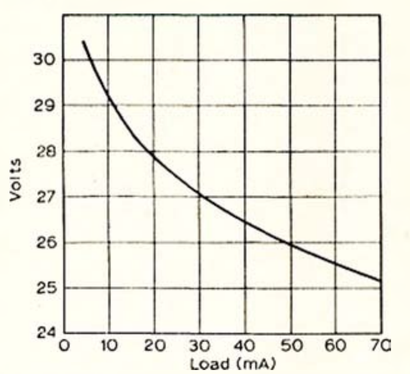


Fig. 5.—P.s.u. voltage drop against load in mA.

DRAKE 2-B RECEIVER

(Continued from Page 3)

The receiver bandswitch is set to 160 metres (band "A") and the pre-selector control to mid-scale. The main tuning control is set to the frequency that corresponds to 1.9 MHz. and the trimmers CT1A and CT2A carefully adjusted for maximum received noise without an aerial connected. If the receiver is fitted with the optional 100 KHz. calibrator, this can be switched on and the trimmers adjusted for maximum S meter reading.

Correct adjustment of the trimmers can be checked by retuning to 1.8 MHz. and the pre-selector control adjusted for a noise peak (or maximum S meter reading on the calibrator signal). This peak should occur with the pre-selector at near maximum capacity (pre-selector dial near 3.5). A similar check at 2.0 MHz. should provide a pre-selector peak at near minimum capacity (28 MHz. on the dial). Provided that the trimmers have been correctly set, tracking over the band will be satisfactory and the aerial can be connected. If it is found that the pre-selector will not peak at the band edges, or if there is an obvious difference in sensitivity over the band, this is a sure indication that the trimmers were not set correctly at 1.9 MHz. and further adjustment is required.

PERFORMANCE

A number of Drake 2-B receivers have been similarly modified for 160 metres, using the arrangement described. In every case the sensitivity throughout the band has compared favourably with that attainable on 80 metres. The G6LX receiver has been used extensively for Top Band DX working and by the Croydon N.F.D. Group, with excellent results.

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OVERSEAS MAGAZINE INDEX

This month five magazines were available to us: 1, "Break-In," July; 2, "CQ," Sept.; 3, "QST," July; 4, "Radio Communication," August; 5, "Short-Wave Magazine," July (all 1971 issues). Material available varied, as usual, with the accent upon antennas.

Antennas: An optimum performance array for 160, 40 and 20 metres; A half-Wave DDRR Antenna; An Antenna for 75 metre WAS; The K7GCO Modified HT-18 Hy-Tower; A Rotatable Dipole for 20, 40 and 80 metres; A Cheap 10 metre Vertical, see key 1; The Ground Image Vertical Antenna (3); "Two-Toter" Lightweight Portable Beam for 2 metres (3); Development of an All-Band Vertical (4).

Accessories: A Simple IC Keyer with weight control (3); Katsumi CW Monitor and Electronic Keyer, review (5).

General: A Second Look at Linear Integrated Circuits (3); A 20 MHz. Digital Frequency Meter using TTL ICs, Part 2 (4); Microwave Diodes (4); Modern Filter Design for the Radio Amateur (4); The Solar Link (Amateur Radio Astronomy) (4).

Receiving: A Solid State Noise Blanker (3); A Tunable 440 MHz. FM Receiver (3); Heath Model SB-303 Receiver, review (3); An RF Noise Bridge and its uses (5); More about Satellite Reception, Part 3 (5).

Transmitting: A Power Bridge and SWR Indicator for 2 metres (3).

Other: Standard Frequency and Time Transmissions (1); Space Conference Interim Report (2).

—VK3ASC.

ACITRON SSB-400

(Continued from Page 7)

to obtain the maximum output consistent with the best linearity. For example, if a transmitter is operated at 400 watts p.e.p. r.f. output it can only be correctly adjusted when running at this level. If it is tuned up at a value below this level and the drive is then increased to full input, it will be substantially maltuned and most certainly not optimised for best linearity.

In order to meet the above, the following requirements have to be met:

(a) A power supply capable of running with a continual two-tone input at the full p.e.p. rating, with little or no voltage drop;
(b) A p.a. tube or tubes capable of standing the full p.e.p. rating for some time.

However, in practice allowing for 50% transmit/50% receive time, the actual duty cycle on speech wave forms is as little as 15% to 20%.

In summarising, it is sufficient to say that for normal operation of s.s.b. equipment, i.e. voice, we require valve and power supply capabilities far in excess of what is necessary simply to enable the transmitter to be correctly tuned.

The novel (patented) tune-up system employed in the SSB-400 overcomes this problem using a different technique. The system of tuning is accomplished by feeding a low-duty cycle wave form into the transmitter audio input. In practice, this consists of a tone burst, with a one to ten mark to space ratio, meaning that the transmitter is running during these bursts to its full rated input, but is only running an average power in the order of 10% of its maximum rating

This in effect means that although the transmitter is running to its full rated p.e.p. input there is only one-tenth of the drain on both power supply and p.a. tube. This enables the operator to be relatively slow in carrying out the tune-up procedure and still have little possibility of damaging the final valve.

The price of the SSB-400 transceiver is $750.

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HY-Q ELECTRONICS TO MANUFACTURE IN SINGAPORE

Hy-Q Electronics Pty. Ltd., the Melbourne based quartz crystal manufacturers whose Frankston, Vic., plant is now operating at capacity, are to start manufacturing in Singapore.

Mr. T. A. Dineen, marketing director of Hy-Q, stated on his return from Singapore that the new operation Hy-Q Electronics International Pty. Ltd. will be in production early in 1972 and that a new air-conditioned factory is already under construction.

Hy-Q Electronics will be joined in this venture by O'Connors Pty. Ltd., a Singapore based organisation with a 30% holding in the new company.

Mr. Dineen recently carried out a survey of East Asian markets, and with Mr. P. E. Cooper, chairman of Hy-Q Electronics, and Mr. R. C. Richards, managing director, concluded the negotiations with O'Connors and the Singapore Government.

BEWARE OF . . . CHAIN LETTERS

Another batch are in circulation.
If you get one, tear it up!

AMATEUR RADIO CO-OPERATION—YB STYLE

HOWARD RIDER, VK3ZJY*

To a modern reasonably equipped Radio Amateur with his commercially built s.s.b. transceiver, cubical quad, monitoring scope, etc., moving through Indonesia is like turning back the pages of history. With very, very few exceptions no such sophisticated equipment will be found, nor even the components out of which such gear can be built.

Valves such as 6V6s, 6L6s, EL34s and 807s form the vast majority of final r.f. amplifiers and modulators, whilst antennas are nearly all of the single wire feed types (inverted L, Windom, etc.). I have only seen two folded dipoles, both manufactured from t.v. ribbon. Co-axial cable is a term read in the very few available magazines.

The few home-brew s.s.b. units I have viewed are pieces of art and reflect the ingenuity of the builders. For example, the Australian Amateur can purchase a crystal filter or p.s.n. from any one of a number of sources. His Indonesian counterpart, however, not only does not have this facility, but could not afford it. The cost would represent more than one month's, and in some cases more than two months, wages (I am assuming the price to be around $9.00).

Following my meetings in Djakarta (Region 0), my work took me to Bogor, a township some 70 kms. distant (Region 1). Here I was very fortunate as my counterpart at the University was Soedarsono, himself a Radio Amateur (YD1PY). Being a member of the local group, he swiftly arranged an informal meeting. Present were: Sofjan Wahab (YB1FX), President; Atje Dimjati (YD1PX), Secretary; Mardijanto (YC-1PD), M. Ali Nursiwan (YD1GA), David Djoemeno (YD1GB), John Murdock (YB1AAK/WA9LRL), Soedarsono (YD1PY) and myself.

After a long general discussion it was decided to hold a public display of equipment and operation techniques on 17th August which is Indonesian Independence Day, perhaps the most important national holiday of the year.

There was to be a general exhibition in a very large hall in Bogor and permission would be sought for display area. If gained, the exhibition would be a milestone, one of the first of its kind ever held in Indonesia.

My presence was politely but firmly requested and even although at the time I would be working in Denpasar, Bali, over 1,000 miles away, it was agreed that I fly back and put in an appearance. Living in the area, John Murdock would naturally come and he offered whatever help he could give.

There was more to this display than appeared on the surface as I was later to find out—it was only the incentive to start that was needed.

For many reasons that are generally known, Amateur Radio in Indonesia is very young, actually just a little over three years old. It is up to about the same stage that existed in Australia in the late 1930s. The old timers will remember those days as ones in which individuals, usually Amateurs, were transmitting regular programmes both on the broadcast and lower short wave bands.

That is the position that exists in Indonesia now. There are two main divisions (a) Radio Amateurs licensed by the government to operate on Amateur frequencies and within the framework of International Amateur Radio Regulations; they issue three classes of licence depending upon the examinable knowledge reached by the Amateur, and (b) Broadcast station licences issued by the government to operate within the broadcast and lower short wave bands; there are two licences depending upon the experience and qualities reached, but knowledge of radio is not a pre-requisite.

Unfortunately there are many unlicensed broadcast stations—policing the regulations is very difficult because of staffing and equipment problems. It is a slow process weeding out the unlicensed, but it is being undertaken and gathering momentum as finance and personnel become available.

I have seen a number of broadcast stations, most of which range between 60 and 100 watts input and have 807s in the final. Some are of good quality, others are very poor but all fill a need which is to give the local population some form of entertainment to listen to.

The general population, however, do not realise that there is a difference between the true Amateur and a broadcast station, to them they are one and the same. Many problems occur particularly because of the extremely limited radio knowledge of the broadcaster. Distortion and harmonic radiation in some areas create "birdies" and heterodynes all over the dial. Of course, the Amateur gets the blame.

Education of the public in this field was thus a further reason for the proposed display at Bogor. When this was first explained to me, I was a little incredulous, but now having travelled extensively throughout Indonesia, I fully agree with all that was said.

A further meeting was held three days later (Tuesday, 13th July) at which it was decided that the display would be completely Indonesian in gear—all home-built and transmissions would take place in the 3.5 MHz. band. A letter was despatched to the Hall Committee requesting available space.

The following day I began my tour which took me over 1,000 miles to the east of Bogor. I was very surprised to find how effectively the grapevine operated.

Amateurs in Jogjakarta and Surabaja not only knew of the proposal but were watching the outcome with great interest. It became obvious to me that if successful, many other such exhibitions would be held the following year in other regions. If unsuccessful, it would be a bitter blow to the Amateur fraternity.

As promised I flew back from Bali and arrived in Bogor during the afternoon of 16th August. Things had not gone well and little had been done because no reply had been received from the Hall Committee up to 1800 hours on 16th.

When I told of the general interest shown, the President (Sofjan), Soedarsono and I went to see the organiser and space allocation committee. Valid reasons were given for no allocation, but by this time Sofjan was adamant and determined.

Things began to move. By 8 p.m. we had space, 9 p.m. we had tables and other Amateurs came to help. 10 p.m. we had display posters beautifully drawn, mostly in caricature by Atjo (Secretary). 11 p.m. we had the antenna erected—a half wave dipole on 3.5 MHz. At midnight we had gathered some components and equipment for display. After laying out where everything would go the next day, we all left the hall at 0100, all very tired but satisfied.

At 0700 on the 17th we again met at the hall and began organising power, display boards, literature to be printed and distributed to interested spectators, covering of tables, etc. By this time there were Amateurs everywhere, all doing their respective parts. I don't remember anyone having breakfast or lunch as it was a race against time—the exhibition was to be opened by the Governor at 1600 hours.

Somehow it was done and the result? One of the most colourful and most visited displays at the exhibition. Even the Governor made special mention at the opening.

It will carry on until 24th August and a timetable was drawn up always to have someone in attendance to take and answer the many numerous enquiries from people in all walks of life. The name given to the stand "Expo Orari" (Organisation of Radio Amateurs of the Republic of Indonesia) was very apt.

For me personally the whole operation had a deeper meaning. I was an Australian working in a foreign country—but in this case I was not accepted as a foreigner. I was an Amateur regardless of race, creed or colour and no special compensations were given. My hands got just as dirty as their's in trying to overcome the many problems that arose.

Late that night I said a temporary goodbye to all concerned because I was expected many miles away the following morning to begin my work. However, I shall always remember that day and a half at Bogor where I played a very small part and saw the true Amateur co-operative spirit at its very best.

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A TABLE OF DISTANCES BETWEEN AUSTRALASIAN V.H.F. LOCATIONS

DEREK BRUMLEY, VK3AVW*

It has long been felt that a table of distances between some of the most popular v.h.f. locations in Australasia would be very useful. Three applications come especially to mind:

(1) The compilation of field day and contest logs, where scoring is dependent on the distance covered;
(2) The planning of possible paths for attempts at distance records, and
(3) Calculation of path loss for scatter circuits.

Small distances may be obtained fairly accurately by reading directly off a map, but above a few hundred miles it becomes necessary to calculate the great circle distance between the points of interest. This is a long and tedious process if done manually, but fortunately it is well within the capabilities of the modern digital computer.

A programme has been developed which calculates the angle subtended at the earth's centre by any two points on the earth's surface, given their latitudes and longitudes. This is then multiplied by the earth's radius to give the required great circle distance.

The programme makes allowance for the difference between the polar and equatorial radii of the earth by using the latitudes of each pair of locations to calculate an "average" radius for each path. Although this is only a first order correction, it is sufficient for the present application. The accuracy of distances in the table is limited by that of the latitudes and longitudes which were taken to the nearest minute of arc.

Those within Victoria were obtained from survey maps; the rest were found from the "Times World Index". The computer calculates the distances to several significant figures, but rounds them off to the nearest integer before printing.

No apologies are offered for the choice of locations. It was hard enough to restrict the number to sixty, but any increase would have made the table prohibitively large.

The table appears on pages 14 and 15.

* 32 Faversham Rd., Canterbury, Vic., 3126.

This month there are no local Technical Articles.
WHY?

We have the Articles, but few Draughtsmen.

CAN YOU HELP US?

VK3 or Interstate aid welcome

John Moyle Memorial National Field Day Contest, 1972

SATURDAY, 12th FEBRUARY, TO SUNDAY, 13th FEBRUARY, 1972

The Federal Contest Committee of the Wireless Institute of Australia invites all Australian Amateurs and Short Wave Listeners to participate in this Annual Contest, which is held to perpetuate the memory of John Moyle, whose efforts advanced the Amateur Radio Service.

There are two divisions of this Contest, one of 24 hours continuous duration, and one of 6 hours continuous duration. The six-hour period has been included to encourage the operator who is unable to participate for the full 24-hour period. The 24-hour continuous operation is to be chosen by an operator from the 26-hour period.

An operator using 25 watts or less input to the final stage will be considered for a certificate where his activity warrants its issue.

DATE

From 0600 GMT, 12th February, 1972, to 0800 GMT, 13th February, 1972.

OBJECTS

The operators of Portable and Mobile Stations within all VK Call Areas will endeavour to contact other Portable/Mobile and Fixed Stations in VK Call Areas and Foreign Call Areas.

RULES

1. There are two divisions, one of six (6) hours, and one of twenty-four (24) hours duration. The six-hour period for operating may be chosen from any time during the Contest, but the six-hour period so chosen **must** be **continuous.** In each division, there are six sections:—
   - (a) Portable/Mobile Transmitting, Phone.
   - (b) Portable/Mobile Transmitting, C.w.
   - (c) Portable/Mobile Transmitting, Open.
   - (d) Portable/Mobile Transmitting, Multiple Operation, open only.
   - (e) Fixed Transmitting Stations working Portable/Mobile Stations, open only.
   - (f) Reception of Portable/Mobile Stations.

2. All Australian Amateurs are encouraged to take part. Operators will be limited to their licensed power. For Portable entries, power shall be derived from a self-contained and fully portable source.

(a) Portable/Mobile Stations shall not be situated in any occupied dwelling or building. Portable/Mobile Stations may be moved from place to place during the Contest.

No apparatus shall be set up on the site earlier than 24 hours prior to the Contest.

All Amateur bands may be used, but no cross band operating is permitted. Cross mode operation is permitted.

Entrants in Section (d) for Multiple Operator Stations can set up separate transmitters to work on different bands at the same time. All such units of a Multiple Operator Station must be located within an area that can be encompassed by a circle not greater than half a mile diameter.

For each transmitter of a Multiple Operator Station a separate log shall be kept with serial numbers starting from 001, and increasing by one for each successive contact. All logs of a Multiple Operator Station shall be submitted by the operator under whose Call Sign the transmitters are working. No two transmitters of a Multiple Operator Station are permitted to operate on the same band at any time.

3. Amateurs may enter for any section.

4. One contact per station for phone to phone, also one for c.w. to c.w. per band is permitted. Cross mode operation will be accepted for scoring.

5. Entrants must operate within the terms of their licences and in particular observe the regulations with regards to portable operation.

6. For VK stations contacting VK stations, the exchange of serial numbers consisting of RS or RST report plus three figures commencing with 001 and increasing by one for each successive contact by the VK station shall be proof of contact. **The exchange of RS or RST reports only with non-VK stations shall be sufficient proof of contact for this contest.**

7. **Scoring—**

(a) **Portable/Mobile Stations:**

For contacts with Portable/Mobile Stations outside entrant's Call Area .... **15 points**

For contacts with Portable/Mobile Stations within entrant's Call Area .... **10 points**

For contacts with Fixed Stations outside the entrant's Call Area .... **5 points**

For contacts with Fixed Stations within the entrant's Call Area .... **2 points**

(b) **Fixed Stations:**

For contacts with Portable/Mobile Statons outside entrant's Call Area .... **15 points**

For contacts with Portable/Mobile Stations within entrant's Call Area .... **10 points**

Operation via active repeaters or translators is not allowed for scoring purposes.

Example of Victorian S.w.l's Log

Date Time (GMT)	Band (mx)	Call Sign Heard	RST No. Sent	Station Worked	Pts. Clm.
13/2/72 GMT					
0600	80	VK2AAH/P	59001	VK3ATL/P	15
0610	80	VK3ATL/P	59006	VK5OV	10
0620	40	VK2AAH/P	599004	VK6VE/P	15
0640	20	VK3QV	59010	VK5QX/P	*
0755	20	VK4OF/P	59040	VK4OX/P	15

* No claim Fixed Station.

8. The following shall constitute Call Areas: VK1, VK2, VK3, VK4, VK5, VK6, VK7, VK8, VK9 and VK0.

9. All logs shall be set out under the following headings: Date/Time (G.M.T.), Band, Emission, Call Sign, RST/No. Sent, RST/No. Received, Points Claimed. Contacts must be listed in numerical order.

In addition, there shall be a front sheet showing the following information:—

Name..........................Address........................
Call Sign..................Section..........................
Division...................(6-hour or 24-hour)
Points Claimed..
Call Sign of other op./s (if any)...........
Location of Portable/Mobile Station.....
From.................hours to..................hours

A brief description of equipment used, and points claimed, followed by the declaration:

> "I hereby certify that I have operated in accordance with the rules and spirit of the Contest."
>
> Signed.................Date.................

10. The right is reserved to disqualify any entrant who, during the Contest, has not observed the Regulations and the Rules of this Contest, or who has consistently departed from the accepted code of operating ethics.

11. The decision of the Federal Contest Manager of the Wireless Institute of Australia is final and no disputes will be entertained.

12. Certificates will be awarded to the highest scorer of each section of each 6 or 24-hour division. Additional certificates may be issued at the discretion of the F.C.C. The 6-hour certificates cannot be won by a 24-hour entrant.

13. **Return of Logs**: All entries must be postmarked not later than **6th March, 1972**, and be clearly marked "**John Moyle Memorial National Field Day Contest, 1972**", and addressed to:

> **Federal Contest Manager, W.I.A.,**
> **Box 638, G.P.O.,**
> **Brisbane, Qld., 4001.**

Written comments are invited from all contestants.

RECEIVING SECTION

14. This section is open to all Short Wave Listeners in VK Call Areas. The Rules shall be the same as for the Transmitting Stations, but may omit the serial numbers received.

Logs must show the Call Sign of the Portable/Mobile Station heard, the serial number sent by it, and the Call Sign of the Station being worked.

Scoring will be on the same basis as for Transmitting Stations. It will not be sufficient to log a station calling CQ. A portable/mobile station may be logged once only for phone and once only for c.w. in each band.

Awards: A certificate will be awarded to the highest scorer of each of the 6-hour and the 24-hour divisions.

DISTANCES BETWEEN AUSTRALASIAN V.H.F. LOCATIONS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	—	26	136	361	131	235	511	223	137	326	150	308	116	333	290	297	330	290	404	399	253	368	286	446	247	174	762	599	749	1045
2	26	—	111	385	151	214	535	249	155	351	176	331	142	307	265	270	304	263	387	373	228	342	259	421	222	149	781	622	770	1055
3	136	111	—	472	237	115	626	353	230	449	284	415	251	198	154	173	201	161	299	265	152	240	159	311	148	39	839	705	843	1068
4	361	385	472	—	236	521	154	165	242	78	236	59	273	661	605	645	672	633	611	726	612	710	631	757	606	508	434	238	397	817
5	131	151	237	236	—	301	389	132	26	215	97	180	100	430	378	409	438	398	430	497	376	476	396	534	370	274	632	472	619	934
6	235	214	115	521	301	—	674	429	285	514	370	462	343	153	92	179	183	157	185	212	202	216	161	237	203	94	842	741	862	1019
7	511	535	626	154	389	674	—	299	396	192	375	213	414	815	759	799	826	787	755	881	763	864	785	911	757	662	353	105	280	794
8	223	249	353	165	132	429	299	—	153	107	77	133	116	551	501	520	552	512	561	617	476	590	508	659	469	391	598	395	560	958
9	137	155	230	242	26	285	396	153	—	229	122	185	124	420	365	403	430	391	408	486	374	468	389	520	369	266	626	475	618	916
10	326	351	449	78	215	514	192	107	229	—	184	90	223	645	592	620	650	610	626	711	579	689	607	748	573	487	506	290	459	896
11	150	176	284	236	97	370	375	77	122	184	—	194	39	482	435	447	481	440	517	548	400	518	436	593	393	322	663	471	632	1001
12	308	331	415	59	180	462	213	133	185	90	194	—	228	603	547	588	614	575	555	668	556	653	574	699	550	450	469	292	443	327
13	116	142	251	273	100	343	414	116	124	223	39	228	—	449	404	411	446	405	498	515	363	483	400	562	356	290	697	508	669	1025
14	333	307	198	661	430	153	815	551	420	645	482	603	449	—	60	80	49	64	252	67	146	68	73	118	153	160	995	888	1013	1158
15	290	265	154	605	378	92	759	501	365	592	435	547	404	60	—	105	96	82	214	122	154	125	90	158	158	116	935	830	954	1102
16	297	270	173	645	409	179	799	520	403	620	447	588	411	80	105	—	42	23	319	124	70	74	18	188	77	139	1005	878	1013	1198
17	330	304	201	672	438	183	826	552	430	650	481	614	446	49	96	42	—	41	300	83	111	38	46	147	119	164	1021	903	1034	1198
18	290	263	161	633	398	157	787	512	391	610	440	575	405	64	82	23	41	—	296	118	83	79	9	179	89	125	987	864	998	1176
19	404	387	299	611	430	185	755	561	408	626	517	555	498	252	214	319	300	296	—	272	366	315	304	247	369	279	847	802	892	933
20	399	373	265	726	497	212	881	617	486	711	548	668	515	67	122	124	83	118	272	—	194	64	125	66	201	226	1053	952	1074	1197
21	253	228	152	612	376	202	763	476	374	579	400	556	363	146	154	70	111	83	366	194	—	139	74	258	8	129	990	848	991	1211
22	368	342	240	710	476	216	864	590	468	689	518	653	483	68	125	74	38	79	315	64	139	—	83	130	147	202	1057	941	1071	1226
23	286	259	159	631	396	161	785	508	389	607	436	574	400	73	90	18	46	9	304	125	74	83	—	187	80	124	988	863	998	1181
24	446	421	311	757	534	237	911	659	520	748	593	699	562	118	158	188	147	179	247	66	258	130	187	—	265	272	1062	977	[illegible]	[illegible]
25	247	222	148	606	370	203	757	469	369	573	393	550	356	153	158	77	119	89	369	201	8	147	80	265	—	127	986	842	[illegible]	1210
26	174	149	39	508	274	94	662	391	266	487	322	450	290	160	116	139	164	125	279	226	129	202	124	272	127	—	868	740	874	1082
27	762	781	839	434	632	842	353	598	626	506	663	469	697	995	935	1005	1021	987	847	1053	990	1057	988	1062	986	868	—	257	121	472
28	599	622	705	238	472	741	105	395	475	290	471	292	508	888	830	878	903	864	802	952	848	941	863	977	842	740	257	—	175	715
29	749	770	843	397	619	862	280	560	618	459	632	443	669	1013	954	1013	1034	998	892	1074	991	1071	998	1091	986	874	121	175	—	590
30	1045	1055	1068	817	934	1019	794	958	916	896	1001	827	1025	1158	1102	1198	1198	1176	933	1197	1211	1226	1181	1180	1210	1082	472	715	590	—
31	570	593	675	210	442	711	89	369	445	266	444	262	481	857	799	848	872	834	771	921	818	910	833	946	813	709	264	31	195	713
32	978	994	1041	666	850	1027	588	828	840	740	890	697	922	1178	1118	1198	1209	1179	998	1231	1192	1243	1181	1231	1189	1065	236	488	325	324
33	641	664	744	281	513	777	151	440	515	336	515	333	553	924	866	917	941	903	829	988	888	979	902	1011	883	778	220	46	130	685
34	830	848	906	501	700	907	413	665	693	572	731	537	765	1059	999	1070	1086	1053	905	1116	1057	1121	1054	1124	1053	934	68	313	153	444
35	558	580	657	205	429	686	119	369	429	270	440	251	477	834	776	829	852	814	737	697	803	889	814	919	797	690	240	70	192	675
36	1122	1135	1167	840	999	1135	779	996	986	917	1052	863	1081	1282	1224	1312	1318	1291	1075	1328	1316	1349	1295	1318	1313	1187	427	684	527	204
37	596	576	475	818	636	362	960	768	615	834	720	763	698	345	343	424	389	407	208	321	489	384	416	260	495	445	1022	1001	1079	1033
38	472	448	341	742	535	238	892	665	517	745	608	684	581	189	195	269	233	252	164	167	335	228	261	112	341	306	1007	948	1048	1089
39	914	896	804	1066	927	689	1188	1054	903	1100	1020	1017	1004	688	683	767	732	750	510	662	832	725	759	598	838	778	1154	1205	1239	1013
40	513	488	377	810	593	292	962	720	577	806	657	752	627	191	223	262	221	252	256	139	332	201	261	74	339	340	1094	1024	1130	1182
41	496	471	360	802	580	281	954	707	566	795	642	743	611	169	207	237	196	229	264	113	307	174	237	51	314	322	1095	1018	1128	1194
42	556	535	434	787	600	322	931	732	579	800	682	731	660	304	301	383	349	365	176	283	447	345	375	224	453	403	1005	975	1058	1035
43	652	635	545	822	668	429	954	797	645	849	759	770	743	447	433	526	494	506	248	435	585	495	515	378	591	520	971	982	1040	934
44	483	465	373	685	510	258	826	641	488	703	597	630	578	292	268	367	341	346	80	296	422	349	354	253	427	349	898	869	950	946
45	588	568	466	813	629	354	955	761	608	828	713	757	691	338	334	415	380	398	202	312	480	375	407	252	486	436	1020	997	1076	1035
46	1760	1737	1630	1979	1808	1525	2110	1940	1787	2002	1891	1926	1867	1454	1480	1523	1481	1515	1379	1399	1592	1455	1523	1336	1600	1594	2081	2133	2169	1870
47	2224	2206	2112	2344	2233	1997	2445	2356	2208	2390	2327	2302	2313	1974	1981	2052	2013	2038	1820	1934	2120	1996	2047	1867	2127	2084	2305	2435	2415	1955
48	2063	2043	1942	2221	2086	1830	2334	2214	2062	2259	2177	2174	2160	1789	1803	1865	1824	1853	1661	1743	1934	1804	1862	1677	1941	1911	2234	2336	[illegible]	[illegible]
49	1582	1561	1459	1763	1613	1347	1885	1742	1590	1795	1701	1713	1682	1301	1317	1376	1335	1364	1184	1254	1446	1315	1373	1188	1453	1426	1826	1898	[illegible]	[illegible]
50	1924	1902	1798	2113	1959	1688	2235	2090	1937	2144	2047	2063	2026	1633	1652	1705	1664	1695	1530	1582	1775	1641	1704	1517	1783	1764	2170	2248	2266	1910
51	434	412	348	795	563	384	944	648	564	755	571	742	533	265	309	206	217	229	517	262	196	205	223	321	200	325	1185	1033	1181	1402
52	434	411	352	794	563	394	941	645	565	752	568	741	529	280	321	217	231	241	531	279	202	221	234	339	205	331	1188	1032	1182	1411
53	535	516	472	889	665	524	1031	732	671	839	656	839	617	411	453	349	363	372	663	407	326	351	366	463	328	455	1296	1126	1282	1537
54	437	417	369	794	567	422	939	641	571	748	564	744	526	318	356	251	270	274	568	323	224	263	267	384	225	352	1197	1032	1186	1434
55	1217	1211	1158	1192	1167	1055	1253	1260	1141	1255	1262	1166	1264	1127	1096	1199	1175	1176	882	1128	1247	1183	1185	1077	1251	1148	1051	1219	1167	688
56	1959	1958	1925	1835	1881	1833	1843	1946	1858	1910	1968	1828	1981	1922	1885	1990	1970	1967	1671	1929	2032	1982	1975	1881	2034	1922	1536	1773	1654	1064
57	1434	1450	1545	1397	1440	1660	1366	1331	1466	1331	1344	1420	1352	1696	1681	1623	1664	1633	1837	1746	1553	1688	1625	1811	1546	1575	1679	1434	1566	2148
58	1375	1384	1455	1461	1425	1569	1480	1347	1450	1384	1332	1464	1328	1561	1563	1482	1520	1498	1754	1597	1416	1534	1489	1664	1410	1475	1827	1571	1730	2271
59	1333	1339	1398	1467	1399	1508	1507	1337	1423	1389	1312	1463	1300	1482	1491	1403	1438	1421	1692	1511	1340	1448	1412	1577	1334	1413	1859	1603	1770	2284
60	1447	1459	1540	1487	1481	1655	1486	1390	1506	1413	1385	1498	1385	1664	1660	1586	1625	1600	1839	1705	1518	1643	1591	1771	1511	1564	1823	1569	1719	2280
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

Area	KEY	Place	Lat. °S.	Long. °E.
VK1	1	Canberra	35.300	149.133
	2	Mt. Ginini	35.534	148.767
VK2	3	Albury	36.083	146.917
	4	Armidale	30.533	151.667
	5	Bathurst	33.450	149.583
	6	Deniliquin	35.550	144.967
	7	Lismore	28.800	153.283
	8	Newcastle	32.917	151.767
	9	Orange	33.317	149.167
	10	Pt. Macquarie	31.467	152.417
VK2	11	Sydney	33.917	151.167
	12	Tamworth	31.117	150.950
	13	Wollongong	34.417	150.867
VK3	14	Ballarat	37.567	143.850
	15	Bendigo	36.767	144.282
	16	Frankston	38.133	145.117
	17	Geelong	38.150	144.350
	18	Melbourne	37.817	144.967
	19	Mildura	34.200	142.150
	20	Mortlake	38.100	142.833
VK3	21	Morwell	38.233	146.391
	22	Mt. Cowley	38.548	143.857
	23	Mt. Waverley	37.880	145.118
	24	Tahara	37.750	141.700
	25	Traralgon	38.200	146.533
	16	Wangaratta	36.367	146.317
VK4	27	Biloela	24.350	150.500
	28	Brisbane	27.300	153.000
	29	Bundaberg	24.833	152.350
	30	Hughenden	20.833	144.167

DISTANCES BETWEEN AUSTRALASIAN V.H.F. LOCATIONS

	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
1	570	978	641	830	558	1122	596	472	914	513	496	556	652	483	588	1760	2224	2063	1582	1924	434	434	535	437	1217	1959	1434	1375	1333	1447
2	593	994	664	848	580	1135	576	448	896	488	471	535	635	465	568	1737	2206	2043	1561	1902	412	411	516	417	1211	1958	1450	1384	1339	1453
3	675	1041	744	906	657	1167	475	341	804	377	360	434	545	373	466	1630	2112	1942	1459	1798	348	352	472	369	1158	1925	1545	1455	1398	1540
4	210	666	281	501	205	840	818	742	1066	810	802	787	822	685	813	1979	2344	2221	1763	2113	795	794	889	794	1192	1835	1397	1461	1467	1487
5	442	850	513	700	429	999	636	535	927	593	580	600	668	510	629	1808	2233	2086	1613	1959	563	563	665	567	1167	1881	1440	1425	1399	1481
6	711	1027	777	907	686	1135	362	238	689	292	281	322	429	258	354	1525	1997	1830	1347	1688	384	394	524	422	1055	1833	1660	1569	1508	1655
7	89	588	151	413	119	779	960	892	1188	962	954	931	954	826	955	2110	2445	2334	1885	2235	944	941	1031	939	1253	1843	1366	1480	1507	1436
8	369	828	440	665	369	996	768	665	1054	720	707	732	797	641	761	1940	2356	2214	1742	2090	648	645	732	641	1260	1946	1331	1347	1337	1390
9	445	840	515	693	429	986	615	517	903	577	566	579	645	488	608	1787	2208	2062	1590	1937	564	565	671	571	1141	1858	1466	1450	1423	1506
10	266	740	336	572	270	917	834	745	1100	806	795	800	849	703	828	2002	2390	2259	1795	2144	755	752	839	748	1255	1910	1331	1384	1389	1413
11	444	890	515	731	440	1052	720	608	1020	657	642	682	759	597	713	1891	2327	2177	1701	2047	571	568	656	564	1262	1968	1344	1332	1312	1385
12	262	697	333	537	251	863	763	684	1017	752	743	731	770	630	757	1926	2302	2174	1713	2063	742	741	839	744	1166	1828	1420	1464	1463	1498
13	481	922	553	765	477	1081	698	581	1004	627	611	660	743	578	691	1867	2313	2160	1682	2026	533	529	617	526	1264	1981	1352	1326	1300	1385
14	857	1178	924	1059	834	1282	345	189	688	191	169	304	447	292	336	1454	1974	1789	1301	1633	265	280	411	318	1127	1922	1696	1561	1482	1664
15	799	1118	866	999	776	1224	343	195	683	223	207	301	433	268	334	1480	1981	1803	1317	1652	309	321	453	356	1096	1885	1681	1563	1491	1660
16	848	1198	917	1070	829	1312	424	269	767	262	237	383	526	367	415	1523	2052	1865	1376	1705	206	217	349	251	1199	1990	1623	1482	1403	1586
17	872	1209	941	1086	852	1318	389	233	732	221	196	349	494	341	380	1481	2013	1824	1335	1664	217	231	363	270	1175	1970	1664	1520	1438	1625
18	834	1179	903	1053	814	1291	407	252	750	252	229	365	506	346	398	1515	2038	1853	1364	1695	229	241	372	274	1176	1967	1633	1498	1421	1600
19	771	998	829	905	737	1075	208	164	510	256	264	176	248	80	202	1379	1820	1661	1184	1530	517	531	663	568	882	1671	1837	1754	1692	1839
20	921	1231	988	1116	897	1328	321	167	662	139	113	283	435	296	312	1399	1934	1743	1254	1582	262	279	407	323	1128	1929	1746	1597	1511	1705
21	818	1192	888	1057	803	1316	489	335	832	332	307	447	585	422	480	1592	2120	1934	1446	1775	196	202	326	224	1247	2032	1553	1416	1340	1518
22	910	1243	979	1121	889	1349	384	228	725	201	174	345	495	349	375	1455	1996	1804	1315	1641	205	221	351	263	1183	1982	1688	1534	1448	1643
23	833	1181	902	1054	814	1295	416	261	759	261	237	375	515	354	407	1523	2047	1862	1373	1704	223	234	366	267	1185	1975	1625	1489	1412	1591
24	946	1231	1011	1124	919	1318	260	112	598	74	51	224	378	253	252	1336	1867	1677	1188	1517	321	339	463	384	1077	1881	1811	1664	1577	1771
25	813	1189	883	1053	797	1313	495	341	838	339	314	453	591	427	486	1600	2127	1941	1453	1783	200	205	328	225	1251	2034	1546	1410	1334	1511
26	709	1065	778	934	690	1187	445	306	778	340	322	403	520	349	436	1594	2084	1911	1426	1764	325	331	455	352	1148	1922	1575	1475	1413	1564
27	264	236	220	68	240	427	1022	1007	1154	1094	1095	1005	971	898	1020	2081	2305	2234	1826	2170	1185	1188	1296	1197	1051	1536	1679	1827	1859	1823
28	31	488	46	313	70	684	1001	948	1205	1024	1018	975	982	869	997	2133	2435	2336	1898	2248	1033	1032	1126	1032	1219	1773	1434	1571	1603	1569
29	195	325	130	153	192	527	1079	1048	1239	1130	1128	1058	1040	950	1076	2169	2415	2337	1920	2266	1181	1182	1282	1186	1167	1654	1566	1730	1770	1719
30	713	324	685	444	675	204	1033	1089	1013	1182	1194	1035	934	946	1035	1870	1955	1931	1589	1910	1402	1411	1537	1434	688	1064	2148	2271	2284	2280
31	—	499	71	324	47	691	971	917	1177	993	987	945	953	838	967	2105	2412	2312	1872	2222	1004	1003	1098	1004	1202	1768	1439	1566	1595	1568
32	499	—	447	176	476	204	1148	1162	1217	1253	1258	1139	1076	1036	1148	2121	2263	2222	1850	2184	1389	1393	1507	1406	993	1362	1884	2055	2091	2043
33	71	447	—	272	92	645	1026	978	1219	1056	1051	1002	1002	894	1022	2149	2436	2343	1910	2259	1075	1074	1169	1075	1211	1747	1463	1609	1644	1603
34	324	176	272	—	304	375	1075	1066	1193	1154	1156	1060	1019	953	1073	2116	2318	2255	1856	2198	1252	1255	1364	1264	1057	1506	1719	1880	1916	1871
35	47	476	92	304	—	663	935	886	1134	964	959	910	913	803	931	2063	2366	2266	1828	2178	992	991	1090	995	1155	1727	1481	1599	1623	1605
36	691	204	645	375	663	—	1198	1236	1208	1330	1339	1195	1108	1099	1199	2074	2149	2132	1794	2114	1511	1518	1639	1536	888	1168	2088	2254	2285	2245
37	971	1148	1026	1075	935	1198	—	156	343	209	236	42	126	133	9	1172	1639	1468	985	1328	581	599	722	644	828	1636	2019	1905	1827	2003
38	917	1162	978	1066	886	1236	156	—	499	93	107	116	268	148	147	1289	1788	1608	1121	1458	429	446	572	490	965	1770	1877	1750	1671	1051
39	1177	1217	1219	1193	1134	1208	343	499	—	535	564	384	262	432	352	931	1310	1160	697	1047	916	935	1053	981	582	1378	2347	2247	2170	2341
40	993	1253	1056	1154	964	1330	209	93	535	—	29	179	333	238	201	1263	1795	1604	1115	1443	381	400	518	446	1036	1843	1885	1735	1645	1844
41	987	1258	1051	1156	959	1339	236	107	564	29	—	203	358	255	227	1286	1823	1630	1141	1469	352	371	490	418	1061	1868	1860	1707	1617	1817
42	945	1139	1002	1060	910	1195	42	116	384	179	203	—	155	108	33	1209	1681	1509	1026	1367	544	561	686	606	857	1665	1978	1863	1786	1961
43	953	1076	1002	1019	913	1108	126	268	262	333	358	155	—	171	133	1157	1572	1418	946	1294	697	714	840	757	703	1511	2085	1994	1924	2084
44	838	1036	894	953	803	1099	133	148	432	238	255	108	171	—	129	1300	1742	1581	1104	1450	554	569	700	610	835	1633	1915	1824	1757	1913
45	967	1148	1022	1073	931	1199	9	147	352	201	227	33	133	129	—	1179	1648	1476	993	1336	572	590	714	635	835	1643	2011	1896	1818	1994
46	2105	2121	2149	2116	2063	2074	1172	1289	931	1263	1286	1209	1157	1300	1179	—	741	466	291	239	1577	1596	1665	1642	1235	1756	3141	2939	2817	3071
47	2412	2263	2436	2318	2366	2149	1639	1788	1310	1795	1823	1681	1572	1742	1648	741	—	279	707	508	2159	2179	2273	2226	1270	1406	3657	3529	3431	3638
48	2312	2222	2343	2255	2266	2132	1468	1608	1160	1604	1630	1509	1418	1581	1476	466	279	—	489	230	1953	1972	2058	2020	1245	1540	3484	3327	3219	3445
49	1872	1850	1910	1856	1828	1794	985	1121	697	1115	1141	1026	946	1104	993	291	707	489	—	350	1465	1484	1572	1532	945	1487	2997	2838	2733	2956
50	2222	2184	2259	2198	2178	2114	1328	1458	1047	1443	1469	1367	1294	1450	1336	239	508	230	350	—	1777	1796	1873	1843	1241	1654	3328	3147	3031	3273
51	1004	1389	1075	1252	992	1511	581	429	916	381	352	544	697	554	572	1577	2159	1953	1465	1777	—	20	146	67	1388	2186	1571	1373	1273	1496
52	1003	1393	1074	1255	991	1518	599	446	935	400	371	561	714	569	590	1596	2179	1972	1484	1796	20	—	132	48	1404	2201	1553	1354	1253	1477
53	1098	1507	1169	1364	1090	1639	722	572	1053	518	490	686	840	700	714	1665	2273	2058	1572	1873	146	132	—	103	1534	2332	1508	1274	1161	1409
54	1004	1406	1075	1264	995	1536	644	490	981	446	418	606	757	610	635	1642	2226	2020	1532	1843	67	48	103	—	1445	2239	1509	1307	1205	1431
55	1202	993	1211	1057	1155	888	828	965	582	1036	1061	857	703	835	835	1235	1270	1245	945	1241	1388	1404	1534	1445	—	809	2586	2589	2550	2647
56	1768	1362	1747	1506	1727	1168	1636	1770	1378	1843	1868	1665	1511	1633	1643	1756	1406	1540	1487	1654	2186	2201	2332	2239	809	—	3207	3292	3280	3321
57	1439	1884	1463	1719	1481	2088	2019	1877	2347	1885	1860	1978	2085	1915	2011	3141	3657	3484	2997	3328	1571	1553	1508	1509	2586	3207	—	472	658	302
58	1566	2055	1609	1880	1599	2254	1905	1750	2247	1735	1707	1863	1994	1824	1896	2939	3529	3327	2838	3147	1373	1354	1274	1307	2589	3292	472	—	192	190
59	1595	2091	1644	1916	1623	2285	1827	1671	2170	1645	1617	1786	1924	1757	1918	2817	3431	3219	2733	3031	1273	1253	1161	1205	2550	3280	658	192	—	383
60	1568	2043	1603	1871	1605	2245	2003	1851	2341	1844	1817	1961	2084	1913	1994	3071	3638	3445	2956	3273	1496	1477	1409	1431	2647	3321	302	190	383	—
	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60

Area	KEY	Place	Lat. °S.	Long. °E.
VK4	31	Ipswich	27.633	152.667
	32	Mackay	21.167	149.167
	33	Nambour	26.633	152.950
	34	Rockhampton	23.367	150.533
	35	Toowoomba	27.583	151.900
	36	Townsville	19.217	146.800
VK5	37	Adelaide	34.933	138.600
	38	Bordertown	36.300	140.817
	39	Ceduna	32.117	133.700
	40	Millicent	37.600	140.367
VK5	41	Mt. Gambier	37.850	140.783
	42	Murray Bridge	35.167	139.283
	43	Port Pirie	33.183	138.017
	44	Renmark	34.167	140.750
	45	Stirling	35.006	138.734
VK6	46	Albany	34.950	117.900
	47	Carnarvon	24.850	113.750
	48	Geraldton	28.817	114.600
	49	Norseman	32.250	121.783
	50	Perth	31.967	115.817
VK7	51	Burnie	41.050	145.917
	52	Devonport	41.150	146.267
	53	Hobart	42.900	147.300
	54	Launceston	41.417	147.117
VK8	55	Alice Springs	23.700	133.867
	56	Darwin	12.383	130.733
ZL	57	Auckland	36.917	174.783
	58	Christchurch	43.550	172.667
	59	Dunedin	45.867	170.500
	60	Wellington	41.283	174.783

QUEENSLAND WINS R.D.

Yes, VK4, with VK9's help, has won the R.D. Contest for 1971 by a substantial margin in a very friendly contest. Congratulations to the winners and thanks to all who participated. I hope everyone enjoyed themselves.

With few exceptions, all the high scoring logs were credits to the compilers. My real admiration and thanks for jobs well done. (Who had the typist on R.D. logs?) I would like you to see how well some of these logs were set out. There were duplications, but invariably there were a few points counted low to make up.

To ensure that VK4 does not capture the trophy during 1972, and for other reasons, I would appreciate you analysing the results and considering them carefully.

You will note that compared to last year, ref. "A.R." Nov. 1970, we are not holding our own. This is not good because the Institute is moving forward quite steadily and successfully. Why have we not advanced with the R.D. Contest? Looking further, note the high participation level of VK7 + VK0. Even by adding a high average top six logs VK7 + VK0 would not have won this year. They needed more State points.

VK5 + VK8 and VK6 + VK9 would doubtless be around the top with a higher participation level as their average points per log is above VK4.

VK2 put up a good show, but together with VK3, seems to have the problem of participation. Why can't these States have a higher level?

There are some interesting solutions to **your** problem.

Most States seem to have their own form of log which goes out with their bulletin. This helps, but, as VK4 has found, is not sufficient. There must be a drive to get operators in the contest. VK4's success of the last two years has been assisted by the activities of Northern W.I.A. members.

I hope that after considering these results, **you** do something about making your State a winner next year.

Tight contests make my task much more difficult, but I don't mind as long as we go ahead. Let your Federal Councillor have your ideas on a better contest—he is interested.

I have some thoughts on contest closing dates and may apply them next year.

A few contestants should look closely at contest rule 6 and P.M.G. regulations (82).

Congratulations to the listeners who submitted some fine logs.

Thanks to those ops. who put in a little note telling how they enjoyed the contest and offering suggestions of improvement.

I noted a full c.w. listeners' log from Eric Trebilcock. Trevor VK2NS put in his log as a token to his late friend Ray who went "Silent Key" just before the contest started. We hope that there will be more on c.w. next year, Trevor. Murray VK4KX was also disappointed there were not more c.w. ops. Others hoped for a better ZL participation next year. As our contest details to ZL were a little late this year, I am sure that there will be more ZLs next year.

Thanks for reading so far. I won't hold you up any longer as I suppose you want to get ready for the Ross Hull and John Moyle contests.

Peter VK4PJ, Federal Contest Manager.

DETAILS OF DIVISIONAL SCORES

Division	Logs	Licensees	% Participation	Average Top Six Logs	State Points	State Score
VK2+1+9	141	2,162	6.5	984	31,165	3,014
VK3	75	1,971	3.8	817	21,689	1,642
VK4+9	124	809	14.9	1,150	30,944	5,886
VK5+8	86	802	10.7	1,245	28,950	4,341
VK6+9	60	512	11.5	1,288	16,876	3,268
VK7+0	61	243	25	730	10,603	3,389

AUSTRALIAN CAPITAL TERRITORY

Phone

	Points		Points		Points
VK1BC	978	VK1FT	273	VK1CG	136
1JL	570	1MP	184	1LF	73
1ZT	324	1AN	140	1LN	19

Open

	Points		Points		Points
VK1AOP	787	VK1DA	517	VK1YR	66
1VK	704	1EP	287		

C.W.

Nil

Receiving

Nil

NEW SOUTH WALES

Phone

	Points		Points		Points
VK2BEC	988	VK2NF	188	VK2SW	63
2OO	963	2AGZ	186	2ZZX	63
2BNS	941	2BAZ	170	2SG	61
2DM	895	2AYF	166	2TS	57
2XT	851	2BZ	159	2ADD	54
2AJY	778	2APP	159	2YS	52
2BGF	777	2ABC	156	2ADL	48
2VG	583	2DQ	151	2AXI	45
2ATT	571	2PN	150	2JF	42
2AGF	566	2BDB	149	2AAB	42
2JP	508	2AXJ	146	2CU	40
2BWJ	491	2AFA	141	2CW	40
2RX	482	2RU	132	2ACZ	40
2AVJ	480	2AKR	126	2AAW	39
2AAC	460	2AJL	119	2ZP	38
2CS	458	2BKG	117	2AEC	37
2BMM/P2	447	2YN	113	2IK	36
2AWN	439	2LH	112	2AQ	33
2AIM	395	2ASJ	111	2ZF	31
2BDN	371	2AOX	102	2AVT	28
2OH	370	2BMD	102	2AKX	27
2BNK	336	2CK	101	2AWX/P2	21
2AUQ	323	2AHH	97	2ZWG	20
2AIA	319	2BRU	97	2LA	17
2QC	300	2AKY	90	2BJO/P	16
2ADA	275	2BMX	90	2EY	14
2GV	218	2AMA	86	2FJ	13
2AKQ	211	2XD	85	2HX	8
2PF	205	2BJT	76	2ZTM	8
2AHP	204	2BKM	76	2ZTP	7
2APQ	203	2CF	73	2ZUT	6
2UJ	194	2GN	63	2ZWC	6

Open

	Points		Points		Points
VK2BO	1139	VK2AJQ	268	VK2RJ	67
2DO	361	2AV	140	2AU	42
2BLK	321	2AHM	82	2PP	12
2PU	298	2HZ	74		

C.W.

	Points		Points		Points
VK2NS	504	VK2YB	136	VK2AXK	56
2GR	401	2ZO	82	2BHO	51
2BF	317	2AMB	80	2XQ	45
2VN	249	2ZC	77	2IV	40
2GT	184	2BRK	74	2XJ	37
2QL	161	2JY	62	2AWI/P	11
2HW	143	2PQ	58		

Receiving

M. J. Rodden	856	Points
J. H. Hillard, L2074	639	"
G. Rossam	605	"
P. J. Vernon, L2259	546	"
Belmore Youth Radio Club	533	"
C. Ferguson, L2046	353	"
D. W. Shephard	139	"
W. Newport	70	"

VICTORIA

Phone

	Points		Points		Points
VK3VK	1032	VK3YQ	419	VK3PR	150
3DF	972	3AUN	414	3AAM	131
3SM	856	3ASO	396	3AIS	106
3AXV	686	3BER	324	3AOW	99
3WW	680	3ZJ	284	3ZD	85
3ADW	679	3HE	264	3ACA	69
3AMO	664	3BFN	254	3AJP	67
3APS	586	3AXJ	253	3BRB	62
3CIF	583	3AJX	246	3DY	61
3JI	579	3AXM	237	3BCH	51
3AYL	570	3ZT	227	3AGH	35
3AYF	541	3CDX	212	3WM	32
3AKR	521	3RN	210	3BCZ	23
3EF	514	3LV	204	3AHL	22
3KI	511	3BAM	196	3KS	19
3AMT	506	3HZ	174	3ARA	17
3QP	499	3KR	168	3ABP	11
3BJB	464	3AXQ	160	3ZPN	11
3AIH	424			3ANM	6

Open

	Points		Points		Points
VK3BCF	560	VK3YC	363	VK3EZ	89
3QV	499	3DG	210	3ARV	88
3BDE	437	3AOT	121	3BDL	25

C.W.

	Points		Points		Points
VK3XB	455	VK3XY	218	VK3TX	102
3KX	418	3RJ	145	3APN	102
3ZO	236			3ZM	55

Receiving

St. John's College	1330	Points
G. Latch, L3460	785	"
E. Trebilcock, L3042	248	"
R. Ward, L3458	155	"
D. M. Harrison, ISWL13440	27	"

QUEENSLAND

Phone

	Points		Points		Points
VK4XY	1198	VK4NB	216	VK4GT	42
4EQ	1182	4VX	212	4JW	42
4ZQ	1162	4HB	180	4JJ	41
4PX	985	4EJ	171	4QS	36
4NY	878	4SR	167	4TT	36
4LT	865	4XV	158	4XN	36
4NP	804	4MJ	157	4XZ	35
4DO	802	4CZ	155	4ZMJ	35
4LE	723	4QF	154	4MU	33
4DJ	679	4RJ	150	4LO	31
4PP	669	4RF	149	4ZLC	31
4KH	649	4LZ	141	4PV/P	30
4TN	580	4BG	139	4CW	28
4QA	566	4ZP	137	4GS	23
4IE	562	4GI	132	4RG	22
4DZ	516	4NS	115	4NV	20
4OW	495	4FE	114	4SF	17
4EZ	484	4LP	113	4ZBH	16
4YL	451	4QT	108	4EV	15
4PS	427	4VS	108	4NZ	15
4FU	392	4FN	98	4BQ	13
4NQ	385	4XJ/M	96	4KS	12
4IO	382	4FP	82	4NG	11
4JM	355	4OR	80	4ZDG	11
4CP	350	4DV	73	4ZEA	11
4EB	349	4RO	73	4ZRG	11
4FX	344	4TK	73	4ZTL	11
4GG	338	4EF	70	4ZJO	8
4PJ	332	4EH	67	4ZTK	8
4YM	295	4HA	60	4KB	7
4ZJ	291	4HZ	59	4ZAM	6
4QD/T	279	4SO	57	4ZFA	6
4CI	270	4BM	54	4ZRL	6
4HJ	231	4UC	52	4ZHS	5

Open

	Points		Points		Points
VK4II	940	VK4WR	423	VK4GP	129
4FK	536	4UA	299	4GH	34
		4XX	184		

C.W.

	Points		Points		Points
VK4KX	301	VK4VR	99	VK4KK	27
4XW	237	4HH	98	4FT	24
4KI	128	4CA	34	4ON	7

Receiving

G. Lee-Manwar	1043	Points
K. Cunningham, L4104	750	"
P. Whiteway	167	"

SOUTH AUSTRALIA

Phone

	Points		Points		Points
VK5QX	1396	VK5RR	422	VK5LC	82
5NB	1286	5VT	406	5WR	79
5FT	1201	5VB	345	5LQ	78
5ZZ	1058	5AS	293	5RI	76
5BW	978	5CY	290	5FL	75
5NM	940	5ZU	286	5DO	67
5JR	924	5PH	251	5ZS	58
5UJ	823	5WN	227	5GZ	49
5LP	817	5EK	216	5OT	44
5EF	791	5FD	211	5LW	40
5GM	786	5MC	211	5ZKK	39
5DK	769	5CL	205	5ZQ	34
5NN	754	5CA	198	5DF	31
5UC	752	5DV	184	5SS	22
5ST	712	5MA	166	5ZFJ	20
5WV	620	5GF	127	5ZLZ	20
5EN	565	5NJ	111	5ZZX	19
5AX	489	5GV	103	5ZWW	17
5QV	470	5UF	101	5ZDX	12
5ZB	451	5TY	88	5CJ	5
		5TU	83		

Open

	Points		Points		Points
VK5RG	1316	VK5EJ	796	VK5FY	123
5BI	1015	5FM	415	5WI	84
5IF	975	5HM	186	5TL	60

C.W.

	Points		Points		Points
VK5MY	306	VK5ZX	139	VK5KU	53
5LD	162	5MZ	103	5RK	30
5OR	149	5BS	101	5HO	6
		5AU	63		

Receiving

C. H. Hannaford, L5096	1253	Points
B. C. Chammem, SWL5118	881	"
I. R. Kirk, L5145	809	"
Jim, L5083	678	"
D. A. Vale, L5132	625	"
J. Elliot, L5138	510	"
R. G. Edmeades, SWL5122	349	"
L. M. Earl, SWL5113	142	"

WESTERN AUSTRALIA

Phone

	Points		Points		Points
VK6CT	1575	VK6KL	161	VK6DE	31
6ZK	1420	6LG	155	6HT	23
6LK	1048	6GB	136	6DC/HU	20
6KW	957	6WL	98	6BO	18
6DA	907	6WY	91	6XW	16
6AO	747	6AWI	80	6ZFF	16
6JY	517	6LO	71	6OR	11
6TX	494	6DC	57	6PX	10
6JK	454	6SH/P	52	6AT	8
6AJ	380	6NA	51	6GQ	6
6FI	279	6BY	50	6ZDK	6
6DD	277	6TU/P	47	6ZAQ	5
6CW	232	6WD	46	6ZBT	5
6LM	205	6JA	41	6ZER	5
		6WB	39		

Open

	Points		Points		Points
VK6RU	1467	VK6HD	555	VK6CR	30
6MA	1265	6WA	257	6LC	15
6AI	563	6EZ	52		

C.W.

	Points		Points		Points
VK6WT	339	VK6EU	141	VK6DW	25
6BQ	324	6PY	101		

Receiving

Bradshaw, L6110	739	Points
M. Bosma, L6112	583	"
A. Wallace, L6087	496	"

TASMANIA

Phone

	Points		Points		Points
VK7JV	1013	VK7PS	123	VK7MK	22
7FM	748	7AB	85	7AX	21
7RR	591	7IL	84	7NZ	20
7AK/P	457	7VK	80	7RX	19
7RC	397	7EJ	73	7ZJG	16
7MS	344	7PF	73	7MR	14
7UX/P	266	7SF	70	7ZGJ	13
7LS	262	7GW	57	7BQ	10
7BM	213	7MT	57	7ZAS	10
7MX	201	7TR	50	7KH/P	7
7KK	185	7RM	32	7ZNR	7
7TB	139	7ZIF	29	1ZPB/7	7
7BJ	123	7CF	24	7ZWX	7
		7ZWK	24		

Open

	Points		Points		Points
VK7KJ	1127	VK7AL	239	VK3SL/7	54
7KB	447	7FB	216	7LZ	45
7ZZ	279	7GK	182	7KS	12
		7MZ	139		

C.W.

	Points		Points		Points
VK7CH	326	VK7RY	103	VK7JB	18
7LJ	255	7OM	77	7YL	8
		7GB	46		

Receiving

R. Mutton	1099	Points
M. J. Fox	1027	"
R. J. Everett, L7043	768	"
B. Livingston, L7049	535	"
I. Ellings, L7038	380	"

NORTHERN TERRITORY

Phone

VK8DI	584 Pts.
8ZQ	75 "
8AJ	63 "
8JS	28 "

Open

Nil

C.W.

VK8HA 145 Pts.

TERRITORIES—VK9

To VK4—

Phone

VK9WD	1344 Pts.
9BK	1029 "
9KA	577 "
9GA	339 "
9RY	164 "
9BS	41 "

Open

Nil

C.W.

Nil

To VK6—

Phone

VK9DR	689 Pts.
9XX	596 "
9XK	114 "

Open

VK9XI 328 Pts.

C.W.

Nil

ANTARCTICA

Phone

VK0MX	348 Pts.
0JM	205 "
0IN	132 "

Open

VK0CC 372 Pts.

C.W.

Nil

LATE LOGS

VKs 6BE, 6RD, 6SR, 6VE, 6XY, 6ZCD, 9DM; S.w.l. L. Berloth.

CHECK LOGS

VKs 3ET, 3ABS, 4RC, 4TC.

NEW ZEALAND

Phone

ZL1AKY	731 Pts.
1AAS	725 "
1ACL	531 "
1ARO	384 "
1AGO	380 "
2AH	681 "
2ACP	492 "
2GJ	438 "
3FM	237 "

Open

ZL1BN	750 Pts.
1OB	91 "
3ABC	427 "
4CA	475 "

C.W.

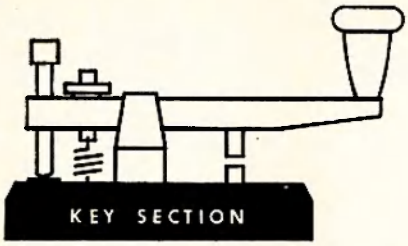
Nil

Receiving

ZL149 639 Pts.

Check Logs: ZL1CK, ZL2AWH, and ZL4KB.

Some Kiwi comments: "Look forward to next year's contest." "Got a big kick out of it, as did all the ZLs I spoke to, and will be in boots and all next year." ". . . in the future we will see more ZLs taking part . . ." "A good contest . . . Very friendly atmosphere throughout the test—a change from the rat-race."



The Wireless Institute of Australia is pleased to invite Australian Amateurs to become members of the Key Section. The aims of the Key Section and qualifications for membership are as follows:

1. The Key Section of the W.I.A. is an association of Australian Amateurs interested in the use of Morse for communication.

2. Membership is open to any Amateur who holds a VK call sign; other interested persons may be admitted as associates.

3. Amateurs may become members by applying to the Key Section; applicants may be asked to provide proof that they satisfy the conditions for membership.

4. For the purpose of assessing membership of the Key Section, the following conditions define a contact with another Amateur station:

(1) The communication must be by A1 or A2 mode by both stations.

(2) The contact must last at least 15 min.

(3) The speed of sending is not a condition of these rules.

(4) Contacts made during contests are not admissible.

(5) Contacts made before 1st January, 1971, are not admissible.

(6) Any one call sign may be used only once in assessing scores.

5. Membership is open to Amateurs who communicate at least 50 points by the rules of paragraph 6, at least 25 of which must arise from contacts with other VK stations.

6. Points are obtained as follows:

(1) A contact as defined in paragraph 4 counts one point.

(2) If one station in the contact is operating 52 MHz. or above, the contact counts two points; if both stations are operating 52 MHz. or above the contact counts four points.

7. All applications for membership of the Key Section should be sent to: Federal Manager, Key Section, W.I.A., P.O. Box 67, East Melbourne, Vic., 3002. The consideration of applications for membership will be undertaken by Divisional Co-ordinators, who are appointed by Divisional Councils, or their nominated deputies. In the event of dispute, the ruling of the Federal Manager will be final.

8. A certificate of membership will be issued.

New members of the Key Section will be listed from time to time in "A.R." It is planned to offer associate membership to overseas Amateurs, and perhaps also to S.w.l's. These schemes, and others, will be made known when our numbers have grown. I look forward to hearing from you! 73, Deane VK3TX.

STOLEN

From the house garage of VK3BDD, D. Vlassopoulos, 2 Sandgate Ave., Glen Waverley, Vic., 3150 (phone 232-3469) about July were the following:

Iuoue IC700T Tx, IC700R Rx, IC700P p.s.u., home-brew linear 1kw. in., digital freq. meter, home-brew nearly complete, Lafayette v.o.m. and t.v. rejuvenator, Philips r.f. f.m. generator, home-brew audio generator.

The matter is under police investigation. If anybody is offered any item from the above list or has any useful knowledge concerning them, please contact the police or the operator concerned.

☆

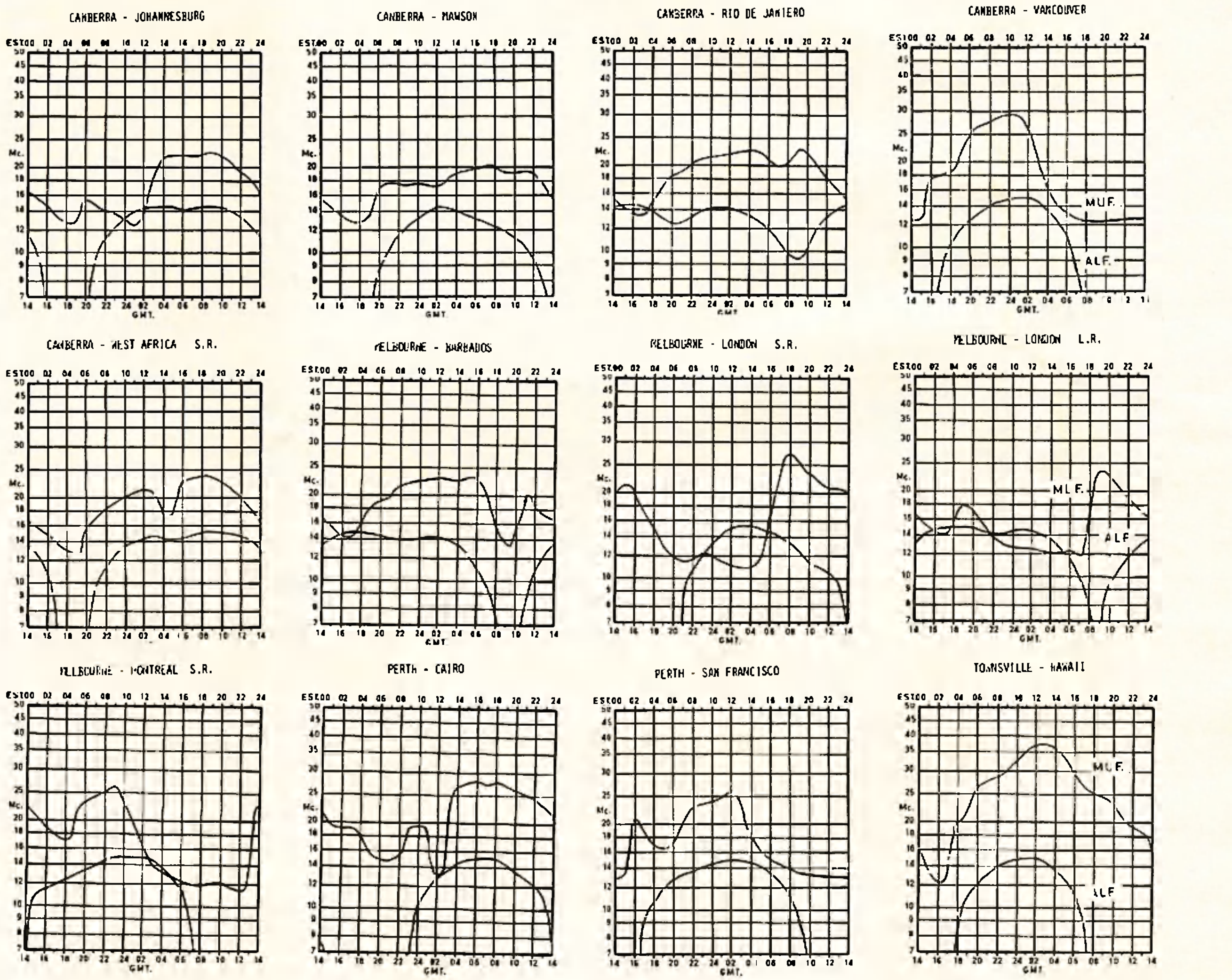
SONNENSCHEIN BATTERY RANGE

A new series dryfit battery has been developed by Sonnenschein to meet the need for float service in stationary operation. The new series can be distinguished by the marking dryfit ST, while the constant charge/discharge type is marked dryfit PC.

Further information from the Australian agents, R. H. Cunningham Pty. Ltd., 608 Collins St., Melbourne, Vic., 3000.

PREDICTION CHARTS FOR NOVEMBER 1971

(Prediction Charts by courtesy of Ionospheric Prediction Service)



VHF

Sub-Editor: ERIC JAMIESON, VK5LP
Forreston, South Australia, 5233.

Closing date for copy 30th of month.
All Times in E.S.T.

AMATEUR BAND BEACONS

VK0	52.525	VK0MX, Mawson.
	53.032	VK0TM, Macquarie Island.
	53.544	VK0PH, Casey.
VK2	52.200	VK2II, Crows Nest, Sydney.
VK3	144.700	VK3VE, Vermont.
VK4	144.390	VK4VV, 107m. w. of Brisbane.
VK5	53.000	VK5VF, Mt. Lofty.
	144.800	VK5VF, Mt. Lofty.
VK6	52.006	VK6VF, Bickley, Perth.
	52.900	VK6TS, Carnarvon.
	144.500	VK6VE, Mt. Barker.
	145.010	VK6VF, Bickley.
VK7	144.900	VK7VF, Devonport.
VK9	144.600	VK9XI, Christmas Island.
ZL1	145.100	ZL1VHF, Auckland.
ZL2	145.200	ZL2VHF, Wellington.
ZL3	145.200	ZL3VHF, Christchurch.
JA	51.997	JA1IGY, Japan.
ZK	50.100	ZK1AA, Cook Island.
KH6	50.101	KH6EQI, Hawaii.
	50.015	KH6ERU, Hawaii.
W	50.091	WB6KAP, U.S.A.
HL	50.100	HL9WI, South Korea.

From the newsletter of the Geelong Amateur Radio and T.V. Club comes advice that Keith VK0MX is running a slow c.w. beacon with 20 seconds of carrier each minute on 52.352. This will be in operation until a permanent high powered beacon is installed in VK0 in March 1972. Providing this and the other two beacons listed are able to remain fully operational throughout the coming DX season it may well be we will see 6 metre contacts between Australia and the Antarctic regions for the first time.

Mike VK2II has written advising that a temporary attended beacon will be running from his QTH in Sydney for the coming DX season. The beacon will run approximately 10 watts of c.w. into a turnstile antenna using his own call sign VK2II. Frequency 52.2 MHz. with the following sequence: 30 seconds carrier, pause, ident. at 7 w.p.m. (VK2II) then ten seconds silence, then 30 seconds carrier and so on. The proposed turn-on date is 1st Nov., so the beacon is therefore added to the current list above. The beacon will be running during the evenings 1700 to 2200 or 2300 hours and during week-ends. It is hoped this beacon will fill the gap until there is something operating from Dural, probably next year. Thanks for the advice Mike, this is a start in the right direction from VK2, and I know there will be many awaiting with interest the final beacon set-up at Dural, with particular thoughts for the 2 metre beacon planned.

Talking with Bob VK6BE who lives near Albany, on 80 (!!) metres recently, I was pleased to learn there is every indication of increased activity from the Albany area this DX season. Bob has a 50 ft. crank-up tower and is installing a 4/4 on 2 metres at 57 ft. and 4 el. on 6 at 47 ft. Others getting in on the v.h.f. act from there include VKs 6ZCD, 6XY, 6RD, 6ZCQ and 6KJ. Bob VK6BE also has plans for 432 MHz., and if these come into being will create a lot of interest eastwards. Bob also mentioned the likelihood of a 6 mx beacon from Albany soon on 52.950 with the call sign of VK6VE. I will try and have this confirmed for inclusion in next month's listings.

Items of interest seem to get to me by long roundabout methods at times, but from the pages of "The Victorian VHFer" comes news that Wally VK6WG in Norseman and Rollo VK6BO, in Perth, have been conducting 2 mx propagation experiments with Rollo beaming Perth to Norseman (note: this is close to a Perth-Melbourne heading) on 144.220 MHz. Skeds are conducted daily at 0645 WAST (0845 EAST) using 80 mx as a liaison frequency. Verification has been achieved on two occasions. The path is approximately 360 miles over mostly flat terrain, but with Perth itself in the shadow of the 1,000 ft. Darling Scarp. Wally can hear the Mt. Barker beacon, VK6VE, over a slightly shorter path, most mornings.

Also from the same publication comes news that David VK3QV, Federal Vice-President, has advised that the following new Victorian records have been ratified:

432 MHz.: VK3ZYO to VK5ZDY, 1/2/70, 406.4 miles.
576 MHz.: VK3AOT/3 to VK3ZKB/3, 11/4/71, 147.5 miles.

The VK5 Federal Councillor, Geoff VK5TY, announced at a recent W.I.A. meeting in Adelaide that as a result of the I.T.U. Space Conference the allocation to the Amateur Service of 21.000 to 22.000 GHz. is to be withdrawn, and a new 24 GHz. band substituted, with 24.000 to 24.050 GHz. as an exclusive allocation, and 24.050 to 24.250 GHz. a shared allocation with the radio-location service, which is the primary service. There will be a gain with the new band too, in that the propagation characteristics of the new band are considered to be more favourable as it is away from a peak of atmospheric attenuation which occurs at 22 GHz. due to absorption by water molecules. While on the matter of the s.h.f. bands, it is probable that the record still stands for a 21 GHz. two-way contact of 27 miles between W2UKL/2 and WA2VWI/2 on 24/10/64. For those wanting to go higher you might care to try and better 2.3 miles for above 30 GHz. set on 9/2/69 by W6FUV/6 and W6ICJ/6.

During the month a copy of "QRM", the bulletin of the Northern Zone of Tasmania, has arrived on my desk. It appears the editor is John VK7JV, and I note with interest in its pages that a committee is investigating the setting up of beacons for 6 and 2 mx, presumably in the Launceston area. Perhaps we shall hear more of this as time progresses. Membership of the Northern Zone increased from 13 last year to 60 this year, which augurs well for the future. Thank you for including me on the mailing list, and I hope to use items which are of general interest from its pages from time to time.

It is noted with interest that there is to be another South-East Radio Group Convention at Mt. Gambier next year. Garry VK5JR, the S.E.R.G. publicity officer advises the Convention will be held in Mt. Gambier on the long week-end of 10th, 11th and 12th June, 1972. As a major sporting carnival will also be held in Mt. Gambier over this week-end, the S.E.R.G. has booked an entire motel. If you are likely to be going to the Convention and require accommodation it may well pay you to make your booking as early as possible.

The V.h.f. Rally on 19th Sept. at the Gembrook Sports Ground was apparently a great success according to Bob VK3AOT, who writes mentioning about 90 Amateurs were present amongst the 200 people who joined in the occasion. The weather was fine, and several VK5s made the journey. However, the same good conditions certainly did not prevail for the V.h.f. Field Day on 26th Sept., a week later. Bob remarked that conditions were "lousy", but this did not deter 14 stations from going out portable. However, due to the conditions no stations were heard here at my QTH, where it rained all day!

Entries are invited for inclusion in the events calendar other than of a purely local nature. Correspondents are again reminded copy for the Jan. issue is required by 25th Nov., five days earlier than usual, due to the Christmas and New Year holiday period.

The DX season for v.h.f. fast approaches and it seems very likely we will see a continued increase in the number of stations, particularly on 6 mx, using s.s.b. It is hoped efforts will be made by everyone to work these stations along with the a.m. stations. A.m. is easy to tune of course and suited to many of the older receivers in use on v.h.f. However, a little thought and work to arrange to improve the overall stability of old rx's makes for greater pleasure when listening. A regulated voltage supply for the mixer and oscillator stage, and the b.f.o., will work wonders in many cases. There are many simple b.f.o. circuits, both valve and transistor, which can be added to existing rx's, although a product detector will be better to handle the large signal level variations found on v.h.f. However, don't overlook the common b.f.o.; if you have this you will not need to give a CQ call for a.m. stations only!

Remember also that many of the s.s.b. stations will be operating transceive, so it will be necessary for you to call them on their own frequency. It would be an advantage no doubt for s.s.b. stations in particular to advise when calling whether they are on transceive. Likewise, it is a good idea for all stations to advise when calling that they will listen on their own frequency before tuning, as there may be a station using transceive there, calling you.

This all means that ultimately v.h.f. operation will follow the pattern of h.f. where almost without exception stations transmit and receive on the same frequency whether they are using transceivers or not—s.s.b. and a.m. stations alike do this, and the practice is already growing on v.h.f. One advantage operators should consider is that this form of operation tends to keep the frequency clear for the two or more stations operating. I wonder how many times you have come back after an over to find another station blocking out the one you were working just because nothing was being transmitted at the time he chose the frequency.

And finally, a word about 2 mx. Evidence suggests that possibly this year, and certainly from next year for a period of a year or two, we can expect better contacts over longer distances on two metres. It was around 1961 to 1964 approximately that propagation improved to permit interstate contacts of 1,000 miles and more, including the record breaking contacts between ZL and VK5. This will occur again, so it will pay all to have 2 mx gear going well, and capable of listening on two while transmitting six. Should you be lucky enough to make the grade and work Brisbane, Sydney or somewhere else, please be fair and make the contact brief, and clear the frequency for someone else. As anyone knows who has worked 2 mx DX of that nature, it generally does not last long, and someone who is long-winded can spoil the chances of many. It's now in your lap!

The thought for the month: "A lot of today's frustration is caused by a surplus of simple answers, coupled with a tremendous shortage of simple problems." Until next month, 73, Eric VK5LP. The Voice in the Hills.

DX

By H. F. EVERTICK
C/o. P.O. Box 36, East Melbourne, Vic., 3002
(Times are in G.M.T.)

News seems scarce this month. That is to say, news which is not out of date by the time you read this. Being winter in the Northern Hemisphere, the DX-peditions are few and certainly nobody would have a shot at, say, Rockall at this season. But where are the Southern Hemisphere DX-peditions?

Perhaps then, this may be a good time to look ahead. We have become so accustomed to thinking about the bands from 1.8 to 28 MHz. as DX bands (possibly adding 52 MHz. now and again) that they are known simply as the DX-bands. No need for any explanations. Everyone knows what you mean.

In a few years we may have to change our ideas. Satellites are bound to come along before this decade is finished which will cause us to scrap the term "DX bands" because all our Amateur bands may become DX bands. The development of repeaters in the U.S.A., here and elsewhere has already extended to satellites. How soon can we expect satellites in geophysical orbits carrying repeaters on v.h.f.?

Will this mean the scrapping of DX certificates as we know them? Will it become easier and more reliable to work into Kansas or Kidderminster on a v.h.f. pipe-line rather than through the natural terrestrial methods we use now?—when we can get through! I suppose, though, the amount of QRM is bound to limit the usefulness of any such system unless there are hundreds of channels available or something else is done.

It is always disconcerting when you talk with old Fred just up the street on a "dead" DX band and suddenly become aware of a breaker 2,000 miles away. How much more disconcerting could this be if you were having a telephone-type contact on 2 metres from your car on the way home from work and became aware of a breaker motoring off to his salt-mine in London. Similar thoughts have been aired in the past but today the reality seems closer. What triggered my thoughts were the Project Australis notes and the article in the Victorian VHFer by VK3AFW.

If all that does come to pass, the days of prediction charts might become numbered. Looking through the charts for November the other day was an interesting exercise in speculating how they will work out in practice.

For the short path to London the MUF peak from Perth extends almost to 30 MHz. as against 27 MHz. from Melbourne and 26 MHz. from Canberra; however, the Canberra peak is some half an hour later than the other two. The MUF dips down into the ALF for all three, but only down to 12 MHz. for Perth as opposed to 11 for Melbourne and 10 for Canberra. Once again, all are at about the same time. However, for Perth the ALF is a much broader based arc than the others—for Perth, the 7 MHz. opening extends from 1430 to 2300z, for Melbourne from 1330 to 2100z, and for Canberra from 1330 to 2030z. The ALF peaks rise to more or less the same frequency (15 MHz.), but for Perth the peak is two hours later than the other two.

Looking in the other direction, it would pay to live on the East coast to work into San Francisco. In Canberra the MUF peaks to 30 MHz. and Melbourne 27 MHz., both at 0100z, but from Perth it reaches just over 25 MHz. at 0200z. The ALF curves are more interesting though. From Canberra the ALF never drops below about 10 MHz. and rises only a little above 14 MHz., whereas for Melbourne it is a dome rising to 15 MHz. at 2430z with a base extending from 1630-0730z and for Perth the dome also rises to 15 MHz. but at 0300z with its base extending from 1645-0915z. In different terms, the 14 MHz. band would be open from Perth to W6 from 0600-0800z and 1500-2100z, from Melbourne 0400-0900z and 1500-2100z, and from Canberra 0300-0900z and 1500-2130z. On 7 MHz. the differences are: Perth 0900-1630z, Melbourne 0730-1630z, and Canberra 0715-1630z.

Although comparable tables were not available, going northwards of course gives greater MUF peaks—for example, the MUF path Townsville to Hawaii peaks to nearly 36 MHz. at 0200z, whereas for Adelaide it reaches only 28 MHz. plus at 0400z.

The long path to London is a complex interweaving of MUF and ALF curves for all three places. However, it would seem impossible to work to London on 7 MHz. long path from Perth, whereas from Melbourne it would be theoretically possible from 0800-0915z and from Canberra half an hour earlier. For closer N-S paths, the possibilities of 28 MHz. DX are better from Perth, particularly on 1F modes as opposed to 2F, but these are more obvious comments.

It was always very interesting to see the prediction charts used in the VK2 Bulletin, as organised by Frank Hine, and by extension to see if there might be another way to display the information. For example, the path to Nairobi for November could be shown thus (local times)—

21 MHz.—

From Perth:
—5 1600 + 4
Melbourne:
—4 1700 + 4
Canberra:
—4 1700 + 4

14 MHz.—

From Perth:
—5 0000 + 4½, —2½ 0800 + 3
Melbourne:
—3 0000 + 3½, —2½ 0830 + 3
Canberra:
—4 0030 + 3, —3 0800 + 3

7 MHz.—

From Perth:
—4½ 0300 + 4¼
Melbourne:
—3½ 0400 +3½
Canberra:
—3½ 0400 + 3½
—3 0400 + 2½

Because the ALF curves often run more or less vertical below 7 MHz., there is significantly little difference between the 7 and 3.5 MHz. bands—possibly half an hour each side of the centre time for 3.5 as against 7 MHz. In other words, if the central opening time is taken for 3.5 MHz., the 7 MHz. opening would last half an hour longer each side of the central time.

Looking at the Prediction Charts in September "A.R." illustrates a number of points on conversions to numerical notations. Take the 14 MHz. band to London long path as an example. The MUF reaches peaks about 2100z and 0800z, both possessing sharp rise times with slow roll-offs. On a numerical notation for 14 MHz., this would be shown as minus 2 2100z plus 5 and minus 1 0800z plus 5½. For the short path the notation would read minus 4½ 0900z plus 9¼.

However, looking at the same two charts for 7 MHz. openings we get minus ½ 0700z plus ½ and minus 3¼ 1900z plus 2½ respectively. The shorter plus time from "centre" indicates a more vertical ALF curve and hence less predictable.

It is an unfortunate fact of life today that prediction charts in their present form are becoming more and more costly to reproduce. The writer holds the view that prediction charts of this kind are easier and quicker to comprehend than those in any other form so far produced in other magazines. However, these charts can be misleading because we do not know if the curves hold good for most of the month or only a part, leaving aside, of course, other factors such as magnetic storms. A sharply rising or falling curve on the chart and a cross-crossing of the MUF-ALF curves would appear to indicate the most sensitive times of change over a period in the same way that peaks and troughs ordinarily change shape rather more rapidly than their actual heights or depths.

If we are compelled to consider a method of numerical notation, the examples quoted might be useful for consideration by DXers.

160 Metres. VK3APN writes with details of the 160 mx annual Transpacific Tests received from W1BB (he also asks about the Contests Calendar which is re-introduced in this issue). In previous years there have been plenty of stations looking for contacts despite the QRN and many contacts were made even on seemingly impossible nights.

The drill is that W/VE stations call CQ DX Test on the hour with VK/ZL/JA taking alternate five-minute periods from five minutes past the hour. The frequencies in KHz. are: 1800-1806 for VK, 1800-1810 for W/VE, 1907½-1912½ for JA, 1876 (approx.) for ZL, and 1975-2000 for KH6; the times are 1330z (or earlier) to 1600z and the activity dates are Nov. 6, 20; Dec. 4, 18; Jan. 1, 15; Feb. 5, 19.

JAs will be looking for DX from 0730z to 1000z on the same days. Reports of QSOs are requested and should be sent direct to W1BB, 36 Pleasant St., Winthrop, Mass., 02152, U.S.A., for inclusion in his 160 metre news bulletin. Last month this column published details of W1HGT's activity periods.

6 Metres. From late Nov. to end of Jan., VK0PG on 52.00 MHz. from Casey and VK0MX on 52.525 from Mawson/Wilkes will be looking (especially Christmas-New Year) on c.w. between 0500z and 0700z and 0800z to 1000z. Call signs will be sent in short bursts followed by listening.

Scouts: VK2BGG of Wauchope in an interesting letter, received too late for October "A.R.," gives details of contacts with 8J1WJ, the Boy Scouts' 13th World Jamboree Station at Asagiri Heights in Japan. He is reputedly the first VK worked by the station and his son, Steven, happened to be there at the time. A good article appeared in the Hastings Shire Gazette. I wonder how the Scout Jamboree on the Air will go this year—here again, details arrived too late for inclusion in last month's "A.R."

Reports: VK4KX as usual came with much material for this column. He listed a QSO with ET3ZU/A on 14010 KHz. c.w. early in September. This station operated from Zuqar Is., part of the Farasan Group, and was recognised by A.R.R.L. from 1st Aug. 1971 as a new DXCC country listing under the names Abu Ali and Jabel At Tair Islands ("QST" Aug. '71).

These seem to be one and the same group. July "A.R." quoted the QSL manager of Aldo as I1LJ, but Murray quotes I1IJ from another source. Perhaps somebody knows the answers to these points. Murray also lists 7Z3AB, Box 2486, Dharan on s.s.b. This is a "club" station with a number of American oilfield and other operators and has been active for many years.

Murray's lists also include many goodies and 1T9LMK (c.w. 7 MHz.), FR7AE/T (s.s.b. 14), MP4TDM (same), G3YCP/MA (c.w. 14; presumably mobile aeronautical), I6ZRA (c.w. 14) and OB4VE (c.w. 7; Lima, Peru).

Murray joins everyone else in complaining about the deadness of poor old 10 metres and listed 40 and 20 as "improving". He also mentions the QRM from non-Amateur stations, particularly on 7 MHz., but from another source I know he is very active on the Intruder Watch and reporting. This is splendid work requiring many operators, much time and great patience. Those who use the DX bands late at night for inane chatter and puerile remarks could find a most useful panacea for boredom by listing Intruders which, at those times, are extremely active on 40 and 80 metres.

Darlene (ex 3B9DK) may operate from rarer European DX-spots in Nov. such as 3A.

"73 Magazine" DX notes mention a possible activation of VR3 Fanning Is. by WA5DYW and that BV2A is the only present activity in Taiwan (xtl. controlled 14023 around 1200z).

RTTY: "Radio ZS" of July mentions several Eastern Cape stations are preparing for r.t.t.y. on 50 MHz.: ZS2s OW, CC, BZ, GS, GE and DD.

Contest Results: Am glad to correct any erroneous impressions. AX2APK listed in Sept. "A.R." DX notes was, of course, top scorer in Oceania on 14 MHz. This is an all time record. In the "CQ" W.W. DX Contest ("CQ" Oct. '71) VK2ADY/9 is listed as the all bands single operator, phone world record holder (1967), VK5KO on 1.8, VK5NO on 7, VK3APJ on 14 and VK8UG on 28 MHz. all single op., single band, c.w. world record holders with AX2BKM multi-op., single transmitter, multi-bands, record holder.

In the R.S.G.B. 1971 N.F.D., VK6II/P gained 2nd position in overseas check logs giving G stations 384 points ("R.C." Sept.).

Again from "CQ" of Oct., it is observed that VK3AHQ secured his 300 endorsement in the "CQ" DX Award (c.w. Cert. 57) and joins the CW WPX Honour Roll with 809 prefixes. VK4FH gained Cert. No. 463 in the phone WAZ and VK3AMK Cert. 861 in WAZ SSB ("CQ" July).

Contest Calendar:

- Nov. 6/7—R.S.G.B. 7 MHz. Phone DX.
- Nov. 13/14—R.S.G.B. (2nd) 1.8 MHz. DX (c.w.).
- Nov. 27/28—"CQ" W.W. DX—c.w.
- Dec. 11/12—Spanish c.w.
- Dec. 11-Jan. 23—Ross Hull Memorial V.h.f. Contest.
- Feb. 12/13—John Moyle N.F.D.

Late News.—From Charles VK4UC via Paddy 4S7PB on SEA net 14320 at 1200z daily comes news of a probable XU1AA call by the Univ. Rad. Club in Cambodia resulting from John's VE7IR/XU, operations; believed approved by A.R.R.L. for DXCC. Also that the ZD5 boys now have the prefix 3D6 (active is 3D6AX, formerly ZD5X). Charles' other data is in the QSL column but he also mentions 4W1AF on s.s.b. 14260 about 1400z and a re-activation of the Sunday DX group net by Nick YV4UA, from first Sunday in Nov. on 14170 from 1130z. There is also the possibility of a new prefix for VR2.

Don Grantley will be writing the DX notes in future and please forward any copy to him at P.O. Box 222, Penrith, N.S.W., 2750.

NEW CALL SIGNS

JULY 1971

VK1HD—H. Daniel, 14 Dianella St., O'Connor, 2061.

VK2GD/T—A. D. Nutt, 7 Attow St., Winston Hills, 2153.

VK2OE—D. J. Terrill, 44 Angophora Cres., Forestville, 2087.

VK2TK/T—P. J. Carter, 5 Bell Pl., Mt. Pritchard, 2170.

VK2AEM—A. W. Mothersole, 650 Pennant Hills Rd., West Pennant Hills, 2120.

VK2BCN—A. Corney, 14/122 Raglan St., Mosman, 2088.

VK2BEU—I. Abel, O'Connell House, 4A O'Connell St., Parramatta, 2150.

VK2BGM—G. Mulhearn (Rev.), St. Pius X College, Park Ave., Adamstown, 2289.

VK2BGO—G. W. Henshaw, 296 Heath St., Albury, 2640.

VK2BHH—H. Henney, 72 Nerrim Rd., Castlecove, 2069.

VK2BKI—The Kings School Electronics Laboratory, Station: Pennant Hills Rd., North Parramatta, 2151; Postal: P.O. Box 179, Parramatta, 2150.

VK2BLN—L. L. Neaverson, 23 Vernon St., Strathfield, 2135.

VK2BPP—B. P. Pinkerton, 1 Kings Pl., Carlingford, 2118.

VK2BUC—A. Buckman, 898 Forest Rd., Peakhurst, 2210.

VK2BYY—J. L. Pages, 62 First Ave., Berala, 2141.

VK2CAW—K. Warchot, 1/19 Nagle Ave., Maroubra, 2035.

VK2ZAF—A. Blake, 32 Lynwood Ave., Killara, 2071.

VK2ZGO—G. Markwart, Hoddle St., Robertson, 2577.

VK2ZHT—M. S. Hort, 10 Doone St., Barrack Heights, 2528.

VK2ZJJ—J. Miller, 7 Wakehurst Parkway, Nth. Narrabeen, 2101.

VK2ZMR—M. Richter, 86 Anderson Ave., Mt. Pritchard, 2170.

VK2ZNI—R. Nimmo, 10 Third Ave., Eastwood, 2122.

VK2ZNT—C. B. Moore, Drummond College, Uni. of New England, Armidale, 2351.

VK2ZPQ—P. D. Angilley, 10 Hinkler Cres., Lane Cove, 2066.

VK2ZUT—A. V. Bull, 67 Fernleigh Rd., Wagga Wagga, 2650.

VK2ZUU—M. S. Horne, 6 Kaling Pl., Cooma North, 2629.

VK2ZVX—R. Wilson, "Greenbank," R.M.B. 18, Millthorpe, 2798.

VK2ZYS—L. A. Adams, 13 Frederick St., North Bondi, 2026.

VK2ZYX—J. Colebatch, 17 Mooramie Ave., Kensington, 2033.

VK3SF—R. H. Wills, Queens College, Uni. of Melbourne, Parkville, 3052.

VK3WI/R3—Wireless Institute of Australia, Eastern Zone, 6 King St., Maffra, 3860.

VK3AGK—R. H. Mould, 3 Bourke St., West Essendon, 3040.

VK3AXO—G. J. Gill, 19 Dorset Rd., Croydon, 3136.

VK3BCD—E. G. Egan, 15 Clunes Ross Cres., Mulgrave, 3170.

VK3BFA—P. C. McEwan, 247 Princes H'way, Werribee, 3030.

VK3BFR—U. H. Shaw, 29 Cecil St., Benalla, 3672.

VK3BFS—C. L. Wareham, 8 Dixon Gr., Blackburn, 3130.

VK3BHS—Benalla High School, Barkly St., Benalla, 3672.

VK3BRB—R. J. Beevers, Station: 11th St., Mildura, 3500; Postal: P.O. Box 32, Mildura, 3500.

VK3YAA—K. J. Wood, 115 Boyden St., Mildura, 3500.

VK3YAH—J. L. R. Wright, 2 Neath St., Surrey Hills, 3127.

VK3YAK—A. A. Knox, Cr. Angus Ave. and St. Davids Dr., Wantirna, 3152.

VK3YAR—R. L. Harding, 39 Wood St., Nunawading, 3131.

VK3YBE—R. J. Forde, 576 Grimshaw St., Bundoora, 3083.

VK3YDT—I. W. Whitehead, 2 Hardridge St., Croydon, 3136.

VK3YEA—J. H. Stone, 23 Westall Rd., Springvale, 3171.

VK3YEK—A. D. Armstrong, 196 Stradbroke Ave., Swan Hill, 3585.

VK3YEY—8th Mordialloc Scout Group, Station: Scout Hall, East Beaumaris Community Centre; Postal: 39 Wells Rd., Beaumaris, 3193.

VK3YGA—R. C. Mayo, 14 Plumridge St., Bendigo, 3550.

VK3YGH—R. G. Heyland, 25 Duncan St., Box Hill, 3128.

VK3YGL—L. J. Brain, 3 Bindy St., Blackburn South, 3130.

VK3ZXB—M. H. Adnams, Station: 6 Saer Crt., Mildura; Postal: P.O. Box 246, Mildura, 3500.

VK4QD/T—P. J. Lindsay, Station: Ropert Crt., Yarrawonga, Townsville, 4810; Postal: P.O. Box 1251, Townsville, 4810.

VK4SO—M. Eunson, Station: 64 Peel St., South Brisbane, 4101; Postal: Box 1513, G.P.O., Brisbane, 4001.

VK4ZIC—I. T. Chappel, D'aguilar, 4513.

VK4ZJE—J. E. Burnham, Burnham St., Forest Hill, 4342.

VK4ZSK—S. Kumar, 37 Lowerson St., Lutwyche, 4030.

VK5OW—B. E. Beckman, 5/26 Delprat Tce., Whyalla, 5600.

VK5UT—P. F. Allen, 5/52 Seaview Rd., West Beach, 5024.

VK5XE—J. F. Russell, 46 Wainwright St., Whyalla, 5600.

VK5ZJB—J. F. Bothwell, P.O. Box 125, Ceduna, 5690.

VK5ZKE/T—J. L. Jones, 3/9 Harvey St., Nailsworth, 5083.

VK5ZLM—L. G. Moffat, 1 Mackinon Crt., North Adelaide, 5006.

VK6CG—R. C. Crowe, 23 Rosser St., Cottesloe, 6011.

VK6JR—S. J. Ryan, 23 Ballarat St., Morley, 6062.

VK6NB—C. R. N. Neubronner, 62 Williamson Ave., Belmont, 6104.

VK6RH—R. H. Cooke, House 684, Tom Price, 6751.

VK7ZQE—L. N. Smith, "Belle Brae," Lileah, 7330.

VK8DO—D. O. White, 3/2287 Wellington Pde., Alawa, 5794.

VK9BC—N. Boland, P.O. Box 5099, Port Moresby, P.

VK9HB—H. Buehler, C/o. Gulf Fisheries N.G., P.O. Box 920, Port Moresby, P.

VK9JV—J. Vogel, P.O. Box 3155, Port Moresby, P.

VK9ZFD—F. Dowse, P.O. Box 301, Rabaul, N.G.

ALTERATIONS

VK2RL—J. E. R. Burstall, Tropicana Hotel/Motel, Australiana Village, Rose St., Wilberforce, 2756.

VK2ZM—N. M. Nicholson, 18 Coorong St., South Tamworth, 2340.

VK2ASI—A. S. Lundy, 9 Minnamurra Cres., Tamworth, 2340.

VK2AZQ—A. Havyatt, 37B The Point Rd., Woolwich, 2110.

VK2ZXD/T—G. M. T. Clarke. Addition of /T.

VK3DM—J. R. Goding (Dr.), 15 Myamyn St., Armadale, 3143.

VK3SZ—S. I. Zeunert, 22 Swift Dr., Glen Waverley, 3150.

VK3UQ—N. G. R. Foxcroft, 9 Havilah Crt., East Rosanna, 3084.

VK3UZ—E. J. Parrow (Rev.), Station: 42 Park St., Brunswick; Postal: C/o. Brunswick Post Office, 3056.

VK3VS—I. L. Griffin, 2 Leonard St., Sunshine, 3020.

VK3AAV—C. J. Dodd, 6/444 Dandenong Rd., North Caulfield, 3161.

VK3AYY—C. J. D. Smith (Dr.), 172 Eastfield Rd., Croydon, 3136.

VK3BDG—D. R. Garratt, 26 Parkhill Dr., Ringwood, 3134.

VK3BDK/T—D. K. W. Bradbury. Addition of /T.

VK3BED—P. L. E. Bennett, 18 Armstrong Crt., Traralgon, 3844.

VK3BEZ—Wireless Institute of Australia, Eastern Zone, 6 King St., Maffra, 3860.

VK3BGL/R2—Geelong Amateur Radio Translator Group, Station: "Bayview," Haines Rd., Gnarwarre; Postal: 5 Kyle Ave., Belmont, 3216.

VK3YAQ—B. A. Butler, 42 Rathmines St., Fairfield, 3078.

VK3ZCA—B. S. A. Heath, 40 Albion Rd., Glen Iris, 3146.

VK3ZQP—I. A. Keenan, 94 Dendy St., Brighton, 3186.

VK3ZVK—N. Hull, 113 Park St., St. Kilda, 3182.

VK4AK—G. C. Moody, 1/468 Montague Rd., West End, 4101.

VK4YL—R. V. Bulman, R.F.D.S. Base, Barkly H'way, Mt. Isa, 4825.

VK4ZDI—D. J. McWilliam, 67 Parkside Flats, Railway Ave., Mt. Isa, 4825.

VK4ZFD/T—R. F. Dannecker. Addition of /T.

VK4ZJC—R. J. Cummings, Jeffrey St., Capalaba, 4157.

VK4ZRD—K. R. Davis, 26 Alkira St., Sunnybank, 4109.

VK5JN—J. M. Brammer, 67A Northgate St., Unley Park, 5061.

VK5KZ—P. R. Keddie, 33 Belmore Tce., Woodville Park, 5011.

VK5QO—M. L. Severson, 25 Russell Ave., Hazelwood Park, 5066.

VK5ZBE/T—H. J. Harvey, 7 Jina Pl., Modbury Heights, 5092.

VK5ZXY—J. R. Waller, 5/43 Price Ave., Lower Mitcham, 5062.

VK5ZWW/T—W. A. Watkins, 244 Shepherds Hill Rd., Bellevue Heights, 5050.

VK6BS—B. H. Smith, Postal: P.O. Box 180, Wongan Hills, 6603.

VK6HS—H. B. Simpson, 3 Vernalien Way, Lesmurdie, 6026.

VK6ZCQ—A. C. Graham, 16 Webster St., Mt. Barker, 6324.

VK6ZFF—D. V. Robinson, 26 Chelsfield St., Gosnells, 6110.

VK6ZGR—W. R. McGhie, 39 Edgewater Rd., St. Lucia, 6152.

VK7FB/T—M. L. Jenner. Addition of /T.

VK7LY/T—A. T. Jenner (Mrs.). Addition of /T.

VK7TX—B. M. Muir, 5 Tingira Rd., Blackmans Bay, 7152.

VK7ZMS—M. G. Salier, Low Head Rd., George Town, 7253.

VK7ZRF—R. F. Grant, Old Main Rd., Perth, 7300.

CANCELLATIONS

VK2ZKL—L. G. Moffat. Now VK5ZLM.

VK2ZMU—A. W. Mothersole. Now VK2AEM.

VK2ZPC—P. J. Carter. Now VK2TK/T.

VK2ZYY—J. L. Pages. Now VK2BYY.

VK3FB—A. W. J. Fussell. Not renewed.

VK3SH—M. K. Bunn. Not renewed.

VK3TK/T—J. F. McCrohan. Not renewed.

VK3WS—P. Q. Scown. Not renewed.

VK3XL—E. S. Coxall. Not renewed.

VK3ZZ—W. L. Stevens. Not renewed.

VK3AJU—H. Jupp. Not renewed.

VK3AMJ—I. L. Arbalaster. Not renewed.

VK3AMM—A. C. Edwards. Not renewed.

VK3ASW—J. F. Ryan. Not renewed.

VK3BCE—M. E. Morere (Mrs.). Not renewed.

VK3BDS—R. H. Wills. Now VK3SF.

VK3BHS—U. H. Shaw. Now VK3BFR.

VK3YDG—G. J. Gill. Now VK3AXO.

VK3ZBN—R. J. Beevers. Now VK3BRB.

VK3ZID—J. C. Livsey. Not renewed.

VK3ZMZ—G. Aberline. Not renewed.

VK3ZUD—H. P. J. Monola. Not renewed.

VK3ZZK—A. E. Humphreys. Not renewed.

VK4FS—R. F. Lingham. Not renewed.

VK4MC—A. D. MacPherson. Not renewed.

VK4YR—R. L. Price. Not renewed.

VK4ZPL/T—P. J. Lindsay. Now VK4QD/T.

VK5BK—J. Grivell. Deceased.

VK5EC—G. E. Cameron. Not renewed.

VK5FZ—W. B. Johnson. Not renewed.

VK5ZAQ—E. J. Whittington. Not renewed.

VK5ZBS—G. Downing. Deceased.

VK5ZJO—J. C. Willoughby. Not renewed.

VK6DS—P. A. Smith. Transferred to Port Moresby.

VK6JU—M. G. Burleigh. Transferred to Tas.

VK6VV/T—B. J. Clarke. Not renewed.

VK6XG—C. W. C. Sirl. Deceased.

VK6ZBF—R. L. Holman. Not renewed.

VK6ZBN—A. R. May. Not renewed.

VK6ZEZ—G. A. Sturcke. Not renewed.

VK8UG—Gove Social Club. Not renewed.

VK9DT—A. T. G. Hanson. Not renewed.

VK9FE—F. E. Earley. Transferred to Qld.

VK9JJ—J. J. Schafer (Rev.). Transferred to Manus Island.

VK9SR—Sopas Radio Club. Not renewed.

VK9WF—W. Frost. Transferred to Tas.

VK9ZBF—D. F. Francis. Not renewed.

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LICENSED AMATEURS IN VK

JULY 1971

	Full	Lim.	Total
VK0	11	1	12
VK1	86	30	116
VK2	1435	496	1931
VK3	1307	668	1975
VK4	522	206	728
VK5	519	227	746
VK6	367	135	502
VK7	156	66	222
VK8	37	12	49
VK9	86	11	97
	4526	1852	6378 Grand Total

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AUSTRALIS

Further to the report on page 17 of June "A.R.," the complete list of call signs of the Amateurs who worked through the balloon package is shown below. These call signs were taken from the tapes of all four flights and were recorded by Jim VK3ZCE. It is possible that some may have been missed due to the rotation of the balloon. Special thanks go to Jim for his tremendous assistance. The VK1 and VK2s were all on flight No. 4 only.

VK1VP.

VKs 2ZHM, 2ZVJ/Mobile.

VKs 3AFW, 3AGF, 3ASV, 3AXC, 3CCX, 3XV, 3YDB, 3YEJ, 3YEK, 3ZBJ, 3ZDN, 3ZDW, 3ZKV, 3ZPI, 3ZSE.

VKs 5CJ, 5DK, 5NZ, 5QZ, 5ZDR, 5ZDY, 5ZK, 5ZKH, 5ZLZ, 5ZMW, 5ZNJ, 5ZSL, 5ZTH.

CORRESPONDENCE:

NOVICE LICENSING

Editor "A.R.," Dear Sir,

I feel that the "pearls of wisdom" of VK3RN ("A.R." July '71) and the comments of his supporter, VK3DH ("A.R." Sept. '71) concerning Novice licences should not go unchallenged.

It would almost appear from the remarks of these two Amateurs that they want the hobby of Amateur Radio to be like an exclusive old gentlemen's club. It is very fortunate for them that they are already members of this exclusive association, but it is unfortunate for the rest of us (brilliant matriculation physics students excepted) that the doors are kept a little tighter closed than some of us would like.

What about the ordinary, keen, prospective Radio Amateur, Mr. Morgan? Why not let him in, via a lower grade licence which he could hold for a limited time? And, if it would seem to you to be such an irreversible process to have a Novice licence, why not agree to have such a measure put into operation on a trial basis as has been suggested by VK3WW and VK4SS? Would not this prove whether the Novice licence had merit or not?

Some considerable comment has been made about the 160 metre band as a possible training ground for Novices. As any Amateur in N.S.W. must agree, the portion above 1820 kilohertz is useless for long distance work because of the severe interference from the strong Loran station in the Philippines. And in the daytime, when perhaps Novices could try cross-town contacts, this band would seem ideal, with interference to other stations as remote as interstate 2 metre contacts.

The radio clubs in this state are always busy preparing prospective Radio Amateurs for the A.O.C.P. Many of the students find great difficulty in passing the examination at the first attempt. Many of them try, again and again to gain the qualification which would get them on the air. Some become disillusioned by the complexity of the questions and the very difficult pass mark of 70 per cent. Some of these candidates are over 40. Few of them are brilliant students. But all of them have one aim in common. They would like to gain their Amateur licence and take part in a rewarding and absorbing hobby.

Only those who conduct classes in the many radio clubs can fully realise the frustrations of those who just can't make it. In 1930, was the technical standard of the licence examination of the same level as it is in 1971? Perhaps when you went for your licence Mr. Morgan things were a bit easier. Perhaps in those days they had a syllabus in Leaving certificate physics which encompassed the whole of the course for the A.O.C.P. Perhaps they did then Mr. Morgan; but they don't do so now. Even teacher members of this club have had to study additional material to gain their A.O.C.P., so how your Matriculation students could accomplish this feat without any preparation whatsoever is a mystery to many of our members.

Surveys conducted by this club indicate that the great majority of members, including those who are already Radio Amateurs, support the report on Novice licensing as put forward at the Easter Convention. Our membership is quite large by local standards at over 160, but, as I pointed out before, many of us are still on the outside. We would benefit by the introduction of a Novice licence and so would the Amateur Service in Australia. The Amateur population would be increased, despite what Mr. Higginbotham suggests, and, by including a Morse telegraphy requirement as has been suggested, we would hope that the increase would be one of quality also.

I trust that all thinking Radio Amateurs will read the report on Novice licensing prepared under the chairmanship of Mr. Rex Black. I hope that Amateurs will make constructive suggestions as to how the recommendations in the report may be amended, and I certainly hope that the Institute will see fit to give the report its support and that soon we may have a Novice licence. We'd like to partake in Amateur Radio just as much as all your other correspondents, even Mr. Higginbotham and Mr. Morgan.

—E. C. Brockbank, Secretary,
Westlakes Radio Club.

Editor "A.R.," Dear Sir,

I read with interest a letter written by Mr. Ivor Morgan concerning Novice licences in the Sept. issue. I am a sixth form student at Booragul High School and I am studying science at the First level. Without any preparation whatsoever Mr. Morgan? You must be joking!

—R. A. Day, VK2BBI.

Editor "A.R.," Dear Sir,

I have read with interest Mr. Morgan's letter as published in the Sept. issue of "A.R." I consider his statement that a boy doing physics at Matriculation level could pass the A.O.L.C.P. without any preparation whatsoever to be rather irresponsible.

Speaking as a high school teacher of science, I am quite convinced that your correspondent has been misled. The electronics content in the high school physics course constitutes a minute fraction of the mass of knowledge needed to pass the A.O.L.C.P.

The fact that some high school boys can pass the Amateur examination in radio theory is most likely due to considerable effort on the part of the candidate outside the classroom.

—F. R. Overvliet, VK2ZFO,
Science Dept., Broadmeadow H.S.

Editor "A.R.," Dear Sir,

Having read the latest correspondence on the important matter of Novice licensing, I should like to offer a few comments from the point of view of an A.O.C.P. correspondence student, associate member No. 9823 of the W.I.A. and a would-be Amateur.

Your first correspondent, Mr. Morgan, decries the suggestion of a lower level Amateur licence and quotes the cases of boys who have passed the P.M.G. Amateur examination on the basis of school physics alone "without any preparation whatsoever". This statement, of course, is designed to stress the opinion which he presumably holds, that the A.O.C.P. is within the capacities of anyone with two arms and two legs. I do not know what occupation Mr. Morgan follows and I regard with respect his 40 years of Amateur experience, but I emphatically deny that any school physics course covers the theory section of the prescribed A.O.C.P. syllabus. Such exaggerated statements do nothing to bolster the strength of the anti-Novice cause, which this correspondent is apparently trying to do.

I can assure you and him and anyone else that I should welcome a Novice licence if it could offer me a quicker means of getting on the air to improve my operating skills and give me experience which the present system denies me. In my present location I am remote from other licensed Amateurs and radio clubs, and I should have to rely on advice from well disposed Amateur friends and from reference books on the subject. I can see a lot of merit in the position whereby I should be permitted to start in a small way with a 10-watt transmitter, simple antenna system, and crystal control as set down in the Novice proposals. The Morse code requirement is one which I am quite happy to observe, as I regard this as a traditional and valuable means of communication. I would not be at all affronted at the idea of being an Associate member of the Institute rather than a Full member, and could well accept the fact that the older and more experienced members would tend to regard me—and the other Novices—as "apprentice Amateurs", as indicated in the Novice Committee's report. On the other hand, I should be flattered and pleased if Mr. Morgan and other well disposed Amateurs would accept Novices as Full members because of sharing transmitting privileges. Also, I should be grateful to receive the benefit of their suggestions as to how I could improve my operating methods and my technical knowledge.

I do not work in a job associated with electronics, so I find the A.O.C.P. course quite difficult. The small amount of electricity which I studied in my school science course does not take me very far along the involved study papers which the correspondence course provides. I have considered the system of examining the last few A.O.C.P. question papers, seeing which topics occur repeatedly and preparing "parrot fashion" a limited number of topics, trusting to luck that seven of them would appear in the A.O.C.P. paper which I attempted. I realise that this method would offer a very limited radio knowledge even if I did succeed in narrowly leaping over the 70 per cent. marks barrier. But, if a Novice licence period of operating could be provided, I am certain that the practical work involved in building my own gear and operating it would give me a far more useful background than a crash course on a limited number of topics. In other words, I would be a "better" Amateur operator when I finally passed the A.O.C.P.

Mr. Morgan has stated that "the regulations can be learned in one evening prior to the examination". Having perused the specified handbook, I am quite sure that such a cursory consideration of the foundations of Amateur operating is most undesirable and I am surprised to think that such an experienced Amateur has such an attitude. One would think that his approach would be towards a long and well-learned preparation on this vital section of Radio Amateur lore. No, Mr. Morgan, when I get on the air it will be with a sound knowledge of regulations—not merely a hasty scanning to pass a fairly simple test.

I must state that the most sensible contributions to the Novice issue have appeared in letters from Mr. Shawsmith, VK4SS, and Mr. Oburtill, VK3WW, both of whom suggest a trial period of (average) five years. No doubt after this period the Institute and the P.M.G. representatives would consider the success or failure of the experiment and act accordingly. This is a very fair approach to the position.

—Mick Rodden.

Editor "A.R.," Dear Sir,

During this week I received from the Federal Manager a photostat copy of a letter addressed to you and relating to the subject of Novice licensing. This letter was written by a Mr. Ivor Morgan (VK3DH) and followed my personal letter to him to clarify and discuss various items relating to this allegedly contentious topic. I think that my letter to him was reasonable and friendly in tone and certainly did not warrant the objectionable tenor of his communication. In the event of your deciding to publish his letter, I feel that you might consider printing mine to him in order that readers may assess the nature and content of his statements.

—R. C. Black, VK2YA.

Editor "A.R.," Dear Sir,

Count me in on this entrance exam. controversy. I belong to the minority group of genuine Amateurs and Experimenters.

I have had more experience than most with this same exam., having failed it five or six times in a row about six years ago. I could quite easily fail it again a couple of times now. It is loaded in favour of the high school type of student, while the less educated, slow-writer, aged, or purely physical workers, are all practically debarred.

Down grading is a step in the right direction provided that it is counter balanced by up-grading at the other end.

If we had up-graded both our entrance exam. and our experimental projects in line with the advances in science, we would now have been providing both technicians and scientists to the computer and laser industries. Instead of this, we have turned our organisation into a network devoted entirely to entertainment (particularly in recent years since commerce has invaded our ranks).

Let us consider this question on a "who gains, who loses" basis.

The "trade" occupies the box seat. In fact for them it will be a real bonanza. The present members will not lose any prestige. That was lost years ago. The experimenters won't be pushed any further off the popular bands. They have already been pushed off.

Let us now consider the sub-standard entrants who are to be enticed into our organisation with suitable pleasure hunting bait. The result will be (1) a big increase in the number of pleasure hunters; (2) a proportionate increase in the influence of the "trade" in our affairs; (3) the public abandonment of any claim to influence science; (4) the swamping of the scientific section of our organisation through lack of proportionate numbers.

A glance at our award system accurately illustrates Amateur Radio as it is in 1971. The highest Amateur awards go to those willing to spend the most money to get it.

If the present proposal is adopted the position will be much worse. No brains will be required to enter our ranks. If the entrant has 500 dollars and some nimble fingers he needs no brains after he has entered either. The highest awards in our Amateur ranks are within his grasp.

This position should be commemorated in pictorial form, either in a badge or a plaque. It could depict nimble fingers twisting a dial on a background of a 500 dollar note. This could be mounted on the back of a crushed "experimenter", or hung round his neck like a mill-stone. The foreground could contain suitable "awards" artistically draped, with the surplus stacked in the corner.

The general public will soon regard us as 500 dollar scientists who are intent on a pleasure hunt that is free of entertainment tax.

We must all agree that the projected step is fundamentally sound and desirable. It is the side effects that are disastrous. To raise the level proportionately at the other end is not feasible.

I would propose that our experimental section be given more recognition. That they be banded together in a quite distinct group (for experimental purposes only). This group should abandon the commercialised lower freq. to the pleasure hunters (including themselves).

It should be agreed that the (at least) 144 MHz. band and above it be recognised as the domain of the legitimate experimenter. A gentleman's agreement on these lines would probably be sufficient to keep the 500 dollar gate crashers out.

By this method we may hold our experimenters within the W.I.A. even though (like myself) they may be experimenting in the infra red to ultra violet part of the spectrum.

The commercialising of our organisation has separated the "sheep" from the "goats", both intellectually and financially. In a similar manner this proposed method will separate the newcomers. The "cream" of the intake will come to us on the higher freq.—if we are there. If we are not there, then Amateur Radio will be inflicting an act of injustice on that group.

Until quite recently the experimental section had to submit to whatever treatment was meted out to them. The position has now changed. The science of masers and lasers have opened wide the infra red to ultra violet part of the spectrum. There is no valid reason, under existing conditions, why the average experimenter should even be on the Amateur bands. The experimenters are being pushed higher and higher. Automation in the form of modern transceivers have invaded even the 144 MHz. band. If we are to hold our experimenters within our ranks, then this band should be held for them.

In the interests of Amateur Radio the removal of injustices to prospective members should not cause further injustice to be inflicted on our own members. I favour lowering that standard. I believe that there is room for all on our bands. This will not be so if we divide ourselves into the groups "the pushers" and "the pushed".

—A. J. C. Thompson, VK4AT.

Mr. J. Wright, of Clifton Hill, Vic., asks why there is so much objection to Novice licensing when for many years the Amateur bands had limited use. Despite the pleas "use the bands or lose them" parts were lost. If there had been such licensing years ago, it might have kept the bands going. He then asks that if we are not to have Novice licensing, what about updating the exam. paper similar to the New Zealand system of 50 questions with alternative answers for completion in three hours.

Of the two countries having the highest ratio of Amateurs to population, U.S.A. which has Novices and New Zealand which does not, seems to indicate the type of exam. is the reason in the latter case rather than a higher percentage of technically minded people there than in Australia. He is convinced the New Zealand exam. paper system is better than ours, particularly where the candidate is unversed in the P.M.G's present methods of examinations. His final two paragraphs read—

"In conclusion, I would like to say that it is a pity that the people who have their licences but spend a large portion of their time listening to 27.24 MHz. can't put this time to more use in helping some of the illegal operators on this frequency do the right thing, instead of simply rejecting them.

"Perhaps this wasted time could be put to better use by 'intruder watching' the bands that count."

Mr. Ian Loughnan, of Penrith, N.S.W., writes that he is a member of the Y.R.C.S. and is very interested in the possibility of a Novice licence scheme in the hopes he can enter Amateur Radio through this channel. Being aware of opposition to Novice licensing he asks why it should not become as good here as in the U.S.A. He hopes to enter the radio and communications field in due course and believes that his Y.R.C.S. studies plus operating an N.L. station would be good groundwork especially as he has already found that Y.R.C.S. courses have helped him in his school subjects, especially science. He believes he can keep up his school work and still have time for radio as a hobby. He, therefore, supports N.L.

INTRUDER WATCH

By Alf Chandler, VK3LC, Federal Co-ordinator

At long last tangible interest in the Intruder Watch organisation is beginning to be evident. Reports are commencing to come through, but we still need more Observers, and if you wish to free your bands of intruders it is very desirable to report them when you hear them, and "that is all the time"!!

The following extract from the U.S. is interesting: "Notwithstanding the frequency agreements, non-Amateur stations will be heard in the exclusive Amateur bands from time to time. There is unfortunately an anomaly in the regulations which allows an Administration to assign any station any frequency provided that no interference is caused to any station of another country operating in accordance with the allocations tabled. In other words, if Amateurs fail to object to interference from non-Amateur stations in the Amateur bands, the Administration concerned is justified in feeling it is complying with the regulations. Enough reports often result in the removal of the intruder concerned." Thus you see how important it is for us to appoint as many Observers as possible.

Another quote from overseas may be of interest: "I happened to catch two tactical stations working each other, and arranged for someone to break into their net in order to see what would happen. This was done by carefully zero beating one of the stations and sending groups identical to theirs. The sequence of their operation leads me to the following tentative description of their communication procedure. First is the call-up procedure—WTL9 de Y85D HJ'—the 'HJ' could mean QSA or simply K. Second, after the stations have established contact, the term 'XH' plus a number indicating the number of messages. 'TY' is frequently used in situations which could mean either QRV or QRX. Most frequently it is used when a station appears to have received a part of a message okay.

"The manner of operation is full break-in, and should a station miss a group he will send a series of rapid 'R R R' until he breaks the transmitting station. All groups consist of four letters: 'NDLB NJKP PLUT' etc. When the receiving station succeeds in breaking the transmitting station he asks for fills as follows: '24W'—meaning repeat group 24; the transmitting station then repeats the group and makes a short pause. Should the receiving station wish him to repeat it again, a long dash will obtain the desired result. Should persistent interference be encountered the station signals the other by a slow 'S' repeated several times. Should the interfering station sound like one of their own, they will then send 'DO', which I interpret as a request to identity. A response using a home-made call similar to their's was made. This was answered in one case by a request to wait—'AS'—and when the calling was persisted in, breaking their communication, they lapsed back into the 'S' business and began taking evasive action moving up and down without any apparent co-ordination, as though such evasive action is prescribed automatically as part of their procedure. When persisted in following them they went QRX, returning in three to five minutes."

I wonder if this procedure is ethical? It is very interesting though. What say?

AMATEUR FREQUENCIES:
ONLY THE STRONG GO ON — SO SHOULD A LOT MORE AMATEURS!

OBITUARY

JIM NEIDECK, VK3AIC (ex W3MEW)

Known to many who are active on the h.f. bands, Jim has been an active member of both the W.I.A. and the Eastern and District Radio Club since arriving here in Australia to live over three years ago.

Jim was born in Pennsylvania and lived in the town of Bethlehem, Penns., where he was employed as a Chief Engineer of the Pennsylvannie-Baltimore Railroad Co. Jim took part in many early developments of the teletype system used for communication within the railroad organisation.

Later his daughter married and moved to Australia to live. Her name is Laurie VK3AGO. Jim later also moved to Australia and, together with Laurie, gave puppet shows to many thousands of children in the primary schools.

Jim is considered a great loss, not only to Amateur Radio, but also to all groups and associations to which he belonged. Jim leaves a wife, Vi VK3BAK, and sister Mrs. Hanson, to whom we offer condolences.

CLIFFORD C. M. COUCHMAN, VK4KZ

Cliff was born near Toowoomba, Qld., in 1907 and passed away at Dalby, on the Darling Downs, on 17th Sept., 1971, after a short illness.

The holder of a Commercial ticket, he first joined the Amateur bands in 1930 and served for five years in the Royal Australian Navy during World War II.

Cliff was on the staff of National Broadcasting Station 4QS, Dalby, for 10 years, but left to devote full time to his electrical repair business and was widely known throughout the district as "Mr. Fix-it".

Although not active on the Amateur bands in recent years, he never lost interest in Amateur Radio. Cliff never married, and is survived by his sister, Miss Jean Couchman, to whom we offer our sincere sympathy.

QSL card of Vi VK3BAK and her husband, the late Jim Neideck, VK3AIC (ex W3MEW)

W.I.A. NOVICE INVESTIGATION COMMITTEE

Since the original Novice Report was submitted to the Easter Federal Convention in Brisbane the following proposals have been received from various sources and are submitted for consideration and opinion.

NOVICE LICENSING

Scheme No. 1—

That there should be a range of five grades of Amateur transmitting licences on the following basis:

(a) **Preliminary Licence.**—No Morse code test; Regulations as for A.O.C.P.; no Theory examination; a practical and oral test on equipment leading to the Third Class Commercial Licence (as issued to operators of fishing craft, pleasure craft, etc.); operation on v.h.f. only (probably areas in 144 and 432); voice operation only; equipment to be P.M.G. type-approved and commercially manufactured; limited power (say 5 or 10 watts).

Note: This form of licence would suit those who are "communicators" rather than "technicians". It would approximate to a hobby class of C.B. but would avoid the rivalry that exists between Amateur Radio and C.B. in U.S.A. and would add a group to the W.I.A. who would not enter the Amateur society under U.S.A. or N.Z. conditions. A special group could be set up within the W.I.A. framework to organise the activities of this group. Perhaps a limited tenure might be incorporated into the licensing conditions—perhaps not.

(b) **Technician Licence.**—Morse code test at 5 w.p.m.; Regulations as for A.O.C.P.; Theory examination at sub-A.O.C.P. level with concentration on v.h.f. techniques. Operation on v.h.f. bands or segments to be determined. 10 watts input. C.w. and r./t. operation. Limited tenure period—say two years.

(c) **Novice Licence.**—Morse code test at 5 w.p.m.; Regulations as for A.O.C.P.; Theory examination at sub-A.O.C.P. level with concentration on c.w. techniques. Operation on h.f. band segments to be determined—10 watts, crystal control, c.w. only. No time limit on tenure.

(d) and (e) **A.O.L.C.P.** and **A.O.C.P.** as at present.

Scheme No. 2—

That there should be a range of three grades of Amateur transmitting licences on the following basis:

(a) **Amateur Operator's Restricted Certificate of Proficiency.**—Morse code test at 5 w.p.m.; Regulations as for A.O.C.P.; Theory examination at A.O.C.P. level in Part A (Telegraphy transmission) section of A.O.C.P. exam. Operation with 10 watts, crystal control, c.w. only, band segments. Two years tenure.

(b) and (c) **A.O.L.C.P.** and **A.O.C.P.** as at present.

Scheme No. 3—

That there should be a range of four grades of Amateur transmitting licences on the following basis:

(a) **Amateur Operator's Certificate in Basic (or Preliminary or Restricted) Telegraphy.**—Morse code test at 5 w.p.m.; Regulations as for A.O.C.P.; Theory examination based on Part A (Telegraphy transmission) section of A.O.C.P. Theory examination; marks for pass 50 to 69 per cent; operation with 10 watts input; c.w. only, segments of (say) two Amateur bands—perhaps 80 and 40, or 80 and 15. Limited tenure for period to be determined.

(b) **Amateur Operator's Certificate in Telegraphy.**—Morse code test at 10 w.p.m.; Regulations as for A.O.C.P.; Theory examination—70 per cent. of marks (or more) in Part A of A.O.C.P. Theory examination. Operation with 100 watts, crystal, v.x.o., v.f.o. to control frequency, c.w. only, use of c.w. segments of all h.f. bands. No time limit on licence tenure.

(c) and (d) **A.O.L.C.P.** and **A.O.C.P.** as at present.

Note that reference is made to Part A of A.O.C.P. examination. A sample exam. paper to meet this format has been made out and is at present under discussion by Eastern Zone (Victoria) Novice Investigation Committee. This will be distributed as soon as it is returned from E.Z. with commentary.

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DIVISIONAL NOTES

DIVISIONAL CALENDAR

Listen also to Divisional Broadcasts

- 5 Nov. VK2—V.h.f. meeting; Hunter Branch meeting; Gosford meeting.
- 7 Nov. VK3—V.h.f. Field Day, 1100-1600 EST.
- 19 Nov. VK2—Gosford meeting.
- 21 Nov. VK3—Midland Zone's H.f. and V.h.f. Rally at Lake Eppalock.
  VK5—V.h.f. Group Picnic, Morialta.
- 24 Nov. VK2—V.h.f. Fox Hunt.
- 26 Nov. VK2—General meeting.
- 27 Nov. VK7—Zone Hamfest, Evandale Mem-
- 28 Nov. orial Hall from 1200 hours.
- 3 Dec. VK2—V.h.f. meeting (auction night); Hunter Branch meeting; Gosford meeting.
- 5 Dec. VK3—V.h.f. Field Day, 1100-1600 EST.
  VK5—V.h.f. Field Day, 0630-1030 and 1230-1530 EST.
- 11 Dec. VK2—V.h.f. Christmas Party; V.h.f. Fox Hunt.
- 12 Dec. VK3—E. & Mt. Dist. Rad. Club Xmas Outing all day, families, Yarra Glen.
- 17 Dec. VK2—General meeting (note third Fri.); Gosford meeting.

NEW SOUTH WALES

SEPTEMBER GENERAL MEETING

The Sept. general meeting held on Friday, 24th, heard a most interesting lecture given by Mr. C. Allan, VK2BLC, the N.S.W. Civil Defence Communications Officer. Charlie's subject was of course the Civil Defence Organisation. A vote of thanks was moved by P. Healy and carried in the usual manner.

Remember, the December general meeting is on Friday, 17th, which is the third Friday of the month.

CONCESSIONAL MEMBERSHIP

That concessional membership be granted to pensioners and full-time students, provided they make application to Council for consideration by an appointed committee which will consider each application on its merits. The rate will be 50 per cent. of the fees which normally prevail with no loss of status.

That the previous motion be retrospective to 1st March, 1971, provided application is made before 30th November.

SEPT. 2 METRE FOX HUNT

The fox was VK2OA and the final location was at Meadowbank. 1st, VK2AWZ (in after 25 minutes); 2nd, VK2ZGX; 3rd, VK2ZTD. Six cars at start at North Ryde. All hounds enjoyed a delicious supper prepared exquisitely by Mrs. Lark. Evening finished at approx. 10.15 p.m. (Carl VK2ZGX, Contest Manager.)

NEPEAN DISTRICT AMATEUR RADIO CLUB FIELD DAY, 26th SEPT., 1971

About 100 persons in all enjoyed the N.D. A.R.C. annual field day in ideal weather conditions. Some difficulty was experienced by the 7 MHz. hounds in the morning, but a re-run saw Dave VK2AWZ 1st—but still no second place getter. The special event—the smallest tunable home-brew receiver—posed a problem for the independent judges (Tim VK2ZTM and Tony VK2ACV) with the multimeter prize going to local club member Leo Michilak. Carl VK2ZGX did very well with three firsts and two seconds. Congrats. to Carl and all other prize winners. Dave VK2ZZN did not do too badly either.

An antique display was given by courtesy of Harold VK2AAH with very old working units of many varieties. Harold's technical quiz of "Jacobs Ladder" got many in for a prize of a pair of stereo phones.

What happened to the cryptic clue starters? They couldn't find the fox, nor their way back —some arrived back after prize giving at 4.30 p.m. The club hopes that everyone had a good time and hope to see you all again next year with your friends. Thanks also to our many donor firms and the N.S.W. W.I.A. Executive for generous support. (Publicity Officer, N.D. A.R.C.)

MEMBERSHIP APPLICATIONS PRESENTED GENERAL MEETING, 24/9/71

- Mr. R. Atkinson, 29 Macdonnell St., Yarralumla, A.C.T., 2600. Assoc.
- Mr. H. W. Buehler, C/o. Gulf Fisheries (N.G.), P.O. Box 920, Port Moresby, P. VK9HB, Full.
- Mr. G. Dunkley, 8 Chambers St., East Maitland, N.S.W., 2323. VK2ZDR, Full.
- Mr. D. Ford, School Residence, Austinmer, N.S.W., 2514. Assoc.
- Mr. R. N. Tregea, 22 Trebor Rd., Pennant Hills, N.S.W., 2120. Assoc.
- Taree OK Youth Radio Club, C/o. G. Hunziker (VK2BGF), 26 Chatham Ave., Taree, N.S.W., 2430. VK2BRC, Full.

VICTORIA

MODIFICATION TO MEMORANDUM AND ARTICLES OF ASSOCIATION

Council has given consideration to proposals aimed at widening members' representation on Council. These proposals have been forwarded to the Division's legal advisers and it is hoped that they may be implemented soon.

MORSE CLASS

A Saturday morning Morse Class has commenced, preparing students for the February 1972 examination. The scale of fees has been designed to give the benefit of worthwhile reductions to both full and associate members. The class is open to all and the fees are:

Full members	$5.00
Associate members	$15.00
Non-members	$25.00

For further details contact the Divisional office on 41-3535.

E.D.P. SYSTEM

The Division's records are being put on an E.D.P. system and your next renewal notice will be made out in this way. It is hoped to effect significant economies by the use of the E.D.P. system for membership records.

LILYDALE CENTENARY CELEBRATIONS

The Eastern and Mountain District Radio Club will be participating in the Lilydale Shire Centenary Celebrations during the week of the 12th to 19th February, 1972. The club intends to set up displays and to operate the club station VK3ER on all bands during the celebrations. This display is part of the club's drive for favourable publicity for Amateur Radio.

A multi-colour commemorative QSL card has been struck for the occasion. Contacts with VK3ER will also count as 2 points towards the club's Southern Cross Award (details last issue). (VK3AUI)

SOUTH AUSTRALIA

The Sept. Divisional meeting was well attended to hear and see a lecture by Rex Vinycomb describing the undenominational mission radio station EL2W in Liberia Africa. Members observed respect for the memory of Joe Kilgariff, VK5JT, an old timer quite active until recently with the assistance of Max VK5GF. Copies of information about Novice licensing were distributed for sub-committee discussions which should report at the Nov. meeting. Marshall VK5QO's motion to go ahead with the swap and shop was carried, details further on. The 23rd Nov. Divisional meeting will hear a lecture from Al VK5MF on slow scan t.v., a field of experimenting gaining popularity on h.f.

The Nov. V.h.f. Group meeting on Friday, 5th, will be a visit to a live t.v. production. For the V.h.f. Group Picnic (see Div. Calendar) good activities have been planned to keep the odd moments filled for all.

ACTIVITIES

The section leaders in the August VK5 intrastate contest on h.f. and v.h.f. were:

- Full licensees, metropolitan—VK5BW.
- Full licensees, country—VK5DK.
- Limited licensees, metropolitan—VK5ZLZ.
- Limited licensees, country—VK5ZTH.
- C.w. entries—VK5ZX.
- Multi-operator station—VK5LP/5.
- Receiving section—O. Schmidt.

All details are in the October journal.

Marshal VK5QO has brought an idea from his native Detroit that could prove very popular. His swap and shop proposal is an advance on the standard jumble sale auctions which have been flooded with low grade equipment. This idea which has gained huge popularity in the U.S. is for a Sunday afternoon gathering where members can bring good equipment now gathering dust, and by renting suitable table space, do their own bargaining face to face. The only financial advantage to the Division is a door entry charge proposed at 20 cents per head, and the table space rental fee, again proposed is 20 cents.

Marshall's committee of Phil VK5NN, Arn VK5XV and Jim VK5NB have organised the first swap and shop for Sunday, 14th Nov., from 12 noon till 5 p.m. at Symonds Place, Adelaide, behind the Repco building, King William St., which has plenty of parking space.

This will be a most enjoyable afternoon, just meeting old friends, but to make it the huge snowball it can be, everybody must bring something to sell, so don't leave it to the next chap, that half completed transmitter will be useful to someone. (Bart VK5GZ)

WESTERN AUSTRALIA

360 questionnaires were sent out in February to all members of the Division and 223 were returned, of which 198 were completed. The nature of the replies were most informative. 25 per cent. had been members for less than two years and 36 per cent. had been members for over 10 years. 56 per cent. did not use the QSL Bureau at all, and of those who did use the Bureau 59 per cent. get their cards at Divisional meetings. Nearly everyone believed the Division should have cash in the bank, the majority favouring a kitty of $500 to $1,000. The majority thought that the full member subscription should be $7 per annum, though there was a substantial number who thought the subscription should be $10 or between $8 and $10.

In the listings of how the Division could improve its appeal, the majority thought there should be club premises with facilities, gear, lectures and streamlining business with finishes on time. Some wanted more social functions and more publicity. Way down the list were specific ideas such as news services on the broadcasts, less sniping at Council, encouraging Y.R.C.S., greater membership and so on.

Full details of the results of the questionnaire were listed in the W.A. Bulletin for July and is interesting study material.

VICTORIAN DIVISION W.I.A.
MIDLAND ZONE

HF and VHF RALLY

on

SUNDAY, 21st NOVEMBER

to be held at

LAKE EPPALOCK

in the

BENDIGO POWER BOAT CLUB ROOMS

Programme includes HF and VHF Scrambles, 2 mx Fox Hunt, 2 mx and 80 mx Tx Hunts, Trade Displays, and competitions for all the family. B.Y.O. eats, Barbecue and Picnic facilities available.

Further details from the W.I.A. Broadcasts or Zone Secretary, Bill Clark, VK3FY, High St., Kangaroo Flat, 3555.

FEDERAL AWARDS

COOK BI-CENTENARY AWARD

The following additional stations have qualified for the Award:

Cert. No.	Call	Cert. No.	Call	Cert. No.	Call
1395	AX3HE	1401	K4PRT	1408	UK9OAW
1396	ZL3SZ	1402	YU4EBL	1409	UK4WAB
1397	LU4ECO	1403	ZL3ABC	1410	UK2FAD
1398	AX7FB	1404	DL1ES	1411	UA0FD
1399	W5DJ/2	1405	AX4ZJ	1412	F6ATE
1400	JA1WVK	1406	ZL1ASY	1413	G3ZY
		1407	UA0ZS		

D.X.C.C.

The following additions have been made to the Australian D.X.C.C. Countries list:

3C0—Annobon
—Abu Ail, Jabal at Tair
—Melish Reef

Although operation has not as yet taken place from Melish Reef, credit will be given to any future operation from there.

— • • • —

VKs HEARD ON 160 METRES

The following table is an analysis of VK calls heard on 160 metres in Western Australia during 1970, showing monthly figures, the result of 289 daily checks. All calls were counted once only on any one date. The aggregate total shows an increase over 1969 of 81 per cent.

Month	VK1	VK2	VK3	VK4	VK5	VK6	VK7	VK9
Jan.	0	0	11	0	3	6	0	0
Feb.	0	0	0	0	0	0	0	0
Mar.	0	0	5	0	4	2	0	0
Apr.	0	0	7	0	2	0	0	0
May	0	0	13	1	10	0	3	0
Jun.	0	0	3	0	0	9	0	0
Jul.	0	4	9	0	11	23	0	0
Aug.	0	4	20	0	11	25	0	0
Sep.	7	7	40	0	12	18	0	1
Oct.	7	7	30	0	9	29	0	0
Nov.	0	0	3	0	8	20	0	0
Dec.	0	0	3	0	3	30	0	0
Totals	14	22	144	1	73	162	3	1

—George Allen, L6042.

SILENT KEYS

It is with deep regret that we record the passing of—

VK2WF—B. Forman.
VK2AGH—G. Hall
VK3AIC—J. Neideck
VK3ZQR—G. Thomson
VK4KZ—C. C. M. Couchman

HAMADS

Minimum $1 for forty words
Extra words, 3 cents each

HAMADS WILL NOT BE PUBLISHED UNLESS ACCOMPANIED BY REMITTANCE

Advertisements under this heading will be accepted only from Amateurs and S.w.l's. The Publishers reserve the right to reject any advertising which, in their opinion, is of a commercial nature. Copy must be received at P.O. 36, East Melbourne, Vic., 3002, by 5th of the month and remittance must accompany the advertisement.

COMPLETE SSB Station comprising: Heath SB101 Transceiver, $380. Heath SB640 External VFO, $100. Heath SB600 Loudspeaker, $20. Heavy duty Power Supply, $85. Will accept $550 for complete outfit. 240 watt SSB Transceiver, 20/40/80 mx, $175. 900 volt 300 watt Power Supply, $85. VK3TD, Phone 783-9633 or 787-1407 A.H. (Melb.).

FOR SALE: As new Trio TS510 Transceiver plus matching 240v. AC mains power supply and matching remote VFO 5D. All facilities provided and 160w. p.e.p. Suitable for VHF Transverter operation also. This is the latest Transceiver from Trio. Mic and desk stand, connecting leads, plugs, handbooks, alignment tool, spare relay and spare set of valves included. Priced for quick sale, $425. Phone or telegram Melbourne (03) 20-4329, VK3ZZX.

FOR SALE: Collins KWM2 with attached PM1 Power Supply incl. Speaker. Collins MM1 Mike, suitcase job, $650, cost $1900. Webster Bandspanner, $50. Johnson Matchbox with SWR meter, etc., $50. Mosley Tribander TR33 Jr. with motor and remote control, $90. BC221 with book and service manuals, AC powered, $35. Take $830 the lot. Kinnear, Flat 17, 417 Toorak Rd., Vic., 3142, or phone 24-8513.

FOR SALE: FT-DX-400 with matching Speaker, circuit, and instruction book. Unit is just over two years old and is as new condition, $350. Kyoritsu SWR meter, $15. Astatic Microphone with desk stand, $35 (new price $60). This is the ideal microphone for SSB. For the lot will accept $380. I. Browne, VK4DB, 32 Duignan St., Cairns, Qld., 4870.

FOR SALE: Complete Sideband Station: 300 watt PEP Phasing Transmitter, heavy duty Power Supplies, modified AR7 Receiver, Crystal Converter, 40-20-15, the lot for $130. VK4NB, 95 Gatton St., Mt. Gravatt, Qld., 4122. Phone 49-4615.

FOR SALE: Linear Amplifier, 80 through 10 metres, GG parallel 4-400As, capable of 1 KW PEP and matching PS. Fully metred and safety protected. Forced air cooled. $170 o.n.o. Contact R. Wyllie, VK3BBZ, Phone 399-1311 Ext. 454 or A.H. 12 Balmoral St., Laverton, Vic.

FOR SALE: MR20A 2 FM Transceiver, 6146 final, FET pre-amp., 2-channel relay switching, A.W.A. Carphone power unit. Mobile power supply and controlling gear. The lot, $50. Tim Robinson, VK3YBP, 52 Warrandyte Rd., Ringwood, Vic., 3134. Phone (03) 870-5302.

FOR SALE: National NC300 Receiver, 160 to 10 metres, plus VHF Converter bands, Xtal Filter and Calibrator, switched selectivity, etc. Excellent physical and working condition. Price $195 or best offer. VK2GR, 18 Queens Rd., Asquith, N.S.W., 2078. Phone 47-4344 (Syd.).

FOR SALE: Splendid Grundig Satellite 6001 Portable Receiver, complete, SSB/CW, also normal AM and FM; torch cells or mains powered, as new, $240. Honda E800E small portable electric generator, good condition, AC 50 Hz., to 1 KW., plus 12 volt DC output, $180. KW2000A Transceiver, complete (includes 160 mx), average condition, $275, and mobile PSU $65. VK3CIF, C/o. Federal Executive.

FOR SALE: Swan 350 5-band Transceiver, complete with AC Power Supply, Speaker, Microphone, Manual plus D.C. Mobile Supply, deceased estate, best offer to G. Sabin, 27 Fishbourne Rd., North Manly N.S.W., 2100.

FOR SALE: Transistor Type Vidicon Deflection Yokes, $10. Vidicons, one inch, 2nds, $12. 5UP1 (F) CRT, $8. Z1020 Nixie Digital Counter Tubes, $1.50. Z505S Counter Tubes, $1. Contact VK2ZPM. Phone 476-2304 (Syd.).

FOR SALE: Trio JR60 Receiver, excl. condition, $140 o.n.o. SCR522 Transmitter, working on 2 mx AM, 4 channels plus 240 v. power supply, $50. MR10C Low Band Transmitter only, $5. VK2ZHR, 131 Tudor St., Hamilton, Newcastle, N.S.W., 2303. Phone 69-1498.

FOR SALE: 200W PEP Multi-band SSB Transceiver, mechanically complete, part wired, $55. New 9 MHz. Xtal Filter and Carrier Xtals, $24. AC PSU to suit above and Galaxy Transceivers, $15, or $85 the lot. 48 Orchard St., Glen Waverley, Vic. Phone 232-9492.

MARCONI AD704 Navigation-Communication Receiver, 108 to 136 MHz., 560 channel capability, about 100 channels and 20 crystals installed of 36 total. Triple conversion, modular construction, 400 hertz, 230v. power supply. Easily converted to 240v. a.c. $50. Phone 93-1638, Melbourne.

WANTED: A.R.R.L. Handbook, 1955-60 vintage. Phone 359-1039 (Melb.).

WANTED: Band-change motors and L-R indicator drive transformers to suit 24 volt Bendix MN26 Radio Compass sets. Transformers are marked T16 or A15064. State price required. Also Vintage Radios complete with Horn Speaker, early 1920's good price paid, send details. O'Brien, Edgar Rd., San Remo, Vic., 3925. Phone 107.

WANTED: FL-2000B, FLDX-2000 or SB-200 Linear Amplifier. Must be in first class condition, by R. K. Lyon, VK6LK, 450 Riverton Drive, Riverton, W.A., 6155.

WANTED: Murphy British Naval VLF Receiver or similar type tuning down to 10 KHz. or lower. R. F. Fisher, VK3BAO, 241 Royal Pde., Parkville, Vic., 3052. Phone (business hours) 340-5931.

WANTED: Rotary Converter to restore R.A.N. Type S Synchronous Rotary Gap Spark Transmitter. Output 70 v.a.c. at high frequency, probably 500 Hz. Unit will probably have 24 field poles and can be identified by an extension shaft coming out one end for driving rotary gap. R. F. Fisher, VK3BAO, 241 Royal Pde., Parkville, Vic., 3052. Phone 340-5931 (business hours).

WANTED: Vintage "Wireless" components of 1920s era for restoration of early receivers, particularly 4-volt triodes, horn-type or separate loudspeakers. Philips or other type "battery eliminator" supply particularly required. Also early wireless literature. J. Abell, 22 Princes Crescent, Shepparton, Vic. Phone Shepp. 21-2367.

WANTED: Wire Recorder 240v. AC Pyrox or similar. Pre-1930 Wireless's, parts, books or any other material. Colin Gracie, Post Office, Cavendish, Vic., 3408.

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★ 500 watts PEP, five bands
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★ RIT: Plus or minus 5 KHz.
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★ AM reception

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SUPER 3500LA LINEAR AMPLIFIER

- Full legal power
- Electronic ALC
- Input harmonic filter
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- Five 6KD6 GG Triodes for high plate dissipation

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amateur radio

Vol. 39, No. 12

DECEMBER, 1971

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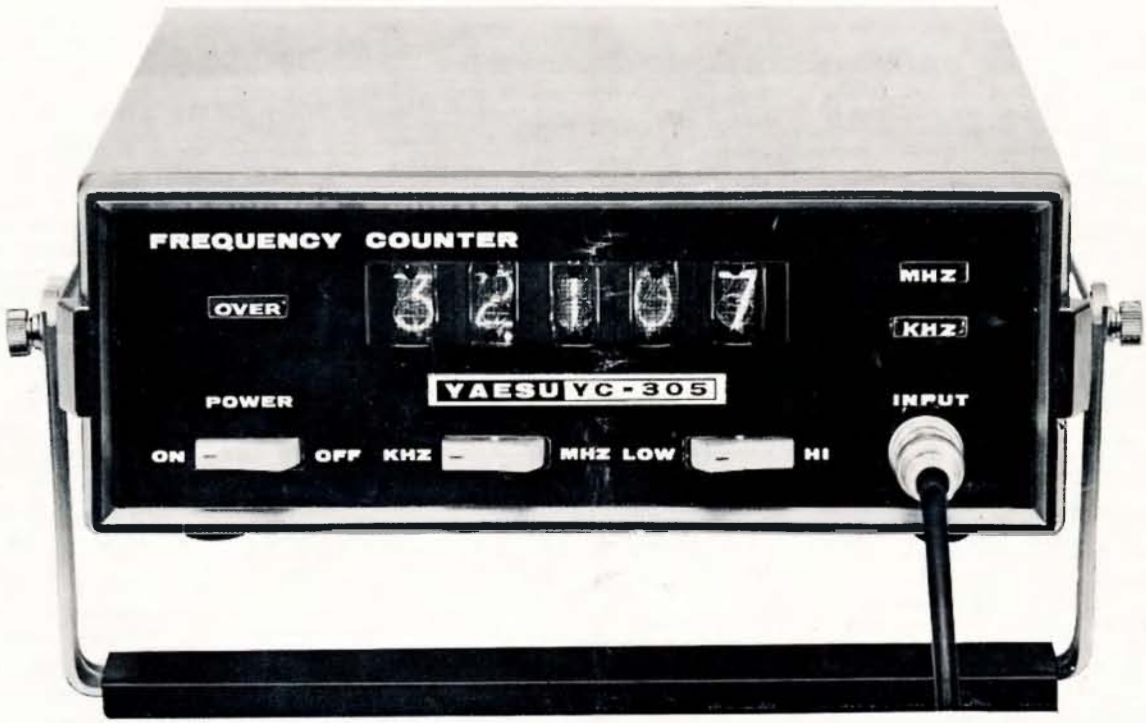

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Postage 10c.

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MR2P METERS: square, face size 1¾-in., M/Hole 1½-in., res. 99 ohms. 0-1, 0-25, 0-250, and 0-500 mA. **Price $5.00 nett.**

MR2P METERS: 0-5, 0-15, 0-30, 30-30 Amps. (Res. SOM/V). **Price $6.50 nett.**

MR2P METERS: 0-15 volt DC, 0-30 volt DC. **Price** $5.50.

MR2P METERS: 0-50, 0-100, 100-100, 0-500 uA. (Res. 900 ohms). **Price $6.75.**

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MO65 METERS RES.: 0-15, 0-30, 0-300 volt DC. **Price** $5.40 nett. Postage 20c.

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MASTER METERS: New. Model S212 24F/498. Face size 3⅛-in., M/H 2¾-in. C/R 1-1 mA. Plain face. **Price** $3.70 nett. Postage 20c.

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Sizes: 0.001, 0.0022, 0.0033, 0.0047, 0.0056, 0.0068, 0.0062 uF. **Price 12c each.**

Sizes: 0.01, 0.022, 0.033, 0.039, 0.047, 0.056, 0.082 uF. **Price 15c each.**

Sizes: 0.1, 0.22, 0.33, 0.39, 0.47 uF. **Price 18c each.**

1 uF. (200v.w.), 2 uF. (200v.w.). **Price 58c each.**

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½ watt 8c each, 1 watt 10c each.

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Five bands, a.m., c.w., s.s.b., Amateur and Short Wave, 150 to 400 KHz. and 550 KHz. to 30 MHz. FET front end. Two mechanical filters. Huge dial. Product detector. Crystal calibrator. Variable BFO. Noise limiter. S meter. 24 in. bandspread. 230v. a.c./12v. d.c., neg. earth operation. RF gain control. Size: 15 x 9¾ x 8¼ inches. Weight 18 lb. S.A.E. for full details.

Price $199.50 net.

LAFAYETTE HA800, solid state, as above but **Ham** Band only. SSB-AM-CW. **Price $195 net.**

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Four-band receiver covering 550 KHz. to 30 MHz. continuous, and electrical bandspread on 10, 15, 20, 40 and 80 metres. 8 valves plus 7 diode circuits. 4/8 ohm output and phone jack. SSB-CW-AM, ANL, variable BFO. S meter, sep. bandspread dial, i.f. 455 KHz., audio output 1.5w., variable RF and AF gain controls. 115/250v. AC mains. Beautifully designed. Size: 7 x 15 x 10 in. With instruction manual and service data.

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Speaker to suit, type SP5D, $15.30 incl. tax.

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Solid state, four bands covering 535 KHz. to 30 MHz., fully transistorised, SW/CW/SSB/AM board-cast. 240v. a.c. or 12v. d.c. operation. Product detector for SSB/CW plus fast and slow a.v.c.; variable pitch b.f.o.; illuminated electrical band-spread, fully calibrated for Amateur bands, cascode r.f. stage; a.n.l. for r.f. and a.f.; zener stabilised; o.t.l. audio; illuminated S meter; built-in monitor speaker.

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Matching speaker to suit, **$13.60**

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Priced at a reasonable $34.50. Postage 50c.

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Telephone Inter-communication Set with signal bulb, two U2 batteries. Ideal for children. **Price** $6.75. Postage 30c.

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8 watts r.m.s. per channel. Input for magnetic, crystal and ceramic type microphone. P.V. cartridges, tape recorder input and output, tuner input, stereo headphone jack.

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Professional quality (well known brand). Large earpads, standard stereo plug, 6 ft. lead.

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Type T530 Tubular Extension Speakers, 8 ohms, new. Complete with lead and two plugs 2.5 and 3.5 mm. **Price $4.30.** Postage 20c.

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amateur radio

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ACKNOWLEDGMENTS: If you write to Federal Executive or to the Editor no acknowledgment is sent out unless you specially request one. Better still, for important items, send them certified mail.

★

Members of the W.I.A. should refer all enquiries regarding delivery of "A.R." direct to their Divisional Secretary and not to "A.R." direct. Two months' notice is required before a change of mailing address can be effected. Readers should note that any change in the address of their transmitting station must, by P.M.G. regulation, be notified to the P.M.G. in the State of residence; in addition, "A.R." should also be notified. A convenient form is provided in the "Call Book".

CONTENTS

COVER STORY

The Yaesu YC-305 Frequency Counter is the latest product from that world famous company to appear on the market. Five-digit display with eight-digit capability reading to 30 MHz., and operating from 117/234V AC or 12V DC, makes this a very versatile instrument. Further information from the Australian agent, Bail Electronic Services.

FEDERAL COMMENT:

"FOUR PEOPLE"

Christmas and the end of 1971 is now only a few weeks away.

I wish to look back at the year just past in one particular aspect, that is the role that has been played in our Federal affairs by four people. Each of these people have been members of the Federal Executive; each has in one way or another made a great contribution to the Federal organisation. It is only right that I should draw your attention to their work at the close of this year, as in each case the Executive has lost their services during 1971.

During this year Peter Williams, VK3IZ, resigned both as a member of the Federal Executive and as Federal Secretary. Peter first became a member of the Federal Executive in January 1965, and was Federal Secretary from Easter 1965 to his retirement, with a break of only one year, when he was Assistant Federal Secretary to John Battrick.

Peter was, of course, the last honorary Federal Secretary. The role of the Federal Secretary is now undertaken by the Federal Manager. The Federal Secretary is a person that in the past has determined the effectiveness of the Federal Executive. As I pointed out so many times prior to the engagement of a paid Federal Manager, the work-load on the Federal Executive became in recent years, intolerable. A large part of this burden fell naturally upon the shoulders of the Federal Secretary.

Apart from long experience, Peter Williams brought to the job a real and lively interest in international affairs. He was one of those responsible for the Wireless Institute of Australia taking the initiative in inviting Amateur Societies in other countries to participate in the Inaugural Congress of the I.A.R.U. Region 3 Society in 1968. It was only natural that Peter would become the first Secretary of the Regional organisation. Peter has, of course, retained that role and whilst he has stepped down from the Executive he has retained his interest in the Wireless Institute as a member of the Victorian Division Council.

The second person to whom I wish to refer is Ken Pincott, VK3AFJ. Ken has been a member of the Publications Committee since 1954 and has been Editor of "Amateur Radio" for five years. He has been a member of the Federal Executive for three years and before that has, at various times, been a member of the Victorian Division Council and was President of the Victorian Division from mid 1965 to mid 1968. A little over a year ago, Ken indicated that he wished to resign as Editor of "Amateur Radio". He was persuaded to remain to allow the Institute time to employ a Manager who would undertake a significant part of the work associated with the production of the magazine and has remained until now both Editor and a member of the Federal Executive.

He has now finally resigned, both as Editor and as a member of the Executive. His service to the Institute has been recognised by the granting of an Honorary Life Membership which was presented to him at the Federal Convention in Brisbane at Easter this year. Ken, as Editor of "Amateur Radio," undertook an enormous work-load. He brought both experience and innovation to the magazine. During the period of his editorship I am sure most of the readers of the magazine will agree that it improved in all ways. As a member of the Executive, Ken contributed much with his long experience and critical approach.

Bill Roper, VK3ARZ, was a member of the Federal Executive for only 18 months. Bill, of course, had prior to this appointment, been a member of the Victorian Council, a member of the Publications Committee and at one time or another had undertaken virtually every job going within the Victorian Division. He was the Treasurer for the Federal Executive during a critical period. Without his assistance, I am sure the Federal Executive would, on the financial side, have had considerable difficulties. It was Bill who set the pattern that the Manager has been able to continue. Bill was forced to resign during 1971 because of ill health. He remains interested in the Institute and I would not really be surprised if one day we were not able to lure him back to the Federal team.

We were all saddened by the passing of George Pither, VK3VX, on 2nd July, 1971. George had been a member of the Federal Executive since early in 1967. He had been particularly concerned with Intruder Watch and with I.T.U. representation. He had only become an Amateur following his retirement from the Royal Australian Air Force as an Air Commodore, and we were lucky that the Institute was one of his many interests. I have read so many sincere tributes to George that I find it hard, even after this lapse of time, to express the tremendous debt that the Institute owes to this man. George had his own particular brand of enthusiasm, it was quite infectious and coupled with his great experience, he was an invaluable member of the Federal team. The reality of his enthusiasm for Amateur Radio can perhaps be best demonstrated by the fact that he, accompanied by his wife, went to Tokyo for the Region 3 Conference at his own expense, using the conference as the centre point for a tour of South-East Asia only a few months before his death. I respected his judgment, admired his enthusiasm and valued his support.

I have called this Federal Comment "Four People". To each of them we all owe a lot. I draw your attention to their contribution, and for us all I say, simply, thank you.

—MICHAEL J. OWEN, VK3KI,
Federal President, W.I.A.

Seasons Greetings and best wishes to you all for a Very Merry Christmas and a Happy and Prosperous New Year.

VK3 SIX METRE CONVERTER

Developed by the VK3 SPECIAL PROJECTS GROUP

There have been many new developments in the type and diversity of semiconductor design and techniques since the development of the 6 Metre Converter by the VK3 V.h.f. Group in 1967. The committee responsible for the development of this updated model felt that Amateurs wishing to use the 6 metre band of 52-54 MHz. would appreciate a new kit being made available using some of the more modern techniques and semiconductors.

DESIGN CONSIDERATIONS

The design parameters set down by the committee for this Converter were as follows:—

(1) A low noise figure, consistent with the inherent atmospheric noise found on the 6 metre band.

(2) Excellent cross modulation characteristics, particularly against adjacent television transmissions.

(3) Sufficient conversion gain, to allow the converter to be used with tunable i.f. receivers which have wide differences in their input sensitivities.

(4) The converter should have an untuned, impedance matching output stage.

(5) The output frequency range should be from the broadcast band to 28 MHz.

(6) The converter should use locally available components and cost less than $25 to construct. This price should also include the price of the crystal.

Many discussions have taken place in this magazine on the subject of converter noise. In the articles on the design of the 2 metre and 70 cm. converters this topic has been dealt with in excellent form and this leaves very little to add. During the development of this converter it was felt that the lowest noise figure was desirable, however there is a limit below which reducing the converter noise figure would bring no real benefit. External noise at 6 metres is made up of man-made electrical noise (a real problem), atmospheric and cosmic noise. Although a quiet location may eliminate man-made electrical interference, the atmospheric and cosmic components are still present. These combined are generally considered to average out at about 4 dB. at 52 MHz.

Without becoming involved in a discussion on noise measuring techniques it was decided to measure the noise and gain figures of this converter by the same method used on the VK3 V.h.f. Group's 144 and 432 MHz. Converters. The equipment used for these determinations was a Rhode and Swartz Psophometer.

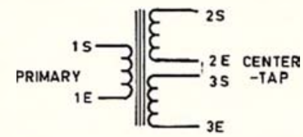
If the basic circuit is examined it can be estimated where noise will be generated. The bandpass r.f. filter has an insertion loss of 0.5 dB. and the i.f. amplifier stage (Q3) a noise figure of 2 dB. The conversion loss of the balanced mixer has been shown to be close to 7 dB. The combined total of these figures would give such a converter an effective noise figure of 9.5 dB. By including a low noise pre-amplifier ahead of the mixer circuit, the noise figure of the converter can be reduced to that of the amplifier by ensuring that this pre-amplifier stage has a gain of at least 10 dB. above the figure previously calculated. The device finally selected was the Motorola MPF121. This MOSFET gives in an unneutralised configuration 25 dB. of gain, which is slightly more than required. Because a balance between gain and cross modulation must be reached, r.f. amplifier gains much higher than this are undesirable.

The input sensitivities and related signal-to-noise ratios of modern communication receivers are of such a nature that only moderate conversion gain is necessary to produce very good results from a converter. However, many types of receivers, some of which come from disposal sources, require a higher conversion gain to produce optimum performance. The conversion gain of this converter may be varied by inserting the required value of resistance in the source of the i.f. amplifier. The value of this resistance R9 and the conversion gain obtained with an i.f. output at 8 MHz. is shown in Fig. 5. Slight differences in conversion gain to that shown in Fig. 5 will result at different i.f. frequencies with the tendency of the gain to decrease as the output frequency increases.

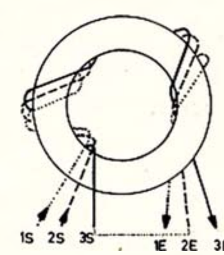
DESCRIPTION

The circuit diagram is shown in Fig. 1. The converter has been designed round a double balanced hot-carrier diode mixer. Hot-carrier diodes make high frequency mixing in this type of circuit possible and although diodes may be used it was felt that the extra cost of the HP-2800 diodes were justified when the results of the converter were assessed.

The balanced mixer transformers use ferrite toroids. The windings are close coupled and when used in conjunction with the hot-carrier diodes may be used at frequencies in excess of 200 MHz.



SCHEMATIC OF T1 & T2 SHOWING TRIFILAR WINDINGS



WIRES 2E & 3S TWISTED TOGETHER TO MAKE TRANSFORMER CENTER-TAP

FIG 2. TOROIDAL TRANSFORMERS

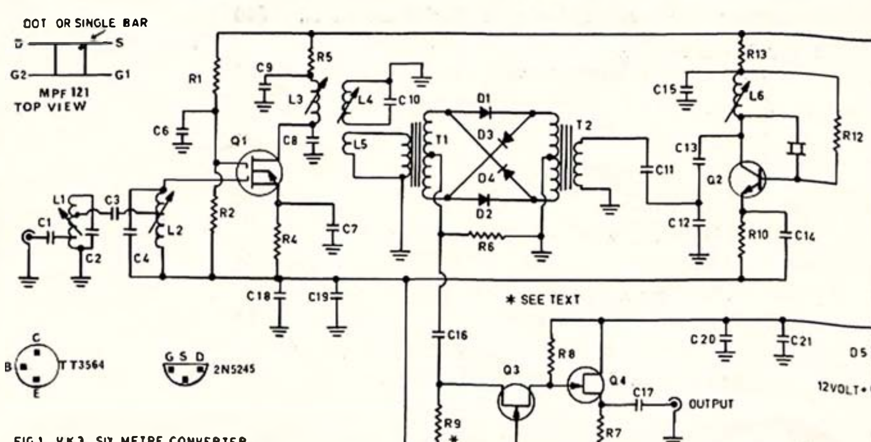


FIG. 1. VK3 SIX METRE CONVERTER

C1, C6, C7, C9, C14, C15, C16, C19, C21—0.001 uF.
C2, C4, C13—15 pF.
C3—3.3 pF.
C8—27 pF.
C10—22 pF.
C11—68 pF.
C12—150 pF.
C17—0.0047 uF.
C18, C20—0.047 uF.
C5—not used.

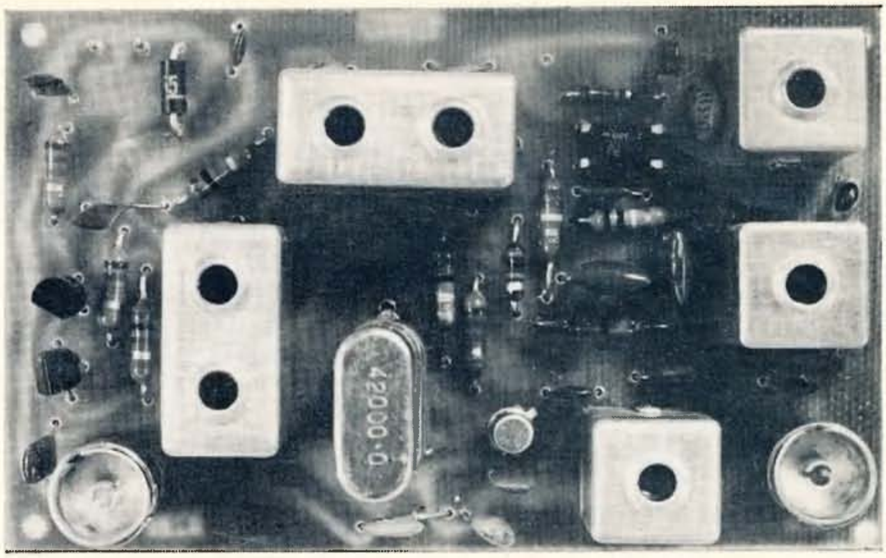
Single tuned front-end:
C2, C3—not used. C4 changes to 6.8 pF.

R1—82K ohm.
R2, R12—100K ohm.
R4, R9—220 ohm.
R5, R13—100 ohm.
R6—1K ohm.
R7—2.7K ohm.
R8—6.8K ohm.
R10—1.5K ohm.
R3, R11—not used.
D1 - D4—HP2800 hot-carrier diodes.
D5—SD55 silicon diode.
Q1—MPF121 or similar.
Q2—TT3564 or 2N3564.
Q3, Q4—2N5245/TIS88 or similar.

* C/o. 478 Victoria Parade, East Melbourne, Vic., 3002.

The method of winding these transformers is shown in Fig. 2 and provided the drawings are followed it is easy to make an acceptable double balanced mixer. Due to the small size of the ferrite toroids, it is possible to build the complete mixer within the area of a double Neosid can. Not only does this give good isolation, but of greater importance, reduces local oscillator radiation from the converter.

A double tuned bandpass filter is used in the front end, however this is not a mandatory requirement. The input coil L1 can be omitted if required and the input tap from the aerial made on L2. The r.f. amplifier uses the MPF121 MOSFET. Unlike devices as the 3N140, the makers have built into the silicon chip small diode elements which protect the insulated gates and allow the device to be handled in a similar manner to JFETs and bipolar transistors. The output of the pre-amplifier passes into a further tuned pair of L3 and L4. Due to the low input impedance of the balanced mixer, a link L5 over the hot end of L4 is used.



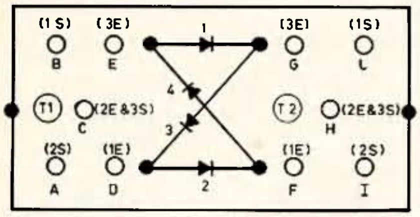


FIG. 3. BALANCED MIXER LAYOUT

A source follower output stage is used to match into the front ends of tunable receivers. The input impedance of this stage is high and to match this to the low impedance output of the mixer a grounded gate i.f. amplifier is used. The gain of this stage can be varied by the selection of a suitable resistor R9 from the graph in Fig. 5.

The oscillator uses a third overtone crystal and injection into the mixer at the correct impedance is via the capacitive dividing network of C12 and C13.

The converter has been designed with both the positive and negative supply rails isolated from earth. Diode protection has been included in the positive supply rail. The diode will protect the semiconductors against a reversed voltage supply, but will not serve any purpose against transistors incorrectly mounted in the board.

A supply voltage of 11-15 volts at 15-20 mA. d.c. is required. The design voltage was 12.6v. The converter is constructed on an epoxy fibre glass board 4½" x 2½". All capacitors below 200 pF. are NPO disc ceramic. Above this value, ceramic or polyester capacitors can be used. Resistors must be of small physical dimensions and ratings up to ¼ watt are suitable. The coil formers used are Neosid type A (single assembly) and type B (double assembly), both with screening cans. F29 v.h.f. tuning slugs are used throughout.

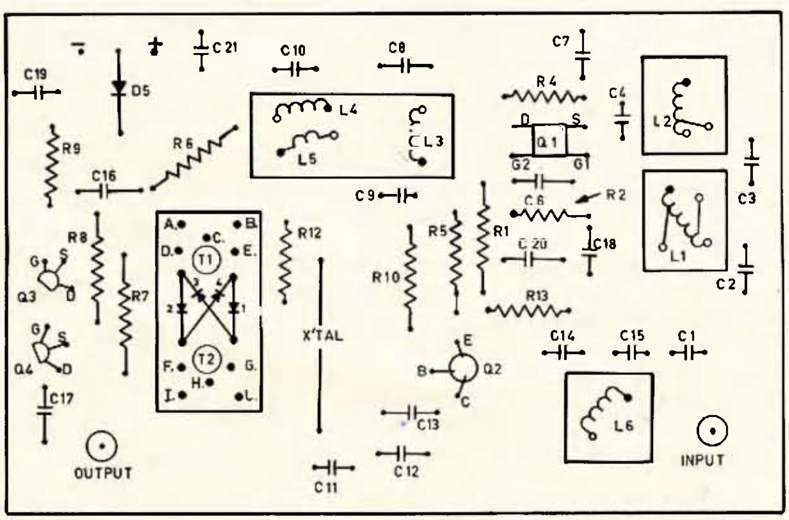


FIG. 4 BOARD LAYOUT

PERFORMANCE

All prototypes measured had noise figures of better than 3.5 dB. The conversion gain is adjustable from 25 dB. to 60 dB. One unit was measured at 52.5 MHz. with an i.f. output of 8 MHz. at a maximum of 68 dB.

When using the double tuned front end with all coils peaked on 52.5 MHz., a —3 dB. bandwidth of 250 KHz. was obtained. By stagger tuning each of the bandpass pairs 250 KHz. either side of the centre frequency, a —3 dB. bandwidth of 750 KHz. was obtained. L1 and L3 were adjusted to the higher side and L2 and L4 to the lower side. Eliminating L1 and peaking all coils on 52.5 MHz., a —3 dB. bandwidth of 460 KHz. was obtained. The stagger tuning of L2, L3 and L4 resulted in a bandpass in excess of 1 MHz.

No measurements of cross modulation have been performed. However, qualitative on-air tests have shown that the converter exhibits excellent characteristics.

CONSTRUCTION

Full constructional details will be supplied with the kits which will be available early in December. For those not wishing to obtain a kit, a few hints may be useful.

First wind the balanced mixer transformers. This is done by taking three by two-foot lengths of 30 gauge B. & S. enamelled wire and carefully twisting them together until five turns per inch is reached. Cut this twisted length in half, one piece for each of the transformers. Wind twelve turns onto each toroid and label the ends as shown in Fig. 2. If a printed circuit board is not being used, the two transformers and four diodes can be mounted on a Neosid type B base and the appropriate wires soldered to the pins. The unit can then be covered with a type B aluminium can.

The remaining components can be mounted in any order. However, we have found it expedient to mount the coil formers and wind the coils as the next step. Although no special precautions are necessary for handling the semiconductors, they should be pushed down to ⅛" from the board.

ALIGNMENT

With the supply voltage connected, tune the oscillator coil L6 for maximum voltage drop across R10. The 5-volt range of a multimeter will be suitable. Switch the supply voltage off and on a number of times to ensure that the oscillator starts reliably each time.

Wind all v.h.f. slugs fully in and then apply a suitable signal to the converter. If a signal generator is not available, an oscillator can be built using the transmitter crystal. A suitable circuit was published in an excellent article written by R. Higginbotham in "Amateur Radio," December 1970, page 9.

Tune L3 until a signal is heard in the receiver. The remaining coils can now be tuned, starting with L4 and working towards the aerial coil L1. As each coil approaches resonance a slight amount of interaction may be noticed. Reduce the signal strength and re-peak each coil, starting at L3 again until maximum sensitivity over the desired bandpass is achieved.

If required, the converter gain can now be adjusted. A number of Amateurs have found it a good rule of thumb to increase the gain until the aerial noise produces a 1-2 dB. reading on the signal strength meter, but others increase the gain until a small amount of aerial noise is just heard. However, as this is a matter of choice, it is best left to the Amateur to satisfy his own individual requirements.

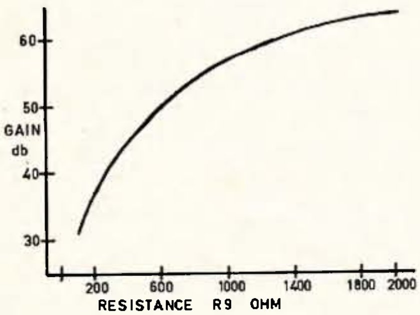


FIG. 5 CONVERTER GAIN

COIL DATA

General:

L3—8½ turns 24 B. & S. wire, close wound.
L4—8 turns 24 B. & S. wire, close wound.
L5—2 turns 24 B. & S. wire, close wound, close coupled to L4.

Double tuned front-end:

L1—11 turns 24 B. & S. close wound, aerial input at 3 turns from earth end, output to C3 at 8½ turns from earth end.
L2—10½ turns 24 B. & S. close wound, input from C3 at 8 turns from earth end.

Single tuned front-end:

L1—not used.
L2—10½ turns 24 B. & S. close wound, input from CI at 3 turns from earth end.

Oscillator Coil, L6:

Close wound with 24 B. & S. wire.

Freq. of Crystal	No. of Turns
48-52 MHz.	10
42-48 ,,	12
38-42 ,,	15
34-38 ,,	18
30-32 ,,	23

AVAILABILITY

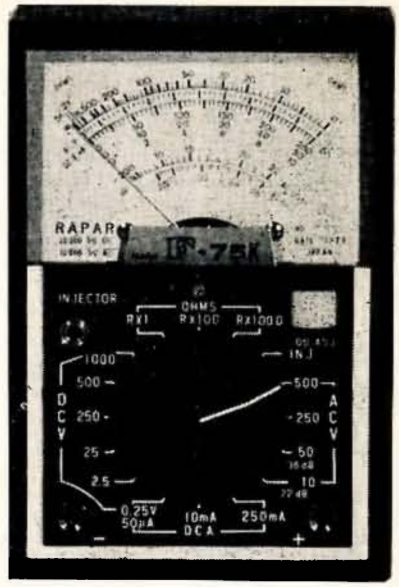
A limited number of these kits will be made available through the Disposals outlet of the VK3 Division. The kit contains all capacitors, resistors, semiconductors, coil formers, ferrites and wire. The builder will need to supply his own crystal at the third overtone frequency. Those made by Hy-Q Electronics (specification number HS291) are suitable. The price of the kit is $15.50 including normal postage and can be obtained by writing to either—

W.I.A. Disposals
(Victorian Division),
P.O. Box 65,
Mount Waverley,
Victoria, 3150,

or to the Divisional office—

6 Metre Converter,
W.I.A. Vic. Division,
P.O. Box 36,
East Melbourne,
Victoria, 3002.

NEW MULTIMETER



Radio Parts in Melbourne have introduced a versatile multitester that will find many applications for use in laboratories and servicing operations. Designated "Rapar" Model F-75K, this tester offers 30,000 ohms per volt d.c., and 10,000 ohms per volt a.c., and is fitted with a burn-out proof device. Other features include a wide range of voltage and resistance measurements, current and decibel measurements, and an in-built signal injector for checking audio or radio circuits.

Further technical data is available from Radio Parts Group, 562 Spencer St., West Melbourne, Vic., 3003, or Tel. 329-7888.

Regulated Power Supply for Transistor and Integrated Circuit Projects

D. J. McWILLIAM, VK4ZDJ*

The following circuit for a low voltage power supply should be of interest to those who require an inexpensive, but well-regulated variable supply for use with transistor and integrated circuit projects.

The supply is based on the National Semiconductor 5 volt regulator integrated circuit LM309K. This unit is mounted in a TO-3 package and has an output rating of 1 ampere. A TO-5 package is available but the rated maximum output is only 200 mA. provided adequate heat sinking is used.

From the manufacturer's data sheet: "The regulator is essentially blow-out proof. Current limiting is included to limit the peak output current to a safe value. In addition, thermal shutdown is provided to keep the IC from overheating. If internal dissipation is too great, the regulator switches on and off with a duty cycle that prevents excessive heating."

Output Range	DC Input Voltage	R1
5 to 20 V.	>23 V.	500 Ω
5 to 25 V.	>28 V.	330 Ω
5 to 30 V.	>32 V.*	250 Ω

Table 1.

* Note: Maximum input voltage 35 V.

The LM309 is a very complex unit comprising a total of nineteen transistors and fifteen resistors. The device does not use a zener diode for the internal reference. Instead, the reference is developed from the highly-predictable emitter-base voltage of the transistors.

The choice of this device gives all the features available in expensive supplies and only necessitates a few external components.

The circuit described is a dual supply designed for IC projects, but a single supply would be adequate for the majority of transistor projects.

The power supply is assembled in an amplifier cabinet measuring 8½" wide x 4½" high x 6¼" deep. This cabinet is readily available from Radio Parts, Melbourne (Type AC3). The two power transformers used have a multi-tapped secondary winding rated at 2 amperes and are available from A and R Transformers (Serial No. 6978). The diodes used are 1 amp. 50 p.i.v. types, available from most suppliers.

The two regulators are mounted on a standard heat sink which is mounted vertically at the rear of the cabinet. All the other components, with the exception of potentiometers and switches are located on a printed circuit board mounted vertically in the cabinet immediately behind the two meters.

A 0-15 volt, 2" x 2" meter is located on the front panel and is switchable

from one supply to the other by a two-pole, two-position switch located at the centre of the front panel.

In series with one of the supplies is a current meter which may be switched to give either 0-100 mA., or 0-1 A. f.s.d. The resistor, R2, is made from a short length of resistance wire such that its value is approximately one-ninth of the internal resistance of the current meter. This can be very easily achieved experimentally.

The data sheets for the LM309K state that for a variation of 7v. to 25v. input, the line regulation is typically 4 mV. and that the load regulation is typically 30 mV. over the current range 0 to 500 mA. The maximum input voltage is 35 volts. Measurements on the constructed supply operating at 10 volts and 20 mA. current showed that the residual ripple voltage at the output was below 1 mV.

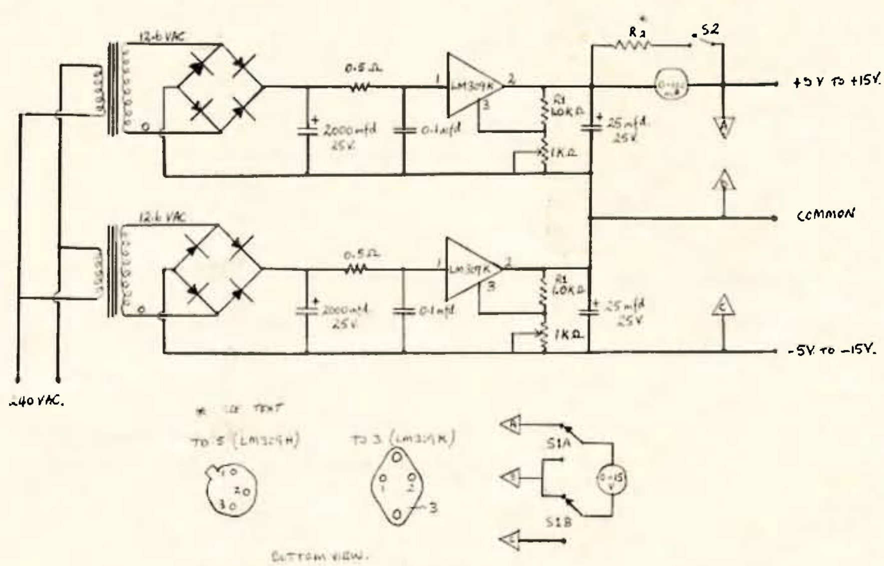
Should constructors wish to have a different voltage output range, then the 1.0K ohm resistor (R1) should be replaced with one of the values given in Table 1.

TECHNICAL ARTICLES

Readers are requested to submit articles for publication in "A.R.," in particular constructional articles, photographs of stations and gear, together with articles suitable for beginners, are required.

Manuscripts should preferably be typewritten but if handwritten please double space the writing. If possible collaborate with any local draughtsman, student or engineer to do illustrations after the method shown in "A.R.," May 1971, page 5. Otherwise drawings will be done by "A.R." staff.

Please address all articles to:
EDITOR "A.R.,"
P.O. BOX 36,
EAST MELBOURNE,
VICTORIA, 3002



Basic Circuit for the Regulated Supply

* 67 Parkside Flats, Railway Avenue, Mt. Isa, Qld., 4825.

OSCILLATOR KITS FOR THE AMATEUR

OSCILLATORS

Hy-Q Electronics have introduced a range of oscillator kits for the serious Amateur and Professional man.

Types QO-1 and QO-2 are supplied as kits containing the components required for the construction of a frequency source of good accuracy. A crystal is not supplied as part of the kit and should be ordered separately.

The oscillators cover the frequency ranges of 3 to 20 MHz. and 20 to 60 MHz. The QO-1 is a fundamental mode oscillator and the QO-2 operates in the third overtone mode.

The oscillators employ a broadly tuned circuit providing crystal controlled operation over the specified frequency ranges.

Power output is 1 milliwatt and is adequate for a wide variety of applications.

Specifications:

Frequency range: QO1 3 to 20 MHz.
QO2 20 to 60 MHz.

R.F. output: Minimum of 200 millivolts RMS across 50 ohms.

Power requirements: 6 volts DC at 20 mA. maximum. The oscillators will operate satisfactorily over the range 4 to 9v.

Operating temperature range: 0° to 60°C.

Dimensions: 1½ x 1½ x 1¼ inches (38 x 38 x 32 mm.).

Mounting: Four 1/8 inch (3.1 mm.) holes on 1¼ inch (32 mm.) centres. Tubular spacers are supplied for above chassis mounting, alternatively the oscillators may be mounted over a cut-out 1¼ in. (32 mm.) square with 3/16 in. (5 mm.) radius corners.

FREQUENCY MARKER

The type QO-3 is a frequency marker intended for use as a convenient source of reference signals at 1,000, 500, 100 and 25 kHz. with accuracy adequate for many experimental requirements. The signals are available singly or simultaneously, depending on the use of the optional selector switch.

The output at each frequency is of the order of 1 volt peak-to-peak and is of such a waveform as to provide harmonics of adequate amplitude for ready detection up to approximately 30 MHz.

The QO-3 marker is normally supplied in kit form with all of the components including the crystal required to assemble the unit on a single printed circuit board, the optional selector switch is connected to the board by short flexible leads.

Specifications:

Output frequencies: 1 MHz., 500, 100, 25 kHz.

Accuracy: Adjustable against external standard or standard frequency transmission to within 1 ppm.

Stability: Typically over 8-hour period and plus or minus 2% supply voltage change, within 3 ppm.

Output voltage: At each frequency approximately 1 volt peak-to-peak.

Output waveform: Distorted pulse with harmonics to 30 MHz.

Power requirements: 9 volts DC plus or minus 5% at maximum of 25 mA. Other voltages with plus or minus 5% stability by change of resistor.

Mounting hole dimensions: Four 0.125 in. (3.1 mm.) holes on 1.75 in. x 2.75 in. (44.5 x 69.9 mm.) centres. If mounted on chassis without spacers, a 1.75 in. x 2.75 in. (44.5 x 69.9 mm.) cut-out with a 0.3125 in. (8 mm.) radius corners is required.

ON WITH THE SHOW

Up in North Queensland the active Amateur fraternity are members of the Townsville Amateur Radio Club. It is a strong club that believes in actively involving its members in interesting projects and not surprisingly these projects seem to reflect the Amateur's community spirit. For far too long, the North has been regarded by the rest of Australia as a sleepy hollow that grows a few coconut palms. Yes, we do rig antennas on coconut palms, and yes we do have a good sleep after the R.D. Contest, but there the similarity ends.

Queensland has more cities of 40,000 population and over than has any other State, and Townsville (population 72,000) is regarded as the Capital City of North Queensland. Thus it is important that the Townsville Amateur Radio Club should not just accept affiliation with the W.I.A. Queensland Division, but that it should be able to hold its own with the Capital City Clubs. Indeed, club members have won every section in the Annual State VHF/HF Contest for the past three years.

As part of the most recent club project, VK4TC, the club station, was taken to the annual Townsville Show. The objects of the display at the Showground were: (1) To recruit starters for the club's current A.O.C.P. classes, (2) To put the club's activities before the public, and (3) as a technical exercise for club members.

And what a technical exercise it was! Because Showgrounds are, electrically speaking, very noisy areas the committee organising the operation of VK4TC decided that the station should transmit from the site but a remote receiver should be set up in a quiet location and that received signals should be linked into the Showgrounds via an FM carrier. In addition, a 53.032 MHz. two-way link was provided as liaison frequency between the transmitting and receiving stations.

Mount St. John, five miles line of sight west of the Showgrounds was chosen as the receiving site. Here the proverbial antenna farm was installed, all co-ax cables feeding a Trio TS510D HF Transceiver. The transceiver audio output was fed electrically to a home-brew ten watt 146 MHz. FM transmitter. A 10 watt 53.032 transceiver and a TV set were also provided for the remote site operator.

At the show, the duty operator monitored his transmission frequency via the 146 MHz. FM link receiver. Instructions to change frequency were sent on the 53 MHz. liaison channel. An FT-200 tx feeding a TA33JR beam was used on HF from the Showgrounds. As a new country was contacted, it was marked on a large map behind the station operator.

Bill Sebbens, VK4XZ, talking to the Showgrounds on 53.032 MHz. AM liaison frequency. The TS510D was used as the main HF receiver at Mt. St. John.

Of course there are always eventualities that no committee can really foresee. This display was no exception in this regard. Half way through the show, the local Civil Defence Group decided to fire up their emergency SSB transceivers operating just above 3700 KHz. As their equipment was located next to the T.A.R.C. display, their 80 metre transmissions were blocking our receiver and vice versa.

In true Amateur style, improvisation was immediately necessary. The operator at the Showgrounds fed audio down the 6 metre link to Mt. St. John where he was relayed on HF via the Trio TS510D. The received signal was then linked back to the show via 2 metres FM. In fact, the system was further simplified when the remote station operator put the TS510 into VOX operation. The Showground operator was then able to call and listen automatically.

This year's display was eminently successful because it involved most members of the Radio Club and equally importantly, many of the general public. Perhaps your club can help fly the Amateur Radio flag and get "on with the show". It's certainly a very worthwhile effort.

(Story and Pictures by Peter J. Lindsay, VK4QD/T.)

Bob Grummitt, VK4ZRG (left), and Bill Sebbens, VK4XZ, installing the 146 MHz. FM link antenna at Mt. St. John. This picture is of interest to those who have had poor results when trying to photograpn antennas. This shot was taken at 10.30 a.m. using Kodak 32 A.S.A. Panatomic X film and an electronic flash. The camera was fitted with a 3-stop red filter which has had a startling effect on the blue sky.

Peter Renton, VK4PV, manned the FT200 at the Showgrounds. The 146 MHz. receiver at the left was used to drive a large monitor speaker. The map in the background shows countries worked from the site.

FILTER TYPE S.S.B. TRANSMITTER

C. RENTON, VK4CR*

Being a comparative beginner in s.s.b., the writer desires to cater for beginners by submitting the following step by step explanation of what happens in such a transmitter, using the block diagram to illustrate the steps.

Radio frequency oscillations are generated in the **carrier oscillator**, this fixed frequency being governed by the frequency to which the carrier crystal has been ground or etched, or perhaps lowered slightly in frequency by rubbing soft solder on one or both faces.

The 3-30 pF. trimmer across the carrier crystal permits a very slight adjustment of the carrier frequency.

As an example, let us say the carrier crystal is at 4994.2 KHz.

* 16 Wilson Street, Booval, Qld., 4304.

This r.f. signal, called the **carrier**, is fed into the **balanced modulator** which consists of two small diodes, a 1K potentiometer and a bifilar wound coupling coil, the latter being wound around the carrier oscillator coil.

In the meantime a very low frequency signal is being introduced by the operator's voice, per the microphone, to the **first audio stage** and amplified in an **audio amplifier stage.**

From the latter it travels to the **balanced modulator** as arrowed in the diagram.

It will thus be seen that two signals are now meeting in the balanced modulator, the high frequency carrier signal and the very low frequency audio signal.

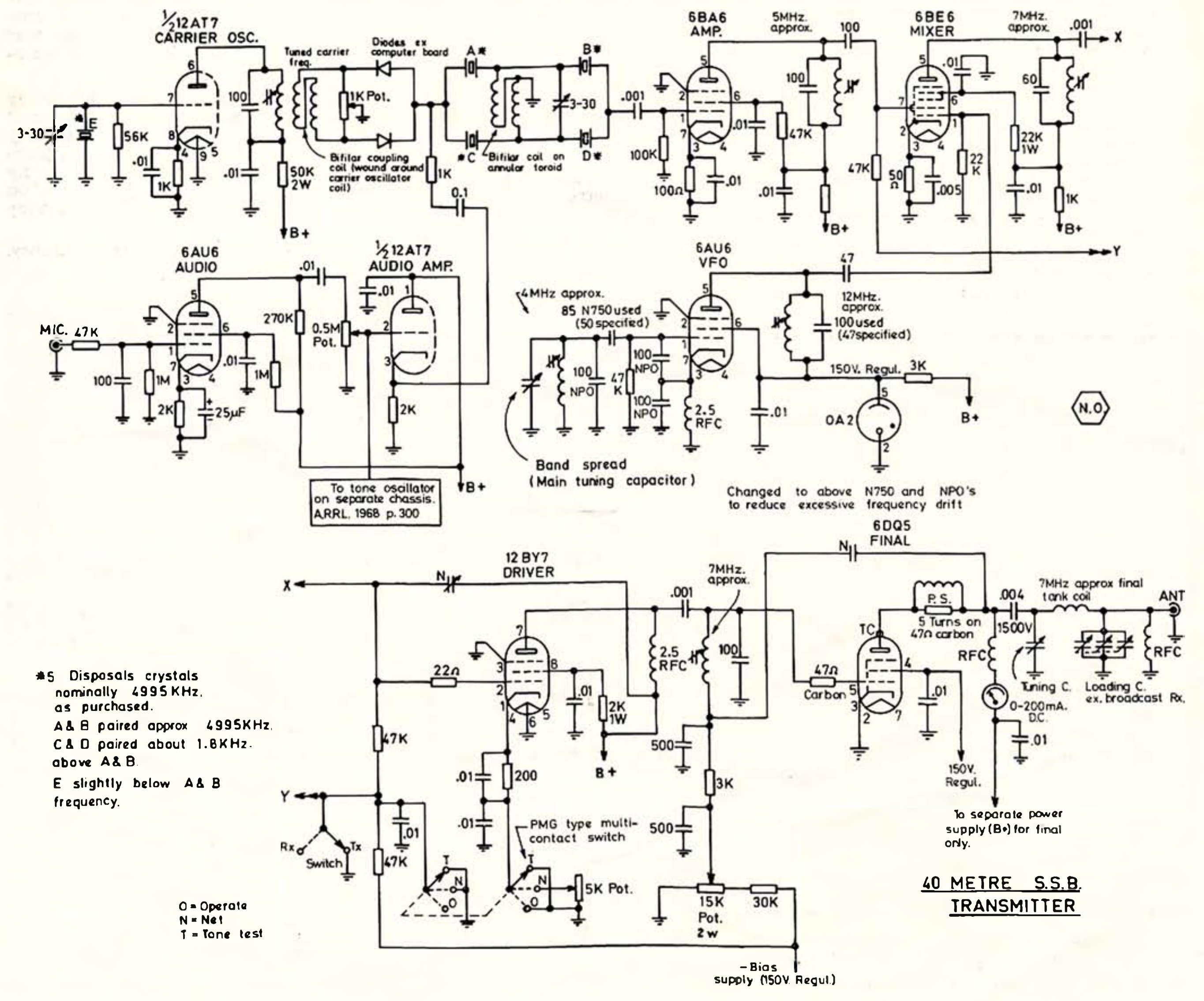
To make matters a little clearer, we will assume that the frequency of a single tone of, say, 1,000 Hz. (1 KHz.) is the audio signal instead of the varying frequencies of the human voice.

The carrier signal, assumed as above as being 4994.2 KHz., mixes with the 1 KHz. audio signal to produce two new frequencies by addition and subtraction respectively, thus 4994.2 + 1 = 4995.2 KHz. and 4994.2 — 1 = 4993.2 KHz.

These new frequencies are called upper and lower sidebands respectively of the original 4994.2 KHz. carrier and **both** of these sidebands proceed to the next stage.

However, the balanced modulator has a further important duty, i.e. it must **prevent the original carrier frequency** itself from accompanying the sidebands on their way.

The next stage is the **sideband filter,** comprising mainly in our case four crystals, two being etched to a slightly



higher frequency than that of the carrier crystal and the remaining two to about 1.8 KHz. higher still. For our example, say two at 4995 KHz. and two at 4996.8 KHz.

(To be a little more technical, the carrier crystal should be located frequencywise about 20 dB. down the lower slope or skirt of the sideband filter passband curve. A second carrier crystal could be similarly placed on the upper skirt.)

Two other components of the sideband filter are a bifilar wound coil on an annular toroidal core and a 3-30 pF. trimmer, these being tuned to an intermediate position between the crystals.

The **sideband filter** will close the gate against one of the two sidebands, so that only a **single sideband** (s.s.b.) will pass on to the amplifier stage.

In our example the 4993.2 KHz. signal will be blocked and the 4995.2 KHz. signal passed.

The s.s.b. signal of 4995.2 KHz. now passes to the 6BA6 amplifier and thence to the 6BE6 **mixer**, where it will mix with an independently generated signal which issues from the **variable frequency oscillator** (or v.f.o.) to obtain the signal frequency which it is desired to transmit in one of the Amateur bands.

We will suppose it is desired to have a QSO at 7050 KHz. in the 40-metre band. The v.f.o. must generate a signal tuned to such a frequency as will produce 7050 KHz. when mixed with the abovementioned 4995.2 KHz. signal.

By addition, 7050 + 4995.2 = 12045.2 KHz. So that, if the v.f.o. is tuned to have an output frequency of 12045.2 KHz., which latter is fed into one grid of the mixer valve, whilst the 4995.2 KHz. signal is injected into another grid of the same valve, a 7050 KHz. output will be obtained from the mixer.

Thus 12045.2 — 4995.2 = 7050 KHz.

(The mixer will also produce another output by addition of 12045.2 and 4995.2 but this signal will be tuned out.)

The 7050 KHz. s.s.b. signal will now be amplified in the 12BY7 **driver stage**, which in turn passes this signal to the 6DQ5 **final power amplifier** where the s.s.b. signal is strengthened sufficiently to be fed via a pi coupler to the antenna.

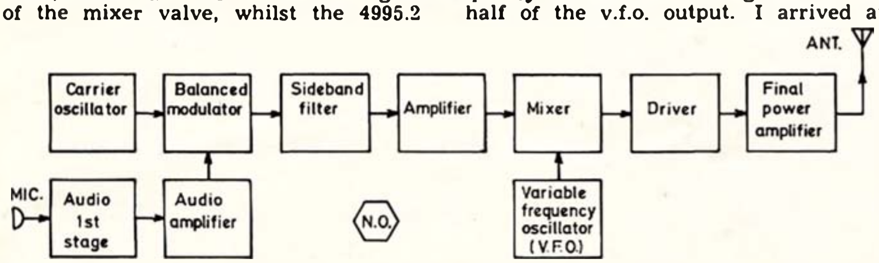
Reverting to the v.f.o., in my case, for the 40 metre transmitter, the input to the v.f.o. valve was set at one-third of the frequency of the v.f.o. output, so that for the above example, the v.f.o. input would be tuned by means of the bandspread variable capacitor to 12045.2 ÷ 3 = 4015.06 KHz.

Both condensers of the pi coupler require to be carefully manipulated to dip the final to resonance coincident with the lighting of a suitable dummy antenna lamp in the first instance (I used a 75w. 240v. lamp), with a further check when the antenna lead-in cable is connected.

I find a small pea lamp inserted in series with the antenna lead gives a good indication of whether the final is tuned correctly. One can adjust to have a very good swing of the final current meter on voice and yet not light the pea lamp.

I have altered the above home-brew to suit the 20 metre band and by choosing 14100 KHz. output to set up coil frequencies, the v.f.o. input frequency in this case being set to one half of the v.f.o. output. I arrived at the following frequencies to which to wind and set the coils:

14100 KHz. for mixer, driver and final frequencies,
Minus 4996 KHz. approx. s.s.b. from filter,
= 9104 KHz. v.f.o. output frequency required,
and 9104 ÷ 2 = 4552 KHz. required input to v.f.o. valve.



NATIONAL POLICY FOR SCIENTIFIC AND TECHNOLOGICAL INFORMATION SERVICES

Every nation needs an efficient system for the storage, retrieval and dissemination of information in science and technology if it is to take its place in the community of technically advanced countries. A new look at Australia's information needs in the fields of science and technology is now under way.

A Committee of Enquiry, with a wide-ranging membership chosen from industry, universities and colleges, C.S.I.R.O., government and libraries was recently announced by Sir Alan Hulme, Minister for the Department of the Vice-President of the Executive Council. The Scientific and Technological Information Services Enquiry Committee, under the sponsorship of the National Library, is supported by a working Secretariat of four.

The committee will examine the needs of individuals and organisations for scientific and technical information with a view to bringing forward proposals which will assist in the formation of a national policy in this important area. It will assess the adequacy and availability of existing resources and the access to them. It will also study the use of computer-based information retrieval systems drawing upon overseas experience with such systems.

The Committee of Enquiry aims to complete a major part of its work this year. Individuals or organisations wishing to submit comment or to obtain further information about the scope and objectives of the committee are invited to contact the Committee Secretariat, C/o. The National Library of Australia, Canberra, A.C.T.

W.I.A. D.X.C.C.

Listed below are the highest twelve members in each section. Position in the list is determined by the first number shown. The first number represents the participant's total countries less any credits given for deleted countries. The second number shown represents the total D.X.C.C. credits given, including deleted countries. Where totals are the same, listings will be alphabetical by call sign.

Credits for new members and those whose totals have been amended are also shown.

PHONE

VK5MS	319/343	VK2APK	289/296
VK6RU	316/342	VK4FJ	286/307
VK3AHO	310/326	VK4TY	284/288
VK4KS	307/322	VK4UC	278/278
VK6MK	303/324	VK2AAK	274/279
VK5AB	296/314	VK3ZE	272/275

New Members:

Cert. No.	Call	Total
122	VK4NQ	105/105
123	VK2AEB	106/108

Amendments:

VK3JW 257/258 VK3ACD 254/258

C.W.

VK2QL	303/326	VK3ARX	271/278
VK3AHQ	300/315	VK3XB	270/284
VK4FJ	289/315	VK6RU	266/289
VK2APK	286/294	VK4TY	259/272
VK3YL	286/303	VK3TL	254/260
VK3NC	273/300	VK3RJ	248/262

OPEN

VK6RU	317/343	VK6MK	303/324
VK4SD	315/330	VK2EO	301/325
VK2VN	311/330	VK3ARX	301/308
VK4KS	308/327	VK4UC	298/298
VK4TY	306/321	VK4FJ	297/323
VK2APK	303/315	VK2SG	294/300

New Member:

Cert. No.	Call	Total
137	VK4NQ	120/120

Amendment:

VK3ACD 254/259

Army Trek to Ayers Rock

LIEUT.-COLONEL J. McL. BENNETT, VK3ZA*

Thirty-nine apprentices from the Army Apprentices School, Balcombe, Victoria, left Balcombe on June 4 on a vehicle trek to Ayers Rock.

The trek included a rare "field-day type" h.f. radio link—s.s.b. operation from the summit of the Rock itself!

A total of 16 vehicles took part in the 20-day training exercise which was code named "Exercise Pebble".

Two former members of the Special Air Service Regiment (Capt. John George and Staff Sgt. Jock Lowson), both of whom are now on the Staff at Balcombe, used the Army's latest man-pack h.f. radio, the PRC-F1, to establish the link with the Army Apprentices School, Balcombe, Vic., from Ayers Rock.

EQUIPMENT DETAILS

Manufactured in Australia by A.W.A. Ltd. for the Australian Army, the PRC-F1 has the following characteristics:

- Frequency range: 2,000 to 11,999 KHz. in 1 KHz. steps.
- Frequency stability: ±25 Hz. between —21°C. and +71°C. over 90 days.
- Modes: S.s.b.-u.s.b. only; c.w. and a.m.
- Output power: 10w. p.e.p. on s.s.b. and compatible a.m., 5w. p.e.p. on c.w.
- Rx sensitivity: 0.5 μV. in series with 50 ohms for 1 mW. audio output in 100 ohms.
- Power source: 28v. d.c. from internal re-chargeable nickel-cadmium battery.

It is designed primarily as a man-pack transceiver, using an 8 ft. whip antenna. An adjustable dipole is also provided for sky-wave operation over extended range.

A conversion kit, including an antenna coupler, allows the PRC-F1 to be used as a ground station with greater flexibility by giving a choice of a wide range of antennas. The coupler provides efficient matching from the 50 ohms unbalanced output of the transceiver to antennas with impedances between 5 ohms and 7,000 ohms.

THE TREK

So much for the PRC-F1; now a little more about "Exercise Pebble".

The apprentices and their officers, and civilian instructors, ate combat rations and slept in the open throughout the greater part of the trip.

This living in the field under varying conditions plays an important part in the apprentices' training as do long distance vehicle movement, navigation, geography and geology, driver training and vehicle maintenance, and first aid in the field.

They visited major industries and places of interest along the way.

The expedition was conducted in two phases. During the first phase, the convoy moved from Balcombe, following the coast to Adelaide, then a general north-west route to Alice Springs along the main road.

Phase two included its return to Balcombe going through Ayers Rock, and taking a south-south-east route using the axis of the Alice Springs to Broken Hill railway line, then on through Mildura.

The apprentices spent most nights camped on the showgrounds of the various towns they passed through. In some cases they camped on the outskirts of a town while Army barracks were made available for their overnight stays at Adelaide and Broken Hill.

Fresh rations were purchased at Port Augusta, Alice Springs, Oodnadatta and Broken Hill, and meals were provided for the party by Army units at Adelaide, Woomera and Bendigo as it passed through these areas.

Among the highlights of the trip were inspection tours of the shipyards at Whyalla and the Iron Foundry at Iron Knob; a guided tour of Woomera; Opal prospecting at Coober Pedy; a day spent climbing Ayers Rock; and a guided tour of Broken Hill.

The apprentices were granted local leave, at the discretion of the Detachment Commander, Capt. A. J. George.

These phases of "Exercise Pebble" provided a break in what was essentially a rigorous training exercise.

But no matter what the conditions, the apprentices were well prepared for their trek.

Each light vehicle was fully self-supporting for the occupants, carrying rations, water and all their personal effects.

A mobile automotive repair shop and an ambulance were among the vehicles in the convoy.

In addition, each vehicle carried two-way radio equipment and communications with the Royal Flying Doctor Service, Balcombe, and Watsonia could be provided, as required, by a Signals Detachment.

The convoy arrived back at Balcombe on June 24 after covering a total of 3,446 miles and maintained communications throughout the trip.

Capt. George and S/Sgt. Lowson pictured near the summit of Ayers Rock with the 'Centre' unfolding below them—the curved horizon proves that the world is not flat! What a take-off for v.h.f.!

* Assistant Director Army Public Relations, Headquarters Southern Command.

Equipment Recommended for Operation with Amsat-Oscar-B

Three communications repeaters are being developed for the Amsat-Oscar-B series of Amateur satellites. A selection has not yet been made as to what combination will be scheduled for the next satellite. This document has been prepared to better help you get ready for operation with this series of satellites.

OPERATION WITH THE DJ4ZC/DJ5KQ 432-TO-144 MHz. REPEATER

The DJ4ZC/DJ5KQ "H" repeater, described in March '71 "Amsat Newsletter," is a multiple-access, linear translator, receiving uplink signals between 432.125 and 432.175 MHz. and repeating them between 145.975 and 145.925 MHz. on the downlink. Sideband inversion occurs in the translation process (i.e., upper sideband becomes lower sideband, and vice versa).

To transmit signals through this repeater, a 432 MHz. transmitter and antenna delivering 200-300 watts of effective radiated power (e.r.p.) is recommended. **For best results s.s.b. and c.w. should be used.** Although a.m., f.m., m.c.w. and a.f.s.k. will work with the repeater, these modes do not make efficient use of the limited repeater power and should be avoided. We recommend that a "transverter" be used to frequency-translate from 28 or 144 MHz. to 432 MHz. In this way, a ten or two-metre s.s.b. or c.w. transmitter can be converted for v.f.o.-controlled transmission on 432 MHz. For c.w. operation, an amplifier/tripler can be used to frequency-multiply the output of a two-metre transmitter to 432 MHz. (see, for example, "Ham Radio," Feb. '70). A varactor tripler can also be used (see the A.R.R.L. Handbook). Perhaps the least expensive method of generating c.w. power on 432 MHz. is to obtain a surplus 450 MHz. f.m. transmitter strip and modify it for c.w. operation on 432 MHz. An article on this approach is planned by the A.R.R.L. Headquarters staff for a future issue of "QST". It is strongly recommended that some provision for adjusting the power output of the transmitter be included. This is desirable to be able to adjust for the proper balance of satellite repeater power among users.

The antenna gain recommended for transmission to the satellite repeater will depend upon the transmitter output power. A 20 watt transmitter will require a 10-12 dB. antenna gain to obtain the recommended e.r.p. of 200-300 watts. A better approach would be to add a 200-watt power amplifier, in which case a dipole or ground plane should provide enough uplink signal to the satellite, and then there will be no need to keep the antenna pointed toward the satellite. The satellite antennas for this repeater will be circularly polarised, so that linear polarisation (either horizontal or vertical) can be employed on the ground. Circular polarisation can be expected to provide as much as 3 dB. over linear and is probably worth the effort. Because the spacecraft will be magnetically stabilised, the orientation of the satellite will be constantly changing and the sense of polarisation will depend upon ground station location. Stations in the northern hemisphere should use right-hand circular polarisation, **and those in the southern hemisphere, left-hand circular.**

For receiving, any good two-metre converter should be suitable, and a two-meter receiving antenna having a gain of the order of 10 dB. should provide good results. Linear polarisation is satisfactory, but again, circular polarisation can be expected to provide as much as 3 dB. improvement (use right-hand circular in the northern hemisphere, left-hand circular in the southern hemisphere). If a 10 dB. antenna is not available, a ground plane or crossed-dipole should provide detectable signals from the repeater's 10-watt p.e.p. transmitter. The receiver should be capable of receiving s.s.b. and c.w. (i.e. have a b.f.o., and a bandwidth less than 4 KHz.), and most h.f. receivers should be suitable for the purpose. Transceive operation is NOT recommended, because it is highly desirable that all stations be able to monitor their own downlink signals during the periods in which they are transmitting.

OPERATION WITH THE AMSAT TWO-TO-TEN METRE REPEATER

The Amsat two-to-ten metre repeater, described in March '71 issue of "Amsat Newsletter", is a multiple-access linear translator which receives uplink signals between 145.900 and 146.000 MHz., and re-transmits them between 29.550 and 29.450 MHz. on the downlink. Sideband inversion takes place in the translation process (i.e. upper sideband becomes lower sideband, and vice versa).

To transmit signals through the two-to-ten metre repeater, a two-metre transmitter and antenna capable of providing 80-100 watts of e.r.p. is recommended. **For best results, s.s.b. and c.w. should be used.** Flight tests with the repeater aboard aircraft demonstrated that a.m. and f.m. signals are not very readable when relayed by the repeater, and they make very inefficient use of the limited repeater power (1-2 watts). C.w. operation is generally possible with most two-metre transmitters. The most expedient means of achieving an s.s.b. capability on two metres is through the use of a transverter which can up-convert the output of a ten, twenty or six-metre s.s.b. or c.w. transmitter to two metres. Transverters of this type are available from several Amateur radio equipment manufacturers, and are also described in the A.R.R.L. Handbook and the V.h.f. Manuals published by the R.S.G.B. and A.R.R.L. Transverters are also usable on c.w., and have the added advantage that they provide a v.f.o. capability if the basic transmitter already has a v.f.o.

The antenna gain recommended for transmission to the two-to-ten metre satellite repeater will depend upon the transmitter output power. A 20-watt transmitter will require a 6-7 dB. antenna gain to obtain the recommended e.r.p. of 80-100 watts. It would be preferable to use a transmitter in the 50-100 watt power output class, so that a nondirectional dipole or ground plane antenna can be employed and pointing of the antenna toward the satellite will not be necessary. The satellite two-metre receiving antenna will be circularly polarised, so that linear polarisation (either horizontal or vertical) can be employed on the ground. If circular polarisation is available at the ground station, as much as 3 dB. less transmitter power will be required for good communications. Stations in the northern hemisphere should use right-hand circular polarisation, and those in the southern hemisphere should use left-hand polarisation).

Any good h.f. receiver capable of receiving s.s.b. and c.w. on the ten-metre band should be suitable for receiving the ten-metre downlink signals if the receiver sensitivity is one-microvolt/ metre or better and the local noise level does not exceed this level. A circularly polarised crossed-dipole should be adequate for receiving in low-noise environments, but a higher gain antenna, such as a three-element beam should provide better results, especially if it is circularly polarised. The satellite ten-metre transmitting antenna will be linearly polarised (a dipole), and Faraday fading can be expected to occur just as was the case for Australis-Oscar-5, unless a circularly polarised receiving antenna is used at the ground station. The use of transceivers is NOT recommended. Separate transmitting and receiving equipment should be used because it is highly desirable that all stations be able to monitor their own downlink signals while transmitting.

OPERATION WITH THE AUSTRALIS 144-TO-435 MHz. REPEATER

The Australis 144-435 MHz. repeater is a channelised, hard-limiting repeater of the demodulation-remodulation type, and is designed to handle f.m. signals only (c.w., s.s.b. and a.m. cannot be used with this repeater). The repeater receives f.m. uplink signals on 145.80, 145.85, 145.90 and 145.95 MHz., and retransmits them on 435.10, 435.15, 435.20 and 435.25 MHz., respectively, on the downlink.

Transmission of signals through the 144-435 MHz. repeater will require a two-metre transmitter and antenna capable of providing a minimum e.r.p. of 200-300 watts. **Only f.m. should be used,** with a deviation of plus or minus 7.5 KHz. [The following could also be used: A2, F2, F4 or slow scan t.v.—Ed.] Available two-metre f.m. Amateur transceivers and converted taxicab radios should operate satisfactorily, but a power amplifier should be used to increase the output power. If the power output is 50 watts, a 6-8 dB. antenna gain should be sufficient. It would be advantageous, however, to use a power amplifier in the 100-200 watt power output class so that a non-directional dipole, ground plane or vertical antenna can be employed without requiring pointing towards the satellite. The satellite two-metre receiving antenna will be circularly polarised, so that linear polarisation (either horizontal or vertical) can be used on the ground. The use of circular polarisation on the ground will reduce the transmitter power requirements by as much as 3 dB. (use right-hand circular polarisation in the northern hemisphere, and left-hand circular in the southern hemisphere).

Reception can perhaps most easily be achieved through the use of a good, low-noise 435-to-144 MHz. receiving converter, which will convert the same two-metre f.m. transceiver that is used for transmission. These converters are commercially available. A high-gain circularly polarised receiving antenna should be used, with a gain of at least 12 dB., because this satellite repeater is expected to provide an output power of less than one watt per channel to individual linearly polarised monopole antennas.

Reprinted from Amsat Newsletter, Sept. '71. Membership of Amsat can be obtained for U.S. $5 on completion of application form available from Federal Executive. Application to be sent to P.O. Box 27, Washington, D.C., U.S.A., 20044.

BEWARE OF . . .

CHAIN LETTERS

Another batch are in circulation.
If you get one, tear it up!

Correspondence

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers.

V.H.F. TRANSEQUATORIAL PROPAGATION

Editor "A.R.," Dear Sir,

The Ionospheric Prediction Service is currently carrying out investigations into V.h.f. Transequatorial Propagation and would be grateful for the assistance of any Amateurs who have had contacts via this type of propagation or have observed v.h.f. signals originating from countries in the northern hemisphere.

We are interested in reports dating back to 1947 if possible and, in particular, reports from January 1970 to the present.

Reports containing as much of the following information as possible would be appreciated.

(a) Date.
(b) Time (note whether local or GMT).
(c) Frequency or band (most likely to be 50 MHz., however if other signals were noticed, note approximate frequency).
(d) Signal strength.
(e) Fading characteristics.
(f) Location of your station and call sign (plus location if possible) of stations heard or worked.
(g) Other observations, i.e. was sporadic E noticed at the time; if so, what areas? Did the signals start in one area and move to another or not? When were signals first noticed and when did they disappear?

Reports should be sent to:—
Dr. L. McNamara,
Ionospheric Prediction Service,
162-166 Goulburn Street,
Darlinghurst, N.S.W., 2010.

We would be grateful for as much publicity as possible concerning this project.

—R. L. Harrison, VK3ZRY/2.

N.Z. NATIONAL JAMBOREE

Editor "A.R.," Dear Sir,

During the first week in 1972 the New Zealand Scout Association will be holding its Sixth National Jamboree at the Pukekohe Showgrounds in South Auckland.

I have been authorised by the New Zealand Post Office as Trustee for the Amateur Radio Station, which will be set up to operate during the activity period, i.e. 1st to 8th January, 1972. The official call sign will be ZL1JAM.

It is hoped to operate on all h.f. bands daily, and between the hours of 1900 and 1200 (0700-2400 hours NZST), although other times can be arranged in the event of any pre-arranged schedules with overseas stations.

Members of the Franklin Amateur Radio Club and the Papakura Amateur Radio Club will be assisting in the setting up and operation of the station, and as it is anticipated that approx. 9,000 Scouts and Scouters from New Zealand, Australia, Canada, United States of America, the Pacific Islands, Japan and South-East Asian countries will be attending, the traffic activity should be fairly intensive.

An attractive QSL card is being printed for the occasion, and confirmation will be 100%.

It would be appreciated if you could give this activity some publicity through your magazine and club nets.

—John W. Hannaford, ZL1BBH.

"HIS OLD BEAM"

Editor "A.R.," Dear Sir,

In 1968 I bought, through Hamads, a TA33 Jr. from Bert Hay, VK2AGW. Since then, I have contacted Bert on odd occasions and also worked a fair share of DX using his old beam.

A few days ago I received a letter from Bert which I feel is worth a para. in "A.R."

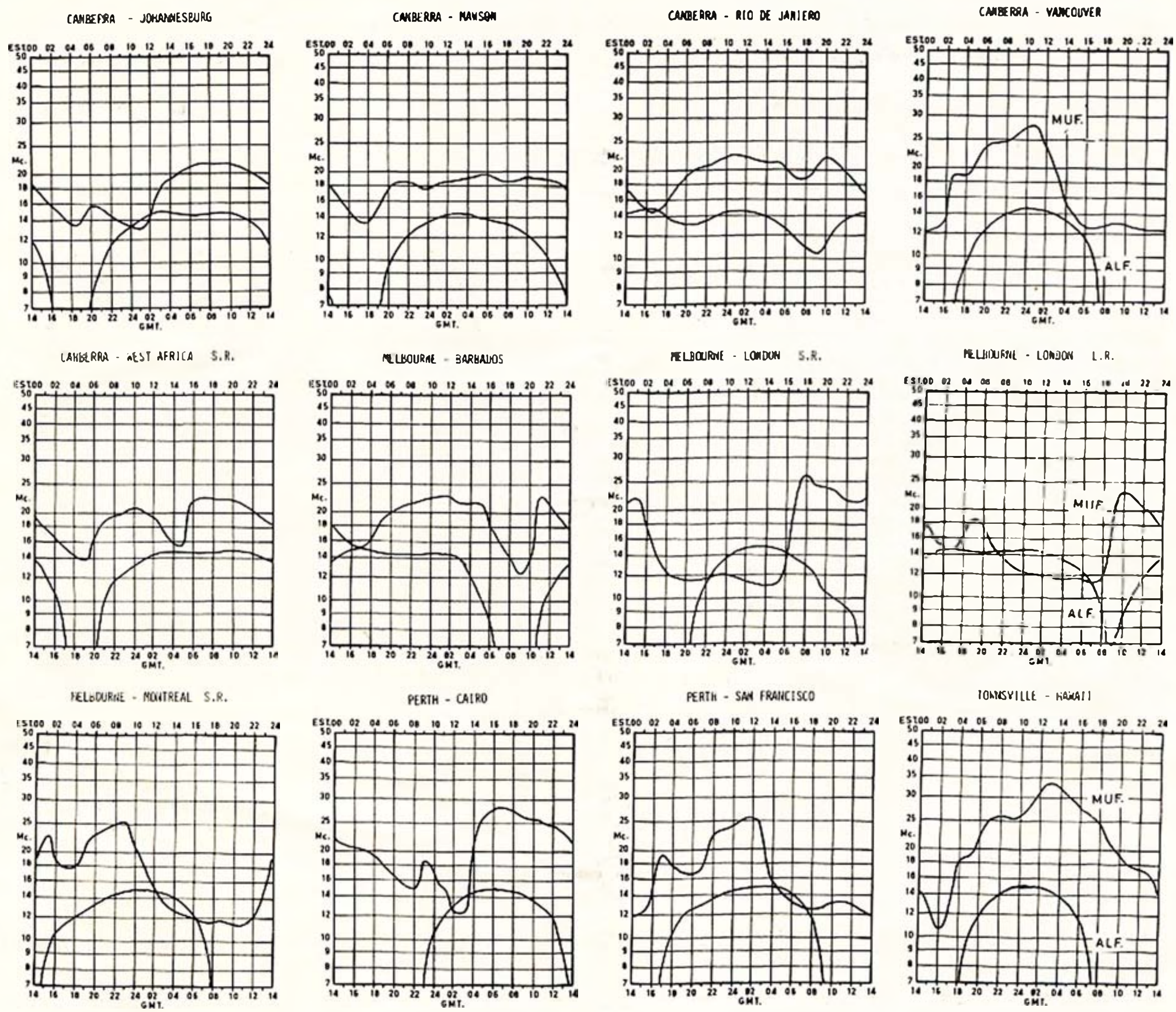
"A few days after we arrived back in this country on 4th May, 1971, I was preparing to get on the air with my old call sign G2KG (52 years old). I coupled up the rig in my bedroom with a 20 mx dipole coiled up on the floor and as the set warmed up there, without touching the dial, was VK3WW working a ZL4, with a signal from my old beam Q5 S0, but on the speaker."

Sad ending—the beam was smashed during the big blow in Melbourne on 3rd October.

—M. O'Burtill, VK3WW.

PREDICTION CHARTS FOR DECEMBER 1971

(Prediction Charts by courtesy of Ionospheric Prediction Service)



DIVISIONAL NOTES

DIVISIONAL CALENDAR

3 Dec. VK2—V.h.f. meeting (Auction Night). Gosford meeting.
Hunter Branch meeting.
VK5—V.h.f. Gp. meeting (equipment Display also).
5 Dec. VK3—V.h.f. Field Day (1100-1600).
VK5—V.h.f. Gp. Field Day (0630-1030, 1230-1530).
11 Dec. VK2—V.h.f. Christmas Party and Fox Hunt.
12 Dec. VK3—E. & Mt. Dist. R.C. Xmas Outing, Yarra Glen (all day).
14 Dec. VK5—Div. Xmas Social.
17 Dec. VK2—General meeting.
Gosford meeting.

NEW SOUTH WALES

MEMBERSHIP APPLICATIONS

The following were presented to the General Meeting on Friday, 24/9/71: Mr. R. Atkinson, 29 MacDonnell St., Yarralumla, A.C.T., 2600, Assoc.; Mr. H. W. Buehler, C/o. Gulf Fisheries (N.G.), P.C. Box 920, Port Moresby, N.G., VK9HB; Mr. G. Dunkley, 8 Chambers St., East Maitland, 2323, VK2ZDR; Mr. D. Ford, School Residence, Austinmer, 2514, Assoc.; Mr. R. N. Tregea, 22 Trebor Rd., Pennant Hills, 2120, Assoc.; Taree OK Youth Radio Club, C/o. G. Hunziker, 26 Chatham Ave., Taree, 2430, VK-2BRC; Mr. V. Barker, 1 Rawson St., Epping, 2121, VK2ZVV/T; Mr. A. S. Brooks, 11 Hawthorne St., South Grafton, 2461, Assoc.; Mr. W. N. Bullivant, 1/122 Old South Head Rd., Bellevue Hill, 2023, VK2BC; Mr. E. C. Crouch, 5 Park Lane, Orange, 2800, VK2EC; Mr. L. R. Lawrence, P.O. Box 107, Kundiawa, T.P.N.G., Assoc.; Mr. S. G. Mudford, Roadside Mail Box 1, Georges Creek Roadside, Tallangatta, Vic., 3700, Assoc.; Mr. A. J. Skerrett, "Glen Alpine," Werris Creek, 2341, Assoc.; Mr. H. Willcoxson, 12 Tarana Cres., Baulkham Hills, 2153, Assoc.

Resignation: Mr. D. E. Vaughan, 3 Hampden Rd., Lakemba, 2195, VK2FY.

Transfer from an Associate to a Full Member: Mr. J. C. Young, 18 Vernon St., Hunters Hill, 2110, VK2ZJG.

LOAN OF F.M. BASE STATIONS

The following clubs have f.m. base stations on loan from W.I.C.E.N. for W.I.C.E.N. purposes: Orange Radio Club, Macquarie Radio Club, Blue Mountains Branch, Central Coast Branch, Hunter Branch, Maitland Radio Club, Nepean Radio Club, and recently the Armidale Police Boys' Radio Club and Taree OK Youth Radio Club.

The following clubs made application, but were unsuccessful: Westlakes Radio Club, Oxley Radio Club, and St. George Radio Society.

Please Note: No more applications as there is NO equipment left for distribution.

OXLEY REGION RADIO CLUB

A meeting was held on 3rd Oct. last by interested Amateurs from Port Macquarie and the surrunding area. It was decided to name the club the Oxley Region Radio Club. Peter Alexander was elected President and Owen Bested Secretary/Treasurer. One of the main objects of the club will be to encourage the use of v.h.f., particularly 146 MHz. The first steps in the immediate future will be to obtain the equipment to establish a repeater station. It is hoped that the locality of the repeater will be on the Middle Brother Mountain.

Henry VK2ZHE gave the meeting a run down on the method of obtaining equipment and the necessary permits. At present there are active stations on v.h.f. at Port Macquarie, Taree and Wauchope and the numbers will be steadily increased as others get their rigs going.

The following members attended the first meeting: VKs 2BGF, 2ZHE, 2ZIX, 2XVI, 2ZGC, 2AWS, 2PA, 2AEB and Bill Collinson, who has yet to get his call sign.

DX NEWS FROM VK2QL

For those who did not hear previous Sundays' broadcasts, it is suggested that you have a pencil and paper ready each Sunday so that, if you are interested in DXing, notes may be made of what is current on the bands.

ILLAWARRA BRANCH

Moonbounce Project.—Most of the work during Sept./Oct. was on site at Dapto. After the fans were placed in the tx cubicle the tx was installed and tests made through the repaired co-ax. feedline. As the rx pre-amp. was not operating, the tx feed was used to line up the dish again on sun noise. The chart recorder was forwarded to Roger VK2BRE to have it "debugged".

The tx was then operated into the dish feed and P.M.G. acceptance tests were carried out. Difficulty in achieving satisfactory stability from the oven controlled frequency source was overcome by placing it inside away from the breezes. The required stability of one part in ten million was then obtained and its frequency was adjusted to be within 50 Hertz at 432 MHz. The other P.M.G. requirements were checked out and were also satisfied. We are thus now cleared for operation by the P.M.G. and the 12 months extension of high power permit has also been granted.

The job of suitably coupling the tx frequency source into the rx input was then carried out to provide a reference tuning point on the i.f. channel rx at tx frequency.

Minor modifications to the tx metering circuitry, etc., were then completed and all tx and power supply chassis were labelled to designate all controls and functions. Roger VK2BRE has returned the chart recorder in excellent operating condition. We are now working on obtaining max. output from the tx into the dish feed and in getting the rx pre-amp. to operate satisfactory. Parts are also being obtained for a sighting telescope and photo-transistor unit to allow optical sighting of the dish on the sun and moon, to give accurate positioning of the main lobe of energy on the moon.

MORSE TAPE SERVICE

There is a Morse Tape Service available through the VK2 Division of the W.I.A. This service is available to anyone whether a member of the W.I.A. or not. The cost of this service is 30 cents per tape and the loan period is set at a maximum of two months. There is also a charge of 15 cents for tapes overdue over the two-month period. Payment of either amount preferred by either stamps or postal notes in favour of W.I.A. VK2 Division. To save time when applying, it would be appreciated if the following information could be supplied in the application:

(1) Name of tape recorder used.
(2) Number of tracks.
(3) Maximum size of tape spool used.
(4) Speeds at which it plays.
(5) Which tape shown in the list under you require. It is normal for only one tape to be supplied at a time.

The majority of the tapes available are on 5-in. spools two-track at a speed of 3¾ i.p.s. There are also some tapes on 3-in. spools at 3¾ and 1-7/8 i.p.s. Tapes available from the service are as under:

Beginners' special, 50 mins.

No. 1	½ hr.	5 w.p.m.	plus	½ hr.	6 w.p.m.
No. 2	½ hr.	7 w.p.m.	plus	½ hr.	8 w.p.m.
No. 3	½ hr.	10 w.p.m.	plus	½ hr.	11 w.p.m.
No. 4	½ hr.	12 w.p.m.	plus	½ hr.	14 w.p.m.
No. 5	½ hr.	15 w.p.m.	plus	½ hr.	16 w.p.m.
No. 6	½ hr.	18 w.p.m.			
No. 7	½ hr.	20 w.p.m.			

There are also several tapes available that consist of code groups rather than the plain language of the ones listed above.

For the supply of tapes or for further information contact the Morse Tape Supervisor, Mr. M. Francis, 93 Kingdon St., Scone, N.S.W., 2337.

VICTORIA

The summer season of sporadic E propagation is now open. Operators on 6, 10 and 11 metres are chasing the excellent interstate contacts which can be had using this form of propagation.

The Right Honourable Lord Casey, K.G., P.C., G.C.M.G., C.H., M.C., K.St.J., has consented to become the Patron of the Eastern and Mountain District Radio Club. Lord Casey has a very distinguished record of service to Australia. He served in many positions, both in Australia and overseas. He was Governor General of Australia for 3½ years from 1965 till 1969. Now in retirement, he still takes an active interest in many community activities.

News for inclusion in the Victoria Divisional Notes should be sent to the sub-editor, Gill Sones, at P.O. Box 36, East Melbourne. Remember these notes are based on the information supplied. If you want to see it in print, please send it in.

Merry Christmas and a Happy New Year from the Victorian Division.—VK3AUI.

EASTERN ZONE

The Eastern Zone held their annual convention at Mirboo North on 29th and 30th May. The office-bearers for 1971-72 voted in were: President, Lee De Vries, VK3AXM; Vice-Pres., Bruce Hockings, VK3ADB (ex-3ZWP); Sec., Gavin Kuch, VK3ZNC, P.O. Box 175, Maffra; Station Officer, David Scott, VK3DY (Zone station call sign VK3BEZ); Publicity Officer, George Francis, VK3ASV; Zone W.I.C.E.N. Co-ordinator, Harry Everett, VK3ZX; Zone Intruder Watcher, VK3ASV.

In the retiring President's report, Rodney VK3UG stated: "This Zone is steadily becoming the most active area in Victoria in nearly all facets of Amateur Radio. I say this with firm conviction that this is indeed true, and providing the enthusiasm shown by most of our members continues, our Zone will be widely known for its activities in the promotion of Amateur Radio in general . . ."

The Zone is running three successful A.O.L.C.P. classes, Warragul supervised by VK3UG, Traralgon by VK3BBB and VK3YEV, and Sale by VK3KR and VK3ZXM. In the August exam. we had seven passes, all now awaiting call signs. A Zone sub-committee was formed in 1970 to research into and make recommendations on the feasibility of a lower class of Amateur licensing. The final report was presented at the Eastern Zone general meeting at Traralgon on 31st July. This report was published in October "A.R."

The Zone held a further general meeting on Oct. 30 also at Traralgon. Amateur t.v. experiments in the 426 MHz. band took place at the Zone Convention and also at the Hobbies Exhibition held at Morwell on June 4 and 5. The t.v. consists of VK3BB/T, VK3YBI, VK-3ZXM and VK3ASV/T. VK3KR and VK3ABC are also experimenting with a.t.v. and also r.t.t.y. George VK3ASV of Morwell also carries out skeds using r.t.t.y. with Noel VK3NR of Melbourne using h.f. and v.h.f. 2 mx f.m. (146.584 MHz.).

SOUTH AUSTRALIA

With the changeover to summer standard time, the use of Greenwich Mean Time will save much confusion during the coming contests, although accepted band opening times will be askew.

The main activity during October was a visit to the Ceduna O.T.C. Earth Station organised by the V.h.f. Group to see the equipment and dish used to communicate overseas telegrams, phone calls and television programmes to the Intelsat III. satellite stationary over the Indian Ocean. The visit was a great success, both as a social outing and as a technical experience. About thirty Amateurs were present with about twenty friends and relatives using all acceptable modes of mechanised transport.

Visitors came from near and far, with Tony VK5ZAI from Bordertown the furthest and John VK5ZJB, one of our guides over the station, the nearest. Everyone really appreciated the intricacies of technology required to set up and maintain the station.

On the home front, further progress in finding a permanent home for VK5WI has been demonstrated by the committee actively investigating the few alternatives found. A conception of a technician licence requiring full theory and low Morse speed and operating from 21 MHz. upwards, together with an eventual lower limit of 144 MHz. for Limited licensees found favour with the October Divisional meeting. V.h.f. operators are worried about the clash of interests on 145.9 with the Australis satellite and repeaters and so there is plenty to talk about.

Our enthusiastic Short Wave Listener representative on Divisional Council, Tom Hannaford, could earn the Amateurs' undying gratitude by persuading his short wave listener enthusiasts to use their skills as listeners to man the Intruder Watch. Amateurs find many jobs in their hobby from aerials, construction, operating, and receiving, so listening can only be a small part of time available. S.w.l's with their listening expertise, and not spending time on construction or transmitting, will be able to pull their weight in the W.I.A., and really earn their spurs if they could perform this vitally necessary job of Intruder Watch. It is a long job, requiring definite receiving skills in identifying coded transmissions of teletype, facsimile and broadcast stations. My thoughts are with you Tom, and your counterparts in the other States. If S.w.l's can shoulder this load, the Amateur fraternity will be that much stronger.—VK5GZ.

W.I.A. 52 MHz. W.A.S. AWARD

New Members:

Cert. No.	Call	Additional Countries
97	VK7ZBY	1
98	VK7ZGJ	1

DX

Sub-Editor: DON GRANTLEY
P.O. Box 222, Penrith, N.S.W., 2750
(All times in GMT)

When I handed this column over to the Editor a few months ago little did I think it possible that I would be taking it over again within such a short space of time. Difficulties which existed at that time have been resolved, and I am very pleased to be back on the job once more. I enjoy compiling this column, and this in itself is a big factor in the successful handling of any task. It is my intention to gradually get away from the practice of gathering all my information from overseas news sheets where possible, and I will in future rely on reports and assistance from the VK gang, and my own listening.

A column of this nature can be divided into three essential features, reports of future events, identification of recent happenings, and information which will enable the reader to acquire his QSLs. Any information of this nature will be greatly appreciated, Box 222, Penrith, 2750, will find me, or a call to Springwood 511364 will do the trick.

In a recent newspaper article published in a Sydney week-end broadsheet, Amateur Radio got quite a lot of favourable publicity, however the main interest to the writer seemed to be a discourse on Alan Fairhall, and King Hussein. The writer, in passing, mentioned that it is possible to converse with people in all walks of life through the medium of Amateur Radio. This is very true, as this very brief list will show. At one stage, three of the Princes of Saudi Arabia were active using the calls HZ1AF, HZ1TA and HZ1SS. OE3AH is the call of Archduke Anton von Hapsburg, the Austrian pretender. UA1LO was the late Yuri Gargarin. Arthur K4LIB is radio personality Arthur Godfrey. WB6RER is held by Andy Devine, K0HWY and W1AYA were used by band leaders Tex Beneke and Pee Wee Hunt. Paul K6AK is Lawrence Welk's arranger, Kurt W2ZXM was the skipper of the ill-fated Flying Enterprise, and who is often heard operating maritime mobile. Several prominent U.S. diplomats, politicians and businessmen are active on the bands, also many of the world's social and religious leaders.

Next time you work a W who says "handle here is Charlie", dig into his background a little and you will find that he is one of Hollywood's best known character actors, or a prominent U.S. Senator. Many contacts would be far more interesting if a little more interest was taken in the person on the other end of the contact.

Band conditions at the time of writing are fair, the noise level is starting to creep up on 80 mx (but VK2QL lists many goodies on this band on s.s.b.). The DX on 40 over the opening weeks of October has been really good. The South American countries are still belting in on s.s.b. in the evenings, whilst the c.w. segment has been loaded. 20 metres has been livening up at around 1130z, and most times that I have checked 15 there has been a plentiful number of contacts available for the taking. As a matter of possible interest to those chaps who have been indulging in verbal and written conflict over the merits or otherwise of Novice licensing, have a look at 21100 to 21250 when the band is open, in fact do a little better, give them a shout, they will appreciate it at the same time it will give a true picture of Novice activity. I have not been watching 160 metres, however the word from the proverbial grapevine is that most of the G land boys who will be active during the summer will be chasing the VKs in the evenings on this band. If anybody doubts the possibility of G contacts on top band, I suggest he has a talk to George Allen over in VK6. George has the score on the board in regard to this most rewarding band.

W6FHM/DU1, currently active on 20 c.w., will be leaving that country for VQ9 where he should be operating from January to June 1972 after which date he returns to his home state.

Ed YA1GNT has been active daily on 14200 or thereabouts and asks for QSLs to be sent to YA1GNT, E. S. Popko, PAA/Kabul, Dept. of State, Washington, D.C., 20521, or direct to him at Box 279, Kabul, Afghanistan, this address may be used for all YA QSLs as the box is shared by the gang. OA8V contest station will be active till the year's end (s.s.b. all bands).

Overseas news pertaining to DX activity is broadcast by the Northern California DX Club every Sunday at 1800z and on Mondays at 0200z. The frequency is 14002, and this session is well worth listening out for if you want to be in the picture regarding current news. Also listen to Div. broadcasts, particularly VK2 (by VK2QL) and VK3 (by Harry Roach).

W3HNK can assist with QSLs from the following stations: UH8AE, UH8BG, UH8BO, UH8CS, UI8CD, UJ8AC, UJ8AJ, UJ8KAA, and UK8MAA plus any UM8 station. Send your card with SASE or IRC to Joe's home QTH and allow several months for a reply. He asks that S.w.l's refrain from sending their reports through him, which is a fair request, in any case I have never had trouble with S.w.l. reports being answered from behind the iron curtain. I bundle them off about twice a year to Box 88, Moscow, and the replies eventually come through even if some of them are five years in so doing.

Nicaragua activities are maintained by YN2OM and his XYL YN2CCN (14 MHz. s.s.b.) and YN3AAA (s.s.b. on 40 and 80).

Ceylon stations are once again on the air after being closed down from April 10 to Sept. 15.

SV0 stations still around are SV0WBB and WLL, both active from Crete, whilst SV0WE and SW0WUU are at it from Rhodes, Dodecanese Is. to be more precise.

Chagos with VQ9WES still active on 14 and 21 s.s.b.

There has been the usual spate of odd prefixes of late, some of these are from operations earlier this year, but nevertheless of interest. HU0A was a special call used by YS2CEN from El Salvador. HW6KAW was a special used by French club station F6KAW. OI1VR was OH1VR using a contest call. Most of the foregoing were used for contest purposes.

Call areas and allocations for PZ Surinam were made available recently. PZ1 Paramaribo and Surinane, PZ2 Nickerie, PZ3 Coronie, PZ4 Saramacca, PZ5 has been reserved for reciprocal licences, PZ6 Para, PZ7 Brokopondo, PZ8 Commewinje, PZ9 Marowijne and PZ0 has been reserved for special stations.

A memo here for the DX chasing S.w.l's. I am holding cards here for L2158, OK3UH/L2949, L2046, L2283, L2287 and SWL20851. If the holders of these numbers would send me their mailing addresses I would be delighted to forward their cards on. Any VK2 S.w.l's who are expecting cards to be returned via the Bureau should drop me a line with their address so that I can expedite the delivery of their QSLs.

The ID stations I1BGJ/ID and I1BUP/ID which were active earlier this year can be reached at C.P. 20, 14100 Asti, Italy. The suffix counts as for Italy, whilst the IE stations which were active a little while ago count as Sicily, for those societies who class the latter as a separate country. The QSL address for IE1PUG, IC1PUG and IC1AA is Box 143, Palermo.

U.S. Samoa is still well represented with KS6DR, DT and DX still appearing in the lists of calls worked. In each case they can be reached C/o. Dept. of Education, Pago Pago, U.S. Samoa 96920, Pacific Ocean.

BY1AB and BY3NK have been consistently heard and worked, the former on c.w., the latter on s.s.b., however there is a very strong feeling amongst the chaps in the Far East that both are pirates, as is possibly the case with BV2A. I would be pleased to hear from anybody who has worked either of these calls and has the QSL card back. There is a tendency amongst writers to brand as a pirate anything which to them seems a little out of the ordinary and in many cases they are right, however it would be interesting to know for sure if the stations they name as pirates are in fact well and truly licensed.

9X5 stations which still crop up are Al 9X5VA, who has been on 21 MHz., QSL to Box 30, Butare; 9X5CC, B.P. 61, Nyanza, Rwanda; 9X5SP, QSL to DL8OA, and 9X5AA whose manager is W1YRC.

4W1AF provides mainly week-end activity from Yemen, s.s.b. on 14 to 28 MHz. bands.

AWARD

A note to hand here re the Thunder Bay Award, this is available to any licensed Amateur who has worked five stations in Thunder Bay since Jan 1, 1970, the date of amalgamation of Pt. Arthur and Fort William. GCR list plus a dollar to Awards Committee, Box 571, Station "P", Thunder Bay, Ontario, Canada. VE3ARN, AVS, DP, EDG, EEF and HU are possible contacts. The award is available to S.w.l's on a heard basis also.

Arabian Nights Certificate.—10 Arab countries including JY.

Persian Empire Award—5 different EP stations (including 9C9DX) contacts in the year to 21/3/72. Five IRCs and log certified by two licensed Amateurs to Am. Rad. Soc. of Iran, Box 1000, A.P.O., New York, N.Y. 09205, U.S.A. ("CQ" Oct.)

QTH SECTION

A2CAD—Box 310, Gaberones, Botswana, Africa.
A2CAH—Box 17, Gaberones, Africa.
CR4BS—Box 101, Praia, Cape Verde Is.
CR3VV—C.P. 306, Bissau, Portuguese Guinea, West Africa.
EA9EJ—Justo Benedicto P., Calle Madrid, Aaiun, Spanish Sahara.
EA9AI—Angel Mora Garcia, Ejercito Espanol 1, Melilla.
ET3ZU—Box 379, Asmara, Ethiopa.
FP8CT—Laurent Briand, B.P. 347, St. Pierre, St. Pierre and Miquelon.
FR7AF—Michel Piolet, B.O. 207, St. Denis, Reunion Is.
FR7AG—Francois Pepin, B.P. 819, St. Denis, Reunion Is.
FR7AH—Claude Nerac, B.O. 819, St. Denis, Reunion Is.
FR7AI—B.P. 4, St. Clotilde, Reunion Is., Indian Ocean.
HS0ISB—Box 2008, Bangkok, Thailand.
KC6LG—Box 156, Yap, West Caroline Is., 96943, Pacific Ocean.
KG4CS—P.O. Box 34, F.P.O., N.Y., 09593, U.S.
KX6IP—Box 1474, A.P.O., San Francisco, Calif., 96555.
MP4BIJ—Box 144, Bahrain Is., Arabian Gulf.
PJ2HT—Box 879, Curacao, Netherlands Antilles.
PZ2AB—Box 71, Nickerie, Suriname, South America.
SZ0BR—Box 814, Athens, Greece.
TL8GL—Box 704, Bangui, C. Afr. Rep (or VE2DCY).
VQ9W—Box 234, Victoria, Mahe, Seychelles Is., Indian Ocean.
WC4SFF—Box 461, Lake Worth, Florida, 33460, U.S.A.
ZD3K—Box 504, Bathurst, Gambia, Africa.
ZD7BB—Box 17, Jamestown, St. Helena, Sth. Atlantic Ocean.
5R8AP—B.P. 3242, Tananarive, Malagasay Republic, Africa.

QSL MANAGERS

CT2BB via WA3NRV	HU0A via WA8DTY
CT2AJ via VE7BWG	HW6KAW via F6KAW
CN8DW via W6GZI	JW5NM via LA7RB
CE0AE via WA3HUP	JX2HK via LA2HK
DL2AA via DJ9ZB	JY9AA } WA3HUP
EA6BT via DL7FT	JY9AB } WA3HUP
F0ZN via DJ9ZB	JY1 } WA3HUP
FY7YR via VE3BYN	JY1/B } WA3HUP
FG0MH via WB8ABN	JY2 } WA3HUP
FG0NH via WB8ABN	MP4TDT via DJ9WY
GC5AWQ via DJ5PN	MP4BLV via W3BMV
GM6UW/P via G6UW	OA8V via W9GFF
HS3AET via K0VIF	VQ9WES via WA3OTV
HB0XJV via HB9AQL	YN3AAA via DL3OH
HB0AZ via HB9AQL	4W1AF via DJ9ZB

QSL information (courtesy DOTM Bull. 3/71, VK2AXK, VK4KX, VK4UC, "73" July, VK6 Bulletin):

AC5TY—K3RLY (c.w. & s.s.b. on 14, 1200z).
IP1MOL, RB, RBJ—DOTM (W2GHK, Box 7388, Newark, N.J. 07107).
JD1ACF (Bonin)—JA1OAF.
KC6BK—Box C, Ponape, E. Car.
KF4SJ (KP4-Aug./Dec.)—DOTM.
MP4BJG—Box 144, Bahrein.
PJ7VL—Now DOTM.
VA2UN (McGill Univ. Montreal, Jul./Dec.)—DOTM.
VE1ASJ—Now DOTM.
VE7IR/XU—VE7BWG.
VP2AAA—W4DQS.
VR5LT—VK6WT.
XE1IIJ—DOTM.
ZS3KC—K4TXJ.
3F1IE (Panama)—DOTM (as HP1IE "awaiting logs").
7Q7AA—K4CDZ.
9H1BG—30 St. Dominic St., Attard, Malta (s.s.b. 14 MHz.).

That is about all I have for this month. I look forward to hearing from anybody who has an item of news, and this month I acknowledge assistance from the Long Is. DX Assn. and the ISWL (with late additions from VK2QL—Ed.) 73, de Don L2022.

VHF

Sub-Editor: ERIC JAMIESON, VK5LP
Forreston, South Australia, 5233.
Closing date for copy 30th of month.
Times: Eastern Summer (Daylight Saving) Time.

AMATEUR BAND BEACONS

VK0	52.525	VK0MX, Mawson.
	53.032	VK0TM, Macquarie Island.
	53.544	VK0PF, Casey.
VK3	144.700	VK3VE, Vermont.
VK4	144.390	VK4VV, 107m. W. of Brisbane.
VK5	53.000	VK5VF, Mt. Lofty.
	144.800	VK5VF, Mt. Lofty.
VK6	52.006	VK6VF, Bickley.
	52.900	VK6TS, Carnarvon.
	144.500	VK6VE, Mt. Barker.
	145.010	VK6VF, Bickley.
VK7	144.900	VK7VF, Devonport.
VK9	144.600	VK9XI, Christmas Island.
ZL1	145.100	ZL1VHF, Auckland.
ZL2	145.200	ZL2VHF, Wellington.
ZL3	145.300	ZL3VHF, Christchurch.
ZL4	145.400	ZL4VHF, Dunedin.
JA	51.995	JA1IGY, Japan.
W	50.091	WB6KAP, U.S.A.
HL	50.100	HL9WI, South Korea.
ZK	50.100	ZK1AA, Cook Island.
KH6	50.101	KH6EQI, Hawaii.
	50.015	KH6ERU, Hawaii.

Additions this month to the beacons list is that of another in New Zealand, ZL4VHF at Dunedin on 145.400 MHz. Additional beacons are planned, including ZL1VHW for Hamilton, in the Waikato area, and ZL3VHT for Timaru. First commissioned area beacons outside the main centres will be 50 KHz. above the main centre area beacon.

Leigh VK6WA/T in a short letter confirms the existence of a beacon at Mawson, VK0MX, on 52.525, mode c.w., running 40 watts output, and beamed at Casey Base, which is roughly the same heading as for VK3. The beacon at Casey, VK0PF on 53.544 MHz. is beamed at VK, and runs 80 to 100 watts of c.w. Additionally there is another beacon at Casey beamed on Mawson, running about 15 watts, frequency approx. 52 MHz. So, on the basis of proposed activity in the Antarctica area, one could do well in keeping an ear and beam pointing South this DX season. It must surely be only a matter of time before someone makes a contact to the boys down there.

I was very pleased to receive a letter from Stan ZL4MB, of Dunedin, this month. Stan outlines the activity proposed for ZL4, which should arouse the interest of readers anxious to make contact with this rare area. Stan reports he has a 100w. a.m. final in the testing stages, and an RF26 unit for basic reception, and expects to complete a suitable two-stage pre-amp., possibly E88CC, etc., to go ahead of this. He has completed one 5-element yagi on a 15-ft. boom and is building another so they can be stacked. Limitations at his end are that their Channel 2 t.v. operates 54 to 61 MHz., usually from 2 to 11 p.m. (Dunedin time daily). However, Stan will be looking for VK contacts from about December to end of January, mostly at week-ends. He proposes transmitting outside t.v. hours, which means VK stations should look for him prior to his 2 p.m. (1300 Eastern Summer Time). After that he is prepared to call on 20 or 40 metres if some suitable frequency can be nominated for VK stations on which to listen. Thank you, Stan, for that very welcome bit of information, you can be assured to plenty of efforts to work you, there must be scores of stations in Australia wanting that ZL4 area for W.A.Z.L. Certificate.

Bob VK6BE is now in Albany and has been spending some time upgrading the beacon transmitters there. Advice comes from the W.A. V.h.f. Group News Bulletin to the effect that it has been proposed installing a second beacon in the VK6VE cabinet, operating on 52.950 MHz. To minimise running expenses it has been suggested that a limited time schedule be adopted, and also that power be reduced, but using better aerials to give an equal e.r.p. Speaking with Bob one night on 80 metres, he further emphasised this point, that the Albany Group is comprised of only a few members, and some quite reasonable costs have been born by the Group, and their finances are definitely being strained in trying to keep beacons on the air. Running costs alone for the present 2 mx beacon are above $40 p.a., and with two beacons this would rise to above $70 p.a. Bearing this in mind, and remembering that the Albany 2 mx beacon has been responsible for some 70 stations working VK6 on 144 MHz., and this number will rise as time goes on, there may be groups to the east of VK6, principally in VK5 and VK3 as the main recipients of the Albany signals, who would be prepared to give some little help on an annual basis to keep this and either a 52 MHz. or ultimately a 432 MHz. beacon active.

Normally I would feel such matters were purely a Divisional one, and possibly some help could be forthcoming from the VK6 W.I.A. Division, the side benefits to the Eastern States is so great in this case, due to ducting and inversions which follow the coast line, that there could be valid reasons for some help in this case. Perhaps the matter could be discussed in the two States mentioned, and possibly VK7. Any action taken could be directed towards Bob VK6BE.

A copy of "QRM" has arrived on my desk. This is published by the Northern Zone of the W.I.A. in VK7. I thank those responsible for sending it. Contained therein is mention of the sale of the equipment of Len VK7BQ, who is Patron and Life Member of the Tasmanian Division of the W.I.A. Len recently made a big decision, that at 81 years, he should retire from Amateur Radio. He commenced operation in 1925, on 200 metres, progressing through time to the early days of 50 MHz., then followed by 144 and 432 MHz., and later f.m. gear. Many VK and ZL stations will recall working Len on 50 or 52 MHz., and possibly other bands, so we do feel sorry to lose such a champion of the cause. However, the last paragraph on the subject in "QRM" shows chivalry has not been entirely lost, and bears quoting: ". . . the sum of $250 was raised. For some reason or other some gear still remained in the shack, together with the QSLs on the wall reminding us of days gone by. Strangely enough, this gear included a 40 mx transmitter, a modulator and associated power supplies, so you haven't heard the last of 7BQ yet, which goes to show you how wrong we were." So Len will still be able to keep some contact with his son John VK3AAC. We wish you good luck Len, for your remaining years, from the readers of "Amateur Radio".

PROJECT AUSTRALIS

Group discussions will be going on now on the subject of Australian repeater frequencies in relation to Project Australis A-O-B satellite frequencies. To bring you into the picture a little more, as this may be the first time you have read the frequencies (courtesy of VK2 V.h.f. and T.v. Group Newsletter):—

(a) VK Translator System (in MHz.):
Uplink: 145.800, 145.850, 145.900, 145.950.
Downlink: 435.100, 435.150, 435.200, 435.250.
(b) DJ Translator:
Uplink: Between 432.125 and 432.175 MHz.
Downlink: 145.900 MHz.
(c) Amsat Translator:
Uplink: 145.900 MHz.
Downlink: 29.500 MHz.

The Australia-wide f.m. repeater and simplex channels in the 2 mx band are:—

Repeaters:	IN	OUT
Channel 1:	146.1	145.6 Secondary
„ 2:	146.2	145.7 Future
„ 3:	146.3	145.8 Future
„ 4:	146.4	145.9 Primary
„ A:	145.854	
„ B:	146.000 Primary	
„ C:	146.146	

Three possible solutions to these frequency conflicts proposed by the Australis Group are: (a) Changing the satellite channels, (b) Changing the VK repeater channel frequencies, and (c) Turning off the VK repeaters during each pass of the satellite. To add to the turmoil, the satellite frequencies are an optimisation of frequency conflicts all over the world. I have not before said much about repeaters and satellites in this column, as they are generally handled adequately in separate articles by those more directly concerned, but I know there are many who have not done their homework and followed these problems as presented before, so perhaps this limited outline of the situation presented right in the middle of your notes will enliven your interest.

DX CALLING FREQUENCIES

From time to time I am asked about the establishment of DX calling frequencies, and usually advise that 52.010 MHz. seems to be fairly well established for such operation. As some stations have used it successfully for meteor scatter operation, there does not seem a need for another frequency. Therefore, I see no need at present to vary my answer, let us make 52.010 a DX calling frequency, but don't hog it, once contact has been made, shift up or down a few KHz. and leave the channel free for some other area to be heard.

Another point in favour of 52.010 is that it is only 10 KHz. from 52.000, a point easy to establish accurately using a 1 MHz. crystal carefully set up. In this way, providing you have stable equipment, you should be able to monitor the calling frequency when in the shack doing other things.

The whole idea is particularly well suited for s.s.b. operators and their transceivers. Similarly, if you are in the shack and not actually operating, your receivers should be listening on some part of some band, if not the above mentioned DX calling frequency, then at least on some beacon frequency, the time of day and conditions will dictate to a certain extent where you ought to be listening. Don't forget also, more than one receiver can use one converter at the same time, feed the output of the converter into two or more receivers and set them on different places, if something comes up you will hear it!

And still on the subject of calling frequencies, remember that 14130 KHz. is the International v.h.f. liaison frequency, a call there may surprise you who answers sometimes. (Reminder also that 7050 KHz. is a VK calling frequency.—Ed.)

VK3 V.H.F. GROUP TROPHY

Congratulations to Ron VK3AKC, who was awarded the above trophy for 1971 for his efforts in breaking the Australian 1296 MHz. record by working VK7ZAH in Launceston, achieved after months of experiments at both ends. Ron was presented with an inscribed microphone at the Gembrook Rally on 19th September, by the Chairman of the V.h.f. Group, Gil VK3AUI.

Bob VK3AOT sends along his usual interesting notes and the following are extracts from them: "Two metre activity in Melbourne is at its highest level for probably four years, many being well aware of the potentialities of VK6 DX, and much upgrading of equipment has been going on through the winter months. Six metres also has been going ahead, despite t.v.i. possibilities, and up to 15 stations can be heard on Sunday mornings following the broadcasts.

"Quite a lot of v.h.f. activity is planned from ZL this season. David ZL4PG and Bernie ZL-4IS intend operating portable on a 5000-ft. mountain on dates coinciding with the VK3 Field Days. They will use 51.0 to 51.5 s.s.b., 52.005 a.m., 2 metres a.m. and s.s.b., and 432 s.s.b., with 80 metres s.s.b. for liaison. ZL4PG operates 52.005 with 100 watts of a.m. most week-ends beaming VK. Times are 0900 to 1130.

"The VK3 Eastern Zone 2 mx beacon construction is nearly completed, tentative frequency until some national beacon plan is adopted will be 144.450 MHz. Launceston are thinking about a beacon, also Mt. Gambier and Sydney.

"Recently a group of Amateurs in Wollongong, N.S.W., conducted 432 MHz. moonbounce tests with K3MYC but results so far are not known. (Those concerned might let me have some information please—5LP.)

"The VK3 V.h.f. Group has decided to publicise a list of suggested beam headings for use by Melbourne 2 mx stations during periods of unknown conditions. If the more distant stations were to beam towards Melbourne at the appropriate time for their area more contacts may result. The suggested areas and times are: Gippsland 1930, Tasmania 2000, Ballarat and Adelaide 2030, Western Victoria and Mt. Gambier 2100, Northern Victoria 2130 and North-Eastern Victoria 2200." (This sounds reasonable and could well produce interesting results.—5LP.) Thanks Bob for your continued interest.

The week-end of 4th and 5th December will be a good one for v.h.f. operation. Field days are being conducted in VK3 and VK5 and in New Zealand as well, and there is reason to believe there will be quite a few stations operating portable in all areas. VK5 portable stations are most likely to be set up and operating on the Saturday night in readiness for a good start at 0730 Sunday morning. The one hour of daylight saving is going to help DX operating in the mornings this year, in effect giving an additional hour of operating before conditions fade out.

The last week-end of October saw the sweeping in of a nice big inversion across the southern part of Australia to produce some excellent 144 and 432 MHz$. DX. Tony VK5ZDY from his prime location at Stirling in the Mt. Lofty Ranges made the most of it, working on 144 VK3s NS, ZOO, ZSB, AKC, JS, AKR, BDA, ZUR and AOT. Not content with that, he turned his attention to 432 MHz. and had 5 x 9 contacts with Ron VK3AKC, Bob VK3AOT and Dennis VK3BDA. Jim VK3YDJ and Les VK3ZUR also heard Tony on 432 but were unable to make contact. Jack VK3NS also heard Tony at 5 x 9, but I understand he has no transmitter. While all this was going on in an easterly direction, things were also happening to the west, with Kerry VK5SU at Ceduna putting in a 5 x 9 signal

(Continued on Page 21)

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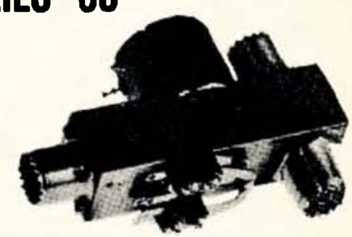

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VHF NOTES

(Continued from Page 19)

to Adelaide. Bob VK5ZDX even worked Kerry on 6 mx as well, but signals were considerably weaker than on 2 mx. Others getting in on this two-way activity east and west included Mick VK5ZDR, Noel VK5VT, John VK5QZ and Jim VK5ZMJ. Much gnashing of teeth went on in my shack as the inversion did not reach the 30 miles inland to my location, and I had to content myself with one solitary b.f.o. note from VK5SU and a very weak signal from VK3AOT, no contacts made, not a sound from any other station, but that's the selective pattern of these openings, and there was nothing I could do about it!

TWO YEARS OF OPERATION

That's right. That's the length of time I have been trying to keep you filled in on some of the v.h.f. news of Australia. It has not been easy and still isn't. It takes a lot of time and much reading and sifting of material has to be done before copy can be prepared for "A.R." I am indeed grateful to a few regular contributors, particularly Bob VK3AOT, who is there every month with something, what a pal! I thank those people responsible for the various bulletins and magazines I receive from different V.h.f. Groups, etc., throughout the country. Currently I receive one or more such news mediums from VKs 2, 3, 4, 6 and 7 plus "Break-In".

If you feel your particular State has not been getting much written about it of late, then the answer is simple, no one writes to me! I do not undertake to give replies to letters unless specifically requested for information, time is too limited, but all sources of information are acknowledged each month in "A.R." as the particular paragraphs are prepared. The "Meet the Other Man" series has been temporarily discontinued due to difficulty of getting those contacted to write with information on the pro forma supplied. I will get it going again soon.

I would like to thank the Editor of "A.R." for his overall co-operation and understanding. He hasn't been too hard with the blue pencil, although a couple of times I have not agreed with him! However, after a month has passed by, time mellows one's thoughts and we proceed as before.

I will try and keep the page going for the time being. Constructive suggestions for improvements are always welcome, news items are ALWAYS welcome, but bear in mind I may not be able to include all you send, particularly if not of a national nature—this is where the Editor's blue pencil comes in!

Please note all times (as indicated at top of page) are now daylight saving time as related to Eastern Standard Time, and will remain this way until the March issue. Where a particular reference has to be made to time it will be referred to as "Eastern Summer Time".

Seasons greetings to you all for Christmas and the New Year.

The thought for the month: "Only he who attempts the ridiculous can achieve the impossible." 73, Eric VK5LP, The Voice in the Hills.

— • • • —

LINCTUS SYNAPSIOSAE
or Little Morsels

A receiver capable of detecting these transmissions need only consist of a pair of headphones connected to two earth rods separated by as great a distance as possible. (Rad. Comm. Dec. 70—1 KHz.)

They would not care to see c.w. waltz ("73," Mar. '71).

Drew particular attention to the development of the ultra-high frequencies and television which was the job of the Amateur today. (T. & R. Bull., Jan. 1932).

Two years ago I took a trip to Latin America. I had written to every Amateur Radio Association in the countries I was going to visit, giving them the exact date and time of my arrival, flight number, hotels where I would stay and I explained that I would like to meet with local Amateurs. I did not get one single (phone) call from them during the entire trip. However, I did manage to meet local Amateurs on my own. (WB2AQC, Reception Centre for Foreign Amateurs visiting New York City, May 1971).

The use of voluntary services by thousands of individuals (Amateurs) on a world-wide basis provides a service to humanity in the advancement of scientific knowledge that cannot be matched by any single country (W.A.R.C. Geneva 1971, extract from U.K. Doc. 315).

The rapid growth of f.m. is beginning to catch up with us. In most major metropolitan centres 146 to 147 MHz. is full with repeaters and simplex operation; the top 10 MHz. of the 450 band is full with repeaters, simplex, up-links, down-links, and various control functions; 6 mx is rapidly filling up in non-channel 2 areas (FM in "CQ" Oct. '71).

It is a curious fact that one of the longest standing unsolved riddles in this field (radio astronomy) is commonly studied with a simple h.f. yagi ("73" Aug. '71, in relation to the powerful sporadic radio emissions from, or near, the planet Jupiter, in the spectrum around 15 to 30 MHz.).

—H. F. Evertick.

Photograph taken at Ockley Radio Club, Narrogin, Western Australia, on 3rd October to mark the visit of the Federal President, VK3KI (standing, with glasses). Operating mobile was Percy Beacher, VK6DD, Vice-President of the VK6 Division, who drove Michael around. (Block courtesy "Narrogin Observer")

OBITUARY

DUDLEY NOURSE, VK2DQ

The key of Dudley Nourse is now and for ever silent. What kind of a man was VK2DQ? He was an exponent of the art of c.w., shorthand and typing.

He was a pioneer of s.s.b. and with home-constructed gear was an original member of the 80 metre "Sewing Circle".

Ever willing to assist others, his cheery voice full of "sky-larking" could be heard on 80 most evenings—only those who were close to him realised the tremendous suffering his war injuries caused him. I considered him a close personal friend and deeply regret his sudden passing.

Although his key is now silent, I'll wager he can hear us on u.s.b. and will some day p.t.t. again when we finally net in on his frequency.

To his XYL Jean and harmonic Pam, I extend on behalf of those who knew him deep and sincere sympathy.

73 Dudley, CU further down the log.—VK5XB.

ANDREW JOHN WRIGGLESWORTH VK2BKW

Andrew's mother writes from Bangalow that he was only 25 years old when he died on 23rd September, and had always been keenly interested in radio and was a member of the W.I.A.

He had little time free for transmitting, but had collected W.A.C. after constructing his own transmitting and receiving equipment, all of which had been done in spare time when firstly at university, from which he graduated with honours in physics, and latterly when he was at home.

We offer sincere condolences to Mrs. E. J. Wrigglesworth and to all who had been associated with Andrew.

PILE-UPS ON 435?

With the continuing progress on A-O-B, and the good prospects for SYNCART and SKYLARC, it looks like we will soon have several new DX bands. Unfortunately, different and more sophisticated equipment is needed to work DX at v.h.f./u.h.f.; so, we probably won't see that many stations on the satellite repeater channels for a while.

If we get SYNCART working, though, the word will get around pretty quick about the new band. One might speculate: How long until we see the first "pile-up" trying to work a rare DX station? What rules of courtesy do we observe? Will the old DX pile-up problems re-appear in the v.h.f. bands? In satellite relay links, high power and high gain antennas are even more of an advantage than at h.f. Will the first satellite-relay DXCC award automatically go to the Amateur who is first able to put a kilowatt into a 30-foot parabolic dish?

The answers to these questions are not in anyone's hip pocket. Some problems, like strong signal "capture" of the satellite repeater, might be eliminated in future design. Others, like the problem of wideband Amateur t.v. and satellite channels on the same frequency, require tact and understanding on everyone's part. Some problems, like the crank who wants to use his transmitter to hurt everyone else, will probably never go away.

The stakes that ride on a solution to our problems are higher in the satellite game than they were at h.f. At the Space Conference, we were given notice that our performance on 435 will be looked at carefully. Our ability to get new bands for space links, and to retain what we have now, depends on how well we can solve these problems.

—WB4SMH in "Amsat Newsletter, Sept. '71.

NEW CALL SIGNS

AUGUST 1971

VK1DS—P. A. Smith, 6 Rowell Pl., Weston, 2600.
VK1CAA—W. O. B. Wilson, Youth Hostel, Dryandra St., O'Connor, 2601.
VK2SO—W. F. Noble, 23 Isabel St., Belmore, 2192.
VK2BAA—Armidale Police Citizens' Radio Club, Rusden St., Armidale, 2350.
VK2ZTR—R. T. Tinker, R.M.B. 1263, Lancelot St., Blacktown, 2148.

VK3PM—G. S. V. Frew, 13 Wellington St., Middle Brighton, 3186.
VK3YV/T—D. K. W. Bradbury, 1 Shrimpton Crt., Box Hill North, 3129.
VK3ABM—W. Porter, 1 Heyington Pl., Toorak, 3142.
VK3AHC—H. N. Charles, 3/22 Wallace Ave., Toorak, 3142.
VK3AJU—H. Jupp, 20 Webster St., Dandenong, 3175.
VK3BFT—Collingwood Technical College, 35-41 Johnston St., Collingwood, 3066.
VK3YCO—S. L. Morgan, 8 Nelson St., Bendigo East, 3550.
VK3YGC/T—R. C. Corrigan, 3 Valewood Dr., Mulgrave, 3170.
VK3ZHC—J. D. Mathieson, 3 Cherry Rd., Balwyn, 3103.

VK4AD—A. W. Eklund, C/o. J. McWhirter, 52 Queens Rd., Clayfield, 4011.
VK4SE—S. S. St. George, 2 Aspect St., Toowoomba, 4350.
VK4WA—A. E. Watkins, 1/21 Lever St., Albion, 4010.
VK4ZJL—J. C. Mounsey, 343 Rockonia Rd., North Rockhampton, 4700.

VK5UP—R. L. Parnell, 23 Margaret St., Port Augusta, 5700.
VK5UQ—J. A. Cooper, 19 Charles St., Norwood, 5067.
VK5ZET/T—E. R. Tuohy, 30 Malvern Ave., Malvern, 5061.
VK6HN—A. T. G. Hanson, 121 Rosebery St., Inglewood, 6052.
VK6NY—M. B. Bertram, Station: Portable; Postal: C/o. Allied Minerals N.L., 283 Rokeby Rd., Subiaco, 6008.
VK6RV—R. G. B. Vaughan, 12 Munyard Way, Morley, 6062.
VK7JU—M. G. Burleigh, 12 Benjamin St., Launceston, 7250.
VK8VV/T—B. J. Clarke, P.O. Box 171, Katherine, 5780.
VK8ZDH—D. R. Hockley, 2354 Britomart Gardens, Alawa, 5790.

ALTERATIONS

VK1ZVT/T—D. S. Thomas, 2/47 Hampton St., Yarralumla, 2600.
VK2BV—Waverley Radio Club, 49 Old Bush Rd., Engadine, 2233.
VK2KR—K. C. Mattei, 31 Putarri Ave., St. Ives, 2075.
VK2LI—M. P. Moore, 21 Avoca St., Randwick, 2031.
VK2ABE—A. J. Forbes, 39 Flood St., Bondi, 2026.
VK2ABS—B. S. Sullivan, 186 Kilaben Bay Rd., Kilaben Bay, 2283.
VK2ANO—J. A. Simenson, 6 Koorabel Ave., West Wollongong, 2500.
VK2ANZ—C. S. Smith, 244 Bacon St., Grafton, 2460.
VK2ASU—H. S. King, 29 Coutman St., West Kempsey, 2440.
VK2ATZ—Westlakes Radio Club, Anzac Pde., Teralba, 2284.
VK2BGV—G. Voron, 60B Dutruc St., Randwick, 2031.
VK2BHJ—H. J. Town, 37 Numa Rd., North Ryde, 2113.
VK2BTB—T. S. Barnett, Lot C, Mt. Keira Rd., Wilton, 2571.
VK2CAS—A. G. Svensen (Sqn. Ldr.), Lot 25, Reid Rd., North Springwood, 2777.
VK2ZFX/T—R. F. W. Boundy, Lot 20, Hickey St., Ballina, 2478.
VK2ZFY—A. E. Kent, Lot 386, Thirroul Rd., Kanahooka Pt., 2530.
VK2ZHE—H. D. Lundell, 10 Tyron St., Chatswood, 2067.
VK2ZHM—J. H. Mitchell, Lot 259, Bannister Head Rd., Mollymook, 2539.
VK2ZIP—R. H. Smith, 162 Pacific H'way, St. Leonards, 2065.
VK2ZIZ—H. P. Robinson, 8/16A Meadow Cres., Meadowbank, 2114.
VK2ZUI/T—R. Ecclestone. Addition of /T.
VK3CY—C. Yeoman, 4/44-48 Durrant St., Nth. Brighton, 3186.
VK3VH—D. H. Sinclair, 9/42 Clark St., Port Melbourne, 3207.
VK3YP—W. H. Payne, 3 Harrow Crt., Doncaster, 3108.
VK3ABG—J. A. G. Miller, 554 Malvern Rd., Prahran, 3181.
VK3AGW/T—A. G. Wilkey, Station: Upper Mt. Morton Rd., Belgrave Heights, 3160; Postal: P.O. Box 106, Oakleigh, 3166.
VK3ARB—R. A. Bourchier, 11A Hall St., Moonee Ponds, 3039.
VK3BBI—B. Lukes (name amended), 48 Pennell Ave., St. Albans, 3021.
VK3YDT/T—J. W. Whitehead. Addition of /T.
VK3ZAU—I. J. Zmood, 1 Wrixon Ave., East Brighton, 3187.
VK3ZCY—J. H. Ely, 12/27 Ewart St., Malvern, 3144.
VK3ZKO/T—R. J. Broughton. Addition of /T.
VK3ZLS—G. R. Forman, 8 Comrie Crt., Bayswater, 3153.
VK3ZOG—P. G. M. Bruer, 21/49 Walsh St., South Yarra, 3141.
VK3ZSN/T—W. Chandler. Addition of /T.
VK3ZXA—D. Mitchell, 17/48 Lansell Rd., Toorak, 3142.
VK3ZIH/T—R. S. Hernan. Addition of /T.
VK3ZPA/T—P. A. Wolfenden. Addition of /T.
VK4OF—K. P. P. O'Farrell, 37 Amsterdam St., Upper Mt. Gravatt, 4122.
VK4ZDS—D. A. Morrish, 2/34 Morshead St., Bundaberg, 4670.
VK5QA—F. T. Wilson, 7 Peroomba Ave., Kensington Gardens, 5068.
VK5XG—G. N. Antuar, 16 Pine St., Peterborough, 5422.
VK5ZCB—T. R. Friebe, 145 North St., Henley Beach, 5022.
VK5ZPR—P. R. Banks, 3 Park Tce., Enfield, 5085.
VK6BQ—R. R. C. Davies, Lot 10, Kawina Rd., Bickley, 6076.
VK6NF—N. F. Odgers, 18 Parnell Pde., Bassendean, 6054.
VK6NH—N. H. Hyde, 67 Hennessy Ave., Orelia, 6167.
VK6ZV—F. X. Lawlor, 12 Bellairs Rd., Kardinya, 6163.
VK6ZCE—C. Morey, 2 Clarendon St., Cottesloe, 6011.
VK6ZFH—G. C. F. Hufner, Station: "Mareeba," Albany H'way, Arthur River, 6315.
VK6ZGG—G. R. Gaiger, 26 McGill St., Kewdale, 6105.
VK7ZAE—A. R. Everts, 17 Gregory St., Sandy Bay, 7005.
VK7ZLH—R. L. Hibbert, 647 Huon Rd., Fern Tree, 7101.
VK7ZNS—N. Stutterd, 57 West Park Gr., Burnie, 7320.
VK8DO—D. O. White, 28 Mullen Gardens, Alawa, 5790.
VK9AD—J. R. Devereux, P.O. Box 846, Rabaul, N.G.
VK9BJ—B. J. Mennis, P.O. Box 706, Madang, N.G.
VK9VM—I. C. Fisher, P.O. Box 428, Port Moresby, P.

CANCELLATIONS

VK2AS—A. C. Freeman. Deceased.
VK2CL/T—L. H. Taylor. Not renewed.
VK2DU—D. R. W. Fullerton. Not renewed.
VK2EF—J. F. Small. Deceased.
VK2JZ—A. S. Mather. Deceased.
VK2NY—R. J. Berry. Not renewed.
VK2QP—L. W. Hughes. Deceased.
VK2VE—R. J. Cramer. Not renewed.
VK2WS—R. N. Sneddon. Deceased.
VK2YV—G. T. Littlefair. Deceased.
VK2AFZ—J. E. Johnson. Deceased.
VK2AIO—A. O. Brand. Not renewed.
VK2AJG—L. D. Sanders. Not renewed.
VK2AKB—W. F. Porter. Deceased.
VK2BBA—H. Schoning. Not renewed.
VK2BED—A. H. Bennett. Not renewed.
VK2BFB—F. B. Crum. Not renewed.
VK2BPA—N. G. Williams. Transferred to Qld.
VK2ZBE—R. J. Jarrett. Not renewed.

VK3JK—G. S. V. Frew. Now VK3PM.
VK3AII—E. W. Cleburne. Transferred to N.S.W.
VK3AVC—Caulfield Grammar School. Not renewed.
VK3BDK/T—D. K. W. Bradbury. Now VK-3YV/T.
VK3ZPE—J. R. Edwards. Not renewed.
VK3ZPY—R. J. Gowland. Not renewed.

VK4BF—W. F. Davidson. Not renewed.
VK4CM/T—T. M. B. Elliott. Not renewed.
VK4MK—M. T. K. Power. Not renewed.
VK4PE—Padua College Radio Club. Not renewed.
VK4WH—W. E. Hagarty. Not renewed.
VK4ZJG—J. G. H. Rowell. Not renewed.

VK5BA—Brompton Boys' Radio Club. Not renewed.
VK5HU—K. L. Gillion. Not renewed.
VK5MV—M. H. Winkler (Rev.). Not renewed.
VK5PD—J. H. Boucaut. Not renewed.
VK5WZ—F. G. Anear. Deceased.
VK5YC—K. C. Young. Not renewed.
VK5ZCL—P. T. Leathem. Not renewed.
VK5ZKZ—D. P. Ramsey. Transferred to Vic.
VK6FS—H. D. Spence. Not renewed.
VK7ZWD—D. Whent. Not renewed.
VK8JC—J. A. Cooper. Now VK5UQ.
VK9LM—L. G. Meek. Transferred to N.S.W.
VK9WB—W. A. Bowles. Not renewed.

LICENSED AMATEURS IN VK

AUGUST 1971

	Full	Lim.	Total
VK0	11	1	12
VK1	88	30	118
VK2	1419	496	1915
VK3	1308	669	1977
VK4	520	206	726
VK5	515	226	741
VK6	369	135	504
VK7	156	65	221
VK8	37	13	50
VK9	84	11	95
	4507	1852	6359 Grand Total

SILENT KEYS

It is with deep regret that we record the passing of—

VK2DQ—D. Nourse
VK2BKW—A. J. Wrigglesworth
WIA-L30313—F. G. Flounders

RECIPROCAL LICENSING

The following is extracted from I.A.R.U. Region 1 News:—

The President,
Radio Society of East Africa,
P.O. Box 5081, Nairobi.

Dear Sir,

1. It would be very much appreciated if you could give the widest publicity possible in all the Amateur Radio magazines to the fact that all visitors to East Africa who are desirous of obtaining an East African call sign whilst on holiday should apply in writing in the first instance to:—

Engineer-in-Chief,
E.A. Posts and Telecomm. Corp.,
P.O. Box 7129,
Kampala,
Uganda
(For attention: "R.C. Section")

and should be prepared to submit a photostat copy of their current licence together with proof of a pass in a Morse test at 12 words per minute, or more. The application should be submitted at least three months before the intended visit, in order that the necessary clearance can be obtained from the respective Governments and should be accompanied by letters from two referees testifying the applicant's good character and interest in Amateur Radio.

2. Upon receipt of the application in this office, the necessary machinery will be set in motion. No guarantee of success of the application can be given, but every one received is dealt with equally.

3. It would also be appreciated if you could bring to the notice of all your members the contents of Clause 14 of the Amateur Radio Licence (EA) which states: "This licence shall be returned to the Director-General when it has expired or been revoked." This applies also to licensed Amateurs who have left East Africa permanently.

Thank you for your anticipated help and co-operation.

Yours faithfully,
(Signed) A. F. Ward,
for Engineer-in-Chief.

OVERSEAS MAGAZINE INDEX

(1) "Break-In" Sept. Turn on that transistor; Designing an equalised pre-amplifier for stereo magnetic cartridges; Microwaves for the Amateur; Interesting facts for the s.h.f. man.

Articles which appear in other magazines are as follows:

Accessories: (3) R.f. Power Measurement with Hot-Carrier Diodes, IC/Photocell Compressor/AGC Unit; The Theft Stopper; Yet Another Code Monitor; The Spider, a gadget for the transceiver man with a following linear amp.; An IC Pulser for the Amateur Experimenter; A DC Isolator for Phones. (5) BK System using Reed Relays. (7) Another Transistor Tester; A General Purpose Solid State Pre-Amplifier. (8) FET Transconductance Tester.

Antennas: (4) Adjusting the Cubical Quad for Optimum Results. (5) Basics About Antennae, notes on the end fed and tuned doublet types. (8) 80 Metre Vertical Antenna.

General: (2) You can take it with you; Four Tube Station (c.w. on 40 and 80); All's Well in Amateur Radio; (3) Transformerless Power Supplies; A Marketing Man's Approach to Ham Radio. (3) Man-Made Interference, Its Causes and Cures; New Hope for Learning the Code. (7) Semiconductor Curve Tracer, Part 2. (2) DX-pedition to the Laccadives; Facsimile for the Radio Amateur, Part 1; Diary of a DX-pedition. (3) Facsimile for the Radio Amateur, Part 2. (4) Highveld goes to the low-veld; The Roof of Africa Rally. (7) Low Loss Passive Bandpass C.W. Filters; Review, Drake "Marker" Luxury F.M. Transceiver. (8) Photo-fabrication of PCB's; RTTY Automatic Frequency Control; IC Phase Locked Loops.

Receiving: (2) 15 Metre Signals from Jupiter; DX from the Stars. (7) 80-10 Metre FET Pre-Selector; 2 x MPF102s in a Cascode Circuit. (8) Multi-Mode I.F. System; Update that old Receiver for SSB, etc.

Transmitting: (2) Tiny Tim Linear Amplifier, 600w., 2 x 811A and an old t.v. transformer; Digital Readout for Your VFO. (3) Build a Solid State TV Camera; A Linear, Stable VFO with tracking mixer (use it in tx or rx applications). (4) An AM Final for Your SSB Transmitter. (5) Build up of a Transmitting Layout. (7) Custom Design and Construction Techniques for Linear Amplifiers.

VHF: (3) Multi-Channel Operation with the Motorola HT200. (5) Wavemeter for VHF. (6) A 4 Element Yagi Antenna for 23Cm.; A 23 Cm. Converter with Hot-Carrier Diode Mixer; Interdigital Bandpass filter for 23 Cm. A Ground Station for Satellite Comm. via Oscar 6; Basic Digital Circuits; A Wideband Pre-Amp. for Freq. Counters to 60 MHz.; A Four Digit Freq. Counter Module for Freq. up to 30 MHz.; A New Method of Freq. Multiplication for VHF and UHF SSB; A Transistorised Power Amp. for 2 Mx using the 2N3632; AM Demodulators using Silicon Semiconductors. (7) Low Cost Hardware for 2 Mx Reception; Using the Motorola TU110 series; Transmitter on 420 MHz. (8) Freq. Syn. for VHF Scatter; Injection Laser Communications; FM Sequencial Encoder; VHF Weak Signal Source.

KEY

(1) "Break-In", Sept; (2) "73", August; (3) "73", Sept.; (4) "Radio ZS", Sept.; (5) "Short Wave Magazine", Sept.; (6) "VHF Comm." August; (7) "QST", Sept.; (8) "Ham Radio", Sept. All issues 1971. —VK3ASC.

HAMADS

Minimum $1 for forty words
Extra words, 3 cents each

HAMADS WILL NOT BE PUBLISHED UNLESS ACCOMPANIED BY REMITTANCE

Advertisements under this heading will be accepted only from Amateurs and S.w.l's. The Publishers reserve the right to reject any advertising which, in their opinion, is of a commercial nature. Copy must be received at P.O. 36, East Melbourne, Vic., 3002, by 5th of the month and remittance must accompany the advertisement.

FOR SALE: A.W.A. MR20B 3-Channel FM Transceiver complete with control box and Channel A or B crystals, $60. E. Penikis, 8/11 Northbourne Flats, Canberra City, A.C.T., 2601.

FOR SALE: Collins 75A4, immaculate, owned since new, one of the last batch made. Latest Collins mods., mechanical filters 6, 3, 2 KHz. Complete with Panoramascope Panadaptor T200, spare 3AP1s, all manuals, $550. N. Stilwell, P.O. Box 104, Bendigo, Vic. Phone (bus.) 43-1400.

FOR SALE: FTDX100, FLDX2000, Heathkit SB610 Monitor, small Oscilloscope, heavy duty Rotator, Hy-Gain Quad, Heathkit Cantenna, co-ax and fittings (incl. 30 yds. new RG14), etc., etc. Leaving VK so am open to offers. Phone 723-2645 (Melb.) after 6 p.m.

FOR SALE: Gonset 2 mx SSB/AM/CW Transceiver, 4 MHz. coverage, transistorised receiver, mainly transistorised transmitter with 6360 final. With 240 volt power supply and manual, $150. 24 Seafield Ave., Kingswood, S.A. Tel. 71-4671.

FOR SALE to those who know the breed. Collins Communication Receivers R390A and R391. 500 KHz. to 32 MHz., 1 MHz. bands, excellent condition. Price $1100 each. Details on request. VK3IZ, Phone 848-5790 (Melb.).

FOR SALE: Two Pye Mk. I. Transceivers (modified 6 metres AM tunable), 12 volt units, pi output with tx xtal included, repainted grey, $20 each. T.C.A. 1674 Transceiver (2 channel mod. 2 FM), 10 watt output, rocking armature mike (needs AC power supply, circuit included), first class unit, repainted grey, Ch. B xtals included, $55. Write K. Brady, VK2AFF, 24 Barellan Ave., Dapto, N.S.W., 2530.

FOR SALE: Yaesu FTDX400 Transceiver. This unit has had little use and is in as new condition. Excellent performer on all bands, $400. VK5ZK, 52 Arthur St., Plympton Pk., S.A., 5038. Ph. 93-1523.

FOR SALE: Yaesu FR50 rx with spkr., $140; Yaesu 6 mx and 2 mx Converters (transistor), $20 each; F Series SSB Generator board, unused with circuit, $35; or $200 the lot. Also Marconi CR100 rx with s.w. antenna tuner, S meter and 100 KHz. calibrator in good order, $80. AC operated Pye Ranger (3/12) with 5/8ths vertical, FET pre-amp., P/S and Ch. B and repeater rocks, $50. National Tape Recorder RQ-7035, mono, 7 in. reels, $60. Contact I. O'Toole, VK2ZIO, on Tel. (Syd.) 84-6086 after 6 p.m. Mondays, Tuesdays or Thursdays.

NATIONAL Tape Recorder RQ158S, portable, battery operated, with AC Adaptor RP-999; 5 in. reels, 2 track, 2 speed, with mike and instruction book; as new, $80. National Cassette Tape Recorder, latest model RQ209S, battery or AC operated, with mike and instruction book, as new, $55. VK3LC, Alf Chandler. Phone 50-2556 (Melb.).

WANTED: AR7 Receiver with Coil Boxes or AR8 Receiver. Write giving full details and asking price. Graham Douglas, VK5ZIG, P.O. Box 565, Port Augusta, S.A., 5700. Phone 2571.

WANTED: AR22 Rotator or Prop. Pitch Motor with Indicator, in good working order. Contact J. Gravina, 36 Robinson St., Moorooka, Brisbane, Qld., 4105.

WANTED: A.W.A. Green Carphone, type MR10A or MR20A, high band. With or without power supply, control unit or valves. Willing to make a deal with a low band set if required. Gordon Reid, 13 Ashton St., Temora, N.S.W., 2666.

WANTED: Band-change motors and L-R indicator drive transformers to suit 24 volt Bendix MN26 Radio Compass sets. Transformers are marked T16 or A15064. State price required. Also Vintage Radios complete with Horn Speaker, early 1920's, good price paid, send details. O'Brien, Edgar Rd., San Remo, Vic., 3925. Phone 107.

WANTED: Galaxy III with or without power supply. Price and condition to Ray Malcolm, VK3BAO, Boisdale, Vic., 3860.

WANTED: Rotary Converter to restore R.A.N. Type S Synchronous Rotary Gap Spark Transmitter. Output 70 v.a.c. at high frequency, probably 500 Hz. Unit will probably have 24 field poles and can be identified by an extension shaft coming out one end for driving rotary gap. R. F. Fisher, VK3BAO, 241 Royal Pde., Parkville, Vic., 3052. Phone 340-5931 (business hours).

WANTED: Someone to repair and re-align No. 122 Transceiver, preferably someone familiar with this type of equipment and am willing to pay the right price for the repairs. Contact York Mendoza on Tel. (Syd.) home 59-4142 or work 59-0401.

WANTED: SSB Transceiver with power supply. Must be in good condition. VK2AFP, R. Gream, 7 Keats St., Byron Bay, N.S.W., 2481.

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NEW DE LUXE TRANSCEIVER *from YAESU*

YAESU

Model FT-DX-401

YAESU offers the all new YAESU FT-DX-401 SSB Transceiver. Considered the best buy in Amateur equipment available today, the FT-DX-401 features high power, super sensitivity, and sharp selectivity, in one complete station package. PTT microphone is included. Except for a speaker, no other accessories are needed to be "on the air".

De luxe equipment built-in to the FT-DX-401 at no extra cost includes: AC power supply, noise blanker, dual calibrators (100 KHz. and 25 KHz.), VOX, break-in CW with sidetone, 600 Hz. sharp CW filter, clarifier, phone patch terminal, cooling fan, and WWV 10 MHz. band. Full transceive capability 80 through the complete 10 metre band. Two blank auxiliary positions are provided on the bandswitch.

The FT-DX-401 features velvet smooth tuning with zero backlash planetary gear system. Read-out to 300 Hz. is easily obtainable when calibrated to the nearest 25 KHz. marker. WWV frequency check to crystal calibrator assures "on frequency" operation on all bands.

For DX operation a noise blanker is mandatory . . . the FT-DX-401 has it! Complete with signal threshold control, the blanker picks out noise spikes completely and leaves only clean signal copy.

DUAL TOROID first I.F. stage provides high gain/bandwidth product for double conversion circuit used in the FT-DX-401. This system guarantees linear tuning rate plus high image rejection.

Twenty tubes plus fifty silicon semiconductors make up the active devices used in the Transceiver. The passive crystal filters are of the six-pole type designed for optimum SSB audio quality and sharp CW reception.

The FT-DX-401 was planned and designed specifically for the World Amateur. Export quality, with superior components and finish, specially tested, and including hand-held PTT microphone. Spare parts, personalised 90-day warranty, and continuing service available through your authorised dealer.

Check the specifications and compare your cost. We believe that the FT-DX-401 is truly the best buy in the Amateur field today.

SPECIFICATIONS

Maximum Input Power: 560W. PEP SSB.
Sensitivity: 0.3 Microvolt for 10 dB. S/N (SSB 14 MHz.).
Selectivity: 2.3 KHz. (6 dB. down), 3.7 KHz. (60 dB. down) six-pole crystal filter nominal shape factor 1.6:1 for SSB: 600 Hz. (6 dB. down) 1.2 KHz. (60 dB. down) for CW.
Frequency Range: 3.5 to 4, 7 to 7.5, 10 to 10.5 WWV, 14 to 14.5, 21 to 21.5, 28 to 30 MHz.
Unwanted Sideband Suppression: 55 dB. down (at 1000 Hz.).
Carrier Suppression: 50 dB. down from full output.
Distortion Products: More than 25 dB. down.
I.F. and Image Ratio: More than 50 dB. down.
Frequency Stability: Less than 100 Hz. drift in any 30-minute period after warm-up.
Antenna Impedance: 50 to 120 ohm—SWR 2:1 or less.
Audio Output: 1.5 watts, 350-2200 Hz., 8/600 ohm impedance.
Power Source: 117 or 234 volts AC, 50/60 Hz.
Dimensions: 15¾ inch wide, 6¼ inch high, 13¾ deep.
Weight: 45 pounds.

PRICE $695.00

Optional Extras: SP-401 Speaker $28.50
FV-401 External VFO $122.00
YD-844 De Luxe Desk Microphone $39.

Prices include Sales Tax. Freight extra. Prices and Specifications subject to change.

Sole Authorised Australian Agent:

BAIL ELECTRONIC SERVICES

60 SHANNON STREET, BOX HILL NORTH, VIC., 3129. Telephone 89-2213

N.S.W. Rep.: **STEPHEN KUHL, P.O. Box 56, Mascot, N.S.W., 2020.** Telephone: Day 67-1650 (AH 371-5445)
South Aust. Rep.: **FARMERS RADIO PTY. LTD., 257 Angas St., Adelaide, S.A., 5000.** Telephone 23-1268
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