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VR2P Signal Meter, calibrated 1/3 db, clear plastic, few only 40/6
VR3P Vumeter, -20 +3 db., clear plastic, 3" x 3 1/2 17/6
VR65 Vumeter...-20 +3 db., black bakelite case, 3" square 24/6
MO65 0-1 mA., 31/2", round, black bakelite case 35/6
MO65 0-5 mA., 31/2", round, black bakelite case 35/6
MO65 0-10 mA., 31/2", round, black bakelite case 35/6
MO65 0-1 Amp., AC/DC, 31/2", round, black bakelite case 35/6
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FEDERAL COMMENT

The commencement of another year is the usual time chosen for looking to the future and injecting new ideas into an organisation such as ours. This year of 1964 promises to be no exception to the rule. However, a few comments of the previous Editorial are in order as it had not been confirmed at that time what the final results of the Extraordinary Conference yielded. We are happy to confirm that the final Plenary meetings of the Conference dealing with particular Services such as the International Civil Aviation Organisation or Shipping.

This will mean shorter Conferences at more regular intervals because it has been recognised that a period of four to five months at a Conference is too long and too wearing on the nerves of the delegates. For this reason, the foresight of Federal Council in deciding to immediately start collecting funds was most timely. Some members have questioned the reasons for requiring so much money to be raised by Divisions. It is the opinion of Federal Council that a Fund must be set up in order to have representation as and when required. We may not be so fortunate in the future as we have been in the past with our delegates who have had the backing of their companies in regard to salaries and expenses.

The Amateur has now grown in stature in international affairs, and in such growth must assume the responsibilities that it entails. He must now consider himself an important part of an international brotherhood of Amateurs which must be financially supported. It is certain that this subject will have greater co-operation between I.A.R.U. Societies, continual raised in the interests of the Amateur Service as a whole. This in turn will mean greater co-operation between I.A.R.U. Societies, continual

responsibility. This is the message then for the New Year—Let us all assume our proper responsibilities as members of the Amateur Service for a prosperous New Year.

FEDERAL EXECUTIVE, W.I.A.

CONTENTS

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FEDERAL EXECUTIVE, W.I.A.

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OUR COVER

An enlarged portion of a printed circuit provides a modern style type of painting for our January edition. (Incidentally, all 1964 covers will be a red colour to differentiate between the 1963 (green) issues of "A.R."

JANUARY 1964
Vol. 32, No. 1
A SINGLE SIDEBAND SYSTEM FOR 144 Mc.

I. F. BERWICK, VK3ALZ

It has long appeared to the writer that the ideal band on which to demonstrate the superiority of sideband for weak signal work is 144 Mc. Although it may take a little time for receivers to improve to the stage where the full 9 db. gain is realisable, it is hoped that the device presented here will pave the way towards that goal.

Despite the imposing title, this is a comparatively elementary device consisting of three parts—
1. A transmitting up converter.
2. An AB1 driver stage.
3. A linear amplifier.

The design of such a converter calls for a little consideration. The problems are—
(a) Linearity of the s.b. amplifiers.
(b) Spurious responses.
(c) Stability of the oscillator.
(d) Efficiency of mixer and amplifiers—an important consideration at 144 Mc.

It will be convenient to consider (a) and (d) in conjunction.

It transpires that some tube types which are highly suitable for mixer and amplifier service at h.f. on the grounds of linearity, are hopelessly inefficient at v.h.f.

Clearly there is little reward in restricting the s.s.b. generator to a single band transmitter. One normally spends considerable time, not to mention expense, in developing an acceptable s.s.b. signal in the s.b. generator. It is highly desirable to use this acceptable signal on each band one normally operates. Hence the concept of the transmitting converter.

The QE04/10 is a single ended beam tetrode on a B9G base and appears to be capable of good linearity and efficiency at 144 Mc.

SPURIOUS RESPONSES

Any given frequency, \( f_z \), can be generated by mixing any other pair of frequencies, \( f_x \) and \( f_y \), according to the formula:

\[ Z = X \pm Y. \]

However, certain combinations of \( X \) and \( Y \) will simplify the problem of suppression of the spurious responses.

Suppose we wish to obtain 144 Mc. s.b. We have available s.b. at the following frequencies: 4 Mc., 14 Mc., 50 Mc. Which frequency to choose?

We have—

(a) \( 140 + 4 = 144 \)
(b) \( 148 - 4 = 144 \)
(c) \( 130 + 14 = 144 \)
(d) \( 158 - 14 = 144 \)
(e) \( 94 + 50 = 144 \)
(f) \( 194 - 50 = 144 \)

Clearly—

(a) and (b) are both unsatisfactory.
(c) and (d) are both reasonably satisfactory.
(c) is a quite popular scheme.
(e) is highly satisfactory and is the scheme I have adopted.

The PAR6J6 is a 30 Mc. to 144 Mc. s.b. generator.

It is convenient, therefore, to investigate the linearity of tube types known to be efficient at 144 Mc.

It appears that certain deflection amplifiers have the desirable characteristics. Of these, the 12BY7 is probably the best. This tube is used extensively in commercial converters. I did not have this type available, but found the 6CK6 to be satisfactory. Of the other types used, the 5763 is satisfactory in Class A or AB1.
In this discussion it is assumed that both s.b. signal and the injection signal are free from spuriouses. The matter of spuriouses in the 50 Mc. transmitter was discussed in my previous article. An examination of the converter circuit will reveal that extensive measures have been adopted to eliminate spur-riuses from the injection chain.

STABILITY OF THE OSCILLATOR

This is determined from the equation \( x = 30 - \alpha \), where \( x \) c.p.s. is the required stability of the injection chain oscillator, and \( \alpha \) c.p.s. is the overall stability of the s.b. source. Since the practical aspects of oscillator stability have been adequately covered elsewhere and should be widely known, I do not propose to pursue this matter further.

LINEAR AMPLIFIER

The choice of tubes is strictly limited at 144 Mc. I have settled for a pair of 832As—not because they are the ideal tubes to use, but because they were available and efficient, and will satisfy the power requirement. They can also be replaced at a later date by the better QRE06/40s, with very minor circuit changes. The amplifier is identical with my 50 Mc. linear except that the coils are replaced with lecher bars and the negative feedback loop is omitted.

LINEARITY CHECKS

Despite what has been previously stated in this magazine and elsewhere, it appears that newcomers to s.s.b. (particularly the v.h.f. variety) imagine that a signal can be put on the air without any form of linearity check whatsoever. Any similarity between the resulting signal and s.s.b. can only be described as a remarkable coincidence. Linearity checks are a must! If you don't have the necessary equipment to do the job, beg, buy or build it. The procedure for linearity checks is adequately covered in the Handbooks.

PUSH-TO-TALK ON THE GELOSO G222TR TRANSMITTER

BILL MAGNUSSON,* VK3AHT

This article will be of interest to all owners of the above transmitter. When operating in nets and contests one soon realizes the shortcomings of a T/R switch that has to be reached for and rotated. I suppose the ultimate would be a foot operated switch and suspended mike or straight out vox. This article deals with p.t.t. but the problems encountered would be common to all three methods.

The rather complicated switching system dictates the use of some sort of relay control. A close inspection of the circuit reveals several problems, however, and discloses the reasons for some of the odd habits of this transmitter. Most users will have noticed that when listening on your own frequency there is a tendency for the carrier to linger for some seconds after switching from transmit to receive. This is annoying and is due to the power supply not having any permanent bleeds. This has been overcome (to a degree) in the original circuit by using a wiping contact on the T/R switch which momentarily shorts a bleed resistor across the h.t. supply of the driver/sub-modulator. If this rotation is done fairly slowly the feedback and fade-away problem is eliminated, but if one is to use a relay here, circuit modifications must be made. That is unless you happen to have a relay with a wiping contact. The net signal also tends to linger. This is because the net switch does not provide this bleed.

By using a four-pole double-throw relay to switch antenna and h.t., and by installing an extra wafer on the net switch, we can achieve very fast p.t.t. operation. The relay is wired as in the diagram so that section A controls the receiver, section B controls the transmitter h.t., section C controls the antenna change-over, and section D inserts the bleed resistor across the appropriate power supply.

Now due to the fact that this power supply is brought into action in the net position, provision must be made to remove this short at the same time. This is done by salvaging a switch wafer and longer shaft for the net switch. Mine came from a wrecked Geloso v.f.o. By an amount of gentle (Continued on Page 21)

* 358 Williamstown Rd., Yarraville, Vic.
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S-METER, G.D.O., F/S METER AND ABSORPTION WAVEMETER

W. H. FLETCHER, B.Sc. (G3NXT)

Measuring instruments are an essential part of any Amateur’s equipment, both to enable him to keep within the terms of his licence and to check on the effects of experimental adjustments to his equipment. Unfortunately, good meters are no longer as readily available or as cheap on the surplus market as they used to be, and the more the measuring units which can be designed to share one meter, the cheaper these instruments are to construct—the idea being, of course, to use one good meter movement for a variety of purposes.

THE S-METER

The basic unit used at G3NXT consists of a valve-voltmeter type S-meter, as shown in Fig. 1. It is housed in a sloping-front meter case measuring 6” x 6” x 5” and is on the right in the picture. Its controls are, from left to right, the g.d.o. sensitivity control, S-meter sensitivity, and meter switch, which should preferably be a good quality ceramic item. The meter used in the prototype is 3” 0-1 mA. moving-coil but any 0-1 mA. or 0-500 μA. meter in the prototype is 3” 0-1 mA. moving-coil but any 0-1 mA. or 0-500 μA. meter applicable to any Rx with the a-v.c. drive is equally suitable.

When a signal causes the receiver to develop an a.v.c. voltage, it is applied at g1 of the double triode VI. This reduces the current flowing through VIa and unbalances the bridge formed by the cathode resistors R2, 3 and 4, and the two sections of the double triode VI—causing a current to flow through the meter, which therefore gives an indication of relative signal strength.

To set up the S-meter, the meter switch S1 is set to the appropriate position and the receiver aerial terminal is earthed. The balance potentiometer R3 is adjusted to give a zero meter reading. Next connect an aerial to the receiver and tune in a strong local signal. The sensitivity control may be adjusted for full scale deflection (S9+). The author used his Top Band transmitter feeding a separate aerial for this adjustment. After a little experience the user will be able to interpret the deflection in terms of S-points.

Auxiliary units to make fuller use of the meter can be plugged into a five-pin Belling-Lee socket J3 mounted on the rear panel. H.t. and heater voltages are available as a direct connection to the meter. With the range switch in the centre position, the meter is connected directly to pins 1 and 3 and is available for measurements, in addition to the primary purpose of providing an absorption wavemeter.

ABSORPTION WAVEMETER

The absorption wavemeter may be built into a small plastic, bakelite or paxolin box of similar dimensions to the case used for the grid oscillator.

The apparatus described by G3NXT, with a 6C4, the unit derives its power and gives a meter indication by plugging it in as marked to J3 in Fig. 1. The sensitivity control for the g.d.o. is R5 in the Fig. 1 circuit.

Table of Values

Figs. 1, 2, 3—S-Meter, G.d.o., and Absorption Wavemeter

<table>
<thead>
<tr>
<th>Freq. Range</th>
<th>C1, C4—50 pF, var.</th>
<th>C2, C3, C7—0.001 μF, ceramic.</th>
<th>C5—100 pF, e.m.</th>
<th>R1—4.7 megohms.</th>
<th>R2—500 ohms.</th>
<th>R3—500 ohms h.t. potentiometer.</th>
<th>R5—10,000 ohms, S-meter sensitivity.</th>
<th>R6—100,000 ohms, 4w., g.d.o. sensitivity.</th>
<th>R7—22,000 ohms.</th>
<th>RFC—2.5 mH, r.f. choke.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.7-3.4</td>
<td>100</td>
<td>30g.</td>
<td>1”</td>
<td>25</td>
<td>3.3-5.7</td>
<td>38</td>
<td>30g.</td>
<td>1”</td>
<td>12</td>
<td>6.2-12</td>
</tr>
<tr>
<td>11.5-21</td>
<td>32</td>
<td>22g.</td>
<td>1”</td>
<td>12</td>
<td>20-40</td>
<td>15</td>
<td>22g.</td>
<td>1”</td>
<td>16</td>
<td>38-84</td>
</tr>
</tbody>
</table>


Front panel of the meter case by the bush of J3, so that it can be picked up by an a.v.c. line. In the prototype it was connected to the five-way socket J3, and the aerial to the receiver. The a.v.c. voltage can be derived from the a.v.c. line end of the resistor (marked R1 in the CR-100 manual) which feeds the r.f. stage; this is located in a vertical position at the rear of the r.f. compartment.

Circuitry shows how this gives an indication of relative signal strength.
The same coils are used as with the g.d.o. They plug into a octal socket in the end of the box and are tuned by a 50 pF. air-spaced variable condenser mounted in the top of the box and fitted with an 180° scale; this can be directly calibrated.

The crystal diode CR1 is connected to the coil tap in order to obtain more efficient energy transfer between the high-impedance tuned circuit and the low impedance diode.

If a small aerial is plugged into J1 a standard coax socket, the unit will function as a Field Strength Indicator. And if a pair of high-impedance phones are plugged into J2, phone can be monitored.

For use as an Absorption Wavemeter, the unit is held with the coil near the tuned circuit under investigation and the 50 pF. variable condenser adjusted for maximum meter reading. The coupling should be kept as short as possible for the v.h.f. range.

The tuned circuit is completed by a 50 pF. variable condenser mounted between the coil socket and the B7G valve holder. R.f. leads should be kept as short as possible for the v.h.f. range.

The sensitivity control R6, mounted on the main unit (see Fig. 1), controls the h.t. voltage to the oscillator. Some adjustment is necessary to compensate for variation of grid current with frequency, i.e. on change of band.

The g.d.o. will check the resonance of tuned circuits by noting the frequency at which a dip occurs in the grid current when the oscillator coil is coupled to an unknown circuit. It may also be used as a signal generator for testing receivers and converters.

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The Grid Dip Oscillator, shown on the left of the photograph uses a 6C4 in a Hartley circuit with plug-in coils.

The prototype was constructed in a 4" x 1" x 1½" ex-A.M. pressed steel-case, but an Eddyzone die-cast box would be more suitable.

The valve holder for the 6C4 is on an L-shaped bracket in the centre of the case, whilst an octal valve holder is mounted in the end of the case, to the case, whilst an octal valve holder is mounted in the end of the case, to

If the instrument range switch is in the left hand position (see Fig. 1) a Grid Dip Oscillator may be plugged into the auxiliary socket.

GRID DIP OSCILLATOR

The Grid Dip Oscillator, shown on the left of the photograph uses a 6C4 in a Hartley circuit with plug-in coils.

The prototype was constructed in a 4" x 1" x 1½" ex-A.M. pressed steel-case, but an Eddyzone die-cast box would be more suitable.

The valve holder for the 6C4 is on an L-shaped bracket in the centre of the case, whilst an octal valve holder is mounted in the end of the case, to take the plug-in coils. The coils are wound on Denco 1" poly, octal plug-in formers for ranges 3-6. The coils for ranges 1-2 are on short lengths of 1" diameter paxolin tube glued into octal valve bases.

The Staff Employment Officer,
Lower Ground Floor, 250 Flinders Street, Melbourne.
Telephone: 60-4491.
MORE ABOUT CRYSTALS AND CRYSTAL FILTERS

ARIE BLES.* VK2AVA

Earlier in 1963 I wrote some articles on FT241A low frequency crystals and high frequency filters using type FT243 crystals. In the course of several months of matching and adjusting crystals and filters, I have learned a few things worth mentioning.

FT241A TYPE CRYSTALS

If you have tried to either edge-grind them or silver-plate them for raising or lowering their frequencies, and have had the bad luck to break one or two of the suspension or contact wires, do not despair and throw that little rock away! In nine out of ten cases you can still fix your crystal to filter or oscillate, provided the little solder dots in the centre of the silver electrodes are still in position.

All you need to do is to find two thin strips of material, brass or tin-plate, to make two 1" long clips and to solder these to the crystal holder's pins. The strips must be flat and parallel, close together to hold the crystal between them, only touching the crystal at the two solder dots with a little pressure. Your crystal will be active again!

FT243 CRYSTALS

Most people do not possess the proper skill to grind these crystals for raising their frequencies. Etching with a saturated ammonium bi-fluoride solution is the easiest way. But if you need to shift the frequency more than say 100 kilocycles, you may already have a very transparent slab of crystal with extra smooth surfaces and the etching goes very slowly or stands almost still. Just heat your bi-fluoride solution to say 150 or more degrees (Fahrenheit), but do it in the open for the fluoride fumes are dangerous. The etching effect can thus be speeded up considerably.

What to do when you have gone too far in frequency? Well, if it is going to be a filter crystal, you can still lower the frequency as much as say 500 cycles by changing the pressure on the crystal electrodes in the holder, or by careful reduction of the little corners on the crystal electrodes, using a small honing stone.

If more frequency change is required it will be better to keep the crystal as an oscillator and use a different one for the filter.

More shift in frequency on active oscillator rocks can be achieved by weighting the crystal surfaces. Some use cold solder for that and rub it in. Personally, I prefer to use a soft pencil and rub a little carbon on the crystal. If you have applied too much (when the crystal stops oscillating, or if the frequency has been shifted too much) just wash the crystal in soap and water and start again.

Up to 1,500 to 2,000 cycles shift can sometimes be effected. I have never noticed the frequency of a treated crystal drifted up again with time. Someone once said that he feared the carbon might be shedded again due to vibration of the crystal.

Of course one can also lower the frequency of a crystal as an oscillator with a parallel capacity across it, but never expect more than 300 to 500 cycles shift in that manner. The crystal will stop oscillating with too much capacity across it.

HYBRID CRYSTAL FILTER CIRCUIT

The impedance of the h.f. crystal filter circuit published in Feb. and Aug. issues of "A.R." is low and either a cathode follower input stage is recommended or some provision must be made to limit the influence of this low impedance loading on the rest of the circuit. In any case, the signal magnitude across a low impedance device is always small.

I have not seen a comment or attempt to overcome this in any magazine, and the solution given in Fig. 1 may really be a novelty.

For 5.5 to 6.0 Mc. operation, the input and output transformers can be made of 1" diameter t.v.-type i.f. transformer forms. L1 is 45 turns, L2 is 15 turns, both close wound and only little spacing between the two coils. C is a 300/500 pF. mica compression trimmer. L1 is in series with the former's iron slug, L2 with C, to give maximum output on the filter centre frequency.

The effect is amazing, the better impedance match between the filter and the high impedances of the input and output sides gives an extra good flat-topped filter passband and loads of signal at the grid of the following stage.

ARIE BLES • VK2AVA

*195 Plateau Road, Springwood, N.S.W.

Page 7

Amateur Radio, January, 1964
ILLUMITRONIC ENGINEER. CORP.
California, U.S.A.

Foster Dynamic Microphones

Specifications:
Output Impedance: 50 ohms or 50K ohms
Effective output level: -55 db. (0 db. = (one) IV. Microbar
Frequency response: 50 to 15,000 c.p.s.

Omni-Directional Dynamic:
Size: 4½" long, 1½" diameter. Colour: TWO-TONE GREY. 
Cable: 12 ft. of P.V.C.
Retail Price 50 ohms: £4/7/9 + Sales Tax 10/11
Retail Price 50K ohms: £4/10/0 + Sales Tax 11/3

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Phone: 2-8510

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58 High Street, Glen Iris, S.E.6, Victoria 
Phones: 25-1300, 25-4556

Manufacturers of Radio and Electrical Equipment and Components

CORRESPONDENCE:

DIVISION OF 420-450 Mc. BAND

Editor “A.R.,”

Dear Sir,

With the eminent opening of the 420-450 Mc. band to Amateurs, the incentive to undertake some of the less common forms of transmission (particularly t.v. and f.m.) will be greatly increased. To try to cope with the problem of standard frequencies and channels to fit in with possibly existing equipment, I should like to submit the following for consideration by all Amateurs.

(1) The band 420-450 Mc. is wide enough to accommodate four channels, each 7 Mc. wide, for Amateur T.V., but to leave sufficient bandwidth for guard bands and other services, and to fit in with the standard domestic t.v. receiver which would most probably be the common method of reception, only three channels are envisaged.

(2) In considering the domestic t.v. receiver (which would most probably be used as a tuneable i.f. to save modification) note much more efficient use of the high band channels as the first i.f. would most likely add to the already difficult problem of converter noise at 420 Mc., and therefore the low band is recommended. However in the low band there are no three adjacent channels which would be the most convenient to use, but as channels 4 and 5 are adjacent, and channel 3 is spaced only 2 Mc. away, it would suggest the use of channels 3, 4 and 5 as the i.f., i.e. from 85 to 108 Mc., and this presupposes the use of a converter with local oscillator injection at 340 Mc.

Now to consider the placement of these bands within the 420-450 Mc. band. As has been seen on the majority of other v.h.f. bands, the majority of serious a.m., c.w. and s.s.b. operating is confined to the lower edges of the band, then it would seem logical to have the three t.v. channels at the top of the band. Here though rises the problem of a guard band to reduce the possibility of out-of-band operation, and if consideration is given to the many possible d.s.b. i.e. non vestigial sideband transmissions which will most likely be undertaken, a minimum guard band of 2 Mc. is suggested.

This now leaves us with the following channels:

(1) 420-425 Mc.—a.m., s.s.b., c.w.
(2) 425-432 Mc.—a.t.v. ch. 1 (ch. 3 on t.v. rx).
(3) 432-434 Mc.
(4) 434-441 Mc.—a.t.v. ch. 2 (ch. 4 on t.v. rx).
(5) 441-448 Mc.—a.t.v. ch. 3 (ch. 5 on t.v. rx).
(6) 448-450 Mc.—guard band.

Now two further advantages immediately become obvious.

(a) Using a converter with 340 Mc. injection, the band 420-449 Mc. is converted to 86-108 Mc., i.e. the coverage of a standard f.m. v.h.f. receiver, many of which are still owned by Amateurs, and which are still available in many overseas equipments.

(b) The band 432-434 Mc. which lies between two t.v. channels is exactly three times 144.0 to 144.8 Mc., thus enabling the operators of many 2 metre transmitters to triple directly using existing transmitters and crystals. However, the first 5 Mc. has already been suggested for the more common modes, and therefore it is suggested that only 1 Mc. be available to these modes, e.g. from 433-433 Mc. to 433-434 Mc. being only for wide-band f.m. as this portion would be covered by the standard f.m. tuner.

In fact another point now arises. Many Amateurs when starting t.v. transmissions will not have the facilities for intercarrier sound, and therefore these two channels become eminently suitable for use as the accompanying sound channels for t.v. transmission without intercarrier sound. Intercarrier sound would normally be available through the standard t.v. receiver.

A further look at the Amateur t.v. position will show that many Amateurs wishing to commence video transmissions will wish to use double sideband as being the easiest to generate. Therefore, to prevent any interference with air transmission (t.v. ch. 3 of 441-448 Mc. could be used for double sideband, the unused or lower sideband then falling in the 434-441 Mc. of a.t.v. ch. 2 band. Therefore a.t.v. ch. 1, 425-432 Mc., should be reserved only for vestigial sideband transmissions with intercarrier sound as conforming to P.M.G. and C.C.I.R., and it is suggested that all official transmissions, e.g. W.I.A. etc., take place on this channel.

It is obvious that people wishing to do serious a.m., c.w. and s.s.b. work would build special narrow band converters to feed into their own communications receivers, but for persons wishing to experiment with t.v. the band resolves as follows:

(1) 420-425 Mc.—a.m., s.s.b., c.w., etc. (narrow band).
(2) 425-432 Mc.—a.t.v. ch. 1, vestigial sideband, intercarrier sound, full C.C.I.R. spec. only.
(3) 432-433 Mc.—a.m., sound associated with video transmissions in a.t.v. ch. 2 and 3, non-intercarrier.
(4) 433-441 Mc.—wide band f.m., sound associated with video transmissions in a.t.v. chs. 2 and 3, non-intercarrier.
(5) 434-441 Mc.—a.t.v. ch. 2, vestigial sideband only, intercarrier f.m. sound or non-intercarrier a.m. or f.m. as in (3) and (4).
(6) 441-448 Mc.—a.t.v. ch. 3, vestigial or double sideband video, intercarrier f.m. sound or non-intercarrier a.m. or f.m. as in (3) and (4).
(7) 448-450 Mc.—guard band to prevent out-of-band t.v. signals, but may be used for either narrow band mode if so desired.

These allocations are shown diagrammatically and will assist in an understanding. It would be most opportune if all Amateurs could consider these proposals and advise their local W.I.A. and other services the a.t.v. ch. 3 of 434-441 Mc. is recommended for the more common modes, i.e. non intercarrier and channel 4 (433-433 Mc. to 433-434 Mc.) as being the easiest to generate. Therefore, to prevent any interference with air transmission (t.v. ch. 3 of 441-448 Mc. could be used for double sideband, the unused or lower sideband then falling in the 434-441 Mc. of a.t.v. ch. 2 band. Therefore a.t.v. ch. 1, 425-432 Mc., should be reserved only for vestigial sideband transmissions with intercarrier sound as conforming to P.M.G. and C.C.I.R., and it is suggested that all official transmissions, e.g. W.I.A. etc., take place on this channel.

Bill Barber, VK6DX, in a note to the Editor, sends his regards to all Amateurs and mentions that although he has not been in the best of health for the past two years, he is now reasonably well.

Douglas W. Rickard, VK2ZDI.

PRINTED CIRCUITS FOR CARS

A British car manufacturer has announced that a new model car they will be producing will use a printed circuit wiring panel behind the dashboard. This will eliminate the familiar wiring harness with its multitude of leads.

NOW REASONABLY WELL

Bill Barber, VK6DX, in a note to the Editor, sends his regards to all Amateurs and mentions that although he has not been in the best of health for the past two years, he is now reasonably well.

Amateur Radio, January, 1964
FOR THE BEGINNER:

A SIMPLE CONVERTER

WITH the advent of Y.R.C.'s I frequently hear demands for a simple converter. Such a converter has been described for a number of years in the A.R.R.L. Handbook. It is very inexpensive and can be used with practically any broadcast receiver, preferably those without a ferrite antenna stick system. The necessary power outlet could be fitted on a broadcast receiver under the supervision of the Y.R.C. leader and if necessary an aerial terminal.

Why is it inexpensive? The band-setting for 3.5 Mc. or 7.0 Mc. is by a two-gang capacitor about 365 pF. from any old scrapped radio. Band-tuning by 15 pF. capacitor (two for 7/9 advertised in "A.R."), one valve 6U8, one coil only (for the two bands, no switch). About a dozen resistors and condensers and, of course, the advantage that the bands are bandspread around 100° of the tuning dial.

For those who have not access to a A.R.R.L. Handbook, here is a brief description and circuit.

L1 couples aerial to L2. L2 and L3 form a bandpass circuit that can be tuned by the two gang (C1A and C1B) to 3.5 Mc. or 7.0 Mc. This bandpass circuit is coupled to the pentode section of the 6U8, acting as a mixer. In the anode circuit of the mixer is L6 and C7, tuned to 1700 kc., and L7 is coupled to the broadcast receiver.

L4, L5, C2 and C3, controlled from the panel, forms the main tuning. The oscillator tunes from 5.2 Mc. to 5.7 Mc. (Any Amateur would set this range for intending constructors.) Thus with this range the oscillator is 1700 kc. difference from the signal on 3.5-4.0 Mc. and 1700 kc. difference from 6.9 Mc. to 7.4 Mc. Thus which band appears as an i.f. of 1700 kc. will depend purely on the setting of the two-gang.

Note: The two-gang capacitor must be insulated from the chassis.

There are only two panel controls, a small knob on the two-gang termed "band set" and a slow motion device labelled "bandspread". If a slow motion dial is not available, a cord drum from a scrapped radio driven by a rubber grommet on a 1/4" shaft makes an ideal replacement. A cardboard scale can be glued to the drum and an old volume control with the wiper gear cut away makes a good panel mount for the grommet spindle. A s.a.e. answers any queries or assistance to constructors.

Coil data (all coils 1" diameter):

L1—8 turns 22 s.w.g., 1/4" long.
L2—19 turns 22 s.w.g., 10/32" long.
L3—Same as L2.
L4—21 turns 22 s.w.g., 21/32" long.
L5—8 turns 22 s.w.g., 1/4" long.

L1 is separated from L2 by 1/32" and wound on the same former. L4 and L5 are separated by 1/32" and wound on same former.

The i.f. coils L6 and L7 can be a variety of arrangements:

1) 50-60 turns 28-32 s.w.g., paralleled with a 600 pF. capacitor and coupling winding of 20 turns wound on the cold end; 3/8" diameter slug tuned former.

2) A r.f. choke of the all-wave type about 4 or 5 pies, and about 20 turns 28-32 s.w.g. wound near the cold end; no parallel capacitor with the choke.

3) As for (2), but instead of a coupling winding, a 100 pF. condenser from the top or anode end to the b.c. set aerial terminal.

4) The medium wave oscillator coil from a scrapped radio with a coupling winding of 20-30 turns added, or if a cathode tap of 100 pF. to b.c. set.

Whichever course is adopted it must be fitted in a screened box or can, and of course to prevent b.c. break-through the whole should be in a metal box, a half size biscuit tin would make a good enclosure, or one of the aluminium or tin plate baking dishes sold in the multiple stores would do.

A. F. W. Haddrell, VK3ZFC

(This circuit originally appeared in the A.R.R.L. Handbook.)

Amateur Radio, January, 1964
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 person 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 M., 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, although if the call sign is subsequently changed, a cross band special call sign providing the applicant is still in the same call area.
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 the correct contacts have been 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 A list, in accordance with the details required in Rule 4.1, must be submitted with the application for the Award.
4.4 A check list must accompany every application setting out the details for each station the applicant has worked.

APPLICATIONS
5.1 Applications for membership shall be addressed to the Awards Officer, Box 2611W, G.P.O., Melbourne, Vic., accompanied by the verifications and the check list with sufficient postage enclosed for their return to the applicant, registration being included in the fee.
5.2 A nominal charge of 2/6, which shall also be forwarded with the application, will be made for the issue of the certificate to successful applicants who are not members of the Wireless Institute of Australia.
5.3 Successful applicants will be listed periodically in “Amateur Radio”. Members of the W.I.A. and its affiliated Society will be afforded the opportunity of physical possession of the W.A.V.K.C.A. Award.
5.4 Notwithstanding anything to the contrary in these Rules, the Federal Council of the W.I.A. reserves the right to amend them when necessary.

WORKED ALL VK CALL AREAS (W.A.V.K.C.A.) AWARD

OBJECTS
1.1 This Award, to be known as the W.A.V.K.C.A. Award, is offered by the Wireless Institute of Australia as tangible evidence of the co-operation of overseas Amateurs in making contacts with the various call areas of the Commonwealth of Australia.
1.2 The Award may be claimed by any Amateur or Citizen of the world who is a member of an affiliated Society of the I.A.R.U., but no Australian Amateur will be eligible.

REQUIREMENTS
2.1 A handsome Certificate will be awarded to any applicant who makes contacts with Australian Amateur Stations in the areas shown in the attached Appendix. The number of contacts required in each area is also shown.
2.2 In the case of applications prior to 1st January 1946, at a total of three (3) confirmations will suffice for call areas VK1 and VK2, thereafter one confirmation for Australian Capital Territory (VK1) will be necessary as shown in the Appendix.

OPERATION
3.1 Contacts between overseas stations and Australian stations must have been made on or after the 1st January, 1946.
3.2 Contacts may be made using any authorised frequency band or type of emission permitted by the relevant authorities, but cross band contacts will not be allowed.
3.3 No contacts made with ship or aircraft stations in Australian territories will be eligible, but land-mobile or portable stations may be contacted provided the location at the time of contact is shown on the confirmation.
3.4 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.
3.5 A check list must accompany every application setting out the details for each confirmed station in accordance with the details required in Rule 4.3.

APPLICATIONS
5.1 Applications for membership shall be addressed to the Awards Officer, Box 2611W, G.P.O., Melbourne, Vic., accompanied by the verifications and the check list with sufficient postage enclosed for their return to the applicant, registration being included in the fee.
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5.4 Notwithstanding anything to the contrary in these Rules, the Federal Council of the W.I.A. reserves the right to amend these Rules as necessary.

APPENDIX

<table>
<thead>
<tr>
<th>Territory</th>
<th>VK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australian Antarctica</td>
<td>VK0 1</td>
</tr>
<tr>
<td>Heard Island</td>
<td>VK2 3</td>
</tr>
<tr>
<td>Macquarie Island</td>
<td>VK3 3</td>
</tr>
<tr>
<td>Australian Capital Territory</td>
<td>VK1 1</td>
</tr>
<tr>
<td>Lord Howe Island</td>
<td>VK4 3</td>
</tr>
<tr>
<td>State of New South Wales</td>
<td>VK5 3</td>
</tr>
<tr>
<td>State of Victoria</td>
<td>VK6 3</td>
</tr>
<tr>
<td>State of Queensland</td>
<td>VK7 3</td>
</tr>
<tr>
<td>Thursday Island</td>
<td>VK8 3</td>
</tr>
<tr>
<td>State of Tasmania</td>
<td>VK9 3</td>
</tr>
<tr>
<td>Northern Territory</td>
<td>VKA 3</td>
</tr>
</tbody>
</table>

Note—In Areas above, where more than one confirmation is required, contacts may be made with any or all of the Territories listed in brackets.
## Australian D.X.C.C. Countries List

| AC3 | Sikkim          | FK8 | New Caledonia |
| AC4 | Tibet           | FL8 | Fr. Somaliland |
| AC5 | Bhutan          | FM1 | Martinique    |
| AP  | East Pakistan   | FN (prior 1/11/54) French India |
| AP  | West Pakistan   | FO8 | Clifferton I. |
| BV (C3) | Formosa     | FO8 | Fr. Oceania |
| BY (C) | China         | FP8 | St. Pierre & Miq. Is. |
| C9  | Manchuria       |   |              |
| CE  | Chile           |   |              |
| CE9, KC4, LU-Z, VK0, VP8, ZL5 etc., Antarctica |   |              |
| CEOA | Easter I.      |   |              |
| CEOZ | J. Fernandez Arch. |   |              |
| CM, CO | Cuba         |   |              |
| CN2 (prior 1/7/60) | Tangier |   |              |
| CN2, 8, 9 | Morocco  |   |              |
| CP  | Bolivia         |   |              |
| CR4 | Portuguese Guinea |   |              |
| CR5 | Principe, Sao Thome |   |              |
| CR6 | Angola          |   |              |
| CR7 | Mozambique      |   |              |
| CR8 (prior 1/1/62) | Goa |   |              |
| CR8 | Port. Timor     |   |              |
| CR9 | Macao           |   |              |
| CT1 | Portugal        |   |              |
| CT2 | Azores          |   |              |
| CT3 | Madeira Is.     |   |              |
| CX  | Uruguay         |   |              |
| DJ, DL, DM | Germany |   |              |
| DU  | Philippines Is. |   |              |
| EA  | Spain           |   |              |
| EA6 | Balearic Is.    |   |              |
| EA8 | Canary Is.      |   |              |
| EA9 | Ifni            |   |              |
| EA9 | Rio de Oro      |   |              |
| EA9 | Spanish Morocco |   |              |
| EA0 | Spanish Guinea  |   |              |
| EI  | Rep. of Ireland |   |              |
| EL  | Liberia         |   |              |
| EP, EQ | Iran        |   |              |
| ET2 (prior 14/11/62) | Eritrea |   |              |
| ET2, 3 | Ethiopia    |   |              |
| F   | France          |   |              |
| FB8 | A'dam & St. Paul Is. |   |              |
| FB8 | Kerguelen Is.  |   |              |
| FC  | Corsica         |   |              |
| *FF8 | French West Africa |   |              |
| TU2 (fr. 7/8/60) | Ivory Coast R. |   |              |
| T22 (from 20/6/60) | Mali Rep. |   |              |
| ST5 (from 20/6/60) | Mauritania    |   |              |
| 6W8 (fr. 20/6/60) | Senegal Rep.  |   |              |
| FG7 | Guadeloupe      |   |              |
| FI8 | Comoro Is.      |   |              |
| FI8 (pr'r 20/7/55) | Fr. Indo China |   |              |

*Fr. West Africa and Fr. Equatorial Africa: Only contacts dated prior to when the particular area obtained separate listing (as shown) will count.
Phone
KC4
KC6
KG4
KG6
KG6 (Rota, Tinian, Saipan, etc.)
KH6
KH6
KJ6
KL7
KM6
KP4
KP6
KR6
KS4B
KS4
KS6
KV4
KW6
KX6
KZ5
LA
LA
LA
LU
LX
MP4
MP4
OA
OD5
OE
OH
OH0
OK
ON4
OX, KG1
OY
OZ
PA0, P11
PF
PJ
PJ2M
PK
PK1, 2, 3
PK4
PK5
PK6
PX
PY
PY0
PY0
PZ1
SD1 (ZST)
SL, SM
SP

C.W.
Navassa I.
Eastern Caroline Is.
Western Caroline Is.
Guantanamo Bay
Guam
Marcus I.
Mariana Is.
Hawaiian Is.
Kure I.
Johnston I.
Alaska
Midway Is.
Puerto Rico
Palmyra Group, Jarvis I.
Ryukyu Is.
Serrana Bank and Roncador Cay
Swan Is.
American Samoa
Virgin Is.
Wake I.
Marshall Is.
Canal Zone
Bouvet I.
Jan Mayen
Norway
Svalbard
Argentina
Luxembourg
Bulgaria
Bahrein
Qatar
Trucial Oman
Peru
Lebanon
Austria
Finland
Aland Is.
Czechoslovakia
Belgium
Greenland
Faeroes
Denmark
Neth. West Indies
Sint Maarten
Indonesia
Java
Sumatra
Borneo
Celebes and Molucca Is.
Andorra
Brazil
Fernando de Noronha
Trindade & Martin Vaz Is.
Netherlands Guiana
Swaziland
Sweden
Poland

Phone
ST2
SU
SV
SV
TA
TF
TG
TI
TI9
TJ
TL, TN, TR, TT
TS
TU, TY, TZ
UA1-6, UNI
UA1
UA2
UA9, 0
UA0 (prior 1/9/60)
UB5
UC2
UD6
UF6
UG6
UH8
UI8
UJ8
UL7
UM9
UN1 (prior 1/7/60)
UO3
UP2
UQ2
UR2
VE, VO
VK
VK2
VK4
VK9
VK9
VK9
VK9
VK0
VK0
UO (prior 1/4/49)
VP1
VP2
VP2
VP2
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VP2

C.W.
Sudan
Egypt
Crete
Dodecanese
Greece
Turkey
Iceland
Guatemala
Costa Rica
Cocos I.
Cameroon Rep.
White Russian S.S.R.
Azerbaijan
Georgia
Armenia
Turkoman
Uzbek
Tadzhik
Kazakh
Kirghiz
Moldavia
Lithuania
Latvia
Estonia
Canada
Australia
Lord Howe Is.
Willis Is.
Christmas I.
Cocos Is.
Nauru I.
Norfolk I.
Papua Terr.
Terr. of New Guinea
Heard I.
Macquarie I.
Newf./Lab.
British Honduras
Leeward Is.
Anguilla
Antigua, Barbuda
Br. Virgin Is.
Montserrat
St. Kitts, Nevis
Wind"d Is.
Dominica
Grenada & Deps.
St. Lucia
St. Vincent & Deps.
British Guiana
Trinidad & Tobago

†One contact with each group formerly known as “Leeward Is.” and “Windward Is.” dated prior to 1/6/58 may be credited, in which case no further credit as a separate listing, as from 1/6/58, will be given those particular islands.

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JOHN MOYLE MEMORIAL NATIONAL FIELD DAY CONTEST, 1964
Saturday, 8th February, to Sunday, 9th February

DATE
Saturday, 8th February, to Sunday, 9th February, 1964.

DURATION
From 1600 hours E.A.S.T., 8th February, to 1600 hours E.A.S.T., 9th February, 1964.

OBJECTS
The operators of Portable and Mobile Stations within all VK Call Areas will endeavour to contact other Portable/ Mobile and Fixed Stations in Australian and Overseas Call Areas.

RULES
1. There shall be five sections in the Contest—
   (a) Portable/Mobile Transmitting, Phone.
   (b) Portable/Mobile Transmitting, C.w.
   (c) Portable/Mobile Transmitting, Multiple Operators, Open only.
   (d) Fixed Transmitting Stations working Portable/Mobile Stations, Open only.
   (e) Reception of Portable/Mobile Stations.

2. All Australian Amateurs may take part. Mobile or Portable Stations shall be limited to an input of 25 watts to the final stage. This power shall be derived from a self-contained and fully portable source. A Portable/Mobile Station shall not be located within one mile radius from the home(s) of the operator(s), nor 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.

3. Amateurs may enter for either (a) or (b), or both, in the Portable/ Mobile sections.

4. One contact per station for phone and one for c.w. per band is permitted.

5. Entrees must operate within the terms of their licences and in particular observe the regulations with regard to portable operating.

6. Serial numbers consisting of RS or RST report plus three figures commencing with 001 and increasing by one for each successive contact shall be exchanged.

6a. Entrees in Section (c) 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.

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 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 ............... 2 points
   For contacts with Fixed Stations within the entrant's Call Area ............... 1 point

8. The following shall constitute Call Areas: VK1 and VK2 combined, VK3, VK4, VK5 and VK8 combined, VK6, VK7, VK9 and VK0.

9. All logs shall be set out under the following headings: Name, Address, Call Sign, Phone, C.w., Q.R.M., Serial No., Total Points, Time of Day, Time of Night, DXCC Station heard, the serial number sent, RST the serial number received.

In addition, there shall be a front sheet showing the following information:
Name: 
Address: 
Call Sign: 
Section: 
Call Sign of other operator(s) (if any): 
Location of Portable/Mobile Station: 
From hours to hours to hours 
A brief description of equipment used, bands 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 highest score for disqualification of 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 Committee of the Wireless Institute of Australia is final and no disputes will be entered into.

12. Certificates will be awarded to the highest scorer in each Call Area. Additional Certificates may be issued at the discretion of the F.C.C.

13. Return of Logs:
All entries must be postmarked not later than the 8th March, 1964, and addressed to the—
Federal Contest Committee, W.I.A.,
Box 638J, G.P.O.,
Brisbane, Queensland.

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. Logs shall take the same form as for Transmitting Stations, but will omit the serial number received.

Logs must show the Call Sign of the Station heard, the serial number sent by it, and the Call Sign of the Station being worked.

Only one lot of points can be claimed for any one contact between two stations, for example: VK2AA/P calling VK3XX/P and exchanging numbers. Points can be claimed only for VK2AA/P working VK3XX/P. No points can be claimed for VK3XX/P working VK2AA/P during this particular contact.

Scoring will be on the same basis as for Transmitting Stations. It will not be sufficient to log a station calling CQ. A station may be logged once only for phone and once for c.w. in each band.

Awards—Certificates will be awarded for the highest scorer in each Call Area.

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- Effective output level: -55 db. [0 db. = (one) IV. Microbar]
- Frequency response: 200 to 10,000 c.p.s.

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- Desk Stand. Clip folds for hand use.
- Colour: WHITE.
- Plastic Diaphragm.

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50 ohms + 10/7

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Recent Trends in Receiver Front-End Design*

Noise Figure and Cross Modulation Characteristics of Tube and Transistor Front Ends

E. A. ANDRADE, WODAN

EARLIER "QST" articles, have painted a fairly comprehensive picture of the performance to expect of a modern high-quality communications receiver. Superheterodyne front-end performance has certainly come a long way from the days of the National FB-7 (a very advanced receiver for its day, indeed!), with its two 20 metre bands 910 Kc. apart, to the modern double-conversion crystal controlled s.s.b. receiver.

Two recent trends in receiver design, the band-passed front end and the transistor front end, will be discussed in this article. Means of minimizing some of the problems will also be discussed.

Before proceeding, it might be well to review the requirements for a good communications receiver r.f. section.

SENSITIVITY

The receiver must have enough amplification to make the weakest signals audible in the loudspeaker. Such amplification is fairly easy to attain in the modern superheterodyne, where gain may be obtained at several different frequencies. The gain can be relatively low at any one of the frequencies, so gain stability is not a serious problem. The gain from antenna to loudspeaker in a typical communications receiver may be as high as 10 million.

However, all this gain will not allow the operator to copy a weak DX signal unless the signal-to-noise ratio is adequate. This means that the noise contributed by antenna coupling circuits, r.f. amplifiers and mixers must be held to a minimum.

The best way to express receiver sensitivity is either in terms of signal-to-noise ratio or—even better—in terms of noise figure. In our discussion we will consider this sensitivity adequate. For a further discussion of noise figure, see references 1 and 2.

CROSS-MODULATION

Unfortunately, adequate gain and sensitivity are not the entire story in a communications receiver. An often neglected area of front-end design is its performance in the presence of strong signals out of the pass-band.

If we are listening to a weak DX signal with an S meter reading of 5, say, and a strong local comes on, the receiver will be driven into saturation. The desired signal is usually strong enough so that it may still be heard. However, the interfering signal is the result of receiver cross-modulation, it will disappear when the pad is inserted. Fig. 1 gives the circuit and values for a 20-db. pad. The pad should be shielded to prevent stray pickup, and the construction should be such as to minimize capacitive coupling between the input and output connectors.

THE BAND-PASSED FRONT END

A considerable simplification in the tuning mechanism of a multiple conversion receiver may be accomplished by replacing all signal-frequency tuned i.f. circuits with suitable broad-band transformers. Usually designed to accommodate one Ham band. The receiver band switch then selects the proper transformer for the desired band. The reduction in mechanical complexity is certainly very attractive, particularly to the home constructor. Unfortunately, a serious penalty in cross-modulation performance, and to a degree sensitivity, is incurred.

Fig. 1 shows the cross-modulation of a typical commercial receiver having a coaxial broadband r.f. section, compared to one (Collins 75A-4) which uses two tuned circuits at r.f. Curve B. The curves were taken with a 5 &mu;V desired signal, both the desired and undesired signals being fed to the 50 ohm receiver input. For undesired signal levels of 0.1 to 1.0 volt, the cross-modulation occurs essentially in the r.f. amplifier tube of a tuned receiver. In a broad-banded receiver it usually occurs in the first or second mixer. Cross-modulation of undesired signal levels below 0.1 volt generally occurs in the mixer stages, in a tuned receiver, unless extremely low r.f. amplifier gain and very high antenna-coil gain are used. The noise figure of the broad-band receiver was considerably poorer than the 75A-4, as a result of a compromise in antenna-coil gain in order to minimise cross-modulation as much as possible.

The poorer performance of band-pass circuits would be most noticeable in the three lower-frequency bands, 3.5, 7 and 14 Mc. As the signal frequency is increased, the effective selectivity of

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the simple r.f. tuned circuits decreases. At 30 Mc., with an operating Q of 40 in each tuned circuit, the 6-dB. response points with two tuned circuits would be 1.4 Mc. apart. Thus at this frequency there is very little difference between the band-pass characteristics of the usual two-tuned-circuit r.f. amplifier and mixer, or the band-passed system.

Let's say that in spite of the problems outlined above, we've decided to build that "dream receiver" with broad-band r.f. circuits, in the interests of simplified home construction. What can we do to minimize the problems? Cross-modulation is caused by two factors: lack of selectivity, and insufficient dynamic range in the r.f. amplifier and mixer tubes. We have sacrificed front end selectivity for broad-band r.f. circuits, but if we are able to find some tubes with a very low equivalent-noise resistance, we can use low antenna-coupling and r.f.-amplifier gain. This would have the same effect as increasing the dynamic range of the tube, thereby allowing us to handle stronger undesired signal levels than previously. While the same approach applied to a broad-band mixer tube would provide outstanding strong-signal performance, a fairly acceptable band-pass receiver could be built.

Fig. 3 shows a rough schematic of such a front end. A 6386 remote-cutoff cathode triode, with both sections in parallel, was selected for the r.f. amplifier. The plate load for the 6386 is very low, about 200 ohms. This keeps the voltage gain between the grid and plate less than unity, and no neutralization of the r.f. stage is necessary. Voltage gain to the mixer is obtained in the broad-band coupling transformer. A transformer voltage gain of 5, combined with a tube voltage gain of 0.8, provides an over-all r.f. stage gain of 4, which is adequate to overcome the mixer noise.

When setting up the transformer, adjust primary turns and coupling for a voltage gain of 0.8 from grid to plate of the 6386. Then re-check the secondary voltage to make sure there is a gain of 5 in the trap circuit to the output.

The mixer is the triode half of a 6U8 or one section of a 12AT7, with cathode injection. These tubes used as mixers have an equivalent noise resistance of about 2,000 ohms, compared with 60,000 ohms in a pentagrid mixer such as a 6BA7. It is this low mixer noise resistance that allows us to use a total r.f. stage gain of only 4 and less. The most troublesome noise injection occurs generally at the high-frequency intermediate frequency. In most cases a parallel-tuned r.f. trap, inserted in the lead to the mixer cathode, is sufficient to reduce this noise to an acceptable level (LC1 in Fig. 3). If a variable r.f. is used following the first mixer, it may be necessary to substitute a high-pass filter with a cutoff frequency below the lowest injection frequency.

A simple way of checking source impedance is to connect the r.f. probe of a v.t.v.m. across the unloaded output circuit of the injection oscillator. Then try different values of resistance across the output circuit, looking for the oscillator voltage to drop to one-half its unloaded value. The resistor value that causes this to happen is equal to the source impedance of the oscillator.

**THE TRANSISTOR FRONT END**

Certainly a general article on receiver design these days should include a discussion of transisterised circuitry. Unfortunately, although it is fairly easy to obtain outstanding sensitivity with the newest r.f. transistors, there is a severe limitation on strong-signal performance. In fact, unless a very severe reduction in sensitivity is acceptable, a transistor front end can be expected to modulate with 20 to 30 db. less undesired signal than an equivalent tube receiver. A typical transistor receiver cross-modulation curve is shown in curve E, Fig. 5.

Text books tell us that there is no significant difference in the noise figure of a given transistor in any of the three amplifier configurations: common-emitter, common-base, and common-collector. This has been pretty well confirmed in practice as well as theory.

It is now possible to attain a transistor noise figure of 4 or 5 db. at high frequency—200 Mc. with transistors in the three- to five-dollar class, thus making a 7-db. noise figure in the 3 to 30 Mc. range a relatively easy job. It should also be possible to design some excellent 6 and 2 metre portable equipment using these types. Some transistors that will do this job are the Philco types 2N1742, 12042, and 12026; Texas Instruments 2N2189, and the Amperex Universal type 2N2064.

In order to realize the best noise figure capabilities of an r.f. transistor, careful attention must be paid to both the recommended collector current for minimum noise figure and the recommended source impedance. The source impedance for minimum noise figure is generally a function both of frequency and the impedance of the transistor in the common-emitter configuration. This value does not change significantly when the transistor is used in the other amplifier configurations: common-base, and common-collector.

Text books tell us that there is no significant difference in the noise figure of a given transistor in any of the three amplifier configurations: common-emitter, common-base, and common-collector. This has been pretty well confirmed in practice as well as theory.

Fig. 5 is a schematic of a typical common-emitter r.f. stage and mixer stage using 2N1742 and 2N1743. The r.f. stage available power is mainly a function of frequency, and varies from 45 db. at 3 Mc. to 25 db. at 30 Mc. A noise figure of 7 db. is attainable if the coil tap to the transistor is set to match the input impedance of the transistor. A collector current of 3.5 mA. corresponds to the recommended value for minimum noise figure, and is adjusted by selecting the...
proper value for R1 (approximately 12,000 ohms).

Fig. 8 is a plot of input capacitance and input impedance vs. frequency, for various values of collector current, for the 2N1743. If the 2N1743 is used in the 3-30 Mc. frequency range, neutralisation will probably not be necessary. However, if it is used at higher frequencies than 30 Mc., it would be desirable to add the network shown dotted in Fig. 5, to realise the maximum power gain and minimum noise figure.

CROSS-MODULATION IN TRANSISTOR R.F. STAGES

As stated previously, cross-modulation is a serious problem in transistorized receivers. R.F. transistors have an inherently limited dynamic range and will cross-modulate with some 20 to 30 db. less signal than a tube stage. Although to date no one has come up with a good answer to the problem, there are a few design tricks that help to minimise it.

The most simple device to minimise cross-modulation would be a 20-db. attenuator with a switch to connect it between the antenna and the receiver input stage when a strong off-channel signal is cross-modulating. Perhaps this sounds a bit agricultural, but it works, provided the desired signal is strong enough to overcome the 20-db. loss. Admittedly, this ruins the noise figure of the receiver, but there's not much point in having a 6 or 7 db. noise figure when a strong local is wiping out the whole band.

A more exotic way of improving the r.f.-stage cross-modulation would be to improve the r.f. selectivity by using two or three tuned circuits ahead of the r.f. transistor. Noise figure would suffer to a degree, but this is a compromise that the receiver designer is frequently required to make, even in a tube receiver.

Another means of improving the cross-modulation is to introduce degeneration in the emitter lead of a common-emitter r.f. stage. Caution must be exercised to assure that no more than 3 or 4 db. of degeneration is used, or the noise figure will deteriorate excessively. Other negative feedback schemes have been considered, but stability becomes a problem if any great amount of r.f. feedback is used.

TRANSISTOR MIXERS

A transistor used as a mixer will generally provide about 3 db. less gain than the same transistor operated as an r.f. amplifier. This is considerably different from tubes, where the conversion gain is approximately 25 per cent. of the tube's gain as an amplifier. R.F. gain in transistor front ends must be held to the minimum consistent with the desired noise figure, just as in a tube r.f. section; otherwise, mixer cross-modulation will become excessive.

A 10 to 12 db. mixer noise figure is fairly common for transistor mixers such as Philco 2N1745. In order to realise this noise figure, careful attention must be paid to the recommended collector current and oscillator injection power requirements for the particular transistor being used. Fig. 7 shows the effect of collector current on noise figure, and Fig. 8 shows oscillator injection power vs. mixer gain. The formula for computing the effect of mixer noise figure on r.f. stage noise figure is

\[
\text{Noise figure (power ratio)} \quad F_b = \frac{F_a + F_b - 1}{A}
\]

where \(F_b\) is the total noise figure, \(F_a\) is the noise figure of the r.f. amplifier, and \(F_b\) is the noise figure of the mixer. These are expressed as power ratios. To get the noise figure in db., take 10 times the \(\log_{10}\) of the power ratio. \(A\) is the power-gain ratio of the r.f. stage including all coupling losses between stages. A numerical example is given below:

\[
F_a = 4 \text{ db.}; \text{ power ratio} = 2.5 \\
F_b = 10 \text{ db.}; \text{ power ratio} = 10 \\
A = 10 \text{ db.}; \text{ power ratio} = 10
\]

Therefore, \(F_b = 2.5 + 10 - 1 = 9 \text{ db.}\)

The noise figure (5.3 db.) is now referenced from the base of the r.f. amplifier transistor. Antenna-coupling circuit losses must also be considered in determining the over-all noise figure of the receiver. Although it is possible to compute the over-all noise figure including the antenna-coil tuned-circuit losses, it becomes somewhat involved because three variables affect it. These are the losses inherent in the tuned circuit (Q), losses due to mismatching, and the effect on transistor noise figure with change in source impedance. The computation of this is somewhat beyond the scope of this article. However, a good approximation may be made by setting the transistor tap on the input coil to match the input impedance of the transistor, measuring noise figure, and then moving the tap as close to the ground end of the coil as you can get, while still maintaining a 7 db. noise figure. This will keep signal levels to the r.f. stages as low as possible, thereby minimising cross-modulation.

 Needless to say, it is very desirable to use high a tuned-circuit coil Q.
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W.I.A. N.S.W. DIVISION
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A FIELD DAY
will be held at VK2WI Quarry Road, Dural
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Transmitter Hunts, Mobile Efficiency Test, Disposals, Competitions, QSL Bureau and Demonstrations.
Registration 10/-
XYL and Harmonics Free
**FREQUENCY MARKER WITH 50 Kc. INTERVALS**

Some of the luckier Amateurs have equipment with 100 Kc. calibrators built in and for them band-edge spotting is no problem, except where again is 7150, 14350 or 21450 kc.

In looking up some information recently on frequency sub-dividers, multi-vibrators, I struck an old "QST" article describing a crystal oscillator locked 50 kc. multi-vibrator, and one evening decided to put it together in a hurry and see how it worked. Well, it works beautifully with a 400 or 500 kc. crystal. Power consumption is very small, so could be taken from the existing receiver. Because of the simplicity of the circuit, no construction details or pictures are given. 400 or 500 kc. crystals can be procured from advertisers in "A.R."

—Arie Bles, VK2AVA.

**RECEIVER FRONT-END DESIGN**

(Continued from Page 10)

as possible in order to maintain the maximum r.f. selectivity for best cross-modulation performance.

**AUTOMATIC GAIN CONTROL**

The choice of an a.g.c. system in transistorised r.f. sections may have a considerable effect on cross-modulation characteristics of the receiver. In general, "forward" a.g.c., which reduces transistor stage gain by lowering the emitter to collector voltage, will provide better cross-modulation performance than the conventional "reverse" a.g.c., which controls gain by varying the base bias to reduce collector current in a manner similar to the bias control used with remote-cut-off pentodes.

Even better results can be obtained with a.g.c. systems where the controlled element is separate from the transistor stage. An example of this would be some form of a bridge or "T" network using a voltage variable capacitor, controlled by a.g.c. voltage.

**CONCLUSION**

As our technology expands, new tools for accomplishing our radio communication jobs are evolved. They are not always a direct advance in the state of the art, but must be considered carefully in the light of existing requirements.

In the case of the broad-band circuits discussed in this article, we have a definite step backward in cross-modulation and blocking capability. Modifying circumstances such as the need for light weight, portability, low power drain, low cost, or mechanical simplification may be worth the sacrifice in performance that accompanies the use of these design techniques.

**GELOSO TRANSMITTER**

(Continued from Page 3)

prodding and wriggling the net switch can be dismantled and the extra wire installed without removing any wires. The new wire is wired in such a way that the bleed resistor circuit is made in the a.m. and c.w. positions, but is opened on net.

The mounting of the relay is a matter of individual choice, but I found that by bending the vertical shield between the v.f.o. and final amplifier sections over at an angle of 45°, a small shelf was made on which the relay could be mounted in a position where all wires would be without being cut or extended. Power for the relay will, of course, depend on the type. Mine is an industrial type with 230v. coil which is triggered by an extremely small single pole relay with a very high resistance coil operated from the in-built bias supply.

At first sight it may appear necessary to replace the 33 ohm resistor with a heavier one, but mine has been operating for nearly a year now without ill effect.

There is nothing very complex about these modifications. They do, however, make what is already a very efficient transmitter even more convenient to operate.
Op. will be SN2RSB, who is familiar to many already.  

**NOTES ANW NEWS**  

VQ8HAA, VQ4IN/VSH is active at the moment. This is the Kuala Muria Expedition in which Gus W4BPD and one or two others are figuring, making it a twenty-four hour affair. Gus’ schedule is filed to be Sikkim, ASCPT, early in December, so he may possibly be QRX from this spot also by the time this reaches your mailbox. (Man, that fellow gets around.)  

**4DX**  

PI-COUPLERS  

For use up to 600 watts p.e.p. Match plate loads of 2,000 to 3,000 ohms (Z) and higher into coaxial cable. Operating Q increases with the harmonic suppression, enabling practical values of tuning capacity to be used on 10 and 15 meters and allowing for wiring inductance (L). Incorporates additional switch section for shunting additional capacity (C) if required, or switching other circuits. Switch rated for 10 amps, at 3,000 volts with (L). Incorporates additional switch section to suit above Pi-Coupler. No resonances on higher frequencies to increase harmonic content.  

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For use up to 600 watts p.e.p. Match plate loads of 2,000 to 3,000 ohms (Z) and higher into coaxial cable. Operating Q increases with the harmonic suppression, enabling practical values of tuning capacity to be used on 10 and 15 meters and allowing for wiring inductance (L). Incorporates additional switch section for shunting additional capacity (C) if required, or switching other circuits. Switch rated for 10 amps, at 3,000 volts with (L). Incorporates additional switch section to suit above Pi-Coupler. No resonances on higher frequencies to increase harmonic content.  

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To suit above Pi-Coupler. No resonances within Amateur bands if spaced diameter or more from metal panels. Stands 6 inches high on 1 inch diameter ceramic former. Base mounting bracket included.  

Price: 25/- (inc. S.T.)  

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Type 4/11 for use with parallel tubes type 6146, 807, etc.  

Price: 39/6 (inc. S.T.)  

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Phone 34-6539
The DX has arrived on 6 metres and each State is working its share. Many new calls are appearing and some old ones are being used again. All states (VK1, 2, 3, 4, 5, 6, 7, 8, 9) are represented, with just a fair share of the 'oldies'! There should be an increase in the 50 Mc. W.A.S. certificate awards.

VK2VZV has been down south into VK3 on 29th Nov. A signal on 50.75 which could be 6XZ was heard. There has been no contact in VK3 but no identification on the carrier.

JAs have been heard on at least three days during November. The last one was on 25th Nov., 2JAZYM on 24th. It was copying the JA but could not positively identify him at the same time. Others heard him as early as 0630 same day.

Northern VK4s have also been amongst the JAs in recent weeks.

The band has been open from ZL to VK since 23rd. First in VK3 was on the 26th and ZL5 for the first time. VK3 and almost ZL2 were heard by VK4, in almost every month.

Numerous odd signals from VK5 and VK7 heard in VK3 during openings, but nothing worked to date. Nothing heard from VK4 direction to the end of November.

The early closure of the notes leaves the pages a little bare for this month. 73, Z2JP.

QUEENSLAND

The v.h.f. meeting was held on Friday, 15th Nov., with about a dozen members present. A1 v.h.f. meeting was held on Wednesday, with six metres—Roy 4ZRM, who puts out a fine signal from Annerley. Also on the air is Ron 4ZJU who has recently had his operating permit renewed. His operating frequency is 50.45 Mc. and is using 14w. to 350w. to 250w. at 250w. On hook-up wire. By the time you read this, he will have a 2 element beam in operation. In the meantime, notes, Malcolm 4ZEL and Allan 4ZAF are mobile somewhere in VK3. George 4ZLG is mobile and will be going to VK3 at the end of November.

The summer DX is coming good with VK5s 1, 2, 3, 5 and 7 being worked and a VK5 has been heard across the other side of the world.

Victor 4ZBT gave a lecture on Satellites to the monthly meeting of W.I.A. Several of the Queensland boys are interested and will endeavour to track the satellite. 73, 4ZDF.

WESTERN AUSTRALIA

Here in W.A. the coming of the summer months has meant less DX activity and as well as hearing a number of seldom-heard call signs on the air, a number of V.h.f. Group projects are on the way.

The 50 Mc. beacon tx which has been in operation at Cable 1a, for some time was being returned to Perth for an overhaul and it is planned to send it to Christmas Island where it will be operated by members of the Christmas Island Radio Club.

By the time these notes are in print the new VK6VF beacon should be on the air and the details of operation are: Freq. 60,002 or 52,002 Mc. (depending on when the 60-52 Mc. band is lost); operation, virtually 24 hours a day; identification, call sign VK6VF keyed by the carrier itself at 500 c.p.s.; power, about 40 watts.

It is unfortunate that the new beacon was not ready for operation, but considerable amount of work is entailed in building a beacon which is to run continuously. The old beacon, incidentally ran for a total of about 10,000 hours, using the original output valve (an 807).

A number of 70 Mc. f.m. mobile transceivers have been seen in operation in the State, and many use in conjunction with the W.I.C.E.N. organisation of the State and these units are being modified for use in mobile work. Small quantities of 70 Mc. a.m. mobile transceivers are also being set up. It has not been decided how these will be used as yet. There is a chance that these units could be converted to f.m. operation with surprisingly little work and if this is the case they will be used to expand the 50 Mc. f.m. net.

The only other news of interstate interest is that Trevor 8ZDZ will be operating portable in Adelaide during the University vacation and no doubt those in VK5-land will know that he is around by this time. 73, 8ZDZ.

NEW SOUTH WALES

During 1963 the VK2 Group showed a marked improvement on previous years. Attendances at meetings were quite good. I feel sure that if more of our Group would come along they would enjoy what is offered and would certainly remain again. Our thanks go to Phil Z2PI and Tim Z2TM for their continued support of our meetings and improved knowledge which is a great inspiration to W.A.S. We are indeed fortunate in having two such stalwarts who are always there to help us on our way.

Our October meeting was a great success. Phil Z2PI gave an interesting talk on how to construct an all-band antenna and explained a three-transistor converter for 2.5, 7 and 14 Mc. If any a1.w. would like a copy of the above converter circuit, just drop me a line, plus a stamp and its yours.

Our Secretary still has a few copies of the ARF manual on hand and members can purchase same for 10/- plus postage. Write to Tom Harding, 33 Warahat St., Berowa, N.S.W.

We offer our congratulations to Ross L2233/VK4 and to L5ZS2 for their respective wins in the last N.F.D. Contest; good work lads.

Sid L22S8 has his AMR300 going on all bands except 80 m.x at the moment. He sends word of logging OA, G and F2, which is not bad going on any rx. Sid intends having a go for his ticket and we wish him well.

Ross L2233/VK4, who lives in the Rockhampton area, sends news of the prospects of a new 4EBS. He intends to use his 4EBS for portable work and the other for his fixed station receiver.

Chas L2211 reports that his 50 Mc. converter is not working, but Vince VK2VC has the answer.

Thought for the month: Use the right tool for the right job. 73, Chas. L2211.

DX LADDER

E. Trebliecock 282 289 40 70 50
D. Grantley 113 272 38 20 104 35
A. Westcott 83 159 33 9 165 12
M. Hillard 93 159 31 9 165 12
N. Harding 411 199 29 4 20 35
E. Trebliecock 282 289 40 70 50
D. Grantley 113 272 38 20 104 35
A. Westcott 83 159 33 9 165 12
M. Hillard 93 159 31 9 165 12
N. Harding 411 199 29 4 20 35
I. Thomas 42 139 20 16 97 14
G. Karl 38 131 22 20 104 3

Wireless Institute of Australia

Victorian Division

A.O.C.P. CLASS

commences

MONDAY, 10th FEB., 1964

Theory is held on Monday evenings, and Morse and Regulations on Thursday 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 (Phone: 41-3353, 10 a.m. to 3 p.m.), or the Class Manager on either of the above evenings.

Yours faithfully,
(Sgd.) L. F. Pearson,
for Director-General.

Federal Secretary
Wireless Institute of Aust.,
Box 2611W, Melbourne.

Dear Sir,

Further to our letter dated 26th July, 1963, in connection with type F1 emission in the Amateur Service (your letter of the 8th September refers), arrangements have now been made with effect forthwith to include type F1 emission, employing a maximum frequency shift of 850 c.p.s., in the types of emission permitted for use by the Amateur Service and in authorised frequency bands. The type of F1 emission shall be confined to radio-teletype (R.T.T.Y.) systems employing a teleprinter type equipment, using either a tape or direct keyboard transmission and a printing mechanism for reception. The use of hand-speed Morse utilising type F1 emission is prohibited. R.T.T.Y. transmissions shall employ a five-unit code in accordance with International Alphabet No. 2.

For purposes of station identification in accordance with paragraphs 132 and 133 of the "Handbook for Operators of Radio Stations in the Amateur Service," July, 1963, which read—

"132. The operator of an Amateur Station shall transmit the call sign of the station being worked and the call sign allotted to the station that is operating at the beginning and end of each session, and at least once in every five minutes during the session.

133. Call signs must, in all cases, be signalled in full, and, in such a manner as to leave no doubt as to their identity, and must include the nationality prefix letters 'VK,' an Amateur Station licensee employing type F1 emission shall transmit call signs either by means of hand-speed Morse (type A1) or radio telephony (types A3 or F3) signals.

It is not proposed that the Department inform each Amateur Station licensee of the new condition at this stage, but it would be appreciated if you would be good enough to arrange for appropriate publicity through the Institute's Divisional Broadcasts and Magazine "Amateur Radio," please.

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NOTES

FEDERAL

FEDERAL CONSTITUTION ALTERATION

Executive, on behalf of the Federal Council of the Wireless Institute of Australia, hereby gives notice that it is intended to alter the Federal Constitution of the Wireless Institute of Australia 1947 as follows:

(a) Delete Clause 21 and substitute

"21. The Headquarters Division shall call for nominations annually from its members for appointments to the Federal Executive, such nominations to be received not less than 60 days prior to the conclusion of the fiscal year. The nominations which shall include the names of any retiring member and Such nominations, if not re-nominated shall be submitted by the Headquarters Division, and Federal Council for the appointment by preferential vote of seven members, two at least of whom shall be retiring members."

(b) Insert new Clause 21a—

"21a. The Federal Executive shall take office at the conclusion of the Federal Convention which they shall attend, or the Federal Convention shall not be held, within one month of the conclusion of the fiscal year. The Federal Executive shall determine its own offices in such manner as it may determine."

(c) Delete Clause 24 and substitute—

"24. The appointment of Federal Executive members shall be determined by the Federal Council without petition by the Headquarters Division not less than 14 days prior to the conclusion of the Federal Convention. The Federal Council shall notify Federal Council in writing to Federal Council, prior to the conclusion of the fiscal year. The Federal Executive which bands is the sooner."

Any member of the Institute not in agreement with the proposed alterations should notify the Secretary of the Federal Secretary within 14 days of the publication of this proposal.

FEDERAL QSL BUREAU

The new address for the W2-X2 QSL Bureau is North Jersey DX Association, P.O. Box 303, Bradley Beach, N.J., U.S.A.

Graham VK4GK will handle any cards for VK4HG and VK4WW who were at Willis Island and also for VK4JQ who is presently at Willis.

Albert Zander, VK3SG, who was active on 45 positions, QTH and EE positions for many years until 1960, has decided to make a comeback. He advises that he should soon be heard on SSB and later on C.W. Gear consists of HT transmitter, SX receiver and a TAF 3J equipped with a fine tower.

Bruno Bossert, HB9QG, was due to arrive in Australia on 28th November and after a stay of about six weeks in Sydney will come on to Melbourne where he will be employed by Landis and Gyr for about two years. Bruno hopes to become active under a VK call sign. Listen out for 20, 15, 12 and 10 meter in his area and watch him at his home at Nottwil just outside Lucerne.

Repaired to Receivers, Transmitters; Construction and Testing; TV, Alignment; Low Noise Xtal Conv., any frequency, £18/10/0 plus tax.

ECCLESTON ELECTRONICS

146a Cotham Road, Kew, Vic. WY 3777.

Preliminary details of the 1964 A.R.R.L. International DX Contest have been received. The only change is that the entry fee has been increased from 14/15; C.W. Feb. 22/23 and March 28/29. The rules are unchanged from 1963.

Ray Jones, VK3JR. Manager.

NEW SOUTH WALES

HUNTER BRANCH

The December meeting of the Branch took the form of a combined Christmas meeting and welcome back to Lionel 2CS. A large gathering had assembled at the socially and physically constructed on the station which was given to him! Jack BK2L is making very good use of the new mast—about 120 feet high and ex

Bert still trying for better output from the DX, but also for VK4JQ who is presently at Willis Island for VSXW and VK4WV who were at Willis Island for a week. Faisal Maloney was successful and is now in the hunting the good fortune to meet Bruno on to Melbourne where he will be employed by Landis and Gyr for about two years. Bruno is making very worthwhile seeing.

Herb 4JW heard after a long time from his old friends in the States, he must have a new interest. Herb 4JX heard working Ken, while the Ingham boys are giving fuller details of the week-end's activity. This activity further enhanced the good will and is very worthwhile seeing.

TASMANIA

Minimum 5/-, for thirty words. Extra words, 2d. each.

Advertisements under this heading will only be accepted from Institute Members who desire to dispose of their own personal property. Copy must be received at P.O. Box 36, East Melbourne, C.2, Vic., by 8th of the month and remittances shall be made to cover the cost of the advertisement. Call signs are now accepted in this column.

FOR SALE: Collins ART13 Transmitter, 813 final modulated by two 811s, good disposals condition, unmodified, with low frequency v.f.o. original supply, large manual, and all tubes, £50. ATR2B Transceiver, working perfectly, £75. 2AWX and 2AXR, $15. 1 only 122, complete with power supply, etc., unmodified, good working condition, £15. 1 only 122, complete with power supply, valves, etc., but not working, £5. VK2AAK, Kulkara, N.S.W.

FOR SALE: Prop Pitch Motor £10. 8 Kc. a.m. Mechanic Filter, brand new, £7/12/6. H. Hild burn, VK3AFQ, 4 Elizabeth St., East Brighton, Vic. 96-2414 evenings.

FOR SALE: 1 only 12 volt Tafaz (imp-ported) Transistorised Power Supply for Swan or Collins, or similar, Transceiver. Good condition, very little use and very compact. £60. VK2AAK, Kulkara, N.S.W.

SELL your own Personal gear through Hamads. Persons trading in any line, regardless of price, or quantity, of similar articles, will be charged commercial rates.

WANTED: Xmitter, all bands, c.w.-a.m.c.w.-s.a.b. 100 watts max. Also all-band 3 element beam. Bill Barber, VK6DX, 15 Whitle Street, Kalgoorlie, W.A.
WORLD RANGE

RECEIVERS — TRANSMITTERS — TRANSCEIVERS

HALICRAFTERS:

SR150 TRANSCEIVER
SR160 TRANSCEIVER
HT32B TRANSCEIVER
HT44 TRANSMITTER
HT45 LINEAR AMPLIFIER
SX117 AMATEUR RECEIVER
SX122 GEN. COV. RECEIVER
SX119 GEN. COV. RECEIVER
SX118 GEN. COV. RECEIVER
SX108 GEN. COV. RECEIVER
SX120 GEN. COV. RECEIVER
SX115 AMATEUR RECEIVER

XMITTER ACCESSORIES

SWAN (Right):
SW240 VK TRIBAND
TRANSCEIVER
SW240 AC POW. SUPPLY
SW12 DC POW. SUPPLY
SW-VFO/TCU TRANSCEIVER, VFO, VOX,
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DRAKE (Below):
2B AMATEUR RECEIVER
TR3 TRANSCEIVER
ACCESSORIES by B. & W
W.R.L., HYGAH, and
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THESE ARE A SELECTION OF THE WORLD'S FINEST
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The degree of purification obtained in the A.W.V. plant is such that the greatest metallic impurity is less than one part in ten million, total solids are less than one part in a million and the water is virtually an insulator—the resistance between opposite faces of a one centimetre cube is from five to ten meeeohms!
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AMERICAN INDICATOR UNITS

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FEDERAL COMMENT

is the Future of the Amateur Service in the Balance?

This is a question which every Amateur in the world might well ask himself or herself and one which vitally concerns the Societies representing the Amateur Service in the various countries where Amateur transmitting is permitted.

Those who have taken the interest in Australia to read the facts relating to International Conferences cannot help but wonder how long the Amateur Service can hold out against the ever-increasing pressure for frequency space by the rapidly expanding commercial services.

If you are concerned about the future of your hobby you are commended to read the article "Two Plus Two Equals Four" by A. Prose Walker, W0DCA, W4CXA, in the October 1963 issue of the American Amateur publication "QST".

As well as giving an enlightened and experienced background of the modus operandi of International Conferences, Mr. Walker points up the great and urgent necessity for a world-wide Amateur programme of "defence" as a barrier against the future loss of Amateur frequency assignments. His summary in three major points is worthy of reprinting in this magazine . . .

(1) "We must upgrade the Amateur Service to keep pace with the state of the art and through this acquired status gain increased prestige and respect from people and governments who exert vast influence on communications.

(2) "We must prepare for conference participation on both the national and international levels.

(3) "We must establish liaison throughout the world to the end that we all work together in presenting a united front to our respective governments, and through them, to the I.T.U."

The Wireless Institute of Australia, representing the Amateur Service in this country, has been working along the line of these three major points for the past five years or more with greater vigor than hitherto was possible.

Our policy is now being planned a long way ahead and the road will not be an easy one. Whether you hold an A.O.C.P. or an L.A.O.C.P., your cherished hobby hangs in the balance because the pressure for frequencies now extends from the H.C. bands into the gigacycle region. If countries like America, where Amateur Radio holds the highest population density, are concerned with future prospects, then the problem is multi-fold in Region III, where the density is far less and widely dispersed. We might add another important point to Mr. Walker's summary . . .

(4) "We must use every resource at our command to encourage the full and continual use of every frequency assigned to the Amateur Service.

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**INTRODUCTION TO CERAMIC DIELECTRICS**

**PART ONE**

An ever-increasing variety of ceramic parts is being used in electronic equipment, and the ceramic dielectrics are one particular type of electronic ceramic. Before discussing the ceramic dielectrics in detail, it may be of interest to mention at least other electronic ceramics.

**ELECTRONIC CERAMICS**

(a) Low-loss steatite in 1932/34 replaced the electrical porcelain used as insulator material, in order to reduce electrical losses at radio frequencies. Dense aluminium oxide parts are also now being used for important applications, in v.h.f. vacuum-tight, low-expansion insulators.

(b) Ferrites, which contain mainly iron oxide plus zinc, manganese, nickel, etc., are now very widely used as core material in coils and transformers of receivers, tape recorders and t.v. sets, or as permanent magnets in loud speakers, t.v. sets, etc.

(c) Other ceramic bodies become semiconductive due to their composition and/or firing atmosphere and form voltage and temperature sensitive resistors, which are called thermistors, varistors, barrier layer capacitors, etc.

(d) Piezoelectric ceramics may soon replace many fixed tuned circuits in electronic apparatus, doing the combined job of a pair of coils and capacitors; also, they are superior to the seigmette salt crystal so often employed in gramophone crystal pick-ups, microphones, and piezo ceramics are now being tried in motor ignition systems, etc.

(e) Special porcelains have long been used as the element carrier of carbon and wire wound resistors.

(f) Glazes, ceramic flux or enamels found important applications in connection with the surface protection of ceramic insulators, transmitter capacitors and wire-wound resistors, as well as copper, tin, lead, point-on silver, palladium, etc., electrodes to the ceramic base.

**DEFINITIONS AND PROPERTIES**

**WHAT IS A DIELECTRIC AND A CAPACITOR?**

The capacitor or electrical condenser was first reported to be used by Gray in 1735, by von Kleist in 1745, and by Count in Leyden (Leyden Flask) in 1746.

Gray used a glass bottle filled with water to collect electrostatic charges. Von Kleist found that the condensation of many small sparks, by charging the bottle and then discharging it repeatedly by holding the bottle with one hand, because the discharging spark was now much stronger. In these cases, the water acted as one electrode, the glass as the insulating dielectric, and the table or hand as the other electrode.

Cunaeus used metal foil as inner and outer electrodes, a technique still applied today, and we, therefore, call the "Leyden Flask" the original capacitor. We define a capacitor or electrical condenser as an electrical component consisting of two opposite placed electric conductors with an insulating medium "the dielectric" (vacuum, gas, liquid or solid) between these conducting electrodes.

What can we do with an electrical capacitor?

**CHARGING, STORING, DISCHARGING, BLOCKING AND BY-PASSING**

**Charging:** By connecting the electrodes to a battery or electric power supply, we notice that an electric current is rushing into the capacitor, which soon stops because the dielectric insulates both electrodes from each other.

**Storing:** Is the dielectric a good insulator, have steps been undertaken so that air humidity does not cause a conduction path, and is the insulation margin clear (no finger print)? If so, then the charge can be stored in the capacitor for quite some time, or, it has been disconnected from the battery.

**Discharging:** The capacitor can be discharged by connecting a wire across the electrodes causing a short circuit, indicated by a spark.

**Blocking:** These experiments show us that d.c. is charging the capacitor but, after that, a further current flow is blocked by the dielectric.

**By-passing:** Applying a.c. to the capacitor means that we charge, discharge, re-charge with opposite polarity and discharge the capacitor again in quarter sine wave cycle steps repeatedly or continuously. That happens if the capacitor is connected to a power point. If we connect an a.c. current meter in series with the capacitor and the a.c. source, we will obtain a reading, which means that the effect of charging and discharging (a.c.) is transferred by the insulating dielectric to the other side without actually conducting the current.

This means that a capacitor can be used to separate d.c. from a.c. by blocking d.c. current and by-passing a.c. The by-passing effect is expressed as a.c. resistance of the capacitor called "capacitive reactance" (Xc).

**UNIT OF CAPACITY**

To express the storing capability of capacitors, we use the basic unit of Farad (Faraday).

1 F. holds the electric charge of 1 Coulomb (quantity) with 1 V. 1 Coulomb Amp. in 1 Sec. charging current.

In practice, we use smaller units:

\[
1 \text{mF} = 1 \mu\text{F} = 1,000,000 \text{pF}
\]

1,000,000 \mu\text{F} = 1 \text{pF}.

There are many types of capacitor meters now available to assist us if we wish to measure a capacitor.

Let us now look at the main properties.

**K FACTOR**

If we replace vacuum dielectric or dry air which are nearly the same in this regard, by other insulating materials, we will usually observe a bigger charging and discharging spark, which indicates a higher capacity value. The degree of capacity so increased or multiplied is called "K Factor", permittivity or dielectric constant, and it is a ratio figure only without dimensions. The relationship between the capacity dimension K and capacity is expressed as follows:

\[
K = \frac{C_{pF}}{\text{thickness of area}} \times \frac{1}{0.224}
\]

where thickness is 0.001", area is in square inches.

Ceramic materials cover the widest range of F factors of all substances: 4 to 15,000.

Mica K, 7-8; glass, up to 18; plastics, 2 to 4; porcelain, 4.5; steatite, 6 to 7; dielectric constant.

We divide ceramic dielectrics into two main groups, LK and HK, or K < 1,000, and K > 1,000 group.

The K factor varies with frequency, voltage, temperature, time and shape of the dielectric, the composition and manufacturing processes.

**TEMPERATURE CO-EFFICIENT OF CAPACITY, TCo**

**LK:** Since the K factor is by no means constant, we don't use the old term "dielectric constant" any more. The change of capacity with temperature is called the TCo or temperature co-efficient of the capacity. Negative, zero or positive TCo values can only be achieved with ceramic dielectrics, which is the reason there are so important.

**Radio Example:** All radio or t.v. receivers, and many other electronic apparatus, have tuned circuits, each consisting of an inductor (in form of a coil) and a capacitor to sort out the desired radio station (frequency) from the many signals arriving at our aerial. Temperature variations, during the warming up and cooling down later, cause a change in the electrical properties of components which affects the radio receiver tuning, and frequency drift, loss of gain and selectivity are the results.

These effects can be automatically eliminated by incorporating ceramic capacitors with the required TCo, or a combination of LK capacitors can be used, which compensates the TCo of other components to a high degree.

The TCo is determined by measuring the capacity variation \( \Delta C \) per degree C. of temperature change \( \Delta t \):—
Illumitronic Engineering has developed a complete versatile series of air core inductors designed especially for the Amateur rig, for prototypes and production models of r.f. transmission equipment. These coils may be used for pi output circuits, conventional LC output circuits, interstage and oscillator circuits. The series consists of a standard coil type, a variable pitch type, an indented type and special wound type, in a range of diameters from ½ inch to 5 inches. All Air Dux Coils are constructed of tinned or silver plated copper wire wound on large low-loss plastic rods for the highest mechanical strength and lowest electrical losses. Coils that resist heat distortion of temperatures up to 400°F, are available on special order for industrial and military use.

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Manufacturers of Radio and Electrical Equipment and Components

**POWER FACTOR**

**LK:** We have seen that different dielectrics result in different capacities, and it was mentioned that the K factor is usually a much lower I.R. when measured. The dielectric has the purpose of assisting the storage of the electric charge and, therefore, it is important to have an I.R. as high as possible to reduce the leakage current through the dielectric. Capacities of P.E. are made with an I.R. of 10⁸ ohms per cm., but it is actually accept 10⁶ ohms as satisfactory.

It is a big problem to find coating materials to protect the surface which are usable from a practical viewpoint, to retain the good I.R. under practical conditions.

Only at operating temperatures in excess of 200°C. does the I.R. become critical again. This is different, of course, in the case of extremely thin oxide films used as dry I.R. meters. Reversing the polarity and measuring the I.R. will not damage the semiconductor ceramics. The I.R. increases due to polarisation as the measuring time is increased. If temperature variations cause stress in HK samples, the dielectric effect can cause a reliable I.R. measurement impossible.

**AGEING AND RECOVERY**

After firing or any heating cycle, the crystal structure has the tendency to change and again we can measure the new ageing cycle. It is not surprising that, during this period also, the electrical properties change. This so-called ageing process is particularly evident in the case of HK capacitors, which depend on the ceramic, the operating temperature and frequency, the r.f. power load, the electric and heat conductivity of the electrodes and terminals, the ambient temperature, duration of operation, and the I.R. of the P.E.

In receivers, the P.F. affects the gain and selectivity and, in this way, we can measure the P.F. as 3f/fr (tuned circuit bandwidth divided by resonance frequency).

Low capacity values, as those obtained with LK ceramics, are required in tuned circuits and, therefore, LK dielectrics should have an extremely low I.R. of a few parts per million. With HK dielectrics, the I.R. should be below 120°C. Even porous ceramics can have a low P.F. if we can keep the air humidity out and do not apply high voltage. There may be an application for these too.

**HK:** HK ceramic capacitors are usually only required in electronic equipment where the P.F. of 0.5 to 2.5% has detrimental effects, as in by-passing and coupling applications. It is interesting to note that the TC of the HK P.F. is negative up to the usual operating temperature of 20°C to 45°C and we observe the usual increase so well known from other dielectrics. Most ceramics have a decreased P.F. at higher frequencies, but HK bodies make an exception sometimes.

**INSULATION RESISTANCE**

The dielectric has the purpose of assisting the storage of the electric charge and, therefore, it is important to have an I.R. as high as possible to reduce the leakage current through the dielectric. Capacities are now being made with an I.R. of 10⁸ ohms per cm., but it is actually accept 10⁶ ohms as satisfactory.

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**POLARISATION**

The application of a high d.c. voltage to the electrodes of HK capacitors causes various properties to change. The I.R. may increase, the P.F. may rise to three times this value after 2 minutes and may, again, double in 10 minutes. Electrolytic capacitors, which help to polarisation, behave in a similar manner.

With a low voltage (a.c. measuring voltage plus polarisation voltage) of about 2 V per 0.001" dielectric thickness, we usually measure maximum capacity, but the application of a higher field strength will increase the ageing and finally, a less severe capacity loss. This loss of K becomes most effective at Curie Point temperatures and tends to reduce the TC. A permanent K loss of 10 to 40% occurs if the polarising field strength becomes too high.

300V. on K : 9000 0.010" (breakdown at 1500v.)

700V. on K : 2500 0.010" (breakdown at 3000v.)

50V. on K : 400 0.010" (breakdown at 500v.)

By heating up to 100°C, we nearly restore the original capacity value. Strange properties will be found if a high operating temperature and a high field strength are used together. The range of possible capacities is limited because a change in the crystal structure may be caused by the application of high voltages. HK: HK ceramics give usually high capacities in electronic equipment where the P.F. of 0.5 to 2.5% has detrimental effects, as in by-passing and coupling applications. It is interesting to note that the TC of the HK P.F. is negative up to the usual operating temperature of 20°C to 45°C and we observe the usual increase so well known from other dielectrics. Most ceramics have a decreased P.F. at higher frequencies, but HK bodies make an exception sometimes.

**IONISATION, BREAKDOWN, NOISE**

Ceramic dielectric bodies are an irregular mixture of crystals. None of the many production processes or commercial grades of raw materials will give a structure which is void free. Even after firing, some voids will remain which trap free electrons. In the case of the capacitor, these voids will be subjected to high field strengths, especially if the K factor is high, and ionisation, as in a neon light, can take place. We are usually able to observe that the P.F. is gradually increasing with several h.t. flash tests, especially if we reach 100 to 200v. per thousandth inch (0.0001") of oxide skin thickness) is determined more by the capacity loss, with voltage applied, than by the danger of breakdown.
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COMMANDER PAUL H. LEE, W3JHR

ALMOST everybody reads the “Bulletin,” says the familiar ad. in Philadelphia. And likewise, almost everybody on the Amateur bands has a v.f.o. these days, except rock-bound Novices, of course. However, their day will come, and this article should be of interest to them also.

Most home-made v.f.o.’s, and some commercial ones (including those in transmitter units) suffer from “driftitis,” a disease whose severity is proportional to the patient’s temperature. Much has been written by knowledgeable authors on the subject of v.f.o. frequency stability, but unfortunately no one has yet been able to divorce the heat-producing vacuum tube from the circuit within which it is supposed to maintain stability. This would be a neat trick if one could do it.

With the advent of semiconductors in plenty, however, there is promise of real progress in the field of stable frequency generation with very simple circuitry within reach of the Amateur pocketbook. The v.f.o. described here is my own answer to that requirement.

Impetus was added to my motivation by the necessity of Navy M.A.R.S. and Naval Reserve frequencies outside the Amateur bands with adequate stability (0.003% tolerance), which previous vacuum tube v.f.o.’s did not do.

Fig. 1.—Circuit of the “Synthetic Rock” v.f.o.
The tank circuit components, L1, C1, and C2 are ARC-5 oscillator components, the values of which are dependent upon the ARC-5 chosen for frequency desity. All resistors are 1/2 watt, all capacitors greater than one in value are in pf., and less than one in value are in pF.

CONSTRUCTION

This transistorised v.f.o. is extremely simple to build, and is quite inexpensive. In a previous article (ref. 1) I described a v.f.o. built from a cut-down ARC-5 command set. For those who do not have the back issue, the ARC-5 chassis was cut just ahead of the oscillator section, the front panel was moved back, the amplifier tuning capacitor, with its dial, replaced the oscillator capacitor, and the ARC-5 oscillator components were used in a vacuum tube circuit.

The same mechanical concept is used in the transistorised v.f.o. described here, but the process of “cutting down” is carried to the extreme by stripping out all the wiring and components except the oscillator tuning capacitor.

Here is a v.f.o., using two transistors and ARC-5 components, that is so stable that it may be considered a “synthetic rock”. Since it is made primarily from ARC-5 parts, it is very economical.

One of the secrets of the excellent frequency stability of this unit is the fact that the oscillator transistor is connected across a relatively low impedance (C4 and C5), and is loosely coupled to the tuned circuit through the voltage divider action of C3, C4, and C5. This effectively removes the oscillator from the frequency determining tank circuit itself. In fact, C3 could be made even smaller if desired. Its lower limit would be that capacity which still permits the circuit to maintain a few cycles.

This circuit is the result of much trial and error. Many published circuits involve connection of the transistor across high tank circuit impedances, resulting in a peculiar instability which manifests itself as a low frequency rumble or burble on the signal. It was actually an irregular frequency shift of only a few cycles (perhaps less than five cycles) about a very stable mean frequency, but the frequency could be seen as a fluctuation of the receiver meter. The long-term frequency stability was excellent, but the burble was there due to making the tank circuit too high a tank circuit impedance.

The v.f.o. works very well in the circuit shown here. The emitter-follower buffer provides excellent isolation from anything that follows that stage. The v.f.o. can of course be designed to work on any frequency you wish. In my case I use it on 40.6-6.1 Mc. to provide the injection frequency for the s.s.b. exciter.f It drives the

6AH6 which formerly functioned as the L.M. v.f.o. doubler in the exciter. It is connected to the transmitter through 10 feet of RG-8/U cable. The 2N384 is so stable in this oscillator circuit that it could actually be keyed on and off for c.w. by merely opening the 12 volt battery lead, with no chirp or frequency instability!

This v.f.o. has been in use at W3JHR for four months as of this writing. The batteries were replaced once, at the end of three months, when their combined voltage dropped to 7 volts under load (a few milliamperes). This included several periods of being left on all night in error. The only noticeable effect of the low voltage was a slight decrease in output. Use of a pilot light, while desirable from the standpoint of showing the “on” condition, would run the batteries down much more quickly, so it was omitted.

The v.f.o. is used when operating on the Navy frequency of 4015 kc. and it keeps me on frequency with better


Amateur Radio, February, 1964
TACHOMETER
(Vol. 6, No. 5)

This versatile electronic tachometer may be operated with internal combustion engines with 4, 6 or 8 cylinders and 6V or 12V, positive or negative earthed, electrical systems. Whilst this tachometer was primarily designed for use in motor vehicles, it may also be used with marine engines having battery ignition.

Wideband Tuner Stereophonic Pre-Amplifier
(Vol. 6, No. 3)

This unit contains a Wideband AM tuner with a selectable bandpass, together with a four-valve stereophonic pre-amplifier. Although primarily designed for the Mullard Stereo "Ten-Ten" Amplifier, this unit may be used with most other high quality amplifiers.

Mullard Stereo "Ten-Ten"
(Vol. 5, No. 4)

High quality sound reproduction is achieved in this Amplifier with a complement of two 6GW8/ECL86 valves and one low-noise AF pentode type EP85 in each channel. A 5AR4/GZ34 rectifier in the power supply is common to both channels. Peak power output is in excess of 10W per channel. The total harmonic distortion (10W output) is less than 0.1%, a typical value being 0.05%.

First published in 1958, and originally intended as a means of communication with the Industry, Mullard Outlook circulation has increased year by year. It is now in great demand, not only within the Industry, but with teaching establishments, home constructors and enthusiasts alike. It has been decided to offer this Journal to interested readers at a nominal charge of 12/- per annum and to secure your copies for 1964, please send your cheque, money order or postal note with this coupon. Each volume consists of six issues, commencing January-February and concluding with the November-December edition.

Mullard Stereo "Ten-Ten" with printed wiring boards
(Vol. 5, No. 4)

High quality sound reproduction is achieved in this Amplifier with a complement of two 6GW8/ECL86 valves and one low-noise AF pentode type EP85 in each channel. A 5AR4/GZ34 rectifier in the power supply is common to both channels. Peak power output is in excess of 10W per channel. The total harmonic distortion (10W output) is less than 0.1%, a typical value being 0.05%.

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EARTHING or grounding is very important in electrical installations yet the reasons for earthing are often put on one side. Even some electricians. A Ham Station is an electrical installation and must comply with the wiring rules for such installations. These rules are now uniform throughout Australia even if given different titles in different States, as they are based on the Standards Association of Australia Wiring Rules A.S. No. CCl 1 Part 1, 1961.

Rule 501 states that all equipment except double insulated must be earthed. Double insulated is insulated mainly on power hand tools such as drills; all live metal parts being covered with at least 0.002 thick plastic insulation. There must be a main earthing conductor from the earth connection at the main switchboard to the water pipe or other earth electrode, the minimum size is 7/029. In house wiring, wiring, and earth lines run from the earth connection at the switchboard to the earth pins of 3-point plugs. The installation of this wire must be done by a licensed electrician.

This appears straightforward, but there is one catch. Many three-pin plugs have been installed under older regulations in the hope of connecting the earth electrode directly to the main switchboard. Using a three-core flex with earth wire may be useless if there is no earth wire from the plug to the main switchboard. A check should always be made on any three-pin plug base to see if there is an earth wire connected. Gas pipes and sprinkler pipes must not be fitted for earthing. A water pipe would appear to give a good earth but cannot be used for earthing. A water pipe the station to this earth bed. Large ground at least four feet. Galvanized iron or pipes in parallel, the lower the earth resistance, the pipes should be spaced at least one foot apart and connected to each other with 7/029 copper wire. The earth wire should be terminated with a Ross Courtney and bolted to the pipe or connected to the pipe with an electrician’s earthing clamp. The connection should be made and then painted to prevent corrosion and should be scraped and repainted at least every 12 months. The earth spare in mind should be kept damp. All soils dry out in summer and this causes a rapid rise in earth resistance.

TEST AFTER INSTALLATION

A simple and reasonably accurate method of testing the earth bed is to use the fall of potential method. Alternating current is circulated through the earth G and a fixed test earth G1 (see Fig. 1). A high resistance voltmeter is connected to G and to a movable test probe P. P is moved along a line from G to G1 and voltmeter readings taken simultaneously with ammeter readings.

Values of R are plotted against distance and the flat part taken as the earth resistance.

LIGHTNING PROTECTION OF ANTENNA TOWERS

Towers should have a pointed spike or finial projecting at least 3 feet above the top of the antenna, with an earthing conductor running from the finial to a separate earth. The wiring rules require the use of a separate earth at least six feet from any other earth connections. Lightning currents may be many thousands of amps. In magnitude, but they are pulses of very short duration, so the heating effect on the conductor is usually small. A 7/029 copper earthing conductor should be ample. Rule 556 lays down that the resistance of any earth electrode shall not exceed 200 ohms. I feel that for safe operation an overall resistance of not more than 4 ohms for the earth bed is absolutely necessary. In a normal house a 30 amp., or 45 amp. fuse is connected in the main switchboard feeder from the street pole and a 15 amp. fuse smaller to the sub-circuit. The neutral return wire is bonded to earth at both the sub-station transformer neutral and the main switchboard with the earth providing an alternative path back to the transformer if the neutral wire becomes disconnected.

Consider the circuit as shown in Fig. 2 with the neutral wire connected normally. If a fault occurs between active and frame, the current will be 240 + 2, that is 120 amps, and the 15 amp. fuse will blow. Now suppose for some reason the neutral wire no longer is in circuit and all current must return through the earth. If the earth resistance is 7 ohms at the house and at the transformer, then the current is 240 + (7 + 7 + 2), that is 15 amp., and the fuse will just blow. Any higher resistance than this and the fuse will not blow. The metal casing of the rig will be at 240 volts to earth.

We have neglected the resistance of the active between transformer and appliance, the resistance of neutral between appliance and transformer, and the resistance of the earth through salt water, about 0.09 ohm per mile, and secondary resistance. If these are considered, the fault current will be smaller than 15 amps.

REASONS FOR EARTHING

This discussion applies to the multiple earthed neutral (M.E.N.) system. The user of the electrical equipment with exposed metal parts cannot earth himself, that is, he is in a room with dry wooden floors with no water pipes or other earthed metal within reach, there is no need to supply an earth on the equipment. However, this situation seldom occurs in practice and every station should be treated as an earthed situation. Rule 520b states that the resistance of the ground from the earth electrode to water pipe shall not exceed 2 ohms. This is easily obtained with stranded copper earthing wire, but care should be taken if cast iron forms part of the conductor circuit as cast iron may have quite a high resistance.

(Amateur Radio, February, 1964)
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SOME NOTES ON THE USE OF R.F. CHOKE


THE radio frequency choke is an extremely useful component which makes its appearance in a wide variety of circuits. In fact in some cases the operation of the circuit is vitally dependent on the use of one or more r.f. chokes. Although the chokes may have little effect on the design of the circuit and as a result tend to be regarded as of little consequence. This viewpoint is in some instances an incorrect one, particularly where the choke is regarded as an anode load when in fact it is not acting as such.

The purpose of this article is to examine whether the choke is being effectively used. In doing so the writer hopes to answer the complaint, often heard, that the multiband exciter or driver unit being used fails to provide sufficient drive on 10 metres when in fact it is not acting as such.

EFFECTIVE USE

Three examples of the effective use of the r.f. choke are shown in Fig. 1. In every case the choke is used to provide a d.c. path for the valve and in the case of Fig. 2(a) and (b) also provides a means of coupling the load to the valve. In all cases there will be stray capacitances associated with both grid and anode together with stray wiring capacitances. These capacitances may be considered, along with the self-capacitance of the choke, as part of the tuning capacitance C<sub>1</sub> in Fig. 2(a) and (b) and may in general be ignored on the assumption that C<sub>1</sub> is much larger than the total stray capacitance.

The choke behaves in these circuits as a low resistance path to d.c. and as a high inductive reactance at the frequency of operation. For example, our 1.5 mH choke has an inductive reactance of about 270 K ohms on 10 metres, and since the load connected to the anode of the valve consists of a resonant circuit having an effective resistance much less than 270 K ohms, the choke has practically no effect on the circuit. The same is true of the second choke RFC2 in Fig. 2(a), the stray capacitance effectively forming part of C<sub>2</sub> in the pi-network. Again in Fig. 2(c), the choke provides a d.c. path for the valve while its stray capacitance is effectively part of C<sub>1</sub>.

INEFFECTIVE USE

A common use of the r.f. choke is in the circuit of Fig. 3 which could be an amplifier or the anode circuit of an electron coupled oscillator. The choke provides a d.c. path for the anode current of the valve but it does not constitute the a.c. anode load. This is because of the stray capacitances that the anode circuit will have a parallel resonance at f<sub>0</sub> = 0.75 Mc. which is well below any of the Amateur bands.

Below this frequency f<sub>0</sub> the anode load is inductive having an effective reactance of L/(1—f/f<sub>0</sub>) if we ignore the resistance of the choke. At frequencies higher than f<sub>0</sub> the anode load is capacitive and has an effective reactance of approximately 1/C<sub>0</sub>. This means that the gain is inversely proportional to frequency. In other words, the gain is halved each time the frequency is doubled. For a value of

\[ \text{Example quoted above, since } L = 1.5 \text{ mH and } C_0 = 30 \text{ pF, so that if } L = 1.5 \text{ mH and } C_0 = 30 \text{ pF, then } f_0 = 0.75 \text{ Mc. which is well below any of the Amateur bands.} \]

At very low frequencies the choke behaves very nearly as a pure inductance and produces a reactance of \( \omega L \) which increases with frequency. The actual reactance is modified by the presence of the capacitance C<sub>0</sub> and, to a much smaller extent, by the resistance R. Neglecting the effect of the resistance, the effective inductance is modified from L to L'<sub>0</sub> such that L' = L/(1—f/f<sub>0</sub>). In other words the effective inductance increases with frequency due to the stray capacitance. As the frequency is increased, however, the inductive and capacitive reactances will become equal (neglecting R), so producing parallel resonance. The parallel resonant frequency is given by

\[ f_0 = \frac{1}{2\pi\sqrt{LC_0}} \]

In the case of the example quoted above, since \( L = 1.5 \text{ mH and } C_0 = 1.4 \text{ pF, the self-resonant frequency works out to 3.5 Mc. and this value was confirmed by actual measurement of } f_0 \).

Above this self-resonant frequency the choke behaves as a capacitance of very small value but of course its reactance decreases with frequency. Due to the fact that the self-capacitance is really distributed, there is a possibility of self-resonance at several other frequencies. These may not cause ill-effects provided they are parallel resonances but it is possible for the capacitance of one part of the coil to produce series resonance with the inductance of another part. Since a series resonance provides a low-resistance path and as the duty of the choke is to provide a high impedance, it follows that such resonances are to be avoided if possible, particularly in the bands being used.

For the purposes of this article, it will be assumed that only one simple parallel resonance exists. If this is so, then at frequencies well above \( f_0 \) the choke will behave effectively as a capacitance C<sub>0</sub> with a reactance \( 1/\omega C_0 \).

Most of the foregoing theory assumes that the choke is in complete isolation, whereas in practice it must be considered as part of the circuit in which it is used.

\[ \text{Fig. 2.—Effective use of r.f. chokes. (a) Power amplifier with pi-coupler; (b) Choke coupled tuned load; (c) Colpitts oscillator.} \]

\[ \text{Reprinted from "R.S.G.B. Bulletin," October, 1963.} \]
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Bearing in mind there were no resonators in the bands used, or so we assume, there can be no flywheel action as in a tuned class B or C amplifier, hence the output from VI is going to will not provide sufficient drive on 10 metres, so we as- be too small on the highest frequency decrease with frequency and could well be only 180 ohms at 10 metres.

Substituting one larger single valve may be effective in reducing C. Should this not be successful then L could have a value L = \frac{1}{C^2} at 10 metres. It should be remembered that if V2 is made up of two valves in parallel, as is common the case with a p.a. stage, then the input capacitance is doubled. Substituting one larger single valve may be effective in reducing C. Should the method of doubling the input capacitance be taken then the output circuit of the crystal calibrator...
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THE rig to be described here runs eight watts to the plate of a 12BY7 to give an r.f. output of 4 to 5 watts—suitable for most local working and also some DX if the band is open and a reasonable aerial (and QTH) is available. The sensitivity of the "rush box" receiver is ample for local work when operating portable or mobile.

It was originally intended to use the transceiver for operation on the 6 metre a.m. net frequency of 53.032 Mc. for portable and mobile use and also possibly for W.I.C.J.E.N., however results with the transmitter have been so heartening it is also used as the shack transmitter in conjunction with a homebrew superhet receiver. For use in the shack the regeneration control is simply turned off and a jack inserted in the earth lead of the T-R switch and connected to the normal relay system in the shack.

The original transceiver used trimmers to tune the final tank and adjust the antenna loading because fixed frequency work only was intended. However if shack use is intended, normal variable capacitors of about 50 pF. maximum capacity with the controls brought out to the front panel would be preferable. V.F.O. can be used, utilising the present overtone circuit as a doubler or tripler (not straight through) if the junction of the 47 pF. and 0.001 µF. capacitors is earthed.

The modulation transformer is a standard single-ended speaker transformer with primary 7K (to 12BY7), tapped at 5K (to 6GW8) primary (common to E-t.), to 3.5 ohm secondary. This gives a much better impedance match than the normal centre tapped transformer or with choke modulation. The current drawn on transmit is in excess of the manufacturer's figure of 50 mA., but the A. & R. transformer type 2624 used in the original has shown no signs of panic. With modulation, the current cancelling effects of the auto transformer configuration helps to prevent any breakdown.

Chassis layout Top view

A crystal mike was used purely because of personal preference, however a carbon mike could be used in the normal manner with the saving of one tube; alternatively, the unused half of the 12AT7 could be used as a tone generator. Do not bypass the cathode of the 12AT7 pre-amp, unless you particularly want r.f. feedback.

With the screen bypass used, the 12BY7 should not need neutralisation, but do not forget to check; inductive neutralisation from plate to grid would probably be the easiest method. While the final was quite stable, 12BY7s have been known to take off when used straight through on 50 Mc. A brass plate across the socket, between plate and grid lugs, should cure this if it should occur.

LAYOUT

All components except modulation transformer, screen dropping resistor, final tank, speaker, T-R switch, regeneration control and, of course, all tubes, are below the chassis.

The only precautions are to make sure that tuned circuits likely to cause feedback are at 90° to each other, and that hot audio leads are shielded. There was some acoustic feedback when switching from transmit to receive in the original which was cured by using a switch on the mike. Removal of the r.f. bypass in the plate lead of the audio preamp. would prevent this, but may accentuate r.f. feedback—this is a matter for experiment.

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frequency), then driver coils were adjusted for maximum grid drive to the 12BY7 (approx. 2 to 3 mA., depending on crystal; at least 1/4 mA. required for good modulation).

The final tank and loading were adjusted for maximum power output. The stick—more satisfactory than tuning for minimum dip and then loading with this particular bottle. Plate current should be around 27 mA., screen current 5 mA. Adjust screen dropping resistor if necessary to allow 180 to 200 volts on the screen with 250 to 300 volts on the plate (measure with v.t.v.m. or high resistance voltmeter).

Modulation level is adjusted with a c.a. or until plate current just kicks upwards on peaks. The unit is capable of excellent modulation when properly adjusted.

The receiver, like all super-regens, will radiate, but tests running it on the bench alongside the shack receiver show that radiation is not significant.

**COIL DATA**

LI—10 turns 27g. close wound on Aegis 5/16" slug-tuned former.
L2—6 turns, as above.
L3—6 turns, 12g. 3/8" i.d., half diam. spacing.
L4—2 turns hook-up wire over cold end of L3.
L5—6 turns 18g. 3/8" diam., 3/4" long.
L6—6 turns as LI.
RFC1—Quarter wave length of 27g. on 5/16" former.
RFC2—Anything from 2.5 to 100 MH. choke.

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In the February issue of "Wood Preserving News," an American publication, there is an article concerning the extensive use of wood for construction of towers which support the antenna units of a giant new radio telescope at the University of Illinois.

Important considerations in the design of the antenna supports were the estimated required life of 15 years and the necessity to reduce to a minimum the electrical and radio interference characteristics. This also meant that the structure had to be as narrow as possible.

The final tank and loading were adjusted for maximum grid drive to the 12BY7 (approx. 2 to 3 mA., depending on crystal; at least 1/4 mA. required for good modulation).

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L6—6 turns as LI.
RFC1—Quarter wave length of 27g. on 5/16" former.
RFC2—Anything from 2.5 to 100 MH. choke.

**AFTER-THOUGHTS**

Power requirements are for 250 to 300 volts h.t. at around 100 mA. Either 6 volt or 12 volt wiring can be used. 12 volt was used in the original to allow for mobile work.

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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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WIRELESS INSTITUTE OF AUS.
Federal Constitution Alteration

Federal Executive, on behalf of the Federal Council of the Wireless Institute of Australia, hereby gives notice that it is intended to alter the Federal Constitution of the Wireless Institute of Australia 1947 as follows:

(a) Delete Clause 21 and substitute—
"21. The Headquarters Division shall hold for nominations annually from its members for appointment to the Federal Executive, such nominations to be received not less than 60 days prior to the conclusion of the fiscal year. The nominations which shall include the names of any retiring members of Federal Executive willing to re-nominate shall be submitted to the Federal Executive Division for the appointment by preferential vote of seven members, two of whom shall be retiring members."

(b) Insert new Clause 21a—
"21a. The new Federal Executive shall take office at the conclusion of the fiscal year in which they shall attend, or where a Federal Convention is not held within one month of the conclusion of the fiscal year. The Federal Executive shall determine its own offices in such manner as considered necessary."

(c) Delete Clause 24 and substitute—
"24. The appointment of Federal Executive which shall be selected by the Headquarters Division not less than 14 days prior to the conclusion of the fiscal year shall be notified in writing to Federal Council prior to the conclusion of the fiscal year. The Federal Executive shall notify Federal Council in writing of the offices and appointees thereto within 28 days of the commencement of the new fiscal year or the Federal Convention whichever is the sooner."

Any member of the Institute not in agreement with the proposed alterations should notify his disapproval and the reasons to the Federal Secretary within 14 days of the publication of this proposal.

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SIMPLIFIED CASCODE CONVERTER FOR TWO METRES

FROM NOTES BY G3NBQ

The details on which this article is based appeared in the Coventry Amateur Radio Society's "Newsletter" for April last, in which G3NBQ described a two-metre converter intended as a prototype for copying by C.A.R.S. members who might have had no previous experience of V.H.F. construction and circuitry. Several such converters have been built from his design, which is essentially simple and easy to get going—nevertheless, it is capable of giving very good results with the minimum of setting-up difficulty.

Fig. 1 is the block diagram, showing a cascode r.f. stage (E88CC) into a mixer (6AK5) with a twin-triode (12AT7) oscillator-multiplier—just about as basic a layout as you could get for an efficient crystal-controlled job on two metres.

At Fig. 2 is given the circuit in detail. The oscillator-multiplier chain is designed to knock out at 118 Mc., near enough from a 6.5555 Mc. crystal, giving the i.f. tuning range of about 26-28 Mc. to cover the (two-metre) band, 144-146 Mc. The crystal frequency is times/3 in the first half of the 12AT7 and then times/6 in the anode of the second half. Provided beats are not thrown into either the i.f. tuning range of the receiver or the 144-146 Mc. signal frequency coverage of the converter, any tunable i.f. can be used by changing the crystal frequency and the order of multiplication in the oscillator chain—but in fact the arithmetic will show that there are relatively few fundamental crystal frequencies that can be used without this sort of interference occurring. The figures given here are to avoid "birdies" in the tuning range.

CONSTRUCTIONAL POINTS

The general appearance of the finished job, as built up by G3NBQ, is shown by the photographs. To simplify the constructional work, he hit upon the ingenious idea of using 18g. tin-plate, with tin screens, as the mounting, this assembly then being dropped into a standard aluminium box chassis. The advantage of using clean tin-plate, rather than aluminium, is the very important one that soldered joints can be made direct to the chassis. Moreover, since at the constructional stage the "chassis" consists of no more than a piece of flat tin, 5½" x 3½", to which the screens (two inches deep) can be soldered, the work is much more assessable than when building inside a small box chassis.

One screen is fitted along the centre-line of the mounting plate, and the other is placed at right angles to form a 1" compartment at the input (V1 end)—see under-chassis photograph—to screen the two halves of the cascode stage. This under-chassis view also shows how the wiring is simplified, and from it and a study of Fig. 2, starting from the V1 end, most parts can be identified.

After construction, it will be found that the mounting plate with its screens will fit neatly into an aluminium box 6" x 4" x 2½" deep, and can be bolted in by self-locking screws.

ALIGNMENT

After doing a thorough wiring check, apply power. On connecting the converter into the main receiver, shunt should be in earth terminal, then look over the mixer wiring. When

(Continued on Page 20)

General view of the Two-Metre Converter designed by G3NBQ. It was produced specifically as a prototype to be easily repeatable.

General view of the Two-Metre Converter designed by G3NBQ, and the article explains the equally simple alignment procedure.
Converter for Two Metres

(Continued from Page 10)

noise is obtained, check the c.o. grid by disconnecting R11 at the chassis end and putting in a low-range milliammeter; this should show a pronounced peak reading on one setting of the slug in L7. If this does not happen, put a 10 pf. fixed capacity between ground and pin 1 of V3. If the grid current still will not peak, re-wind L7 with a few taps, and determine which tap gives greatest current. You are aiming to get a grid current reading of 0.5-0.7 mA, and when this is obtained, the meter can be taken out and R11 re-connected to the chassis.

If C13 is now adjusted, a noise-peak should be heard; no difficulty will be encountered here, as C13 shifts the resonant frequency of the tuned circuit through quite a wide range. Careful adjustment of C13, or of the spreading out on squeezing in its turns, should peak up the sharp even more.

On connecting the aerial, something should now be heard from outside, even if it is only ignition noise (which can be heard in). For preliminary adjustment of any converter!). There may even be a few signals on the band on which the signal circuits can be peaked by manipulation of L2 and L3, while fiddling with the configuration of L1 with respect to L2 may give you a further gain in signal. For the 26-28 Mc. tuning range on the main receiver, the i.f. winding L4 should be peaked at 27 Mc.

If having reached this happy condition, with something coming in on two metres, the converter appears to go quite dead after switching on again, it will be because the crystal has not picked up. This is a very annoying and not uncommon fault, and can only be prevented by careful adjustment of the crystal. This is a part that must be regarded as being critical, and the probability is that a strong c.o. beat will be found somewhere on the tuning range of the main receiver (right outside the two-metre band, that is) and this can always be used as a reference point for the activity of the crystal.

It is understood that these converters built to the recipe by G3NBQ, as discussed, here, are giving entirely satisfactory results, and went off first time without difficulty. The design can be confidently recommended to anyone thinking of making a start on the two-metre band.

Under-chassis view of the Converter. The main criterion is 5% in. When the "chassis" is actually a mounting plate, with screens made of clean tinplate which simplifies because earth connections can be soldered. Two screens as shown are fitted (by soldering), each smaller one at right angles being 2 in. deep with a slot cut for the valveholder, and placed to give a 1/4 in. space for the V1 input unit. The finished converter on its mounting plate drops into a standard 3 x 4 x 3/4 in. box chassis, and is secured by self-tappers at the four corners. In this view the aerial input end is at lower right, and the i.f. output can be socketed at left.

PHONEM OPERATION BY L.A.O.C.P. LICENSEES

Pursuant to representation to the Postmaster-General's Department by the Wireless Institute of Australia, the following modes of telephony may now be used by licensees in the Amateur Service holding Limited Amateur Operator's Certificates of Proficiency authorising transmission in the bands above 52 Mc:—

All authorised bands:
A3, A3a, A3b, F3.
All bands above 144 Mc:—
A3, F3.
Ultra high and super high frequency bands:
P3d, P3e, P3f.

Licensees will not be independently advised by the Postmaster-General's Department. Amateurs are therefore advised to pass this information by word of mouth and whilst in contact on the air.

FEDERAL EXECUTIVE, W.I.A.

-------------

Transistorised V.F.O.

(Continued from Page 7)

than the required stability of 0.005%, as evidenced by my stable zero beat with station NPG on that frequency. It is a constant source of joy when operating in the Amateur bands also. There is absolutely no drift from this source any more!

S.s.b. and a.m. operators plagued by "drift-tits" and a.m. operators whose frequency shifts with modulation would do well to build and use this little gadget. You c.w. men can actually key it for break-in! It is truly a "Synthetic Rock!"
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Federal Comment

As yet another Easter approaches, so does the annual meeting of the Federal Council of the Institute—the Federal Convention. This will be the 28th meeting of Federal Council at a Convention and could prove to be a momentous one in the long history of the W.I.A. One might ask why this one should be any more important than any other Convention at which matters of policy and the future operation of the Institute are discussed. The answer will undoubtedly lie in the presentation of the first draft of the new Federal Constitution.

This important aspect of the Institute administration was thoroughly discussed at the last Convention where guiding principles for its preparation were laid down. The Institute in the past on a Federal plane has been bound together as a whole only by mutual agreement between the Divisions which are autonomous bodies and as such are not obligated to a Federal amalgamation by law. The principles referred will now enable the Divisions to be bound to a Federal company by law yet still retain their own autonomy within their State boundaries.

The average member is perhaps unaware of the necessity for the existence of a Federal governing body—space would prohibit giving every reason why this should be so; however, the main one would be a central authority through which the voice of the Institute would be heard and which would guide and execute the policies expressed by the different Divisions. There are other functions it would undertake such as the publication of the magazine, the task of which has been that of the Victorian Division, and in addition we hope, a most profitable and momentous Convention.

As a time when holidaying is prevalent, any members who can be present at the Convention in Adelaide, which is the venue for the first time since 1935. The success of this or any other Convention depends largely on the interest of the members of the host Division, and although Easter is a time when holidaying is prevalent, any members who can be present at the deliberations of the Federal Council are always welcome and can learn something useful about Federal administration of our Institute. We can promise an interesting experience for any visitors who can come along, and in addition we hope, a most profitable and momentous Convention from the aspect of decisions and policies.

FEDERAL EXECUTIVE, W.I.A.

Our Cover

During the recent Ross Hull Contest it was possible, due to the activity in VK8, to obtain W.A.S. on 50 Mc., so it is appropriate to show a collection of all VK Call Area cards. The reader should also refer to the Correspondence column (see page 17) and page 14 for the W.I.A. (V.H.F.) W.A.S. Rules.

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A LOW-COST U.H.F. GRID DIP OSCILLATOR

C. HAGOORT,* VK5ZKC, and B. CLEWORTH,† VK5BQ

With the 70 Cm. band now available, some v.h.f. enthusiasts will want to construct equipment for this band. With this idea in mind, the writers have been experimenting with various circuits, tubes and layouts, and finally have decided on the following design.

No originality is claimed for the particular circuit used, however, it will be observed that the layout is novel and quite effective in practice.

Although it would be preferable to use tubes such as the 6CW4, which would result in a higher maximum frequency, we used the 6J6 because it is readily available and has a satisfactory maximum frequency capability (in this g.d.o., 550 Mc.).

Everyone knows that the 6J6 will oscillate up to 600 Mc. with suitable tuned circuits, but it is not so easy to make it oscillate over the wide frequency ranges necessary for a practical g.d.o. This is further aggravated by the fact that the maximum capacity of the tuning capacitor will have to be reasonably large in order to provide as large as possible a frequency range with each coil. With these problems in mind, the series tuned circuit (Fig. 1) was tried and found to give the desired result. The only serious disadvantage is that the grid current varies over fairly wide limits, from maximum to minimum settings of the tuning capacitor.

To minimise this, a "magic eye" tuning indicator was used in both grid circuits. Tubes and layouts, and finally have decided on the following design.

Although it would be preferable to use tubes such as the 6CW4, which would result in a higher maximum frequency, we used the 6J6 because it is readily available and has a satisfactory maximum frequency capability (in this g.d.o., 550 Mc.).

The problem has been overcome in the following manner.

Two short pieces of brass tubing 1" inside diameter and about 8" long are made into two little sockets by cutting four slots with a junior hacksaw as indicated in Fig. 3. One socket is soldered rigidly to the fixed plate of the tuning capacitor, and the other one directly to the plate pin of the 6J6. The plate pin is then braced to the centre terminal of the 7-pin socket with a "blob" of Araldite.

This method has the advantage that there is no additional dielectric loss over and above that in the valve socket and tuning capacitor insulation. Reference to the layout drawing (Fig. 2) will show how this socket is arranged.

The coils themselves are made from 1/" outside diameter copper tubing, bent into the shape of a hairpin loop. Finally, after calibration, they are finished with a piece of P.V.C. tubing pushed over them. This precludes the possibility of shock to the operator. A neat job will result if the tubing chosen is a very tight fit and pre-soaked in a solution of amyl acetate or duco thinners to swell it. When pushed over the coils and allowed to dry it will shrink back to its original size. Differ-
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CONSIDERATIONS IN RECEIVER FRONT-END DESIGN*

AL BROGDON, K3KMO/0/D1OHZ

The author explains the importance of r.f. selectivity and linearity, and methods of improving this important characteristic.

T HE Radio Amateur is faced with a communications problem which is unique in nature. One of these unique features is that the Amateur is allocated continuous non-channelised frequency bands through which he may roam at will. This is found in no other communication service. This freedom to choose an operating frequency, plus the fact that there are more Amateurs in the United States than can be comfortably accommodated by the frequencies available for their use, results in mass mutual interference. This over-population of the Ham bands will certainly never lessen; on the contrary, it appears as if it must become progressively worse. The major factors contributing to this increasing problem are the phenomenal rate of growth of the U.S. Ham population and the increasing pressure to reduce the Amateur's frequency allocations.

Thus, we may look forward to more and more interferences on the high frequency Ham bands. Practically the only approach to the solution of this interference problem is that of narrowing the bandwidth of the communication receiver until it is just wide enough to accommodate the desired signal.

In the typical communication receiver the high selectivity is built into the lowest frequency i.f. stages. The selectivity, equipment specifications are principally the selectivity of these low i.f. stages. These curves lead us to believe that this is the performance capability of the receiver, but the sad fact is that this selectivity cannot be linearly transferred back to the antenna terminals of the receiver. The reason for this is that the lower frequency i.f. stages are linked by vacuum tubes (or transistors)—nonlinear elements. So the actual bandpass characteristics of the receiver will be degraded by the amount of linearity in the transfer. Let's take an example to show the difference between the i.f. bandpass and the overall bandpass characteristics of a receiver.

On field day, there will often be two operating positions in close physical proximity but on widely-separated frequency bands. According to the manufacturer's data sheets, the selectivity curve there should be almost an infinite amount of attenuation at such far-band frequencies. Yet the interference is present. Let us consider the reasons for the existence of this theoretically impossible interference.

The level of the undesired signal becomes so great that it causes the r.f. stage to become overdriven. Therefore, any number of interferences to occur. The sensitivity of the receiver may be seriously degraded due to the extra bias placed on the over-driven r.f. stages through the excessive grid current. Cross-modulation may result because of the overdriven stage's non-linearity. Harmonics of the undesired signal are generated, which may cause a spurious response. Two strong signals may combine in an overdriven r.f. stage to produce intermodulation products. When one of these products falls within the r.f. stage to produce intermodulation products. When one of these products falls within the receiver's tuning range, it will cause interference.

With all of these possible sources of interference, it becomes obvious that the linearity and selectivity of the r.f. amplifier stages is an absolute necessity. No r.f. stage should be operated without self-bias, and a.v.c. bias should be applied to all r.f. stages (plus the i.f. stages if desired). Two signal amplifiers that are recommended are the "delayed" a.v.c. and "hang" a.v.c. systems.

A delayed a.v.c. system is one in which the receiver is operated with the r.f. stages at maximum gain until a signal is detected, at which point the receiver is switched to a lower gain. The hang a.v.c. circuit is developed for use with c.w. and s.s.b. reception, and features a fast attack time and a slow release time. This results in a.v.c. action which is applied at the first signal to reach the receiver when an undesired r.f. signal is present.

R.F. RESPONSE

A spurious response can occur in a receiver when an undesired r.f. signal reaches the signal grid of the mixer. The selectivity of the r.f. amplifier determines the rejection of the undesired signals. Therefore, the selectivity of the r.f. amplifier stages of a receiver should be considered over a wide frequency range. By injecting a signal at the antenna terminals of a 10 to 30 Mc. communication receiver, and measuring the voltage developed at the signal grid of the mixer stage, it was possible to determine the r.f. selectivity curve. Thus it included the selectivity of all tuned circuits between these two points.

It was seen that the off-frequency attenuation rose to a maximum just above the tuned frequency, then gradually decreased and decayed into erratic valleys and peaks. The receiver under

* Reprinted from "CQ" July 1963.

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When Sound Reproduction ran out of print in 1962 after sales totalling 47,000 copies since 1949, it was decided to revise the book in sections. Audio and Acoustics deals with this aspect of the subject. Out of the 140 illustrations, only 30 are repeated from SR3. This fact, plus the valued help of Acoustical Consultant James Moir as sub-editor, means that the A.A. book is mainly an original work.

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183-185 ELIZABETH STREET, MELBOURNE, C.1, VIC.
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With the co-operation of our overseas associates our crystal manufacturing methods are the latest.
INTRODUCTION TO CERAMIC DIELECTRICS

PART TWO

CERAMIC DIELECTRICS

An Engineering Problem

The case of Centralab, U.S.A., gives some idea of what is involved.

Centralab, a leading U.S. ceramic capacitor manufacturer, stated in 1948 that 30 ceramic and electronic scientists and engineers worked 150,000 hours preparing 25,000 HK compositions, but only two of these were used for mass production. Further, they stated that it will take them 15 more years to evaluate all measuring results and investigate special observations more closely.

This statement underlines the complexity of the job and the nearly infinite number of possible combinations. As one may well imagine, we could not do the development of ceramic dielectrics on such a grand scale in this country, but this example shows how much work is involved if one wants to reduce the chance of overlooking possibilities.

Our Job: In our profession, it usually goes like this:

A customer sends us a t.v. circuit and wants a suitable capacitor for a certain application, or he sends us some foreign capacitors and wants us to make exactly the same type. If we find something interesting in a technical magazine or in the patent literature, then a new developmental programme may be initiated, and the same may be the case if we have a new idea ourselves.

In all the cases we have to translate electronic properties into chemical formulations, and these into ceramic processes (without a dictionary). Next, we have to prepare and measure ceramic capacitors, evaluate the results, and correct the formulation and change the ceramic processes to achieve the required properties more closely. This may be the electronic measuring techniques and new ceramic processes have to be developed. Production and measuring techniques have to be well understood, or the results will be misleading.

SOME CERAMIC DIELECTRIC FORMULATIONS

LOW LOSS STEATITE

Typical insulator porcelain, at 1 Mc, has a P.F. 30 to 100 times higher than good mica or ceramic. The Tcₜ is many 100 parts per million, and the I.R. falls rapidly at elevated temperatures. The alkalis were found to be mainly responsible for this, and it was also found that the same is so with glass compositions. The low loss steatite, composed of very pure talc (H₂O-Al₂O₃-SiO₂) plus carbonates of earth alkaiks (Mg, Ca, Ba) and other oxides as mineralisers, was the answer. Only small amounts of clay, contributing traces of flux, have to be added often to achieve vitrification below 1,400°C. The low P.F. of 0.04%, high I.R. of 10² ₂/₉ cm. at 200°C., and the low K factor from 7 make this material very suitable as r.f. insulator, where low, stray capacities are required.

The Tcₗ of P140 to 180 was more important in the past, because iron dust cores used in tuned circuits had a negative TC of the permeability and the resulting frequency drift could be compensated with steatite capacitors (German trade names, since 1932, are: Calit, Frequenit). LL. steatite is widely used in switches, valve holders, terminals, v.h.f. coil forms, transmitter serial capsels, etc.

LK DIELECTRICS

The electronic industry required dielectrics with higher K factors to be able to make less bulky capacitors. Suitable mica was not available in Germany around 1930-34, but then remembered a patent of Schmidt, 1902, in which he had found that TiO₂ had a K factor of 117. Then the Hescho and Stenmag Companies developed, during the period from 1934 to 1938, a range of LK dielectrics with:—

K Factors of 14 40 80
Tcₗ: NPO N400 N750
P.F.: 0.02% 0.2% 0.1%
and 1938/1939:—
K Factor 40
Tcₗ: N120 N250
P.F.: 0.2%

Nearly all the shapes and styles still used all over the world today were developed by these two firms during about 25 years ago. The compositions used in those days were relatively simple:—

Tcₗ: Mainly containing Trade Name
NPO MgO and TiO₂, Tempa S.
N120 La₂O₃ and TiO₂, Tempa T.
N400 Clay and TiO₂, Condensa C.
N750 10% Clay & TiO₂, Condensa C.

These dielectrics had peculiar properties. The NPO needed 1,450°C. to fire dense.

The N120 shrank about 50% (extruded tubes).

The P.F. increased 100 times at 800°C., and the TCc became 10⁻⁴/cm. under accelerated life test conditions.

Again, other additives improve the P.F. so that there is no deterioration under accelerated life test conditions (100°C., 100V/thou.), which could cause, in some cases, a partial reduction of the degradation P.F. and breakdown level.

The importance of temperature compensation was gradually appreciated more and more by radio designers, and this requirement had to be satisfied for all Armour Ferrite equipment, and now too for domestic receivers. The introduction of ferrite coil cores for inductances of tuned circuits called for higher H. Tcₗ capacitors for the achievement of good compensation of frequency drift.

These are the reasons why we have all over the world now 17 standard Tcₗ values:—

P150 P100 P33 NPO N33 N75 N150 N220 N470 N560 N750 N1500 N2200 N3300 N4700 N5600.

It seems to be possible only to produce high P TCc values either with a low K factor or with a high P.F. The more common oxides of Zn, Sn, Zr, Mg, Ba, etc., are often used which give suitable P.F. and K factors if just sufficient TiO₂ is added to achieve the desired TC. The TiO₂ must be high at 75-90% of TiO₂, but much research work had to be carried out to overcome the P.F. increase occurring formerly after flash tests. The more negative TCc the dielectric may be obtained with alkaline earth titanates such as Ca and Sr, but other oxides have to be added to obtain the properties which are now world standard.

The highest K associated with low P.F. and the standard TCc is the target, but practical production requirements have to be considered as well. An LK series which would require a different firing temperature for each TCₗ type with low P.F. and K factor will not be able to be obtained with alkaline earth titanates such as Ca and Sr, but other oxides have to be added to obtain the properties which are now world standard.

It is now possible to make NPO or N750 bodies with losses so small that discs 1" thick, with an oil-protected surface, have a P.F. so low that many well known Q meters do not register a P.F. at all. It is, therefore, not surprising that transmitter plate type capacitors are made from dielectrics which are almost entirely replaced the much larger and more expensive mica capacitors.

HK DIELECTRICS

It was around 1941/42 that the high K factor of Ba TiO₂ was discovered in U.S.A., Germany, Japan and Russia. However, most of the early work on HK bodies was carried out by Dr. E. Wainer, of the Titanium Alloys Manufacturing Co., and the many patents are proof of the tremendous work done and the important results achieved.

H. F. RUCKERT,† VK2AOU

†25 Berkeley Road, Beverly Hills, N.S.W.
The K factor vs. temperature curves or TCc graphs are most important in comparing HK dielectrics.

The graph, Fig. 1 (curve 1), shows the TC of the K factor of 99.8% pure Ba TiO₄ and the curve II gives an indication of the importance of having the correct stoichiometric ratio (+6% Ba O). The reduced K factor of curve III shows one reason why clay is usually no longer found in capacitor dielectric formulations. Too much milling jar and pebble material have been ground off and contaminated the Ba TiO₄.

In Fig. 2 we see the temperature vs. K curve of Sr TiO₃ and Ca TiO₃. The obvious aim was to shift the Curie Point of Ba TiO₄ from +120°C. and the K peak of Sr TiO₃ from −100°C. impurities), and the price must be small compared with the labour cost of the product.

After satisfying the electronic requirements laid down by the customer or the world-wide standard of development, our ceramic production men call for modifications, so that the new mixture is easy to press or extrude, that the kiln furniture does not become contaminated, that the existing furnace does not cause heat-shock cracks, that warping does not occur, that firing in layers without a separating medium is possible, and that an already used production firing temperature below 1350°C. will give all the listed properties achieved in the laboratory. Quite often, we have to start all over again and again, trying to fit one more requirement in a scheme developed so far, without losing other valuable features.

We, therefore, have a sample collection with capacitors from all tests in several thousands of numbered envelopes. All measuring data are being recorded in a library of lab. record books accumulated over 10 years. Quality control tests, with statistical evaluation of results and 2,000 h. accelerated life tests with climatic cycles, are carried out before a dielectric is approved for mass production of capacitors. If, finally, the customer does not like it, then the project has to go back to the ceramic lab. once more.

PIEZOELECTRIC BODIES

Most bodies containing Ba TiO₄ become piezoelectric after polarisation. This is usually done by heating the capacitor up in oil above the Curie Point (130°C.), applying 100v./thou. and cooling the parts down gradually with the voltage applied. In recent years, PbO-ZrO₂-TiO₂ bodies have gained importance, because their resonance frequency and piezoelectric coupling factor is far more stable with time and temperature. They often contain other oxides as well.

The firing of bodies, which contain PbO to over 50% dense, presents many problems. Lead vapour atmosphere of the right pressure, saggers and kiln furniture, which do not become fused by lead vapour, have to be used to prevent too much shrinkage, porosity, distorted shapes and an unbalanced composition. Used in transfilters as radial mode overtone resonators, uniform structure and diameter are very
important to obtain low insertion loss, selectivity and few spurious resonances.

These dielectrics are now becoming very important as more applications are
found.

SEMI\text{CONDUCTOR CERAMICS}

Semiconductor ceramics have been

used in Germany since 1946 as heating

elements in hot plates and cigarette

lighters containing TiO\text{2}, iron oxide,

tin oxide and other ingredients. Uranium
dioxide has long been used in

thermistors by Siemens in a.c.-d.c.

radios. Some ferrites and modern

thermistors also come into this

class. Semiconducting bodies have also

been developed using transistor-like

techniques. The following three types

may be mentioned:

(i) To increase the capacity per unit

of component volume, as required by

modern miniaturisation (transistor sets,

space rockets), thin sheet HK pieces can

be stacked by interposing alternatively

conducting ceramic thin sheet pieces to

act as electrodes (compare stacked mica

and tin foil capacitors). The latter ones

are composed of titanates and iron

oxides. The sheet is 0.002" to 0.010" thick, made by various

manufacturers.

(ii) The oxide skin type of dielectric

is formed by adding a small percentage

of rare earth titanate to an HK

body. When this body is fired in

oxidising atmosphere, a typical HK ceramic

results, with an I.R. of 10\times 10\text{6} MO and a

certain Curie Point and HK P.F., but,

with increased voltage. Even so, the

I.R. reaches 1,000 to 10,000 MO and the

breakdown voltage is usually 150 to

800v. for 30v. types. We were among

the first few countries and firms in the

world to market this type of capacitor.

In the lab., we achieved, with a special

process, up to 30 \mu F. on a \frac{\text{1}}{8}" diam.

disc, suitable for 3v., but this type is

not yet on the market. That is 4,000,000

times the capacity a porcelain disc of

the same size would have.

(iii) The barrier layer capacitor does

not use a true ceramic dielectric any

time more. The ceramic is usually Ba TiO\text{2}

with a critical Ba O to TiO\text{2} ratio doped

with a small and critical amount of a

rare earth or other oxide, which will

affect the Ba TiO\text{2} crystal structure in such a way that the body becomes a

semiconductor already when fired in

air.

With commercial grade titanates,

which have 2 to 3% impurities, and

which may be out of balance by up to

4% as far as the stoichiometric ratio

is concerned, firing under reducing

conditions is still necessary to obtain

the best properties, but reoxidisation

is not attempted in this case.

At the interface of the semiconductor

(here a ceramic) and the conductor

(here the silver electrodes), diodes or

developed similar units also. The TC\_c, piezoelectricity

and other dielectric properties of the

ceramic, often expected due to the

HK composition, cannot be found

any more on these diode components

which can be used as capacitors. The

maximum working voltage, in combina-
tion with an acceptable I.R. or Leakage

capacity on electrolytic capacitors. (We

may even call the electrolytic capacitor

a wet ceramic capacitor having an

aluminium oxide body, and other com-
binations are possible, also.)

Some 200 millions of ceramic cap-

acitors have been made in this country

in recent years, doing their job in

amateur radios, t.v. sets, ships, aeroplanes,

transmitters, fluorescent lights and

many other applications.

ACKNOWLEDGMENT

The permission of the management of Ducon

Condenser Py. Ltd. to present this paper is

gratefully acknowledged.

Amateur Radio, March, 1964 Page 9
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Amateur Radio, March, 1964
that certain actions taken by the Publications Committee have not been fully understood by some Amateurs, so this article is published to further explain the editorial in the 1963 October issue of "A.R."

"Amateur Radio" magazine has a fixed income so that as further demands are made upon the Publications Committee to add additional features, it is necessary to adopt either one or two courses of action. If the magazine is made larger, costs will be increased and there is not enough money available to pay for the larger size issue. Therefore if additional items are to be added, space can only be made available by reducing that already taken up by existing features.

Only the last few years articles devoted to S.W.L., Y.R.C. and S.B. have been added to the magazine, as your Committee believes that many readers are interested in these, and other subjects. But by publishing such matters it is not possible to include all technical content of "A.R.," and it is considered that most readers would prefer to have technical articles.

Accordinly it was decided to reduce the amount of space allocated to non-technical matters. It has never been said, nor has it ever been the intention of the Publications Committee not to publish any notes or Hamads in the February issue of "A.R."

The above brief outline explains the broad principle behind the facts previously stated in the October "A.R." Editorial. The following paragraphs give a more detailed statement regarding specific matters about which some Amateurs are making incorrect statements. These are the facts.

DIVISIONAL NOTES

Divisional Notes from all sources will still be published in "A.R.,” and all correspondents are asked to forward their notes each month. However, the amount of space that will be made available will be reduced, so correspondents should not be offended if some of their notes are omitted.

Never has it been the Committee's intention not to publish Divisional Notes. The October Editorial suggested that correspondents should publish purely local matters in their Divisional Bulletins, and forward items of general interest to "A.R." for inclusion in their "A.R." Notes. Regrettably, some correspondents have not forwarded any notes and whilst it is not correct to name any one in particular, the Committee consider that many Amateurs make the assumption that the V.H.F. Notes are exempt and our thinking.

The facts are that "A.R." will publish Divisional Notes but less space will be made available. It is suggested that correspondents forward one less note, so reducing their space requirements. This will save time in editing.

Similar comments apply to the notes from the V.H.F., S.W.L., Y.R.C. and DX sources, etc.

Remember that "A.R." will still publish the various notes, but we cannot give each correspondent as much space as he would like. This can only be done when more money is made available to publish the magazine. Each page costs about £13 and at present we cannot afford to add more pages each issue.

SIDEBAND COLUMN

The Sideband column has been temporarily discontinued until such time as a suitable sub-editor is obtained. When the facts became available to your Committee they were faced with the problem of producing three issues of "A.R." in the one month. Rather than add to their problems, they decided that the matter of publishing the Sideband column would be held over until early in 1964 when they could more fully consider it. Due to misunderstandings, statements are being made that "A.R." will not publish a Sideband column.

This is not a fact. Technical matters dealing with Sideband will again appear in "A.R." as soon as we can obtain the services of a suitable volunteer sub-editor.

PREDICTION CHARTS

When the Ionospheric Prediction Service advised the Publications Committee that they could no longer provide the Prediction Charts in the form they had previously appeared, we had no option but to discontinue this service. No one on the Publications Committee is qualified to prepare suitable charts from the current information supplied by I.P.S. To publish this information in graphical form, it is currently provided by the N.S.W. Divisional Bulletin, would cost "A.R." a very large sum of money. As already stated, we have not the funds available to do this job.

Until such time as we can afford to publish such charts in a graphical form, or until some reader will volunteer to prepare such charts in another form, your Committee has no option but to temporarily discontinue this feature.

Suggesting from now on the matter would be welcomed and you may be assured that we will give every assistance to again provide this feature in "A.R."

PUBLICATION DELAYS

"A.R." is run by an honorary voluntary committee who meet on the second Monday of each month. At this meeting all matters addressed to the Publications Committee are considered and acknowledgment sent to the writers.

Technical articles have to be read and where necessary alterations made to the text and drawings have to be prepared in the majority of cases. Thus it is very rarely that a technical article can be published in the next issue of the Magazine. Generally three months at least will elapse from receipt of the article to its publication.

Some Amateurs overlook these details and become intolerant of the delays in seeing their article in print. They should realize that much work has to be done before their article is printed, particularly when detailed drawings are needed.

Your Committee does welcome readers' comments, not necessarily for publication, and if you are prepared to write you can assist us in issuing a magazine you want. Remember, however, that we are limited by finances. We can only do what we believe to be correct. You must guide our thinking.

As Amateurs we possess two vital forms of communication, a magazine and our hobby, Amateur Radio. Yet problems still exist as the message does not always get across. Instead of passing unfavourable comments to your fellow Amateurs, why not advise the Publications Committee direct? In any organisation critics will always be found, yet it is always difficult to obtain volunteers to do any job.

Amateur Radio is our hobby, yet to cater for you, by preparing a magazine requires some persons to devote much of their free time. Perhaps you may be prepared to also assist by some contribution to "A.R." Your Committee can only prepare a magazine within the means at its disposal, hence good ideas have to be rejected, not because we disagree with them, but because we cannot pay for them.

Any Amateur is welcome to attend any Publications Committee meeting or to serve on the committee. The door is always open, so please come in! 

—K.M.C.
Greetings fellow Amateurs! As your new DX sub-editor I find activity fairly low over the festive month of December. It will take some time to familiarise myself with this new chore.

This month is the new year. If you will make the plea to one and all, please send any news you may have on any piece of paper providing it has not been used previously.

AI VK4SS has been inactive except for a few contacts. This month he worked the following:
- VP2CA, W8MOG, WA6PMF (1300z)
- 7 Mc—UP2CA, YU2GQ, DUNL, YQH6, VK1AB, VK2AFL, VK4BR, KB4H3, ON2SQ, S4IW, HM2IB, GD5Q, QA4Q, QA5L, JAN6, AUSCL, I8DPP, VK8HA, VQ1N/VSH, 5BNK, 4X4D, DURFP, VVF2, 5X63 CW:
  - Ken VK3TL—ACSPN, CB3AD, GCPFV, ET5QG, HI1ZE, 2AMFQ, SU8IM, SU8VW (Doodedcan), PK7JK (Nevus), VK9MD (Xmax), VP2LG, QG48A (Conga)
- 28 m s.s.b.: Ken VK3TL—ACTA, PJ1AO, VP2CJ (St. Ken's), Airway 1, YN1LI, ZB1A, ZS4F, 6001X, 3A2QP, QG5AB, HSDFN
- Peter VK3CMX—KB6QK, DMIAN, MP4FPQ
- VP3U, VP2LCI, W2PVL, WA6C0U, YB2A (Shaak), Y9206, UD6B, W2SSOE, W2BREDX (Boss Ady), UA2HLD, SP2PGX, L2100, 3A6H, GM2R, GM2EQ
- 15 m: AI VK4SS—JT1RDX, 6A2ZG, 3A5OH, Q8LS, Q8AI, UQDA, 2X1AR, KG64AY (mostlly around 0700z)

No one can say that the v.h.f. enthusiasts did not make good use of their last months on 50 Mc. From mid November until mid January the 6 m DX enthusiasts have had a field day. The activity during the Ross Hull Contest reached a peak around 10th December, then the WW DX activity remained at a high level until the first week in January. All States were well represented in VK2—VK5.

This was to prove the highlight of the season for many operators who were able to complete their first VK8 and complete the tally for 50 Mc. W.A.S.

From early indications at least 80 will be made, including yours, and can complete the deed after a three-year wait. This is nothing when compared with Rololo VK6BO who over the height of the season numerous Amateurs ideally situated made W.A.S. in a matter of a few hours and repeated the total on a number of occasions. Call areas VK1—2—3—4—5—6—7—8—9 were not available to present someone with a W.A.V.K Call. And this could be a distinct possibility within the next few years.

Two metres was not living up to expectations and only two openings occurred on Dec. 24. VK3SZK and VK3CFF worked ZLIAUM and ZL1AEP, and later in the month VK4—VK5 worked ZLIGC and ZLIGW.

ZL openings were on 8 m from 8 Mc. right through January. This was to be expected up to early January. Activity from VK3 returned 'to roughly the same level as from 22. The N.Z. TV. Channel 1 made it easy to monitor openings in this direction. We are still rather mystified by the appearance of an opening from ZL which was not a sign of a ZL. One ZL4 opened on the 27th December and got reports from only a few W.A.C. stations.

A number of stations made the 1,000 mark during the month. The general feeling that the period should still continue but submit to a seven-day period. This gives those not favourably located a chance to do good. However, it will be worth while and the experience will aid those near the opportunities as in previous series.

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INCREASING TALK POWER
For Beginner or Low-Power Ham

This accessory of recent American origin will improve an average 30% modulated signal to more nearly 100% modulation. It can be connected between a crystal microphone and the rig as an outboard unit and can be switched out as desired.

The circuit uses a fast a.v.c. action, the control voltage being obtained from the second grid of the 6BA6 grid R/C network via the 0.5 μF capacitor. This voltage is rectified by M.R. and after filtering, is applied as a negative voltage to the grid of the 6BA6 (a remote filtering, is applied as a negative voltage is rectified by M.R. and after switch out as desired.

Referring to the rectified negative voltage, it will be seen that as modulation increases to 100%, the negative voltage will increase, the time constant of the 6BA6 grid R/C network is decreased so that the voltage does not undergo long term change, but varies rapidly at syllabic rate. In effect, the negative voltage on the 6BA6 grid is varied by syllable width with the resulting causing modulation, and this negative voltage depends on the percentage of modulation caused by the syllable.

Now consider the signal applied from the microphone to the grid of the 6BA6. The gain of the microphone signal will depend on the bias applied to the 6BA6. If a weak syllable is spoken, the bias rapidly drops and the 6BA6 gain is increased and vice versa if a strong syllable is spoken.

If the input signal and bias increase beyond a desired pre-set level, the gain of the 6BA6 flattens at a relatively fixed level, clipping the waveform at approximately the 100% modulation level. The "processed" audio signal is fed to the rig from the slider of the 500K pot.

To Set Up: With an audio sine wave modulating the transmitter 100%, adjust the 10K pot. to give —4.5v. on the grid of the 6BA6 and adjust 50K pot. to suit. When 10Kpot is turned to suit with 50K fixed at 100%. The accessory is now ready for use.

— A. F. W. Haddrell, VK3ZFC.

YOUTH RADIO CLUBS

Schools are back, which means the majority of the clubs are at work. If I leave myself out, who's to come up with the idea of hearty congratulations to those hardy teachers who teach kids all day and like them enough to come in the early mornings or after school when they carry on Y.R.C. work? If you can, write a club leader or two and write nasty letters. I like you just as much if you turn out in the evenings after a hard day's work.

We have spread even further. Mr. C. C. Hiew, Y.R.C. leader at Secondary English School, Pontian, Johore, Malaysia, is interested in developing correspondence between members of W.R.C. Australia. If you are interested, please write directly to Mr. Hiew. We find that a club like this could do a lot to help the Malaysian youngsters, with sending circuits, technical articles, and club leaders. If you are a club leader you will push this hard, and also send a set of instructions. If you may have done for your club. Photographs of your activities would also be appreciated.

During 1964, the Y.R.C. Committee will organise a contest to find the most efficient Y.R.C. club. We hope to help build this contest into an annual affair to give State champions competing, with due publicity, to be Commonwealth champion. Fuller details have to be worked out, but leaders should start preparing candidates. The boys will go for this.

Result of the Training Clinic Conducted in VK1 was found very useful. The Chairman treated the students to a very nice lunch, where there was much discussion on Y.R.C. activities in his area, with several secondary school and a Scout group. Some schools there have a leader for a club about a year, but the others are still in the "green" stage.

More club leaders are needed—there are fertile fields in many places waiting for you. Desperate remarks about the lack of a leader for a possible club—"you could help at lunch hour or after school or..." The Operating Frequency. Two r.f. stages are desirable. The lack of an r.f. stage (antenna feeding directly to the mixer through a single tuned circuit) puts the receiver out of the "communication receiver" class.

Multi-tuned coupling circuits at the operating frequency will greatly increase the selectivity.

Thorough shielding of the r.f. section should be employed to reduce the leak-through of undesired signals to the mixer.

4. Extreme care should be taken in the wiring layout. All signal leads should be kept short.

5. Filtering, decoupling and bypassing should be used on all leads in the front-end other than signal leads.

6. For best operation, r.f. stages should be neutralised. This is seldom done.

7. Care should be exercised in the choice of r.f. tubes to minimize interference effects. Some recommended tubes for r.f. amplifiers include the 6BZ6, 6EH7 and 6EJ7. The 6U8 makes an excellent mixer/tube, and yields a much lower noise figure than the common pentagrid converter tube.

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

Listed below are the highest twelve members in each section. New members and non-members of the committee have been amended will also be shown.

PHONE

Cer. C'tnt- Cer. C'tnt-
Call No. ries Call No. ries
VK8M 20 348 VK25W 4 211
VK2H 15 210 VK3A 14 211
VK5RU 2 297 VK3ATN 28 294
VK3AT 295 VK2LZ 6 181
VK3HAO 51 279 VK4HR 12 192
VK4FJ 21 270 VK4RW 23 186
VK5AM 17 278 VK5IC 23 186
VKSTL 63 141

Amendments:

VK3RJ 42 212 VK3AXK 30 179
VK3RF 76 150 VK3TL 78 156

OPEN

Cer. C'tnt- Cer. C'tnt-
Call No. ries Call No. ries
VK3RU 8 304 VK3AHO 76 282
VK3ACX 6 300 VK3H9 26 269
VK3QO 5 298 VK3AHR 78 230
VK3E 28 291 VK3NQ 26 230
VK3LC 19 282 VK3RP 56 229
VK3UO 18 259 VK3CW 25 211

Amendments:

New Member: VK3SX 93 104

Amendment:

VK3HL 75 216 VK3TL 85 194
VK3V 18 221

RECEIVER DESIGN

(Continued from Page 5)

additional front-end gain was required, but would serve little use in providing additional front-end selectivity.

R.F. AMPLIFIER NOISE FIGURE

Another consideration in the evaluation of the front-end of a communication receiver, especially at the higher frequencies, is the noise figure. The r.f. amplifier is usually the first mixer and the stages which determine the receiver noise figure. Numerous articles in the past have treated noise figure considerations, but let us briefly summarise a few of the most important points as related to the design of a low-noise r.f. stage.

A low-noise figure can be obtained through the use of low noise tubes in the front end (e.g. 6BZ6 r.f. amplifier and 6U8 oscillator/mixer), and by obtaining a proper impedance match between the antenna and the grid of the r.f. amplifier. The gain should be high enough so that the receiver noise figure will not be affected by the succeeding stages. This will give the required amount of gain for the modulation, intermodulation and de-sensitisation, and at the same time yield the optimum noise figure.

SUMMARY

In closing, let us enumerate some of the important practices to follow in designing your own communication receiver front-end, or the points which should be considered in the evaluation of a commercial receiver:

1. The receiver should have at least one r.f. stage and two tuned circuits at the operating frequency. Two r.f. stages are desirable. The lack of an r.f. stage (antenna feeding directly to the mixer through a single tuned circuit) puts the receiver out of the "communication receiver" class.

2. Multi-tuned coupling circuits at the operating frequency will greatly increase the selectivity.

3. Thorough shielding of the r.f. section should be employed to reduce the leak-through of undesired signals to the mixer.

4. Extreme care should be taken in the wiring layout. All signal leads should be kept short.

5. Filtering, decoupling and bypassing should be used on all leads in the front-end other than signal leads.

6. For best operation, r.f. stages should be neutralised. This is seldom done.

7. Care should be exercised in the choice of r.f. tubes to minimize interference effects. Some recommended tubes for r.f. amplifiers include the 6BZ6, 6EH7 and 6EJ7. The 6U8 makes an excellent oscillator/mixer tube, and yields a much lower noise figure than the common pentagrid converter tube.

CAN YOU ASSIST?

The Publications Committee require the services of a voluntary DRAUGHTSMAN

Please contact Editor "A.R."
P.O. Box 36, East Melb., C.2.
W.I.A. (V.H.F.) W.A.S. RULES

1. This award has been created in order to stimulate interest in the v.h.f. bands and is of a high standard to fully acclaim the proficiency of the recipients on their v.h.f. achievements. The award is to be known as the W.A.S. (Aust.) Certificate and is to be issued to any Amateur in Australia or overseas who satisfies the following conditions.

2. The Certificate will be awarded for contacts on the 50 Mc. band and higher frequency bands. All contacts must be made on the same band and cross-band contacts will not be allowed.

3. Portable operation will be permitted provided that such portable location shall be within the same State and not more than 25 miles from the fixed location in the case of Australian stations, and in the same call area and not more than 100 miles from the fixed location in the case of overseas stations.

4. The applicant is required to submit verifications from the following areas of the Commonwealth of Australia:

(a) New South Wales, Australian Capital Ter., or Lord Howe Is.
(b) Victoria.
(c) Queensland.
(d) South Australia.
(e) Western Australia.
(f) Tasmania.
(g) Northern Territory.

In all, seven (7) verifications are required.

5. Additional credit will be given for verifications from other overseas countries, say, New Zealand or the Territory of Papua and New Guinea, in the form of a sticker to be attached to the Certificate.

6. It will be necessary for the applicant to produce documentary proof in the form of QSL cards or other written evidence which completely verifies a two-way contact has been made. By completely is meant that the time and date, signal strength, type of emission used, location of the claimed station and the frequency used must all be clearly shown on the verification.

7. Contacts may be made using any authorised type of emission and must be in accordance with the current P.M.G.'s. Regulations or those applying in the country of the applicant.

8. Submitted verifications must be exactly as received and not altered or marked. Failure to comply with this rule will lead to the disallowance of that card and may lead to the disqualification of the applicant.

9. All applications must be accompanied by a list setting out the details required by Rule 6, and stating whether any of such contacts were made while portable, and if so, giving that location. Sufficient postage must be enclosed for the return of verifications to the applicant, registration being included if desired.

10. The verifications and list (Rule 9) will be addressed to the Awards Committee, Box 2611 W, G.P.O., Melbourne, Australia.

11. The registrations so submitted will be examined by the Awards Committee, who will arrange for the successful applicants' names and call signs to be listed in "Amateur Radio". Certificates will be forwarded to successful applicants through Divisional Councils or direct to overseas applicants as the case may be.

12. The decisions of the Awards Committee of the W.I.A. in the interpretation and application of these rules shall be final.

13. Notwithstanding anything to the contrary, the Federal Council of the Wireless Institute of Australia reserve the right to alter these Rules from time to time as necessary.

W.I.A. 50 Mc. W.A.S. as at 6/2/64

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VKNR—Dr. D. W. Boyd, 80 Lurline St., Katanning.
VKAVO—R. O. Chapman, 21 Kallaroo Rd., Lane Cove.
VKZJZ—J. J. Brown, 12 Walton St., Lismore.
VK2TS—L. T. Scotorney, Lot 8, Hilltop Ave., Lane Cove.
VK3EG—E. H. Gray, 218 North Blvd., East Melbourne.
VK3ZC—F. D. Clarke, 18 Bendon Drive, Frankston.
VK5ZGC—G. S. Veitch, Scotch College, Glenferrie Rd., Hawthorn.
VK4GW—G. S. L. Ward, 23 Ruth St., Corinda, Brisbane.
VK5ZAU—J. G. Ward, 37 Dale St., Maryborough.
VK4WBO—W. A. Flat, Flat 4, 159 Labouchere Rd., Devonport.
VK5ZBD—R. S. Watkins, 48 Cobden St., Bayswater.
VK7ZTC—A. C. Carter, 22 Keane St., Launceston.
VKTL—L. M. Tongs, 3 Ashburner St., Devonport.
VK5ZEB—R. S. Bowman, Beau View, Parrakie.
VK3ZME—N. H. Shattuck, 61 Shakespeare Ave., East Melbourne.
VK5ZFC—A. E. Cooling, 20 Blencowe St., Melbourne.
VK4US—Queensland University Squadron, C/o. R.A.A.F. Centre, Alice St., Brisbane.
VK4WF—J. J. Brown, 126 Lauriston St., Melbourn.
VK5ZRB—R. S. Bowman, Beau View, Parrakie.
VK8HI—L. G. Reynolds, Station: O.T.C. Radio Station, Darwin; Postal: P.O. Box 288, Darwin.

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Applications are invited from British subjects (born or naturalised), who are under the age of forty years, for employment as:

Applicants must hold a current Amateur Radio Licence. Salary: £1,049-£1,343 plus shift allowances. Qualifications: Intermediate standard or equivalent. Ability to touch type at 30 words per minute; to transmit and receive, on a typewriter, morse code at a speed of 20 words per minute plain language, and 16 words per minute code.

Clear and well enunciated speech. Commercial Operator’s Certificate of Proficiency, or its equivalent, or at least two years’ experience in a comparable commercial or Government telecommunication service.

Further information regarding salary, conditions of employment, etc., may be obtained from the Regional Director, Department of Civil Aviation, Box 1733P, G.P.O., Melbourne, C.I.

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17 Torrington St., Spring Hill.
Phones: 2-4825, 2-4827

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12 Deacon Ave., Richmond.
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AUSTRALIAN D.X.C.C.

Editor "A.R."

Now that the elusive 300 mark has been reached or exceeded by some aspirants, I would firstly like to congratulate all the Amateurs who have obtained that very creditable tally.

I would also like to pay tribute to our Australian D.X.C.C. DXCC, a truly national institution, but our D.X.C.C. DXCC may be said to have obtained a truly national status, having a few DX contacts on 6 metres to renew an equal and fair footing.

Now off this number we must take two, the Leeward and Windward business, so if you would kindly look for these stations from 1/4 to 1/4 when VO was deleted it is possible you may work us.

Since 1/4 of these 338 a total of 27 countries—CRE, CRI, CCON, FKJ, FPC, FKJ, FPC, UNI, VO, FP1, FP2, VOQ, V6I, VS1, VS4, ZC5, ZD4, 8ZM, 904, 9M2, 9S4, 9U5—have been deleted from the list, so if you are unlucky enough to be licensed today or in the future, there is only one way to acquire these countries for the D.X.C.C. DXCC. The today licensed Amateur must feel proud to think he is so much better than these "old timers" prior to 1/4 of 15,000, so that 9M2, 9S4, 9U5 will appear to have a total of 339 countries which you can work on the Awards Manager, but I do not think anyone should be upset the tally of any member and that the temperature "duct" phenomena could be utilized to the fullest extent possible.

One objection that will be raised to this listing is that the number worked out of the present available tally.

Many of the old-timers were there awaiting the listing to be published, but they were not waited too long to realize the illusory nature of the situation. Probably the understatement of the value of DX contacts made by political and conventional VK5 operators, well needs the accepted operating procedures of the high frequency band, and when he's told, "Their method of using the v.f.o. on this band is rather unusual," many DXers expressed when not engaged in Amateur Radio activities that users of the "slicke whistle" spend their time on c.w.

A challenge from the Toastmaster of each section and once done would be complete this would be very great, the double listing of each section and once done would be complete and so now and so off and clear; CQ, CQ, DX.

Finally, in case anybody gets the idea that some fancy job and we should be thankful to have all the old friendships, acquire new ones, exchange information overseas magazines. Something that is not even printed in the big radio books on the market, all of which contain much valuable information to the more serious individuals or groups, in hopes that someone might accept our challenge. Interested parties should contact us at 59-216 Kam Hiway, Sunset Beach, Oahu, Hawaii, for more information and should include a brief outline of their equipment.

—P. G. Romer, WKBCC, President, Microwave Society of Hawaii.

ROSS HULL MEMORIAL CONTEST

Editor "A.R."

Dear Sir,

I am prepared to say that as long as the top end of the D.X.C.C. that nobody starting today should not be hard for a group of Hams to start getting to the top of the A.R.R.L. note that we have not yet on our list, so today there is 340.

I feel the s.w.l.'s. or beginners would be helped more if the W.I.A. could produce a better whole section of a large recreational area due to the inherent love of neighbours, these operators have since been created by the A.R.R.L., now appear to have a total of 339 countries that is not even printed in the big noise overseas magazines.

A CHALLENGE FROM KHO

Editor "A.R."

Dear Sir,

The members of our society, the Microwave Society of Hawaii, have a long and proud record-smashing 144 Mc. contact between Hawaii and California was only the beginning, and there the operators responsible for this contact has not been explained on our contact list.

It has been our feeling that under the proper conditions, a 144 Mc. contact between Australia and the United States is quite possible. Recent meetings with KH8UK, the microwave a good many DX contacts, adding to our liking, and that he too is convinced that such a contact is possible, provided that suitably equipped and tuned equipment is available.

We know that the temperature "duct" exists in the Hawaiian and New Zealand areas, but it is doubtful, however, that this duct would extend to Australia. Let us also know that certain conditions prevail in the oceanic hemisphere during certain times of the year. It is our sincere belief that if certain favorable conditions prevail at a given time, on each side of the equatorial belt, that a 144 Mc. contact is a distinct possibility.

After much consideration, we wish to issue a challenge to all Hams in the United States and European DXers, to attempt such a contact and maintain regular schedules with this station, KH8CM. KH8CM is ideally situated for such an attempt, as the station is located only a few hundred miles west of the Hawaiian ocean, with unobstructed over-water paths to the east coast of the United States or New Zealand.

Equipment employed at this station is considered excellent, by any standards. A transmitting converter provides 144 Mc. c.w. or s.s.b. and a 300 Watt Full Wave Filter.

The receiving system at present consists of the popular "W2AZL converter", using cascode 41TA, followed by a Collins "TA-4 receiver. However, we are now experimenting with the 7071 planar triode, and this, in conjunction with a low-noise NuVistor mixer, shows promise of being a superior converter. If this does prove to be the case, the 41TA's will be placed on the shelf. In either case, a 50-90 dB. noise filter is available for weak-signal c.w. reception.

The antenna system, now under construction, is a time-proven array. It consists of four 144 Mc. elements, three 144 Mc elements and two 2 Mc. elements, and provides 24.5 db. forward gain. We hope to install this array, horizontally polarized, on a 76-foot former in the near future.

In addition to our 144 Mc. activities, KH8CM and myself are also active on 50 Mc., running a 1500 Mc. antenna and s.s.b. The antennas are 8-element 24-foot yagi's and 12-element 100-foot s.s.b. The antenna is 300 Watt Full Wave Filter and 1.0 db. overall noise figures are employed. The v.f.o. is 1.0 Mc. wide. Like holiday campers who feel switched on the 8 metre receiver.

It is our hope that 50 Mc. Te propagation may again be possible between Hawaii and Australia during the spring and summer months, and we would welcome schedules on this band.

Please mention this letter to some of the more serious individuals or groups, in hopes that someone might accept our challenge. Interested parties should contact us at 59-216 Kam Hiway, Sunset Beach, Oahu, Hawaii, for more information and should include a brief outline of their equipment.

—P. G. Romer, WKBCC, President, Microwave Society of Hawaii.

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FEDERAL
FEDERAL CONSTITUTION ALTERATION
Federal Executive on behalf of the Federal Council of the Wireless Institute of Australia, hereby gives notice that it is intended to alter the Federal Constitution of the Wireless Institute of Australia 1947 as follows:-

(a) Delete Clause 24—

"24. Any station needing American Samoa on c.w. should look for KTVAX/X58 around 0530z on 14600 kc. as he is teaching in Pago, Pago, is on daily and will be there for at least two years. He has a good signal, but operates only limited hours.

(b) Insert new Clause 21a—

"21a. The new Federal Executive shall take office at the conclusion of the Federal Convention which they shall attend, or where a Federal Convention cannot be held, within one month of the conclusion of the fiscal year. The Federal Executive shall determine its own offices in such manner as considered necessary."

(c) Delete Clause 24 and substitute—

"24. The appointment of the Federal Executive which shall be finalised by the Headquarters Division shall not be considered valid unless it is notified to the Federal Council within 14 days prior to the conclusion of the fiscal year. The Headquarters Division shall notify the Federal Council in writing to Federal Council prior to the conclusion of the fiscal year. The Federal Executive shall determine its own offices in such manner as considered necessary."

Any member of the Institute not in agreement with the proposed alterations should notify his disagreement in writing to the Federal Secretary within 14 days of the publication of this proposal.

FEDERAL QSL BUREAU
In these notes in the January issue it was stated that Graham VK1AGH was handling cards for VK4JQ, Willis Island. This is NOT correct. The QSL manager for VK4JQ is VK2QL, ex Wills Island.

The box number of the Hungarian QSL Bureau has been changed. The new address is: Central Club of Hungarian Radio Amateurs, P.O. Box 21, Budapest 5.

Copies of "CQ" for 1963 are available from this Bureau for free. First applicant gets them for postage. Do not send postcard. Application successful applicant will be advised of postcard required.

Any station needing American Samoa on c.w. should look for KTVAX/X58 around 0530z on 14600 kc. as he is teaching in Pago, Pago, is on daily and will be there for at least two years. He has a good signal, but operates only limited hours.

The Federal Treasurer, W.I.A., has for sale the second edition of "The Wire and the Word" by Chris 2APZ. Copies are priced at 50c each, foreign subscribers please add postage as follows:—

1. First class mail, incoming cards thickened considerably over the Xmas week, to bring the December total to 452. Considering the short time which has elapsed, this is above average. According to all reports, the service has been running smoothly.
them and thank them for their patience. The other DX visitor was Charles KE10. The SSB field on 20 mc. in the U.S.S. Glacier, which called at Hobart early in February. Charles KE10, who has been making contact with some fairly good DX stations on 7 Mc. and 11 Mc. the past few months, also had some DX visitors. He should slow up and live longer. They say only the good die young, he is right for a few years yet. Fred Cox.

TOWNSVILLE AND DISTRICT

With the advent of the Ross Hull Contest, I must say that the boys in the south are having a field day almost every other day. The QSO numbers being exchanged by some of the Contest stations are really something else. I went back to the past contests. Sorry to report that there were no Contest stations on 3.1 Mc. So I have had to work a VK6 and then I can worry about VK5 and VK4. Tomkinson, of Tewantin, who is now 40, is too busy to use his call sign. He is spending all his time working on his boat, the Panama City. Recently, he has been Ken 7KH, Jack 7JB, Terry 7CT, John 73, Fred Cox.

Queensland

North-West Zone

January meeting of the zone was held and if the attendance is an indication of things to come, it looks very promising year in store. We were pleased to welcome members who have a desire to dispose of equipment and which is their personal property. Copies must be received at the office of the Zone Secretary, 222, Phone 37-4071.

For Sale: AR8GD Rx, £90. Geloso 222TR Tx, £90. Both in mint cond., had little use. Offer? VK3ANV, Box 239, Bairnsdale, Vic.

For Sale: Collins equipment of the late VK3JK. 321 Transmitter, £345. 75S1 Receiver, £345, or offer. All offers in writing to W. L. Jackson, VK3XK, 23 Malone St., Ormond, S.E.9, Vic.

For Sale: Gear ex late VK3QK:

Eddystone 888 Receiver, new condition; BC457A Command Xmitter (7 Mc.), £20; Collins 2022A motor supply; Kingsley SK9'er; Type 109 Transceiver; Link Receiver F/M type 1305, tuned Channel 5 (new); CPRS5 Range Indicator; Xmitter Tuning Unit, £50, or offer. Includes Dynamotor type DA1A; Roof Indicator Unit Y10Q/B5000; W/T Set 109 Mc. II., 230-200 volt Transformer; complete home-built a.m. 150w. Transmitter, Geloso v.f.o. for C.W. or the right offer, a couple of miscellaneous valves, sockets, etc. All equipment in working order. Best reasonable offers accepted. Contact Arthur Evans (VK3QV), phone 99-2817, or Arthur Tinkler (VK3ZV), phone 29-3446 (Vic.).

Hams

Hamads

Minimum 5/- for thirty words. Extra words, 2d. each. Advertisements under this heading will only be accepted from individual members who desire to dispose of equipment which is their personal property. Copies must be received at the office of the Zone Secretary, 222, Phone 37-4071.

For Sale: Complete home-built Geloso v.f.o., plate and screen modulated Transmitter, and R107 Receiver. Arr Type 3 Mk. II. Transceiver complete, with good filter, offer. Equipment of ex late VK3CH. C/o. N. Harrison, 1 Duncan St., Birkenhead, Vic.

For Sale: Callimeters SX111 Rcvr., 80 thru. 10 metres and WWV, a.m., c.w., s.s.b., selectable sidestand, large slide-rule dial, 0.5 to 5 Kc. selectivity, xtal cal., noise limiter, notch filter, new condition, £190. VK3DM, 40 Ware St., Fairfield, N.S.W. Phone 72-5601.


For Sale: Trans. Cabinet, duodec grey, 68 high, 22 deep, 26 wide, price 30/- Smaller Cabinet, duodec grey, 20 high, Power Supply parts; back issues of "QST", "CQ" and "Short Wave Magazine": text books. VK3JK, 110 Francis St., Ascot Vale, W.2, Victoria, Phone 37-4071.

For Sale: Wagner Sideband Transceiver, covers 80, 40, 20, 15 and 10, upper or lower sidestand, break-in c.w. with audio tone monitor, 2.1 kc. mechanical filter, two v.f.o.'s. with 1 kc. accuracy, built-in v.p.f., xtal and 20 mc. "S" meter, 80w. input, in-built relay for linear, only 15 x 10 x 6", complete with a.c. power supply and speaker in matching cabinet. Still under factory warranty, very little use. VK3DM, 40 Ware St., Fairfield, N.S.W.

Sell: Collins 32S1 Transmitter, with 512P2 power supply, £360. 75S1 Receiver, £330. All in excellent condition. J. G. Maciver, 21 Hurst Tce., Morningside, Brisbane.

Sell Out: Best offer. Commercial Power Supply, 1,000v., 120v. c.t., 500v. c.t., four 866As, Filters, Fil. Trans. 1 chassis, 1 Trx. pair 807s, 5 C.r.o., Super Pro Rx, A.C. Relays, Valves, Condensers, Telephone swt, Wire, 37 Pacific Pde., Long Jetty, N.S.W.

Sell: Collins 32S1 Transmitter, with 512P2 power supply, £360. 75S1 Receiver, £330. All in excellent condition. J. G. Maciver, 21 Hurst Tce., Morningside, Brisbane.

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Sell: Woden UM3 mod. trans. £5. Woden UM1 mod. trans., £3. A & R power trans., 1,000v. 120v. 500v. m.a. tapping down to 500v. £5. A & R filter chokes, 2 only, £2 each. Geloso 222 Transmitter, faultless performer, £85. Byer 55 tape recorder goes, but needs a little work, £10. VK3SAHT, Phone 314-6760 (Vic.).


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FEDERAL COMMENT

COLLECTIVE RESPONSIBILITY

The title of this Comment was inspired by one of the same name in the R.S.G.B. "Bulletin" which pointed out some of the dangers ahead for Amateur Radio if the Amateur does not present a united front at all future International Telecommunication Conferences. The Editorial made three points which briefly were: (i) Region II. and III. Societies must establish active regional organisations as in Region I.; (ii) the I.A.R.U. must bring home to administrations, particularly in newly developing countries, the importance of Amateur Radio as a Service and a scientific hobby, and (iii) the I.A.R.U. must be represented at every International Conference as well as Frequency Allocation Conferences.

The portent and sense of these points are to be commended and generally have always been supported by the W.I.A., but because of different conditions, both political and geographical, are not necessarily our answer to this challenge. The W.I.A. has made two approaches in the past to all Region III. Societies to form a Regional organisation but without success. New Zealand has also made at least one unsuccessful attempt along the same lines. Regarding the second point, the International Amateur Radio Union can undoubtedly contribute by way of suitable literature and a constructive public relations programme, and also in relation to the third point, must always be represented at International Conferences as the head of an established Service.

However, the W.I.A., despite its unsuccessful approaches in Region III., does believe that many benefits may accrue by regular exchanges of information between Region III. Societies in relation to regulatory matters and frequency problems. The answer may lie in the publication of a Region III. Newsletter between the appropriate Societies, which there are at present ten. Although it is conceded that the I.A.R.U. can do some good with newly developing countries, it is believed that perhaps more can be achieved by Amateurs in the particular country. Each administration must be made aware of its Amateurs and the role they can play in the community, and this can best be done within the countries' boundaries. In relation to I.A.R.U. representation at I.T.U. Conferences, although in favour of this idea, the Institute believes that a proper briefing on the status of Amateur matters for the national delegation is more important and has achieved such status in the last few years.

Although the above arguments may appear to decay the points made in the R.S.G.B. Editorial, the intention is rather to point out alternatives which suit our Institute better and which we know are workable and successful in our case. However, the W.I.A. does believe that the status of the International Amateur Radio Union must be enhanced and supported in every way possible. Perhaps financial support of the Union is the next step in this direction. Any means of presenting the Amateur's case in his country or at International conferences must receive the wholehearted co-operation of Amateurs in general and National Amateur Societies in particular.

FEDERAL EXECUTIVE, W.I.A.

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Further particulars may be obtained on application to the Mullard Professional and Industrial Department.

A push-pull parallel arrangement of four ADY26 transistors mounted onto a locally produced 400 heatsink extrusion.

Mullard three-phase bridge rectifier assembly using silicon power diodes mounted on three heatsinks.
With an astounding increase in the amount of expensive commercial equipment now used in Amateur shack, it may interest the S.W.L. and the newer operators to know the simple equipment which keeps VSIAU airborne in sideband.

Using a hodge-podge of components dating from 1930 to the present, acquired from Japan, U.S.A., Australia, U.S.S.R., Germany, China, Malaya, and paid for in as little of the national currencies as the market permitted, a reasonable signal has been kept on the air for years with the absolute minimum of expense.

With present-day pressure for modernisation and miniaturisation, it will come as a surprise to many, to hear that the rig has never been modified, and is the early 1930s, and that the receiver uses four more, which are about twenty-three years old. There are also two power transformers and a tube, a very similar vintage, which were salvaged from discarded domestic t.r.f. radios of the same era. Some old fashioned glass and carbon resistors are still in use, and there are even one or two paper capacitors which still pass a leakage test, despite twenty-five years in Amateur service.

In the station equipment there are such treasures as a tin, second world war, radio, a leather phone, a mother and a brother, which it has been pounding out for nearly every day for the last six years, and simple antennae. In its sideband has often received praise for its quality configuration, it has been on the air and has been great fun. The biggest ex-bits and pieces, and the welding of inspiration. Whilst the station's appearance has been in time spent seeking their emission despite operation over insulators, and even portion of an eleen. From this, the station equipment there are.

The acquisition of potentially useful electronic elements, an aroma of fried Ham! Intelligent observation is the first key to success. Although a shack full of radios of the same era. Some old 56 is as with a new fangled 6CL6. This has been a problem for many years of experimenting and the satisfaction of finding out for one's self a wide range of electronic, communication and constructional techniques.

If my experience is indicative, and I know many who agree it is, the lessons learnt and the attitude of mind engendered by success and failure in such projects stand the new Amateur in such good stead that it is to his lasting advantage technically, mentally, an hour or so with the handbook, or a discussion with knowledgeable and helpful Hams on the air.

One day, inevitably, there will be a leakage test, and the gear will suffer a major failure which will finally be uneconomic to repair. Alternatively, the demands on Hamming time, or for house room, may be such that metal chassis are permanently earthed well enough to blow line fuses in the event of a mains-to-chassis fault, that microphones are earthed and that headphones are properly isolated from the h.t. line.

Make it a rule never, never to poke round inside a live chassis while wearing phones, or holding the microphone.

Faulty headphone insulation caused by perspiration, for example, can effectively earth your skull, so that the first inadvertent prod on the h.t. line with a finger puts you on the hot seat of a miniature Do-It-Yourself electric chair.

People who are superstitious about electric chairs, also make a point of using double pole switches and three-pin plugs on all mains leads, and bleeders on the filter capacitors. They also make sure that single pole switches are in the hot side of the mains. While you're about it, better make sure the rest of your family know how to kill the mains.

TALKING POINT—WNG.-CDR. C. G. HARVEY,* R.A.A.F., VSIAU (Ex VK2AQU, VK3U0)

Arthur, April, 1964
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Page 4 Amateur Radio, April, 1964
HOW TO WIN A CONTEST

ADRIAN ROFE, VK2HE

My attitude towards contests, as set out in "Amateur Radio" (Mar. 1964, p. 17), met with disapproval from many who entertained different views. Why, they asked, adopt this defeatist outlook?

After a thorough review of the situation and some deep thought I have undergone a mental turnabout. The erstwhile mouse is now a fully grown eristics to bring about their early withdrawal in contests.

First of all change your occupation and become an employee in an appropriate industry where you will be set down for your three weeks' annual leave at Christmas time. Acquaint yourself with the frequency isolated like a shag on a rock waiting to pounce on any caller. When all other stations have been v.f.o'd. onto their frequency, either accumulate sick leave will add, say, 100 watt modulator, the best receiver and a high gain antenna.

If you are lucky enough to find a station there quite high in the shack to give you numbers. If you are lucky enough to have a stab at it and you will probably be correct. Promise to send an immediate QSL card—he will call you day after day to ask why it has not arrived thereby increasing your numerical tally.

For 5 pointers—be fair and less brief and find time to comment on something irrelevant, such as the weather or your local stocks of TRANSMITTING COMPONENTS arriving from

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Adrian Rofe. 9th April, 1964

Melb. (try 1.20 p.m. & 5.20 p.m.): 67-1859, McEwan House, 343 Lt. Collins St., Sydney. (try 10 a.m.-3 p.m.): 61-6214, Daking House, Rawson Place, Sydney.
MOST Amateurs these days provide themselves with a 100 kc. crystal "calibrator," either built into the receiver, or external—which furnishes harmonic signals accurately marking the low frequency limits of the various amateur bands. However, since the harmonic frequencies fall at intervals of 100 kc., it does not provide similar calibrating signals for the upper or lower limits of some of the phone sub-bands. In addition, there are many applications calling for markers between 100 kc. points. Such markers are useful in the calibration of a.v.f.o., in spot-frequency schedule operation, or in accurately calibrating a receiver dial.

For the most part, such a piece of gear has been a fairly costly item; even those that have been available on the surplus market have been by no means inexpensive. In the unit described here, I have attempted to hold the cost down to suit the average pocketbook while still maintaining an accuracy, if proper precautions are used, close to that of more expensive equipment. Most of the components for the original model were picked out of the junk box; with all new parts, the cost should not exceed $1.50. Later, the stability with self control is improved. This is an self-contained source can be very modest. Simplic VR tube regulation is desirable where line-voltage fluctuation may be a problem.

OSCILLATOR

The circuit of Fig. 1 starts out with the 696 oscillator. The Colpitts arrangement, which has been chosen because it lends itself well to either crystal or self control. Crystal operation will provide a more stable signal, of course, but the stability with self control is surprisingly good and will serve the unit for most calibrating purposes. When using a tuned circuit for self-excited operation, no coil tap is required. This is an advantage, especially when a multilayer cell is involved. The circuit will work over a wide range of frequencies, which makes it additionally useful for checking crystals, or for using higher frequency crystals for spotting certain harmonics. The output is rich in harmonics.

THE MULTIVIBRATOR

The second stage in Fig. 1 is primarily a multivibrator using a 12AU7 dual triode. As most readers know, a multivibrator is a resistance-capacitance oscillator that is quite unstable by itself, but which can be stabilised by driving, or triggering it with a stable oscillator of higher frequency. Thus, it becomes a "frequency divider". In this instance, the multivibrator frequency is 10 kc. which provides harmonic spotting frequencies of usable strength at 10 kc. intervals up to at least 30 Mc.

Although a multivibrator will "lock in" with a driver frequency as high as 100 times the multivibrator frequency, adjustment becomes quite difficult if the driver frequency is more than 10 or 20 times the desired multivibrator frequency. The multivibrator, being an unstable oscillator, has an increasing tendency to jump from one sub-multiple of the driving frequency to the next as the driving frequency is raised. That is, if the driving frequency is 1,000 kc., the multivibrator frequency may jump from the desired frequency of 1,000/100 = 10 kc., to 1,000/99 = 10.1 kc., or to 1,000/101 = 9.9 kc. For this reason, the oscillator is designed to operate at 200 kc. self-excited; 100 kc. crystal-controlled "driving the multivibrator.

The multivibrator may be switched off by means of Sl: Sib opens the cathode of VIa in all except the m.v. position. The oscillator signal is then simply coupled to the grid of VIb which operates as a resistance-coupled amplifier. Since this switching results in a small change in oscillator frequency, C3 is provided in the oscillator circuit to compensate. This capacitor is adjusted so that the oscillator frequency remains the same with the multivibrator in or out of the circuit.

OUTPUT AMPLIFIER

The 6AK5 amplifier is included principally to isolate the multivibrator from output loading effects. It will, however, provide some amplification of oscillator harmonics when the multivibrator is switched out. A parallel-tuned tank connected across the output terminals of the amplifier may be used to accentuate certain harmonics if desired, although the simple resistance coupling shown provides good signal strength up to at least 30 Mc.

CONSTRUCTION

Components may be assembled on any chassis of convenient size. There is nothing particularly critical about the arrangement of parts on the chassis. If the crystal is not used, the capacitance of C1 should be about 1.5 times that of C2. The exact values will depend upon the inductance of L1, a used an r.f. choke from an old diathermy oscillator. The inductance of this choke is about 1.6 mi., and it tunes to 1,000 p.f. with a capacitance of 780 pF. at C1 and 530 pF. at C2. The odd values were made up of standard values in parallel combination. These capacitors should be mica, preferably silver mica, and the coil should have a reasonably high Q.

Critical adjustment of capacitances can be avoided by using a slug-tuned coil, such as the Miller type 4414 which has an inductance range of 1.3 to 2.1 mH. This coil should be capable of tuning to 200 kc. with standard values

**A Junk-Box Frequency Standard**

INEXPENSIVE OSCILLATOR-MULTIVIBRATOR UNIT

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[Diagram and schematic not transcribed here]
of 7,500 pF. at C1 and 5,100 pF. at C2. The five-prong socket J1 will accept the standard plug-in coil form.

**ADJUSTMENT**

The oscillator should be adjusted first. The output terminal should be connected to the input of a receiver. The circuit should function with most crystals, regardless of frequency. With higher frequency crystals feedback may be adjusted by means of C3. When a 100 kc. crystal is used, C3 is used to “zero” the crystal against WWV.

To adjust a 100 kc. crystal, turn on the receiver b.f.o. and listen to one of the broadcast carriers when the multivibrator frequency may change slightly. Adjust C5 to bring the signal back to WWV immediately before the measurement has taken more than a moment or two, for it tells whether the oscillator frequency has changed during the measurement. If there has been a change, the amount can be estimated to determine if the accuracy is sufficient for the particular purpose. If not, the measurement can be repeated.

**Accuracy**

The principal difference between this unit and one costing many times as much is in the long-term stability. Changes in humidity as well as temperature will affect the accuracy. It is the compensation for such effects that runs up the cost of more expensive equipment. However, the short-term stability is excellent and, in the hands of a careful operator, highly accurate measurements can be made. The only requirement is that the oscillator frequency be checked against WWV immediately before the measurement is made and again immediately after. The latter check is perhaps the more important, especially if the measurement has taken more than a moment or two, for it tells whether the oscillator frequency has changed during the measurement. If there has been a change, the amount can be estimated to determine if the accuracy is sufficient for the particular purpose. If not, the measurement can be repeated.

**Technical Correspondence**

**RECEIVER FRONT-END DESIGN**

Editor “A.R.” Dear Sir,

The article on receiver front-end design by WODAN in January 1964 “A.R.” leads to consideration of ways to achieve equivalent performance in practical circuits.

The desired r.f. amplifier characteristics may also be obtained by use of a grounded grid stage, with considerable simplification of circuitry. A circuit following this line of thought is given in the new R.S.G.B. Handbook. Here two halves of a twin-triode are used, the first being a grounded grid amplifier, the second a triode mixer, with two tuned circuits coupling them.

For all those except the unfortunate few living adjacent to powerful high frequency transmitters, even greater simplification may be achieved by using a single tuned circuit between the two stages. With this configuration problems of gang tuning and alignment disappear, while band changing can be effected by tapping up the coil from the earth end, thus eliminating problems of switch capacitance and lead inductance.

Provided sensible L/C ratios are used, together with high Q components, e.g. 100-150, the 100 kc. harmonic output and ability to oscillate should suddenly hop to a different frequency. At some point within the range of the receiver the needle should drop to zero. When this occurs, check one or two other channels to make sure that the multivibrator signal is at zero beat with these carriers also.

The multivibrator is rather touchy as to the strength of the driving signal. If the driving signal is too weak, the multivibrator will have a tendency to jump from one submultiple to another. If the driving signal is too strong, “squegging” may take place which will be evidenced by a myriad of unidentifiable beats as the receiver is tuned. Overdriving may also cause the multivibrator to produce signals at 20 kc. intervals, rather than 10 kc. intervals. In any case, it should be possible to make corrections by adjustment of C6. Under proper operating conditions, an oscilloscope or peak-reading v.t.v.m. should show a 10 to 20 per cent. higher value at pin 7 of the 12AU7 than at pin 2. C6 may have to be adjusted differently for the crystal than for the tuned circuit.

While the crystal harmonics will be audible shortly after the power supply is first turned on, it is advisable to allow plenty of warm-up time for the multivibrator and the self-excited oscillator, if the latter is used. The amount of power consumed by the unit is negligible, and the Australian who finds use for it two or three times a week will soon learn the value of leaving the heater power on all the time, even when not in use.

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**Equipment and Components**

I have included the circuit of an oscillator circuit popular in ZL. It has many advantages, including low harmonic output. The output is produced with almost constant output over a wide range of frequencies. The feedback capacitor is adjusted to the minimum value required for reliable oscillation at the highest frequency required. Output may also be taken from the cathode if required.

It must be kept in mind that the performance of such a front-end will be degraded if it is followed by a stage having poor signal handling capabilities, or a poor signal-to-noise ratio. For best results all it should be followed by a high or low frequency bandpass filter. The circuit below is the most selective element in the receiver as close to the antenna as possible.

-Barry Kirkwood, VK2AUV, ex ZL1DR, ex ZL3J
A NEW BOOK—

AUDIO AND ACOUSTICS

by G. A. BRIGGS, with James Moir, M.I.E.E., as Sub-Editor

168 pages — fine art paper — 140 illustrations — semi-stiff cover

Price only 17’9 plus 1’ postage

When Sound Reproduction ran out of print in 1962 after sales totalling 47,000 copies since 1949, it was decided to revise the book in sections. Audio and Acoustics deals with this aspect of the subject. Out of the 140 illustrations, only 30 are repeated from SR3. This fact, plus the valued help of Acoustical Consultant James Moir as sub-editor, means that the A.A. book is mainly an original work.

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Method of Winding Coils*

TO GIVE EVEN SPACING TO ANY DIAMETER

W. C. GREEN, G3QG

Visiting a model engineer friend recently the writer was interested to note the way in which he made the small springs for his models. It was revealed that the method he used would be suitable for making radio coils, and after reading hundreds of books and magazines, and not having seen it described before, the idea is hereby passed on. The tools and material used are simple and easy to make and obtain. No great skill is needed to make coils even up to 1 inch diameter and no one need fear the result.

The first thing to make is the winding mandrel (see Sketch 1). This can be of anything round—such as wood dowel, paxolin tube, or metal rod, the latter for preference. A slot is cut in one end of the rod, deep and wide enough to take the gauge of wire that is to be used. At the other end of the rod a means of rotating it is needed. Next, provide some padding material, such as scraps of leather. This, with a bench vice and the necessary wire, is all that is needed for the production of perfect coils.

The wire is then fitted in the slot in the mandrel, it will look to be close-wound, but as the wire is wound on the mandrel, it will look to be close-wound, but on releasing the coil the springing-out effect will give the spacing. It is possible to wind a coil beginning it as close-wound and then to change the spacing several times over its length merely by altering the angle of feeding in the wire. There is no need to straighten the wire—just feed it in from one end and it will expand and be more lying the wire to a door handle and walking towards it, only to find when the coil is half-made someone wants to open the door.

Sketch 1

To the jaws of the vice will give a close-wound coil which can be wound as long as required.

If the wire is fed in at an angle to the vice, a spaced-turn coil will be the result. As the wire is wound on the mandrel, it will look to be close-wound, but on releasing the coil the springing-out effect will give the spacing. It is possible to wind a coil beginning it as close-wound and then to change the spacing several times over its length merely by altering the angle of feeding in the wire. There is no need to straighten the wire—just feed it in from one end and it will expand and be more lying the wire to a door handle and walking towards it, only to find when the coil is half-made someone wants to open the door.

Sketch 2

As in making coils by any other method, the diameter of the mandrel will govern the final diameter of coil required because the coil will expand on being released. For example, to wind a ⅛ inch diameter coil the diameter of the mandrel will have to be less.

The method of making coils as described here is so simple that it leaves you wondering why you never thought of it yourself. As it is a very quick method of finding out the dimensions, it is unlikely to appeal to a great number of Hams. However, several copies of this index should be held by any library which has the magazine listed, as it is a very quick method of finding much sought after information.

Published by Amateur Radio Publishing Inc. Our copy from Victorian Division, W.I.A., who obtained the book from America.

Audio and Acoustics

By G. A. Briggs

This slim volume of 163 pages was written as a replacement for "Sound Reproduction" which ran out of print in 1962. It appears to the reviewer to be an ideal "short text" for those who wish to gain a general understanding of the subject matter.

Price 13/6 plus 1/- postage. Our copy from McNeill's Authorised Newsagency, 183-185 Elizabeth Street, Melbourne.

Index to Surplus

By Roy E. Fahlenberg, W4WKN

This is an index to six hundred magazine articles published in "QST," "CP," "73 Magazine," "Electronics World" and "Radio Electronics." It gives the title of each article and a brief description of the subject matter. At a price of approx. 18/- per copy, it is unlikely to appeal to a great number of Hams. However, several copies of this index should be held by any library which has the magazine listed, as it is a very quick method of finding much sought after information.

Published by Amateur Radio Publishing Inc.

Our Cover...

Hints and Kinks

Soldering Miniature Valve Sockets

Many Amateurs using miniature glass button base valves adopt incorrect wiring practice when soldering components to the valve base lugs. This cover photograph shows the disastrous results that can occur, with the valve being ruined due to glass fracture. If you are using a miniature valve socket it is very important that the lugs be correctly positioned. This can only be done by using a wiring jig, available for a few shillings each. An old valve is not a satisfactory substitute.

The wiring jig, seven or nine-pin, is a very robust device which is inserted into the valve socket whilst the parts are soldered onto the socket lug. This ensures that the small valve socket lugs correctly spaced so that the valve will accurately fit into the socket.

The cover photograph shows the actual effects of inserting the small valve socket lugs. When the valve was inserted excess strain was put on the glass button base, the valve then warmed up during operation. This caused additional stress and the base fractured.

A complaint was made to the makers who examined both the valve and socket. They pointed out that the particular socket used did not comply with the required standard, and in addition the lugs were incorrectly spaced. They rejected the claim for replacement under warranty which, under the circumstances, was only fair.

Since that time the correct metal wiring jigs have been used during construction and no further trouble has been met. The low cost of the wiring jigs is far lower than the cost of replacing a broken valve.

The jig should always be removed from the valve socket before testing the circuit. The heavy metal construction acts as a very effective direct short to all pins and does make the filament transformer groan under the load!

Modern ptf or porcelain sockets are a preferred type as one low cost "bakelite" type of wafer socket imposes excess strain on the valve base, because of incorrect socket design.

Be warned and invest a few shillings in a wiring jig to save having to replace broken valves. Don't think it can happen to you. The cover photograph shows that breakage does occur and your valve may be next!

Removing Broken Drills

When a metal drill breaks off below the surface of the material being drilled, drive two thin wire nails down the flutes of the drill; with a pair of pliers twist the nails in an anti-clockwise direction to remove the drill from the work—N.Z.A.R.T. "Break-in."

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VOICE OF AMERICA TRANSMISSIONS

The many Amateurs in this country who listen to the V.O.A. "Radio Amateurs Notebook" programme each Sunday, will no doubt be interested in learning the following vital statistical figures relating to the V.O.A. transmitting station at Greenville, N.C., U.S.A.

Total acreage: 6,194.24.
Transmitters: Six 500 kw., six 250 kw., six 50 kw.
Transmitting power: 4,800,000 watts.
Total antennae: 94 (directional transmitting antennae, 73).
Antenna towers: About 400.
Height of towers: Up to 400 feet.
Antenna types: Rhombic, curtain and log periodic.
Total cost: About 24 million dollars.
Opening date: Feb. 8, 1963.
Steel for towers: 3,000 tons.
Concrete required: 36,000 cubic yards.
On-site paved roads: 30 miles.
Transmission lines: About 200 miles.
Electrical power requirement: 5,000,000 kilowatt hours monthly (based on daily 16-hour operation).
Micro-wave relay system: Six stations covering 265 miles from Washington studios to Greenville receiver station.

Voice of America programmes are on the air 24 hours per day in thirty-six languages—as part of the world's largest and most powerful long-range radio facility.

—BERS195, WIA-L3042.

OSCAR III.

I am pleased to let you all know that Oscar III. has been going well, and most all the defects are now out. Many tests have been completed and now it is expected that Oscar III. will be up about July or August, 1964.

As a number of you already know, Oscar III. is a communications satellite. It is expected that it will keep on the way out in space, up to 1,000 miles. This will make the period longer, but you will have a much longer time in which to contact it, approximately up to 20 minutes and possibly longer.

You will transmit to it on a frequency of 144.1 Mc., ±15 kc. That gives you a 50 kc. band-width. You will listen for your replies on a frequency of 145.9 Mc. ±15 kc.

An urgent request that the frequencies of 145.9 Mc. ±15 kc. be kept clear just before and during this new sphere of operations on the 144 Mc. band, namely Project Oscar III. Let's make a gentleman's agreement for the duration of these operations. Help your fellow Ham who wants to indulge in this new era of long distance communications. We can all help by requesting the possible offenders to move to another frequency, and possibly help him to go up or down in frequency. You may have a crystal you can loan, etc.

You call CQ Oscar III., announcing your call clearly and distinctly. One minute seems to be long enough, then switch over to receive signals answering you. Do not stay too long as there are others wanting to get a contact. If you are alone you may make four contacts in the one fly past. I suggest that you practice a bit and get into the swing of short contacts. Of course if you are the only one about, say, during the day time, you may be able to hold a contact for 10 minutes or so.

The mock-up model of Oscar I. has been around the States. In N.S.W. it has been as far as Lismore, Gosford for the Field Day, to meetings, in shop windows, on TV., and in the newspapers. It has to date been quite a success. VK4 have it for their Convention on 4th and 5th April. Owing to the relatively short time we can have the model, it will not reach all the States. This is, however, unavoidable. It has to be back in Sydney at the U.S.I.C. by 21st April. It is hoped that it will have visited at least five States.


IT HAS BEEN SAID . . .

"A Radio Engineer is a person who passes as an exacting expert on the basis of being able to turn out with prolific fortitude infinite series of incomprehensible formulae calculated with micrometric precision from vague assumptions based on debatable figures taken from inconclusive experiments carried out with instruments of problematical accuracy by persons of dubious reliability and questionable mentality for the avowed purpose of annoying and confounding a hopelessly chimerical group of esoteric fanatics referred to all too frequently as practical radio men ..."
Over long listening periods the DX appears to be at an all-time low, at least at this QTH. Many contacts were enjoyed, are those running the maximum power and those with the best antennas, are very spasmodic, and no longer can you go to the shack at random and work that far off the grid and be sure of working a stand-by band. This band is opening occasionally. The skip right now seems to be very selective. Quite a workable signal say to VK6, but in VK5 only just audible. I suppose the reverse is so. I think activity from down under could be increased by a lot more activity from the VK boys.

An instance was brought home to my notice on a recent evening. A certain ZL was relating a story to a friend how he tuned an apparently dead 14 Mc. band, to try it out he called CQ and from One night in January was rewarded with no less than three new countries.

We must realise that we are a long way from the major continents, which are the heaviest populated Ham areas and, incidentally, in a QRM situation we cannot possibly imagine. Then let's go to it. Quite a workable signal say to VK3, if they can't hear us, they can't work us.

NEWS AND NOTES

ST2AS is the present call of G5KPO (ex VP2KJ) who is back from the Sudam Republic. The rig is a home-built s.s.b. rx using a McCoy filter, and the aerial a ground plane 14125 kc., which works extremely well. He is at present active on 20, 15 and 10 Mc. very soon. QSLs should go via R.S.G.B.

The QSL Bureau for Sierra Leone has been taken over by the Technical Institute, Freetown.

The QSL Bureau for the Aruba Amateur Radio Club has now been taken over by JIKIO, Cards, etc. to P.O. Box 275, San Nicolas, Aruba. Address, Aruba Amateur Radio Club, P.O. Box 275, San Nicolas, Aruba.

Syria, never easy to work, has been represented on 14 Mc. a.m. by YK1AA, giving the name of Raschild and reported as active on 14 Mc. s.s.b. and on 40 Mc. c.w.

St. Helena, ZD7BW is back in England. While at ZD7 he made 7,100 QSOs with 104 countries. Mailing of QSLs is beginning.

Chagos, Rodriguez, St. Brandon and Agalega: From VP2KJ reports that VP0H, will be active on Chagos VP0QF, then from other Islands. Calls will be VP0QB, VP0BF, VP0HP, VP0PA, VP0PE, VP0QF, VP0W.

Marcel, the operator, is sometimes heard active from Crozet Islands. Marcel, the operator has been active from the island. He is sometimes heard active from Crozet Islands. Marcel, the operator has been active from the island. He is sometimes heard active from Crozet Islands.

Jan Mayer: The following calls are now active from this rare QTH: LAFQ/P, LAMF/P, and LAMF/P on c.w. and s.s.b. on 14 Mc.

Antarctica: Dave Tremaine ZL1AV is flying down to Australia and plans to operate from the New Zealand Base Station ZLAA. The South African Base will be at an all-time low, at least at this QTH.

It is reported that Steve Perry, W1BB, has worked 76 countries on 150 Mc. Anyone worked 76 countries on 150 Mc.?

From 7500 kc. upwards very good signals have been heard, mostly on s.s.b. around 0800. These include: K8HIF, WS6XU, K5MCT, and K3JCBZ.

On s.s.b. 14105 kc., for s.s.b. 21 Mc. will also be tried but only 7005, 7025, 14025 kc. will be tried. QSLs should go via R.S.G.B.

The South African Base Station ZLAA will be s.s.b. and c.w. on 14 Mc. for now, Bert VK5BB.

Many thanks to all those who sent in items for this month. It helps a lot fellas. Please hear with the K4KL plan we get the hang of things here. Thanks to A1 4SS, Ken STL, WIA-L4020, DX-Prest, W6TGY, DX Magazine. With the bands on the Improve, I'll say till now, Bert VK5BB.

**S.S.B. CRYSTALS**

Set of Five Gold-Plated Matched Crystals

Mounted in HOCU Holders

Suitable for 455 Kc. L.F.s.

Price £16-10-0 per Set

+ 12% Sales Tax

Full details on request.

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FOSTER DYNAMIC MICROPHONES

SPECIFICATIONS:
Output Impedance: 50 ohms or 50K ohms
Effective output level: -55 db. (0 db. = (one) 1V. Microbar)
Frequency response: 50 to 15,000 c.p.s.

OMNI-DIRECTIONAL DYNAMIC:
Size: 4½" long, 1¼" diameter. Colour: TWO-TONE GREY.
Cable: 12 ft. of P.V.C.
Retail Price 50 ohms: £4/7/9 + Sales Tax 10/11
Retail Price 50K ohms: £4/10/0 + Sales Tax 11/3

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Phones: 25-1300, 25-4556

Manufacturers of Radio and Electrical Equipment and Components

YOUTH RADIO CLUBS

Sub-Editor: Len Poynter, VK2ZGP.

Very little news for this Issue. The closing date was the 2nd month inon sequence. I must have my copy in by the 2nd month inon sequence. If you have your notes by the end of the month.

By now we are using 53-54 Mc. and hoping that the competition will be more generally successful. The 53 Mc. net in VK3 is gaining in popularity and many have converted their 6 mc gear for this frequency of 53.032 Mc. More of our activities next month.

LONGEST DISTANCE H.F. CONTACTS

At 24th February, 1964

New South Wales:
50 Mc.: VK2ADE-V7AQQ, 9/4/59, 7230 miles.
144 Mc.: VK2ZGP-V7CD, 13/4/59, 5925 miles.
210 Mc.: VK2GJ-ZL6B, 15/4/59, 5917 miles.

Queensland:
50 Mc.: VK4HD-W6PUZ, 13/5/59, 5272 miles.
144 Mc.: VK4ZAX-V7KTA, 27/12/61, 1107 mile.

South Australia:
50 Mc.: VK5KL-WL7AC/K1H6, 28/4/57, 5361 miles.
144 Mc.: VK5GL-VK3BO, 30/12/51, 1222 miles.
210 Mc.: VK5GL-VK5ZDS, 12/12/51, 1011 mile.

Western Australia:
210 Mc.: VK7/7AA/ABPB, 30/10/59, 5450 miles.
144 Mc.: VK6BO-VK5GL, 30/12/51, 1222 miles.
210 Mc.: VK6LK-VK5ZDS, 12/12/51, 1011 mile.

N.S.W.
144 Mc.: VK7LZ-JAF1L, 3/12/79, 5428 miles.
210 Mc.: VK2ZAV-VK7BAX, 27/12/61, 1107 mile.
228 Mc.: VK7LZ-VK8ALZ, 10/12/61, 282 miles.

Papua:
50 Mc.: VK3AU-KHDDY, 30/4/60, 4312 miles.

SOUTH AUSTRALIA

50 Mc.: With the impending loss of 50 to 52 Mc. from this band, many are wondering how the 52 to 54 Mc. band will be populated. The band is showing signs of many of the 50 Mc. dew so as to reduce Channel t.v.i. and i.v.t. No definite decision has been taken on that adopted by the Eastern States, who are making good progress in their activity.

Several DX openings were available over February. VK3 was worked on the 15th and 16th of February. VK5, the VK3 Z V.S.I. transmitter which was coupled to a fixed tuned receiver?

WESTERN AUSTRALIA

50 Mc.: VK2ADE-V7AQQ, 9/4/59, 7230 miles.
144 Mc.: VK2ZGP-V7CD, 13/4/59, 5925 miles.
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Good news from Canberra this month—our tvs, Mr. and Mrs. Jim Watson sat in January and passed all sections. He received the news the day before his birthday and was overjoyed. A.O.C.P. study in his leisure time has helped his school work—he is in the few at the top in Chemistry. The future is a toss-up between Radio Astronomy and Medicine. Jim hopes to complete his O.C.P. at the University of Canberra. We wish him all the success in his future.

Lameroo, on 144.5 Mc. Several Adelaide chaps are using crystal controlled transceivers on 144 Mc. Pete 5CJ works some regular signals from the south coast, and should have to f.v.o. up on the frequency on which the transceiver is operating.

Oscar III, information suggests that this latest satellite is ready for launching soon. It has been missed on 144.1 plus or minus 25 kc. But a bit of luck, the Ham should have a good chance of reception of 100 Mc. in this thing goes up. Here's hoping we are told where it will be visible to us.

General News: V.h.f. Group meeting held with Peter 5CJ, Ian 5JAF, Bob 5ZJH, and John 5JDX as representatives. The group is being well supported and should be able to operate on a regular basis to links.

Tasmania:
50 Mc.: VK2HJ-VK1HIS, 30/12/51, 1322 miles.
144 Mc.: VK2HJ-VK1HIS, 30/12/51, 1322 miles.
210 Mc.: VK2HJ-VK1HIS, 30/12/51, 1322 miles.

Tasmania:
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Papua:
50 Mc.: VK3AU-KHDDY, 30/4/60, 4312 miles.

Another new man on 2 is 5ZRB, near Clare, about 80 miles north of Nowra. Tim 5TJ, near Clare, about 80 miles north of Adelaide, is working into Adelaide at good strength. Tim 5TJ, near Clare, is making good progress into Adelaide from (Clare) occasionally, but contacts here are less frequent as the video i.f. strip, which determines Brian's system bandwidth, results in wider band. This in turn results in a poorer signal to noise ratio. New stations on 6 recently include 5ZD (11 w., 3 el. beam), 5ZR (n.b.g.f.m.)

FOR THE ROYAL WEED, THE ROYAL WEED.

Hints to Club Leaders: Lads at this age CAN be interested in Radio, and made more so by a little encouragement. Those who have the most to gain, and who are keenest on the hobby, should be helped.
Greetings fellow S.W.L.'s. As you will note from the above back page of B.A.R. there is a new Sub-Editor to whom all notes for this page should be forwarded in future. In the absence of any news I may be able to persuade some S.W.L.s. to do their listening on the 160 mc. band, that is between 1800 kc. and 1860 kc. This requirement is an old broadcast set with an r.f. stage for prefer-

NEW CALL SIGNS

DECEMBER, 1963

VK2MO—Mrs. Verle Weston, 6/737 Anzac Pde.
VK3ALT—E. G. Clare, Station: 5 Palla St., Yarraville. Postal: P.O. Box 146, Griffith.
VK2AB—Mrs. J. M. Kingston, 141 Grove St., Kooringal, Wagga.
VK3AYT—F. Jacobson, 9 Ormonde Ave., Epping.
VK5AVX—R. D. H. Sides, Kingston Park, S.A.
VK2ZDR—G. A. Cruickshank, 26 Killara Ave., Riverwood.
VK2ZDG—W. Walker, 53 Gordon St., Rosebery.
VK3ZBR—J. Grouse, 17 Ivanhoe Street, Marrickville.
VK3ZLJ—L. D. Jennings, 62 Unwin St, Bexley.
VK3ZBG—R. B. O. Fillingtuft, 48 Westbrook Ave., Wahroonga.
VK3ZZ—W. Young, Myall Place, Engadine.
VK3ADT—A. M. Brighton, Lubeck.
VK3ZRH—J. R. Harris, 1 Elmo Ave., West-End, East Melbourne.
VK3AYM—Gowrie Park State School Youth Radio Club, Morrel St., Glenroy East.
VK2XK—L. H. Waller, 46 Pepparil Ave., Syndal.
VK3AA—A. Schellies, 8 Queen St., Moe.
VK3ZBH—G. S. Hart, 73 Harrison St, Box Hill.
VK3RZX—D. M. Bennett, 367 Claydon Rd., Claydon.
VK3ZES—E. Wight, 12 Arameln St., Sheppart.
VK3PFM—L. D. Downing, 7 Svenstons St., Blackburn.
VK4TG—D. G. Taylor, 10 Angela St, Salisbury.
VK4ZMB—J. Lindsay, 52 Illova St., The Gap.
VK3GCO—A. Middleton, 10 Struan Ave., Enfield.
VK3OP—W. Avard, C/o. Mrs. Fooks, Woodville.
VK3YB—B. A. White, 53 Mitcham Ave., Lower North Side.
VK3ZMM—R. M. Olesnicky, 35 Edwards St., Daylesford. Light Gardens.
VK4ZHR—G. F. Pynsent, Elmo Ave., Westbury Park.
VK5SZ—S. Sinclair, Mil-Mel.
VK5MP—M. T. Kower, 6 Richardson St, Mount Newton.
VK3QV—E. Hunt, 46 Tuckfield St, Frangeville.
VK3ZG—A. L. Martin, 15 Hale St., Bunbury.
VK3ZKE—J. K. Chippier, 19 Joseph St, West Perth.
VK3ZEG—H. Sturcke, 61 Margaret St, Cottesloe.
VK3ZJH—M. Hart, 97 Norwood Ave, Launceston.
VK5WEF—A. Easterling, Port Moisesby.
VK5LEF—L. F. Fracce (Rev.), Kondou, T.P.N.G.
VK5TWF—P. Gencuski (Rev.), Banu, W.H.D., T.P.N.G.
VK5ZGB—G. R. Barkworth, Boroka, T.P.N.G.

NEW SOUTH WALES

It is pleasing to see that during the first two months of 1964 a keen interest is being shown in VK7 and VK8. A. M. Brighton, VK3ADT, in a recent QST to VK7ZMG, said: "In my opinion, the VK7s and VK8s are just as interesting as the VK6s, and I feel that both VK7s and VK8s should do more to increase their contacts with the rest of the world." The Argentine Naval Maritime Radio Station has recently been activated with a 160 mc. transmitter operating at 1500 kc. per second. The station is located on the island of Clipperton, approximately 1000 miles south of Mexico. The station is being used to transmit weather information to ships in the Pacific Ocean.

The next step is to adjust the aerial and r.f. coils by adjusting the cores so that their mutual inductance is the same as the receiver's. The frequency of this stage is then checked with an oscilloscope or a signal generator.

The frequency of 1600 kc. is used by the receiver's core, and the aerial is tuned to the signal strength of the station being received.

The step back is to turn off the receiver's core and to set the tuning gang to minimum capacitance (piles out of mesh) and the tuning gang to minimum capacitance (piles out of mesh) and tune the oscillator to the signal frequency. The receiver is adjusted until the signal is heard. The frequency of 1600 kc. is then set on the receiver's core, and the aerial is tuned to the signal strength of the station being received.

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FEDERAL QSL BUREAU
Details of the annual U.S.S.R. world-wide DX contest have been published. Contest period is from 2100z, May 9, to 2100z, May 10, and only 12-hour entry is required; operation can be claimed. Full details from this Bureau.

The CR7 QSL Bureau is now located at Box 161, Beira, Mozambique.

The ARRL QSL Bureau is now located at P.O. Box 204, Chalfont, Pa., 18914, U.S.A.

The following ex-Finnish Amateurs are now permanently resident in Australia: OH4NT (now VK200), OH1NX (now VKNSX) and OH2UL (now VKUL). The QSL Bureau is now located at Box 181, Beira, Mozambique.

The CR7 QSL Bureau is now located at Box 161, Beira, Mozambique.

The ARRL QSL Bureau is now located at P.O. Box 204, Chalfont, Pa., 18914, U.S.A.

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Paul Thompson, E7TP7, in acknowledging receipt of information as to the best time and details of its Aruba, Ariba Award. Details Box 161, Beira, Mozambique.

Peter Thompson, E7TP7, urging all Amateurs to use all the frequency allocations available, having consideration to the pressure being exerted on band space. He also pointed out that the Branch had had its most successful year as far as attendances at meetings, the average being 40 present at each meeting for the year. A resolution by Gordon 2ZS, by acclamation, was later made by Bill 2XT in recognition of Peter’s excellent work of the past which has resulted in the Branch being one of the most progressive in Australia.

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the rules. Kevin SARD headed the first group operating 14 and SO Mc.; Ken SACS the second group operating 144 and 7 Mc. 144 group operating 21, 3.5 and I.S Mc.; Alt 3LC without undue stress, and all members had a jolly good time.

Amateurs seem to be moving around the very much those days, and we it was 103.3 sojourn at which a lecture on computers will be delivered. Those other members helping Friday evening. April 17, our general meeting being held at the home of Harold 3AFQ.

Local activity in Townsville Is in the dol-

Page 16 Amateur Radio, April, 1964

Ham Radio, April, 1964

Perc Healy blew along and saved me 73, 4RW.

Advertisements

WANTED: Commercial S.s.b. Transmitter, state make, input, condition and price. Sell: 33 ft. oregon. Price £75 or offer.

WANTED: Type 3 Transceiver, in working order, preferably adapted for p.s.t. use. Contact: O'Brien, VK3ACJ, 20 Tucker Street, Horsham, Vic. Phone Horsham 749 (business) or 1044 (residence).
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3. Signal Tracer

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Controls—
Selector (Auxiliary, Tuner, Phone), Mode (Mono L-R, Stereo, Reverse), Rumble Filter (On-Off), Phase (Normal, Reverse), Speakers-Phone, Treble Base Volume with A.C. Power Switch. Mounted in steel cabinet with attractive front panel. Suitable for bookshelf mounting, etc.

Special Price while they last—
£39/15/0 + 25% Sales Tax

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- GANGED POTS
  With D.P.S.T. Switch. 2 meg. linear.
  £7/5/0 + 12½% S.T. Pack & Post 1/-.

- SILICON DIODES
  400 P.I.V. at 1 Amp.
  6/3 + S.T. 25% or
  70/- + S.T. 25%.

- HAMMER TYPE CHASSIS PUNCHES
  Locally made and guaranteed. Set of three—½", 3" and 1¾/16".
  59/6 S.T. exempt.

- DYNAMIC MICROPHONES
  Hi-Impedance with in-built stand.
  24/- + S.T. 25%.

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  Irish Brand. 5" 1,200' Reels. Mylar Base. 47/6 inc. tax and postage.

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WARBURTON FRANKI
359 LONSDALE ST., MELBOURNE — MU 8351
(MOVING SHORTLY TO 220 PARK ST., SOUTH MELBOURNE)
The miniature valve base is a glass-to-metal vacuum seal, an insulator, and a stressed structure.

The vacuum seal results from dissolving in the glass some of the oxide on the surface of the seal wires to form an intimate physico-chemical bond. These wires, having a nickel-iron core and copper sheath, are designed to have an expansion coefficient to match that of the glass.

Glass containing much lead oxide is used to confer excellent insulating properties.

The structure undergoes stressing by leverage on the contact pins from the socket. A resilient cushion of gas bubbles is therefore provided around the contact pins, and the strength of the whole stem is raised considerably by stress-toughening.
NEW VALVES AT BARGAIN PRICES

ENGLISH INDICATOR UNITS

CO-AXIAL CABLE

50 ohm, UR07, 3/8" diam., in 25 yd. rolls 39/- or 1/5 yard.
71 ohm UR32, 3/16" diam., in 100 yard rolls 7/-10/0.
72 ohm UR70, 3/16" diam., in 27 yd. rolls 39/- or 1/5 yard.
73 ohm, 3/16" and 35 feet 10/-; 100 ohm, 3/8" 2/- yd. 8/-15/0 100 yds.

NEW CAPACITORS (Electricity)

Price only £3, post paid.

VARIABLE CONDENSERS

ROBION, 10-415 pF., one-gap 25/-
Rabion, 10-415 pF., two-gap 32/-
Rabion, 10-415 pF., three-gap 40/-

POLENTOMETERS

250K and switch 15/-
1M 12/-
2M 8/-
5K and switch 10/-
10K and switch 15/-

ER22 GERMANIUM POCKET RADIO

Complete with earphones and instructions, 25/-.

NEW TRANSISTORS IN STOCK

OC45 14/-
OC170 17/6
OC71 10/-
OC71 17/6
OC74 11/-
OC45 14/-

PACKING AND POSTAGE 5d. per Valve.

BARGAINS! — BARGAINS!

Crystal Earpieces with plug
Actuating Diaphragm Inserts
7-pin Valve Sockets and Shields
16 for £1

IN763 (OA210) Diodes, 400V, 500 mA.
12/-

2-Core P.C.V. Covered Cable, 1" diam.
1/- yd. or 100 yds. £4/5/0

2-Core Microphone Cable, 1" diam.
2 x 7/0076

HOZAN CHASSIS PUNCH SET

Sizes: 16, 18, 20, 25, and 30 mm.
Price £3/7/6 set

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We sell and recommend Leader Test Equipment, Pioneer Stereo Equipment and Speakers, Hitachi Radio Valves and Transistor Radios, Kew Brand Meters, A. & R. Transformers and Transistor Power Supplies, Ducon Condensers, Welwyn Resistors, etc.
FEDERAL COMMENT

HOW TO KILL OR BUILD AN ORGANISATION

When conditions on the Amateur bands are bad or there is a sunspot minima as we have at present, Institute activity generally seems to decline. It is at these times when one hears complaints, rumours and other wild mutterings. It is a case of "idle hands get into mischief". This state of affairs is common with all organisations, and at some stage or other when a general stasis applies a glorious lassitude pervades the membership in their attitude towards their club or organisation.

It is similar with the W.I.A. and it is now that the members should be wary—they should be bestirring themselves to create interest and not kill it. The quickest way to "kill" any rehabilitation process is to adhere to the following ten rules (with apologies to the U.S. Magazine Popular Gardening):

1. Don't come to meetings, but if you do, come late.
2. Find fault with the officers and other members; particularly on the air.
3. Never accept office; it is easier to criticise than to do things.
4. Nevertheless, get annoyed if you aren't appointed to a committee.
5. If appointed, don't attend the committee meetings.
6. When asked to express your opinion, say nothing but afterwards tell everyone how things should be done.
7. When others roll up their sleeves to help, say the Institute is run by a clique.
8. Never write a magazine article; it's too much of a bore.
9. Hold back on your dues as long as possible, or don't pay at all.
10. Don't bother about getting new members, but if you do, be sure they are moaners like yourself.

Fortunately, we believe there are very few Organisation Killers amongst us, but in times of inactivity, beware. The Organisation Killer is an insidious disease and can become epidemic.

We would like to believe that every member of the Institute was the direct antithesis of the OK, and it does not really take any great effort to become so. Beware of that feeling of complacency that advises that one is at its best. Beware of that feeling of complacency that advises there are plenty of others to do the work. There is always some job in the Division you can do, and to quote the old proverb—Many hands make light work. Too often too much is left to too few.

So we suggest that you offer your assistance to your Divisional Council and you will find them only too willing to accommodate you in some way; don't be shy about coming forward to help when assistance is required— you may find you may hold an important office yourself in the near future; become a real Organisation Builder and not a Killer.

FEDERAL EXECUTIVE, W.I.A.

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THE "TETRA-LINEAR"

A "Passive-Grid" Linear Amp. using four EL38s in Parallel (tamed)

PHIL WILLIAMS,* VK5NN

The exciter at VK5NN uses a 6146 with about 80-100 watts peak input which has done very well "DX-wise" during the past six years, but with deterioration of the H.F. bands, it was found to be struggling. So designs were started for a linear which would meet the following specifications:

• It would need to fit into the remaining 8" width of shelf space beside the exciter and AR88 receiver, so 18" of depth and 10½" of height were available.
• There should be no very high voltages employed and a readily available and replaceable transformer used.
• There should be no large tungsten filaments and the associated heat dissipated in the shack.
• Silicon diodes should be used with the same object in view.
• The power supply should be within the amplifier case.
• Small transmitting tubes or large t.v. line-time base tubes should be used to keep initial and replacement costs down.
• A 70 ohm nominal output impedance pi-network should be employed with universal matching on all bands from 10 to 160 mhz.
• There should be no input tuned circuits.
• It should not be necessary to use large transmitting components.
• The need for neutralisation should be avoided.

The above ruled out the use of 813s, 805s, 866s and the like, high voltage transformers and h.v. block condensers.

Surveying the literature, the Globe LA-1 Linear, described in Stoner's New Sideband Handbook, using four EL38 line-time base tubes at 80/- each proved easy to build and appeared to fit into the space available. A standard 17" x 8" chassis was purchased and 8" x 10½" trays fitted to make front and rear panels, with ½" aluminium angle on the top side corners to stiffen the assembly. The cover (top and two sides) of perforated metal is bent to fit over the angle and fixed to the sides of the chassis with three screws on each side.

The amplifier was first wired as a grounded grid device but otherwise in accordance with the circuit and layout shown. It worked, but loading of the exciter was unsatisfactory because of the change of loading with drive level, as well as some instability when exciter and output pi-networks were not tuned in accordance with settings which were marked after much experiment.

It was then realised why these LA-1 linear amplifiers are so cheap on the U.S. second-hand market, but in an attempt to "save the day," it was decided to rewire the tubes for passive-grid operation, i.e. with 210 volts on the screen grids, fixed grid bias, and 75 ohms of carbon resistor at the grids.

These changes proved so beneficial that the amplifier has remained in this condition and performed with complete stability ever since. The 75 ohm 1kw. grid resistor loads the exciter perfectly at all times whether the linear is switched on or off, and no grid or cathode tuned circuits or pi or L networks are required, with their attendant handswitching complications.

Visitors' comments and many queries over the air have prompted this write-up for "Amateur Radio". Several similar amplifiers have been built allowing to rise to 15, and where the plate tuning capacitor's maximum value is inadequate on 100 metres, the Q is allowed to be lower, with little degradation in quality.

Table 1.—Pi-Network Data.

With correct loading the amplifier will allow the plate current to rise to a peak instantaneous value of 1,500 milliamps, so that a peak input of about 500 watts is possible in an amplifier with a total plate dissipation rating of 80-100 watts, and using a plate transformer rated at 80 watts (h.t. winding only), viz. 400v. at 200 mA.

In order to keep the amplifier from being overloaded thermally, the meter readings kick-up to about 150 mA on speech, at which current, the plate dissipation may be 1400 or 1500 m.a. of total cathode emission. It is surprising to notice that at such values the plates show no colour, and the transformer does not become overheated. The amplifier should never be run at full input, indeed it cannot, as the power supply regulation will not permit it, the plates will colour-up to give you warning, and something will go "phut!" or melt.

Thus our objective of designing a linear amplifier for s.s.b. speech, which would take about 150 watts, average input on peaky male speech with about a 25% duty cycle, without flattening, and without overheating, has been achieved.

Fig. 1.—Passive-Grid Linear Amplifier for S.S.B.
The circuit diagram shows the method of obtaining and regulating the voltages. It will be noted that capacitors—large electrolytics—are considered the cheapest and best method of achieving the dynamic regulation necessary. Static regulation is rather unimportant. "On the air" tests and reports have given a clean "bill of health".

In order to reduce intermodulation distortion at low levels, the plate current is set at 60-80 m.A., i.e. 15-20 mA per tube, in the quiescent condition. This is not switched off when not transmitting as the amount of heat liberated is no more than from a soldering iron.

The power supply uses twelve silicon diode rectifiers, three in each leg of the bridge, with the usual 1,000 pF, ceramic and 470K resistor across each 400v. p.i.v. rectifier unit. Those used are an odd mixture of HS5s, 1N4765s and OA210s. The bias supply voltage doubler employs two more, and 100 pF, condensers, giving 28 volts into the bias pot.

The main h.t. supply is about 1,080 volts on no load, dropping to just over 1,000 volts on speech, with 45 mA, (measured) in the interconnections, which is built onto a sheet of bakelite and insulated from chassis.

There are five 200 v.w. coils, 275v. peak, 200v. working, capacitors in series with a 100K w.r. resistor across each condenser to stabilise their potentials and discharge them when not in use.

This is a dangerous item, and the amplifiers should be switched on unless the cover is on — protecting the operator from the valve anodes and condensers, and, incidentally, preventing the large peak amounts of r.f. it can generate from getting into the exciter sitting next to it, via the microphone lead and other inter-connections.

The usual grid, screen and anode parasitic stoppers were all used as a precaution, but these are solidly grounded, using short strip connections. The old bakelite wafer octal sockets are preferred for this job.

Screen current peaks are very high, although the average value measured is only ten of milliamperes. In order to achieve adequate regulation without the VR tubes becoming extinguished, a 200 ohm resistor in the ground end of the bias supply, but this does not adversely affect performance. Switching in the h.t. winding is unconventional, but the switch should be a large fast-operating toggle; perhaps separate transformers for h.t. and heaters would be better. (Continued on Page 5)

---

**PARTS LIST FOR "PASSIVE-GRID" LINEAR AMPLIFIER**

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1—0.01 μF. Hi-K disc ceramic condenser.</td>
<td>200 pF. 200 v.w. (same as C22)—operates OK on 215 volts</td>
</tr>
<tr>
<td>C2—0.002 μF. x 2 kv. working Hi-K disc ceramic</td>
<td>C10—2,000 μF. 200 v. w. (275v. peak), five off in series, mounted on 1/16 inch thick bakelite strip—insulate from chassis.</td>
</tr>
<tr>
<td>C3—0.002 μF. x 2 kv. working Hi-K disc ceramic condenser (may be mica if a suitable)</td>
<td>C11—1,000 μF. Hi-K tubular ceramic condensers, twelve off—one across each silicon rectifier unit.</td>
</tr>
<tr>
<td>C4—C7—0.005 μF. Hi-K disc ceramic condensers, four off.</td>
<td>C22—C28—200 μF. 200 v. w. (275v. peak), five off in series, mounted on 1/16 inch thick bakelite strip—insulate from chassis.</td>
</tr>
<tr>
<td>C8—14-360 pF. tuning capacitor, plate spacing at least 0.05 inch—in disposals equipment, e.g. &quot;Gibson Girl&quot; transmitter, or re-insulate an old b.c. set condenser with low minimum C.</td>
<td>C27 and C28—100 μF. 25 v.w. electrolytics (insulated).</td>
</tr>
<tr>
<td>C9—Three x 500 pF. b.c. gang, A.W.A. (ex AR8 l.f. tuner).</td>
<td>C29—500 μF. 25 v.w. electrolytic (can insulated).</td>
</tr>
<tr>
<td>R1—Nine 680 ohm, 1 watt, carbon resistors in parallel.</td>
<td>C30—500 μF. 200 v. w. (same as C22)—operates OK on 215 volts.</td>
</tr>
<tr>
<td>R2-R5—10 ohm, 1 watt, carbon resistors—four off.</td>
<td>C31 and C32—0.01 μF. Hi-K disc ceramic condensers.</td>
</tr>
<tr>
<td>R6-R9—47 ohm, 1/2 watt, carbon resistors—four off.</td>
<td>R1—Nine 680 ohm, 1 watt, carbon resistors in parallel.</td>
</tr>
<tr>
<td>R10—10 ohm, 1 watt, carbon resistors—four off.</td>
<td>R8—R9—47 ohm, 1/2 watt, carbon resistors—four off.</td>
</tr>
<tr>
<td>R11-R14—47 ohm, 1/2 watt, carbon resistors with 10-turn coil of 24 s.w.g. wire wound on each (RFC-PCH).</td>
<td>R11—R14—47 ohm, 1/2 watt, carbon resistors with 10-turn coil of 24 s.w.g. wire wound on each (RFC-PCH).</td>
</tr>
<tr>
<td>R15—50 ohms, 10 watt, wire wound 1.R.C. resistor.</td>
<td>R15—50 ohms, 10 watt, wire wound 1.R.C. resistor.</td>
</tr>
<tr>
<td>R16—R20—500 ohms, 1/2 watt, carbon resistors—12 off, one across each silicon rectifier.</td>
<td>R16—R20—500 ohms, 1/2 watt, carbon resistors—12 off, one across each silicon rectifier.</td>
</tr>
<tr>
<td>R28—R32—100K, 1 watt, carbon resistors—five off, one across each 200 μF. condenser.</td>
<td>R28—R32—100K, 1 watt, carbon resistors—five off, one across each 200 μF. condenser.</td>
</tr>
<tr>
<td>R33—5,000 ohms, 20 watts, wire wound, with slider to adjust current to give 7 or 8 volts across R35 (adjust only when &quot;off&quot;).</td>
<td>R33—5,000 ohms, 20 watts, wire wound, with slider to adjust current to give 7 or 8 volts across R35 (adjust only when &quot;off&quot;).</td>
</tr>
<tr>
<td>*Note.—Most electrolytics of this size and voltage need to be &quot;conditioned&quot; before use leaving each unit on a supply equal to the peak voltage rating, with 10K resistor in series. The voltage on the condenser will gradually rise and stabilise at less than 1/2 millamp. leakage current—if not, suspect it and use another condenser.</td>
<td></td>
</tr>
</tbody>
</table>
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Effective output level ... -55 db. [0 db. = (one) 1V, Microbar]
Frequency response ... 50 to 15,000 c.p.s.

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The driving power required from the exciter is 15v.² (2 x 757/10), i.e., 2 watts, and thus has made it possible to reduce the level of signal right through the exciter, resulting, according to reports, in a much cleaner signal. See that r.f. is piped in 70 ohm co-axial cable, with the usual s.w.r. bridge in the output circuit.

Loading and tuning the amplifier is carried out by speaking and observing the peaks on the oscilloscope monitor. The output controls are quite broad and non critical. The loading condenser and inductance are preset according to band, the netting control operated, transmitter brought to zero beat, and then the final tuned to peak the rumbly noise from the exciter (even though the audio is shorted). Both exciter and linear (separately) are tuned on a dummy load made of twenty 1,500 ohm 5 watt carbon resistors with a germanium diode r.f. voltmeter attached.

The other versions of this amplifier used 807s and similar tubes need slightly more grid bias than the EL38s but even at 25 volts bias, the drive requirement for a 75 ohm grid resistor is less than 10 watts.

Any exciter using a 2E26, 807, 6146 or similar small transmitting tube will supply this with ease. The exciter may be operated plugged to the linear without having the amplifier switched on—a small point, but this is not advisable with a grounded grid linear.

Finally, the secret of correct operation of linear amplifiers is that the plate meter needle should wave gently in the breeze, not kick violently from a low quiescent figure to the maximum stop on the meter.

This linear amplifier operates in such a fashion, but has the capacity to supply the peaks demanded by an old "leather larynx". Demonstrations are often given on 80 metres in the evenings.

Transformers of the 385 to 450 volt class at 200-250 mA. are readily available on the surplus market and I'm sure you can rustle up enough large pentodes or tetrodes from the junk box, to give this one a try. Suitable tubes are 807s, ATS25s, EL38s, KT88s, 6CM5s, 6B6Qs, TT21s, or VT127s.

If you have spotted a certain surplus item with four 807s in it, you have the basis of a very useful and effective linear amplifier. The generator compartment will take power supply components, but I should advise more care than normal because they are glued in the bottom and sides of the case. It is considered, however, that the narrow front panel, using the layout described, is much more pleasing in a neat tabletop station.

**SERIES RESONANT BY-PASSING FOR V.H.F. APPLICATIONS**

STEVEN E. SUMMER, WA2KYF

A cardinal rule of v.h.f. construction is to connect by-pass capacitors with the shortest possible lead lengths, but, unlikely as it may seem at first, long leads and smaller values of capacitance may provide more effective by-passing than the 500 and 1,000 pF. units now commonly used.

At 50 Mc. and above, the lead inductance and internal inductance must be considered when selecting by-pass capacitors. In the v.h.f. region the leads can be used as the inductive elements in series resonant circuits. Such a circuit is a theoretically ideal by-pass, having close to zero impedance at a single frequency. Series resonant by-passing is impractical over a wide band, and on lower frequencies, but in single-band v.h.f. converters and transmitters it may be highly effective.

Table 1

<table>
<thead>
<tr>
<th>Values of capacitance in pF. required for resonance at frequencies commonly encountered in Amateur band v.h.f. work, for leads of ⅛&quot;, ⅞&quot;, and 1&quot; in length.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Freq.</td>
<td>Mc.</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>48-50</td>
<td>72</td>
</tr>
<tr>
<td>76</td>
<td>96</td>
</tr>
<tr>
<td>144</td>
<td>100</td>
</tr>
<tr>
<td>220</td>
<td>39</td>
</tr>
</tbody>
</table>

In using ceramic disk or dog-bone capacitors of 1,000 pF. or less, the internal or plate inductance may be neglected. Similarly, the resistive losses need not be considered, since they have no effect on the resonant frequency. Table 1 gives lead lengths and capacitance for series resonance at frequencies commonly encountered in Amateur v.h.f. work. These values were derived mathematically, but they can be checked experimentally. Simply twist the leads together and check for resonance with a grid dip meter.¹

¹ Information in Table 1 is for total lead length twice that given. That is, the middle column refers to ½ inch leads or one ⅛ inch and one ¼ inch, etc. Values are approximately and will depend on arrangement of leads. For example: a 0.1 pF. capacitor with 1 inch leads connected together and formed into a circular loop resonates at 220 Mc. The same leads running from lead to lead around a ⅛ inch by-passing capacitor up around 375 Mc.

If a capacitor is to be installed at some point where it is accessible with a dipper coil, short the terminal being by-passed to ground with a screwdriver blade or some other low-inductance device, and check for resonance. Adjust the lead length (either side of the capacitor) for resonance at the middle of the desired frequency range. Another good check is to wire series to the transmitter amplifier stages, is to set up your favorite system for checking neutralization, and then trim the capacitor lead length until the best indication is observed.

Series resonant by-passing offers many advantages over more conventional methods, and can be applied in most v.h.f. applications.

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Series resonant by-passing offers many advantages over more conventional methods, and can be applied in most v.h.f. applications.
The Tri-Band Birdcage

GEORGE COUSINS, VE1TG

AFTER moving from Ontario to the Annapolis Valley of Nova Scotia in November 1959, the first problem was to find a place to live, and the second was to get back on the air. With winter coming on, the antenna problem had to be solved in a hurry, so after two attempts at a scandalous conglomeration of long-wires, doublet and other arrays, mostly for 20 metres.

Of course with my good friend VE1GA only four houses away across the field, it wasn't long before I was very conscious of the results he was getting with his three-element wide spaced beam. The difference was that he is a permanent resident while I am a transient, so a beam was considered a bit too much for me to invest in.

A good compromise seemed to be the cubical quad, so work was begun, with the XYL's clothes pole in mind for a support.

Two quads were built during the winter, but didn't survive. Finally came spring, and with it a copy of "CQ," complete with an article on the G4ZU Bird Cage. This looked so interesting I sold on it before I was half way through the article. The birdcage was constructed from the article for 20 metres only and was duly propped up against the clothes line pole.

The bottom elements were 24 feet off the ground, but having no tower this couldn't be helped, so the thing was tuned up where it stood. All the methods tried, failed to bring the s.w.r. down under about 2:1. Deciding that the elements must be too long, we tried all sorts of capacitor arrangements, to no avail, so a pi-network coil from a surplus transmitter was placed in series with the coax, and the s.w.r. came down very smoothly to 1.05:1.

Fig. 1 shows most of the construction details. The mast is a 20-foot section of 2" o.d. aluminium irrigation tubing with a very thin wall and very light weight. A piece of 2" x 2" clear pine is turned down and driven into the tubing, making a solid wood insert a little longer than the length of the pipe, and so creating much greater strength than either would possess alone.

The elements were cut from lengths of 65S-T aluminium tubing, using 1" o.d. for the 20 metre elements, and 3/4" o.d. for the 15 and 10 metre elements. The 20 metre elements were 0.052 wall and the others were 0.035. By careful planning and checking to see what stock lengths are available, the elements can be cut with very little waste. Don't throw away any extra pieces; you may be making Gamma or T matches before you're through and they will come in handy. The phasing lines are made of No. 12 wire with solder lugs on the ends, which are then bolted to the elements. The aluminium on both ends is bevelled before the lug is tightened into place. I also coated the whole joint with clear plastic which is available in most hardware stores. The lengths which I eventually ended up using are:

20 metres—
   Elements 8' 8"
   Phasing lines 17' 6"
15 metres—
   Elements 5' 8"
   Phasing lines 11' 7"
10 metres—
   Elements 4' 4"
   Phasing lines 8' 8"

The phasing lines are only approximate lengths and should not be cut until the points mentioned later are understood. There are eight elements and four phasing lines required for each band.

Six mounting plates are required for the elements. They are cut from 1/4 or 3/8 ply, the 10 and 15 metre elements being 1" square, and the others 1' square. Two inch diameter holes are cut in the centre of the plates so that they will sit over the lengths of the elements. The plates are eventually bolted to the mast using non-rusting hardware and angle shelf brackets. Remember the spacing requirements for each band.

The best method is to mark out the spacing required between the top plates and then bolt them in place on the mast, remembering to keep them in line with each other so that the elements will also be in line when they are fitted. The mast can be laid across two boxes or saw-horses while this is being done. By placing the top elements near the top of the mast, there will be about two feet of mast left at the bottom for fastening to an extension shaft.

The elements are fastened to the plates at right angles to each other, using water pipe straps bolted to the plates. This is shown in Fig. 1. A brass wood screw is also run through the element into the wood to prevent the element from turning or slipping out.

Remember to fasten shorting strips of copper braid or other suitable material to the top elements. Select two adjacent elements for the driven element and short them together. Do the same for the parasitic element. Do not allow the shorting strips or the elements to touch the mast, and remember as you proceed with the other bands, to keep the same relationship between elements all the way down.

Not having much faith in a 9' length of tubing suspended from only one end, I extended the wooden insert out the top of the mast by a couple of feet and then ran guys from the top of this extension to the outer regions of the 20 metre top elements. These guys are nylon here, but in any case should be non-metallic and of a mast...
RAISING THE ANTENNA

After spending many hours reading articles on antenna construction, I decided it was time to put some of these ideas to the test. The first step was to decide how to get the things up in the air. In this case it depends on the design of the tower, height, and facilities available. When the antenna is completely assembled on the ground you will have something resembling an overgrown porcupine and just about as easy to grasp.

As soon as you decide to build the antenna (if you do) start cultivating friends—you'll need them for the great day. Also, if at all possible, I would suggest you try to tailor your tower to your needs. I found a lot of fun in raising lots of fun when the big day arrived. I built the tower with a 3-foot square top and a platform about 4 feet down from the top. In this way, three men can work at the top with lots of safety. This is a good thing to point out to your friends when requesting volunteers for the raising. Even with this, there is a lot of fun when the mast considerably out of the way and an antenna all struggling away on top at the same time.

We raised the antenna all in one piece, completely assembled, by sheer manpower. Don’t let the length of the top element (one of the very top ones, of course) and also put a dent in the mast. Luckily both of these faults were remedied without too much trouble but they could have been a lot worse.

Further experimenting has proven that the easiest way to accomplish the task is one of the following:

**Method 1:** Mount a gin pole at the top of the tower, complete with a small block and tackle, and rig a rope sling around the mast in such a way that it can be raised vertically. The gin pole should be high enough so that the mast will clear the top of the tower and the base can be then swung into place.

**Method 2:** Release all the plywood plates except the top one. Slide them all up to the top of the mast in a way such as before with the gin pole. The difference is that you now have about 18 feet of mast to grasp and also all your elements will be at one end—an important point when you’re trying to keep an eye on all 24 of them at once.

**Method 3:** Remove the plates and elements as complete units. Stack them at the top of the tower in the correct order. Run the mast up through the sides of the tower and through the plates also. Bolt the top plate, slide the mast up, bolt the next plate, slide the mast up, etc., until the elements are all in place.

A combination of method 1 and 2 was tried out when we had to lower the mast up, etc., until the elements were all in place.

The guys should be non-metallic. I have prevented any sag or bending in the antenna in order to straighten out the rotation of the antenna. This can be quite a problem, in a closed loop system such as this.

The solution here, shown in Fig. 2, was to use, and then proceed by means of right angles on the mast itself, as low as possible, without interfering with rotation. Mine are mounted just on top of the lower 20 metre elements, and each boom is made up from two lengths of 2" x 2" x 14' lumber, with a piece of 2" x 2" x 3' at each end. The centre point of the boom is bolted through the mast and the ends are fitted with eye bolts.

GUYING

Before tuning or anything else you must work on guy wires. A four-man crew is necessary to man this job. I for one have little faith in a 15 metre guy. It is necessary to have one man at the transmitter and one on top of the tower.

When it comes time for tuning, if you don’t have a s.w.r. bridge and a grid dip meter, beg, borrow or buy one. Aires ends need to be made of B. & W. coil stock and inserted in the driven element. I found that, even though I had cut the chasing wires so that the total element was theoretically longer than the low end of each band called for, the measured frequency of resonance was considerably higher than the upper band limits. This may be due to the proximity of other wires for the other bands, but in any case is not too much to worry about.

Faced with this problem on the ground, the phasing lines can be lengthened to the extent necessary to bring them to resonance at the correct point. However, I was on the top of the tower by the time I discovered this, so changing the lines was definitely off the cards. In any case get the grid dip meter to work and check the driven element.

First decide whether you want a director or a reflector. The original article called for a reflector, but this has been changed now to a director. I used 32 ohm RG-59/U which I had on hand and had no difficulty in bringing the s.w.r. down. Possibly the Tri-Gamma match mentioned in W6SAI’s Quad Handbook could be made to work here, but personally I prefer the separate cables.

FEEDING

Separate coaxial cables are used to feed the three sections of the antenna. Though originally intended, I decided to match the three sections of the antenna to the transmitter and one on top of the tower.

(Continued on Page 11)
RADIO TECHNICIANS
AND
OPERATORS WANTED

SUPERVISING TECHNICIAN
Salary per annum: £1,721
Location: Mawson (1) and Wilkes (1)
Duties: Install and maintain H.F. transmitters, up to 5kw. output, H.F. communication receivers, portable field equipment, ground aeradio communications and navigation equipment, radio teletype systems and fixed antenna systems and telephone lines and instruments.
Qualifications: Qualified Senior Radio Technician. Wide experience in the maintenance or installation and testing of radio communications transmitters and receivers and radio navigation equipment.

RADIO SUPERVISOR
Salary per annum: £1,301-£1,385
Location: Macquarie Island (1) and Davis (1)
Duties: Install and maintain radio transmitting and receiving equipment, and act as Senior Radio Telegraphist.
Qualifications: Applicants should state any appropriate licence or technical diploma held by them. A thorough knowledge of theoretical and practical electronics plus a First Class Commercial Operator's Certificate of Proficiency or equivalent service experience.

RADIO OFFICER
Salary per annum: £1,101-£1,287
Location: Macquarie Island (2), Mawson (4), Davis (1) and Wilkes (4)
Duties: Radio Telegraphist.
Qualifications: Commercial Operator's Certificate of Proficiency or equivalent service experience. Ability to send and receive Morse Code at least 22 w.p.m., and to touch type at 35 w.p.m., together with experience in the operation of ground radio installations utilising morse, teletype and speech communications facilities.

CONDITIONS OF EMPLOYMENT

Two to four months' preparatory work in Melbourne followed by approximately twelve months at the Station. Tentative sailing dates: Macquarie Island—early December 1964; Mawson, Davis and Wilkes—late December 1964. Whilst absent from Australia, kitting and maintenance are provided free by the Commonwealth, and there is an allowance of 37½% of salary up to a maximum of £575 per annum, in addition to which a district allowance of £325 per annum for married men and £200 per annum for single men is paid. Recreation leave accrues at the rate of five weeks per annum. Subject to the provisions of the Income Tax Assessment Act, Zone Allowance deduction of £270 may be allowable. Salaries commence within the appropriate range according to qualifications and experience. Employment will be in a temporary capacity under the Public Service Act 1922-1964.

Applicants must be in robust health. Ice or snow experience not required but history of outdoor activities is desirable. Applications, which must be accompanied by a recent photograph and the names of at least three referees should be lodged with—

THE DIRECTOR
ANTARCTIC DIVISION
DEPARTMENT OF EXTERNAL AFFAIRS
568 ST. KILDA ROAD, MELBOURNE, S.C.3, VIC.
A Simple 160 Metre Antenna

HAROLD L. HEPBURN, VK3AFQ

Since the authorisation of the 1.50 to 1.60 Mc. allocation in 1963, its use in VK3 has been sporadic and mainly confined to amateurs who have had sufficient real estate available to erect the conventional half wave dipole or at least a wire long enough to act as a reasonable radiator on the frequency. The average suburban block in the 55 x 150 ft. category does not lend itself to such arrays and it is perhaps for this reason that 160 metres has not enjoyed great popularity.

For local working (and in these days of low sunspot activity for DX as well) 160 metres is, in a Radiation sense, a very useful band. Only small inputs are required to the final to provide truly arm-chair local contacts on phone or S8-9 c.w. contacts up to 2-300 miles. Recent trials, carried out by VK3WQ and the weekly VK3WI broadcast relays on 1.86 Mc. have given a more reliable suburban coverage with 20 watts than the 80 metre 500 watt "rockcrusher".

With these advantages in mind, a prototype antenna was constructed.

MECHANICAL CONSTRUCTION

The radiator proper consisted of a 14 ft. length of 1" o.d. 16 gauge aluminium tubing and a 12 ft. three section, cooper clad steel tank whip, obtainable from disposals. Whilst aluminium tube is recommended if portable work is envisaged, there is no reason why 1½ galvanised waterpipe could not be used if a fixed home antenna is required.

It is the purpose of this article to describe the development of a portable (not mobile) vertical antenna for use in the 1.5, 3.5 and 7.0 Mc. bands.

The bottom 1" tube and the tank whip are supported electrically, but joined mechanically by means of a centre insulator. In the case described this insulator was a 4½ length of 1½ o.d. perspex rod which was turned down to half length (to be a tight push fit into the aluminium tube and the other half drilled axially to accept the base of the tank whip. Reference to the exploded construction diagram (Fig.1) will show this and subsequent written explanation.

While perspex was used in this case, its use is not mandatory and any other insulating rod will do provided it does not absorb moisture, is mechanically strong and can be drilled and turned. Ebonite rod fits these requirements and is by far the cheapest of the alternatives offering.

The toroid (a Ducon yellow spot) provides the electrical continuity between the two halves of the whip and is mounted on a small piece of insulating material held in place by means of a car muffler clamp running down the top of the aluminium tube. This muffler clamp also acts to hold the centre insulator in place if a fine saw cut is made for down one side of the aluminium tube. In addition the clamp provides the electrical continuity to the bottom half of the antenna. Electrical contact to the top half (the tank whip) is made via a short length of braided (taken from some scrap coaxial cable) which is soldered to the tank whip.

The base insulator is an S.B.C. throw-out. It is 3½" in diameter and 4½" high. In each end is a metal plug which is tapped 1½ Whitworth. To the top and bottom of this insulator are fitted two L shaped pieces of 16g. brass sheet which are 3½ wide. The top brass piece is secured to the insulator by means of a short length of 1½ Whitworth (a 3½ x ½ bolt with the head cut off) and a 1½ Whitworth hexagon nut. The length of the stud should be such that when the top plate is assembled into the insulator about 1½ of the threaded stud remains above the top of the nut. This residual length screws into a mating tapped hole in a mild steel plug fitted to the bottom of the aluminium tube.

The bottom brass plate (the shorter arm of which is fitted with a co-axial socket) is fitted to the other end of the insulator by means of a nut and about 2½ of thread cut on the end of the stud. This unit is very strong and is quite adequate to withstand the swaying action of the 25 ft. ungued whip.

The short arms of the L shaped brass plates extend some 3½ beyond one side of the insulator and are made rigid by means of two short insulating pieces bolted between them. There is thus
formed a protected space of about 3" cube which houses the base matching network.

The mechanical work having been satisfactorily completed, it remained to get the whip on to the required frequency.

RESONATING THE WHIP

The description which follows applies not only to the case but to all similar cases. Within wide limits the method of resonating the whip and matching it to the transmission line given here can be used for whips of different lengths and on different frequencies. Only the figures quoted apply specifically to this antenna.

The first step was to make a small air spaced coil 1½ in diameter and about 3" long, containing (for 1825 kc.) four turns of 16 gauge wire. This coil was soldered across the brass base plates and acts as a coupling link to the g.d.o., used to measure the resonant frequency of the whip. Next, the toroid was covered with insulating tape to prevent shorts between the wire and core. In order to establish the antenna sections and a g.d.o. reading to resonate at 1825 kc.

MATCHING TO FEED LINE

However one problem remained. That of getting it matched to the 50 ohm feed line. Reference to the literature indicated that (at 1825 kc. at any rate) the feed impedance would be low and probably in the 3-5 ohm region.

Some fancy work with an "Antenna-scope" gave readings of 75 ohms, too good to be true, and finally given the lie direct by trying to feed it with this impedance cable and getting a s.w.r. of well over 10. The reason for the nice null obtained at 75 ohms on 1825 kc. still remains obscure. Anyhow as it was not possible to get a direct measurement of feed impedance, matching was done on an experimental basis.

Fig. 3 gives the entire test set-up. The mechanical work having been completed, it remained to get the whip on to the required frequency. Reference was then made to an excellent article on vertical antenna and matching problems in the July 1961 issue of "CQ".

In this article the design procedures and calculations for "L" matching networks for short vertical antennae are set out and the appropriate size of the capacitance and inductance required in the experimental matching network was determined from this information.

For the antenna under development the article indicated that an appropriate "L" network would require a shunt capacitance of 3,000 to 5,000 pF. and a series inductance of somewhere between 0.5 and 2 micro-henries.

Accordingly a very flexible experimental network was breadboarded. It consisted of a three-gang broadcast capacitor, a small roller inductance and a series of fixed mica capacitors of 1,000 pF. each which could be padded across the gang by means of crocodile clips. Fig. 3 gives the entire test set-up.

The matching procedure was as follows. The original base coupling link was removed and with no additional capacity across the gang and with the transmitter by trying (1825 kc. of course) the variable inductance was moved from zero to maximum, noting the effect of this change on the s.w.r.

Then the gang was swung through from zero to maximum capacity and the effect on s.w.r. again noted. An additional 1,000 pF. was clipped across the gang and the process was repeated, once again noting the effect on s.w.r.

A second and then a third, 1,000 pF. capacitors were clipped across the gang and both capacity and inductance varied across their range. The transmitter was kept on resonance at all times.

For the 1825 kc. frequency the s.w.r. did not drop appreciably from a high value until some 2,000 pF. was in circuit (one 1,000 pF. fixed and the gang right in). The inductance did not appear to be very critical and a couple of turns either way did not vary the s.w.r. to any great extent.

Ultimately a position was found where the s.w.r. had been reduced practically to unity. At this stage the values of inductance and capacitance in circuit were measured (using the g.d.o. again). One fixed capacitor and a small coil of the correct sizes soldered direct into the small "box" at the base of the antenna.

A quick trial with r.f. showed that the s.w.r. had remained the same as with the breadboard experimental hook-up. The final values found at 1825 kc. for this antenna were 3,000.
USE OF GROUND RADIALS

Reference was made at the beginning of this article to the effect of the ground resistance Rg. In any vertical whip—no matter whether mobile or fixed—this ground resistance is large. The simple method of using in developing the antenna described was about the simplest (and thus the worst) earth that could have been used. To overcome completely the effect of the ground resistance, the classical solution is to provide 32 quarter wave radials fanned out from the base of the antenna. On 1825 kc. this would mean 32 wires each about 130 ft. long, or just over 3 mile of wire! The perfect solution is thus not a practical proposition. However, to do nothing about minimising the ground resistance is poor practice—and a compromise solution was adopted.

Since the antenna was designed with portability in mind, six 30 ft. lengths of electrician's earthing wire were used to provide a better earth path. They were arranged in three sets of two wires. Each pair had a common connection to a battery charging clip which was snapped on to the lower brass plate of the antenna base and the two free ends each soldered to a 4" tent peg. The six wires were fanned out about 60 degrees and simply left lying on the ground, the tent pegs serving to locate the ends in the right spot. If you want to provide guys, each alternate tent peg can be used as a guy anchor.

The results quoted above were obtained without the use of the radials and comparative tests with and without them are still in progress.

Use of anything between no radials and the six recommended does not change either the tuning or the matching of the antenna—only its radiating efficiency.

THE TRI-BAND BIRDCAGE

Having resonated the element, the coaxial cable was attached. The outside shield of the cable was attached to the exact centre of the small coil and the inner conductor was connected to a small gamma matching section. In the case of the 20 metre section, the gamma bar is about 30" long and the capacitor is a 75 pF. I feel these values will serve as a good general starting point, but would not necessarily always be correct. However, this is not different from any other type of antenna matching arrangement.

With an assistant on top of the tower to tune the capacitor, the s.w.r. was quickly brought down to 1.1 on 20 metres. Checking across the band revealed a total swing of from about 1.05 to 1.2 at the highest point, with no difficulty.

The 15 metre section was tuned in the same manner, as far as the driven element was concerned. Again it was necessary to use a small coil in the element. The coil was constructed from 6 turns of 1/4" copper gas line, 2 1/2" i.d., and close spaced. Again it must be realised that the necessity for these coils may not arise and even if it does, the size required may not be the same as mentioned here. However, it is well to know how the problem was solved here, in order to save time in another installation.

The 10 metre element was found to require a small coil of tubing containing 3 turns 1/2 inch copper; 15; 5 turns 1/2 inch copper; 20; 3 turns No. 12. The gamma bar for 20 metres is a 1/2 inch tube.

The directors are tuned by the use of wire stubs on each element. In my case the 20 metre stub is 4 1/2 feet long, the 15 metre one is 36 inches long, and the 10 metre one is 24 inches long. This will give a good starting dimension and coarse tuning; final adjustment is done by any of the methods shown in antenna handbooks. I used the grid dip meter to set the directors for a frequency about 5% higher than the driven elements and then enlisted the aid of another Amateur who lives a few miles away. Using his receiver and S meter the stubs were then given a final adjustment. The eventual lengths are very close to those given above.

S.S.B. CRYSTALS

Set of Five Gold-Plated Matched Crystals

Mounted in HC6U Holders

Suitable for 455 Kc. I.F.s.

Price £16-10-0 per Set

+ 12½% Sales Tax

Full details on request.

BRIGHT STAR RADIO

46 Eastgate St., Oakleigh, S.E.12, Vic. Phone 57-6387

Amateur Radio, May, 1964
HAVING been interested in using the Command receiver for finding hidden transmitters for some years (3-6 Mc., BC454), it has been obvious that there is insufficient audio for mobile work.

In an endeavour to overcome this, as a stop gap, the 1430 kc. i.f. was fed into the car receiver, and while this worked well enough, it was a bit hard on the car battery, with a mobile radio-phone operating and no engine running.

EXTRA AUDIO

After looking at possible ways to improve things, and trying some of them, the present arrangement appears to be the most satisfactory, with a minimum of alteration to the receiver.

The original 12SR7 second detector, b.f.o. tube was removed, and a 12AH7 rewired into this socket for use as the first audio and b.f.o. tube, and an OA85 installed as the second detector, as shown in the circuit diagram, Fig. 1.

While a 12SL7 may have been a better choice for greater audio, there were several 12AH7s available, and have proved satisfactory.

ADDING A.V.C.

It was thought that since a.v.c. is so easy to install, this would be an advantage for phone operation, although not used when transmitter hunting, as c.w. is used for identification and bearings. But in mobile phone operation, it is necessary.

(Continued on opposite page)
This was achieved by removing the 0.1 megohm grid resistor R11 on the second i.f. transformer, and fitting a 2 meg. resistor in its place, removing the earth wire from one end and connecting this point to the end of the diode load resistor R18.

From the opposite end of the 2 meg. resistor, run a wire to the front panel box, to connect to the a.v.c. off/b.f.o. on switch, under the tuning dial. This box will contain a.v.c./b.f.o. switch, 10K cathode bias gain control, and audio output pack—all miniature types as there is very little room.

R.F. STAGE BIAS

It was found that the bias resistor to the 12SK7 r.f. stage was 620 ohms and, when measured, the bias was 6 volts, at maximum gain position of the gain pot. Installing a 400 ohm resistor in its place reduced the bias to 3 volts with an increase of signal gain. Changing the i.f. valves bias resistors did not improve the gain enough to warrant the change over.

SPEAKER OPERATION

The original output transformer, while suitable for phone operation, has to be replaced for speaker operation, and a miniature speaker transformer was installed in its place in the rear of the chassis. This should match the 12A6 output valve, 7,500 ohms to voice coil impedance.

With the greater audio gain, the motor generator whine became very noticeable and an 8 pF 600 p.v. electrolytic was installed across the h.t. line for extra ripple filtering. It will be found that the original 12A6 grid resistor is 2 megohms. This should be replaced with a 0.5 megohm resistor, as the cathode bias resistor of 1,500 ohms can be replaced with 400-500 ohms.

While this will give a higher than normal grid bias for the 12A6, sufficient audio will be available for mobile operation and, at the same time, will reduce the plate current and battery power drain.

These modifications could be made to other ranges of the Command receiver if desired for mobile operation.

Preliminary Announcement of
7th Jamboree-on-the-Air, 1964

The 7th Jamboree-on-the-Air is to start at 0001 hours G.M.T. on Saturday, 17th October, and will finish at 2359 hours G.M.T. on Sunday, 18th October, 1964.

Special stations proposing to be on include—

VE1WSB—World Scout Bureau, Ottawa, Canada.

GB3BPB—Baden-Powell House, in London.

K2BFW—Boy Scouts of America.

XE1ASM—Scouts de Mexico.

Mercury Award

Object: To promote contacts with member stations of the Royal Naval Amateur Radio Society.

Classes: Class I. (U.K.). 20 points required.

Class II. (Europe). 10 points required.

Class III. (DX). 5 points required.

Scoring is as follows: QSOs with each member station counts as one point per band and stations can be counted on more than one band, each QSO counts one point. Contacts with the Headquarters Station G3BUZ count double (12) points per band. Contacts after 1st October, 1960.

A fee of 1/6 or six I.R.C's. (for foreign cards, plus fee, should be sent to R.N.A.R.S. Awards Manager (G3HBL), 133 Worple Road, Isleworth, Middlesex, England.

Claims, together with check list and QSL cards, plus fee, should be sent to R.N.A.R.S. Awards Manager (G3HBL), 133 Worple Road, Isleworth, Middlesex, England.

IGNITION NOISE V. FREQUENCY

IRWIN MATH, WA2NDM

Due to the increasing interest in mobile communications by Amateurs, it was felt that an investigation of the frequency distribution of the r.f. energy radiated from automobile Ignition systems would prove useful both to the Amateur contemplating mobile operation and the Amateur already engaged in this phase of the hobby.

Tests were conducted between the frequencies of 2-150 Mc, thus encompassing the 80 through 2 metre bands. For those frequencies between 2 and 30 Mc, a Hallicrafters SX-100 was used and for frequencies above a Civil Patrol 30-50 Mc. receiver; a 6 metre converter; and a 100-156 Mc. converter using the SX-100 as a tunable i.f.

In order to have some sort of reference, a Measurements Corporation No. 80 signal generator was used and all noise measured with respect to a 10 m.v. signal at the respective frequency. All readings were taken by a peak voltmeter placed across the receiver's voice coil leads, and were converted to db. of noise readings vs. frequencies.

The auto used was not equipped with Ignition suppression devices. Unfortunately, one that was so equipped was not available and thus could not be tested.

The maximum value of Ignition interference seemed to centre around 30-45 Mc. In fact at about 40 Mc. noise was about 30-40 db. above any other frequency examined. This would indicate why equipment such as six metre transceivers are so plagued with Ignition interference.

Fig. 1—Graph showing results of study by the author of automobile Ignition noise. Noise peak between 30-45 Mc.

Antennae used were quarter wave whips above 30 Mc. and a 12 foot length of copper rod through a variable impedance matching device below 30 Mc. All antennae were placed where the whip antenna would normally be and vertically polarised. With horizontal polarisation of the pick-up antenna, results followed very closely but with somewhat lower noise amplitudes.

The auto used was not equipped with Ignition suppression devices. Unfortunately, one that was so equipped was not available and thus could not be tested.
JUST ARRIVED! NEW 1964 EDITIONS!

Price 51/6 and 2/6 Post.
The Standard Manual of Amateur Radio Communication

★ The Radio Transistor Handbook
by Stoner & Earnshaw
Price 68/- and 2/- Post.
THIS UP-TO-DATE HANDBOOK COVERS A WIDE RANGE OF COMMUNICATION FOR BOTH AMATEUR RADIO & COMMERCIAL APPLICATIONS

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SPECIFICATIONS:
Output Impedance 50 ohms or 50K ohms
Effective output level —55 db. [0 db. = (one) 1V. Microbar]
Frequency response 200 to 10,000 c.p.s.

OMNI-DIRECTIONAL DYNAMIC:
SIZE: 3" x 2-1/8" x 1".
Cable: 12 ft. of P.V.C.
Switch: on-off.
Desk Stand. Clip folds for hand use.
Colour: WHITE.
Plastic Diaphragm.

Retail Price 50K ohms £2/10/7
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Manufacturers of Radio and Electrical Equipment and Components

A request for the condensing of DX Notes in "A.R." (as appeared in March issue) will enable the curtailting of trivial chatter, and only notes of actual workings, reception, and movements of interest can be included now in this column. All those who requested QTHs will be included where possible.

For those who do read these notes and take a genuine interest in them, will please those who don't care to read them, line them up in a row and focus on what they think should be included. The news printed herein is for people interested only in handling phone traffic, not for those who have no interest in it.

2.5 Mc.: Contacts on s.s.b. are possible, dependent on static, and quite a deal of c.w. DX contacts are being parted.

7 Mc.: Pile-ups on s.s.b. to be heard to be believed between VK and G land. The efficiency of this mode of transmission is borne out by mobile contacts. W contacts on 72 are most evenings our time. Quite good signals from W, VE, KH, KW, KJ, etc. For those who have not listened previously, try 0730z 1030z daily. C.w. contacts go on this includes all modes of transmission. The average run of the mill contacts, viz. Malaysia through AP2, 1, to the continent are workable for those who have no Interest in it.

3.5 Mc.: Contacts on a.m. are being effected greatly by QSB. Early mornings bring JA, DU, KR6 and some strong, are being worked. An impressive list of countries was received for those who have no Interest in it. This includes all modes of transmission. The only news received from the various stations break through again. This includes all modes of transmission. The average run of the mill contacts, viz. Malaysia through AP2, 1, to the continent are workable for those who have no Interest in it.

7 Mc.: Signals on this band, although not strong, are being heard according to the type of station. Early mornings bring JA, DU, KR6 and some strong, are being worked. An impressive list of countries was received for those who have no Interest in it. This includes all modes of transmission. The average run of the mill contacts, viz. Malaysia through AP2, 1, to the continent are workable for those who have no Interest in it.
YOUTH RADIO CLUBS

And now the girls are getting into the act! Susan Brown (age 17), a prominent member for some time in Keith Howard's fine club at Booragul High, passed full A.O.C.P. recently-first school-girl to do so as far as I know. Sorry I have no details about Susan, but this event opens up other possibilities. There is every reason, in this modern world, for girls to have the same scientific training as boys. There is also the news that Phillip Lowe, of Epping High (Sydney), is the first of the non-school club members to have a traineeship with Telephone and Electronic Industries. This is an excellent effort without club help.

Y.R.C.'s have had a bad blow from staff changes in High Schools-Keith Howard from Booragul to Cook's Hill, Lee Kinsella from Wollongong, Ralph Luff from Homebush to Moorfield, and at least three others in VK2. Enthusiastic support from the Division and Amateurs generally means merely that the budding brass-pounders training? and making the Redcliffe Peninsula and its schools a real Y.R.C. stronghold. With some help from Rotary (have you club leaders tried to get their local group going?) and the Peninsula may proceed. Any rescuers for these clubs?

Keith has started a non-school club near Booragul—can anyone beat the extraordinary help from Rotary (have you club leaders tried to get their local group going?) and the Peninsula may proceed. Any rescuers for these clubs?

and there is a good list of potential club leaders. Can any VK9 Amateurs assist?

We're fortunate in finding a live personality in VK3, Max Keen. He is Chas. Taylor, VK4UC (Junior Champion of the VK4 division of VK4) teaching at Clontarf Bay High, near Brisbane, and making the Redcliffe Peninsula and its schools a real Y.R.C. stronghold. With some help from Rotary (have you club leaders tried to get their local group going?) and the Peninsula may proceed. Any rescuers for these clubs?

Keith's Newsletter (Southern Mouse!) where Ken Matchett keeps us fully in touch with VK3 boys—more of that later.

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1. Competitors be required to return their full operating log, but to indicate thereon that the best seven days scoring, as summary of the best daily totals attached to the completed sheets would aid the Computing Committee. By the best seven days method:
   (a) Those having a shorter period than one month in which to operate could

2. Allow a competitor to enjoy Xmas with the rest of the family and seriously affect his log. (This overcomes one of Dr. Rofe's objections.)

3. Intestate contacts under 50 miles not necessarily coincide with that of the publishers.

Any opinion expressed under this heading is the responsibility of the author alone. The correspondence section is edited by Chas Abernethy, WIA-L221.
FEDERAL AND DIVISIONAL MONTHLY NEWS REPORTS

(SEND CORRESPONDENCE DIRECT TO DIVISIONAL REPORTER NAMED AT PARA. END)

FEDERAL QSL BUREAU

FOBAQ requests that all QSLs be sent to him direct and not to FOBAQ.

We regret to learn of the tragic loss sustained by Bud Schultz, W6CNW, known to VK and r.t.t.y. stations, when on March 28th his wife Mary was killed in an accident to the family car. The circumstances are even more distressing. Mrs. Schultz was driving along a freeway when a get-away car driven by hold-up men hotly pursued by police and travelling at high speed ran into the rear of her vehicle. Bud learned of his loss in the course of his duty at the local b.c. station when compiling a news bulletin. We mourn with you, Bud.

Rules for the annual SP International DX Contest arrived too late for publication. This Contest was held on 11th and 12th April. Rules were similar to previous years and logs due by 31st May. Full details from this Bureau.

Rules for the 1964 P.A.C.C. Contest staged by the Netherlands Section of the I.A.R.U. also arrived too late for publication. This Contest was held from April 25 to April 26. Logs must be postmarked not later than June 15. Further details from this Bureau.

After seven years as VK2 Inwards QSL Manager, Frank Hine (VK2QL) has surrendered the appointment due to a restrictive illness. Frank will now be able to undergo treatment. His successor is VK2SG.

The E.D.R. 13th OZ-C.C.A. Contest Awards were accepted after the meeting of the Branch Council. The following awards have been made since 6th February, 1964:

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Cert. Addt.                      

FEDERAL AWARDS

The following awards have been made since 6th February, 1964:

W.I.A. 50 Mc. W.A.S.:  

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<td>VK2ZCM</td>
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BRIGHT STAR CRYSTALS

FOR ACCURACY, STABILITY, ACTIVITY AND OUTPUT

Our crystals cover all types and frequencies in common use and include overtone, plated and vacuum mounted. Holders include the following: DC11, FT243, HC-6U, CBA, B7G, Octal, HC-18U.

THE FOLLOWING FISHING-BOAT FREQUENCIES ARE AVAILABLE IN FT243 HOLDERS:

- 5280, 4095, 4535, 2766, 2524 Kc.
- 5.500 Kc. T.V. Sweep Generator Crystals, £3/12/6.
- 100 Kc. and 1000 Kc. Frequency Standard, £8/10/0 plus 12½% Sales Tax.

Immediate delivery on all above types.

AUDIO AND ULTRASONIC CRYSTALS—Prices on application.

455 Kc. Filter Crystals, vacuum mounted, £8/6/0 each plus 12½% Sales Tax.

Also Amateur Type Crystals—3.5 and 7 Mc. Band.

Commercial—0.02% £3/12/6, 0.01% £3/15/6, plus 12½% Sales Tax.

Amateur—from £3 each, plus 12½% Sales Tax.

Regrinds £1/10/-.

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We would be happy to advise and quote you.


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Phone: 57-6387

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CABARILLA \-* STRONG • NON-CORROSIVE
PORT MELBOURNE, VIC. WINGFIELD, S.A.

W.I.A. LOG BOOKS
5/6 plus postage

DURALUMIN, ALUMINIUM ALLOY TUBING

IDEAL FOR BEAM AERIALS AND T.V.

★ LIGHT ★ STRONG ★ NON-CORROSIVE

STOCKS NOW AVAILABLE FOR IMMEDIATE DELIVERY

ALL DIAMETERS—\* TO 3"

Price List on Request

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GUNNERSEN ALLEN METALS PTY. LTD.
SALMON STREET,
PORT MELBOURNE, VIC.
Phone: 64-3351 (10 lines) Telegrams: "Metals," Melb.

HANSON ROAD,
WINGFIELD, S.A.
Phone: 45-6021 (4 lines) Telegrams: "Metals," Adel.

QUEENSLAND

THE SUNSHINE STATE'S 1964 CONVENTION

PICTURE POSTCARD OF A HOMEBUILT "A" FRAME

Cyclone Henrietta heading for the coast . . .
100 m.p.h. winds . . . devastation could be as great as . . . mountainous seas . . . heavy rain.
What a shock to everyone! Early hopes that the Conven-
tion was to be held in the city were then dashed, and the
venue was to be changed. Did it deter anyone? No it did not. A well packed Convention came to Alexandra Headlands to the best Convention ever. What of the weather? Two bad showers over the weekend.

This year's Convention differed from previous years in that the V.H.f. Group, who had been too busy with a "mountainous" sea, were able to help with the Boy Scouts' Easter venture. There were many well designed "usual hustle and bustle of cars and much activity with contests.

Another thing was the more of the h.f. fraternity perhaps of a year or two older group who were content to go more quietly enjoying meeting old and new acquaintances. It seemed to be but time for four contest activities instead of a "normal" event. Perhaps Bob 4ZRC will have more assistance next year.

Of notable importance was the strong support from the Wide Bay and Burnett Branch who were held by President Roy 4ZWK and Secretary Jocelyn 4JJ.

It is pleasing to note that the policy of encouraging visitors to bring along family is being appreciated as this year the space that was reserved for families was almost fully taken so that next year when, so we are told, more members will be bringing their families we will have to make another wing available. Where else can members with a family get such a low-priced pleasant week end holiday?

Some dozen visitors arrived on Friday night and a breakfast next morning, Saturday 4th, when two h.f. and a v.h.f. station were set up.

During the morning an all-band scramble, no holds barred, was held. After dinner the v.h.f. gang turned on a hidden tx hut and the ladies arranged and showed the new visiting family how to climb a hill and visit the rim Mt., where they spent a pleasant afternoon watching the "survivors" in action.

The Annual General Meeting was held at 4 p.m. when Pat 4KB gave a resume of the financial year's progress, which was received with acclamation. It was indeed a pleasure to have such a large proportion of country members at the meeting. Treasurer Keith 4DG and Lionel 4VS came up specially for the meeting.

Alf 4OL gave the 4WI Sunday morning news from the Convention at 0000 hours and was pleased with the reception and especially with the publicising of the activity with contests.

Contest winners were as follows: All-Band Scramble (Sat.), Rod 2ACU; Hidden Tx Hunt, Paul 9ZBV; 1st, 2nd, 3rd, 4th, 5th All-Band Scramble (Sun.), Leigh 4RH; Most Distant Visitor award, Paul 9ZBV; Most Non-Important Equipment, Ken Chiverton; Lucky Reg. Number, Paul 4VS, ART Rx; Raffle, ART Rx, Max 4HD; Luckiest Group, 4RH; and a special "30 Metre" award, XYL 2ALB, Shelly ware; also six children won "goodie bags". The registration booth was manned by 4ZRC, Jocelyn 4JJ and Marie, who were quite perturbed, enquiring where Henreitta the cyclone had disappeared to after the last one played havoc in Fiji. Then the dulcet tones of Ray 9RH came on and reported that it had lashed Norfolk Island in the wee small hours of the morning, and the temporary antenna still working. So Gregg 4ZRV was not going his way. Amateur Radio still keeps the boys informed just what is happening.

Activity seems to be picking up around here also. Tony 4ZWK is trying to get his noise level down. Allan 4PS hard at it getting...
Joe TV is soon to be hibernate for the winter at his mountain bachelor's quarters and we hope that this will be for the better. Let us hope that the publicity on "Trends in Receiver Design" to conclude his series will keep the forthcoming before the snow sets in, TVAS.

NORTHERN ZONE

Last month the Annual General Meeting and Dinner were held in the North. I won't go into the lists of times. The various state affairs of the meeting is too long to list here. The business of the meeting included the election of officers and the presenting of the hotel bill for a good time. We have a number of members who helped to considerably swell the ranks.

Last meeting was held on the 7th and was well attended as usual. We were pleased to welcome several visitors including former Secretary, VK3WE, and Charlie TCH, who are now living in Burnie.

There have been several good openings recently on the 144Mc. band, and there is plenty of s.w.r. reports. Many VK6s were contacted, Kevin TVZM using a large tower in the area.

Seems we are losing one of our newer, and keener, Hams, Basil TBL is departing for VP land in August. Best of luck, Basil, TBL.

TASMANIA

Well, another Annual General Meeting and Dinner have come and gone, and a succession of good weather and good times. Last meeting was held at the Hobart Club Rooms on the 7th of last month. The meeting was well attended and the dinner was enjoyed by all. The president, DNSZ, is now no one to claim the mantle of emu totem. The business of the day was to elect new officers and to discuss various club affairs. None of these will be reported here. The meeting was well attended as usual.

What has happened to the Capital City boys? So nots watch all those bits and pieces lying around, as he belongs to the emu totem that sent all those wonderful and weird ideas that he has been dreaming up the last few years. He should then be happy to try his hand at the new satellite band, so it will be interesting to see how things go. Merv 4ZMV shortly on the v.h.f.

Now that the Highway has by-passed my home, I miss those callers from the South. There were active in all three zones and the J-band was sufficient to say that a good time was had by all.

Congratulations to Reg 7RL for obtaining second place in the recent intrastate 7AJ Memorial V.h.f. Contest. 

There was a good 2x break-through during Easter and quite a few new VKs were worked. Seven circuits were heard on that night. 7Z, Leigh Pretty.

NORTH-WEST ZONE

Sorry no notes last month, but they must have been delayed in the mail. The same fate may befall these, what with a late meeting and a P.O. strike. I am keeping my fingers crossed.

Main news last month was the highly successful Field Day held at Port Sorell. The weather was good and a good time was had by all.

Congratulations to Reg 7RL for obtaining second place in the recent intrastate 7AJ Memorial V.h.f. Contest.

There was a good 2x break-through during Easter and quite a few new VKs were worked. Seven circuits were heard on that night. 7Z, Leigh Pretty.

HAMADS

Minimum 5/- for thirty words.
Extra words, 2d. each.

Advertisements under this heading will only be accepted from Institute Members who desire to dispose of equipment, whatever it may be. No personal property. Copy must be received at F.O. Box 36, East Melbourne, C.S. Vic., by 8th of the month. The minimum charge is 3/- per advertisement. Call signs are now permitted in this heading. No advertisements not accepted in this column.

WANTED TO SELL: Kokusai Mechanical Filter, Type 3 Mk. II. ($25, 70 May St., Nth. Fitzroy, VK3AS). Phone 314-6760 (Vic.).

FOR SALE: Heathkits—11 tube C.r.o., 5 Mc. bandwidth, Model 0-12; Audio Sine Wave Square Wave Oscillator, 20 c.p.s.-1 Mc., Model AG-10; Solder, 5 Mc.-220 Mc.; Audio Modified for ship's frequency, 10 Mc.-20 Mc.; 3 Mc.-40 Mc.; Solder Tube Checker and Case; Balun 75-300 ohm; Ham Band V.f.o. All complete and new. Best offer to VK3AMW, 23 Winters Way, Doncaster, Vic. or telephone 857-6482.

FOR SALE: Wagner Sideband Transceiver. Upper or Lower Sideband or break-in c.w. on all bands 80 through 10 mc. 2.1 kw mechanical Filter, built-in range from Xtal Cal. 5 Mc. to 40 Mc.; S.T.R. Relay, etc. Separate V.f.o.'s with 1 kc. accuracy for transmit and receive. Complete with Speaker and a.c. power supply in matching cabinets, in new condition, still under guarantee. £350 or offer. VK2DM, 40 Ware St., Fairfield, N.S.W. Phone 72-5601.

FOR SALE: Wagner Sideband Transceiver. Upper or Lower Sideband or break-in c.w. on all bands 80 through 10 mc. 2.1 kw mechanical Filter, built-in range from Xtal Cal. 5 Mc. to 40 Mc.; S.T.R. Relay, etc. Separate V.f.o.'s with 1 kc. accuracy for transmit and receive. Complete with Speaker and a.c. power supply in matching cabinets, in new condition, still under guarantee. £350 or offer. VK2DM, 40 Ware St., Fairfield, N.S.W. Phone 72-5601.

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To facilitate our forthcoming move to new premises stock must be drastically reduced. This means big price reductions and a unique opportunity for you.

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Features
- Twin A.M. Tuners with Short Wave Band 3.8 to 12 Mc.
- 9 watts per Channel.
- 12 Valves.
- Freq. response: 20 to 20K c.p.s. ±1 db.
- S/N. Ratio exceeds 60 db.
- Hum and Noise less than 3 mV.
- Channel separation 50 db.
- Input for Crystal or Ceramic Cartridge.
- Output: 4, 8 or 16 ohms, Centre Amplifier.

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£57-10-0 includes Sales Tax.
+ Freight to cover weight 25 lb.

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Sensitivity: 10,000 o.p.v.
A.C./D.C. Volt: Up to 700.
D.C. Current: 0-100. 0-1.4. 0-140 mA.
A.C. Current: 0-200 mA.
Resistance: 0-50K ohms, 0-5 megohms.
Capacity: 0-1 uF. 0-100 uF.
Inductance: 0-1.000 H.
Decibels: ±15 to ±59.
Features: Tube emission G.M., Mirror Scale.

Accessories supplied: V.I.G. Probe.
E.H.T. Probe 0-17.5 kV. Cap. Ind. Adaptor.

Size: 6" x 4" x 2 1/4".
10 GNS. including Sales Tax.
+ Pack and Post 2/6.

UNION 2-Station Intercoms.

With Radio built into Master Unit. Cheaper than a Radio alone, yet you get the benefit of the intercomm. feature. Fully transistorised and supplied complete with connecting wire, Batteries and instructions.
£10-19-6 including Sales Tax.

RECORD CHANGER in Case

Famous DUAL Mono Model 1005 Deluxe Record Changer in solid carrying case. One only.
£11-19-6 including Sales Tax.
+ Freight 5/-.

RECORDING TAPE

American Irish Brand

5" 900' 
5" 1,200' 
53" 850' 
53" 1,200'

Also famous German GRUNDIG Tape in plastic cassette—
53" 1,200'

Prices include Sales Tax.
+ Pack and Post 6d. reel.

CHOKES

1 Henry 300 mA. National.
12/6 each, including Sales Tax.
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POTENTIOMETERS

25K, 100K and 250K Ohms
250K Ohms with Switch
including Sales Tax.
+ Pack and Post 6d.

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9" diameter. 15 Ohms Impedance, ideal Patios, Boats, etc.
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Complete with base and wiring.
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For effective use two are required, and they will carry 10 amps.
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TECH MULTIMETER

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BARGAINS!! BARGAINS!!

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ER22 GERMANIUM POCKET RADIO

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CO-AXIAL CABLE

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No. 19 Mk. 2 (Aust.) A.W.A. TRANSCIVER

PLUGS AND SOCKETS

Packing and Postage 2/-

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FEDERAL COMMENT

AMATEUR SATELLITES

"In accordance with actions taken at the Extraordinary Administrative Radio Conference on Space Communications of the I.T.U. held in Geneva last year, and in agreement with the conversations between I.T.U. representatives, the A.R.R.L. has formally invited Member Societies to participate more fully in a Radio Amateur Space communications programme utilising satellites created by Amateurs."

In the few words of this injunction by the A.R.R.L. to Member Societies is contained a wealth of meaning. These words indicate in a non-flamboyant way, the extent of experimentation and progress made by Radio Amateurs in little more than 50 years of existence. The most far-seeing Amateur soothsayer around 1914 could never have envisaged that in such a short time, Amateurs would be "creating" and communicating via their own satellite. Such, however, is progress.

It has been proven that even the most far-seeing scientists and technologists at any particular time can cast predictions with only about 66% accuracy of what will actually be the case in the future. That is to say, if an aeronautical specialist today predicts that 10 years time aircraft will attain a speed of Mach 6, when the time arrives they will actually be flying at about Mach 9. If we follow this analogy into the Radio Amateur field, we can assume similar seeming-impossibilities in the communications field.

It is not therefore possible that in not too many years time, all v.h.f. and u.h.f. communication will be just as easy by Amateur satellites as by the use of the ionosphere? Let us hasten to say that no such prediction will ever be fact without a great deal of endeavour. It is this endeavour of the Radio Amateur that has kept him ahead of commercial developments in a number of communication fields. The opportunity is now here for Amateurs to experiment and develop a new system of D X communication in the bands where such is not consistently possible by normal means.

The launching of the Oscar repeater satellite (Oscar III.) is expected in about September this year. The A.R.R.L. anticipate forwarding technical data on this unique experiment to the W.I.A. shortly, which in turn will be passed on to the members via this journal. As this undertaking will involve a great deal of time and money by its promoters, we hope many of our members will take this opportunity and assist by using the facilities presented.

We agree with the A.R.R.L. that the expansion of self-education of the Amateur and the study of this new field of communication are essential to keep abreast of the state of the art. By co-operation in this venture, we will undoubtedly help in the promotion of bigger and more exotic Amateur satellites which may well become our stable means of international communication in the not-so-distant future. We hope to hear many calls of C Q DX Oscar before the end of the year on 144 Mc.

FEDERAL EXECUTIVE, W.I.A.
MULLARD PREFERRED RANGE OF TRANSISTORS

For Entertainment Applications

More comprehensive data and curves are contained in Volume 4 of the Mullard Technical Handbook. Additional enquiries should be directed to the Technical Service Departments at the addresses shown below.

<table>
<thead>
<tr>
<th>Type Number</th>
<th>Description and Application</th>
<th>$-V_{CE,\text{max}}$ (V)</th>
<th>$-V_{CE,\text{max}}$ (V)</th>
<th>$-I_C,\text{max}$ (mA)</th>
<th>$-I_B,\text{max}$ (mA)</th>
<th>$T_J,\text{max}$ (°C)</th>
<th>$P_{\text{out,max}}$ (mW)</th>
<th>Outlines and Dimensions</th>
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<tbody>
<tr>
<td>AC125</td>
<td>General purpose audio pre-amplifier and driver of the p-n-p alloy junction type</td>
<td>32</td>
<td>32</td>
<td>10</td>
<td>100</td>
<td>5</td>
<td>90</td>
<td>500** TO-1</td>
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<tr>
<td>AC126</td>
<td>High-gain audio pre-amplifier and driver of the p-n-p alloy junction type</td>
<td>32</td>
<td>32</td>
<td>10</td>
<td>100</td>
<td>5</td>
<td>90</td>
<td>500** TO-1</td>
</tr>
<tr>
<td>AC127-AC132</td>
<td>n-p-n/p-n-p germanium alloy junction transistors for use in complementary Class 'B' output stages</td>
<td>$\pm 32$</td>
<td>$\pm 32$</td>
<td>$\pm 10$</td>
<td>$\pm 200$</td>
<td>$\pm 10$</td>
<td>90</td>
<td>260** TO-1</td>
</tr>
<tr>
<td>AC128-2-AC128</td>
<td>High-gain germanium alloy junction transistor of the p-n-p type designed for use in Class 'B' output stages</td>
<td>32</td>
<td>32</td>
<td>10</td>
<td>200</td>
<td>10</td>
<td>90</td>
<td>500** TO-1</td>
</tr>
<tr>
<td>AD140-2-AD140</td>
<td>Germanium junction power transistor of the p-n-p alloy type intended for use as an amplifier in the output stages of receivers and amplifiers operating from either battery or AC mains.</td>
<td>55</td>
<td>55</td>
<td>10</td>
<td>3.0A</td>
<td>500</td>
<td>100</td>
<td>35W** TO-3</td>
</tr>
<tr>
<td>AF114N</td>
<td>Germanium transistor of the p-n-p alloy diffused type designed for use up to 100Mc/s</td>
<td>32</td>
<td>32</td>
<td>—</td>
<td>10</td>
<td>1</td>
<td>75</td>
<td>50*** TO-44</td>
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<tr>
<td>AF115N</td>
<td>Germanium transistor of the p-n-p alloy diffused type designed for use up to 100Mc/s as mixer-oscillator and for use as RF amplifier up to 27Mc/s</td>
<td>32</td>
<td>32</td>
<td>—</td>
<td>10</td>
<td>1</td>
<td>75</td>
<td>50*** TO-44</td>
</tr>
<tr>
<td>AF116N</td>
<td>Germanium transistor of the p-n-p alloy diffused type designed for use as mixer-oscillator and RF amplifier up to 16Mc/s</td>
<td>32</td>
<td>32</td>
<td>—</td>
<td>10</td>
<td>1</td>
<td>75</td>
<td>50*** TO-44</td>
</tr>
<tr>
<td>AF117N</td>
<td>Germanium transistor of the p-n-p alloy diffused type designed for use as mixer-oscillator and RF amplifier up to 6Mc/s</td>
<td>32</td>
<td>32</td>
<td>—</td>
<td>10</td>
<td>1</td>
<td>75</td>
<td>50*** TO-44</td>
</tr>
<tr>
<td>OC74N-2-OC74N</td>
<td>High-gain germanium alloy junction transistor of the p-n-p type designed for use in Class 'B' output stages</td>
<td>20</td>
<td>20</td>
<td>6</td>
<td>300</td>
<td>—</td>
<td>90</td>
<td>550** TO-1</td>
</tr>
</tbody>
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*** $T_{\text{amb}} = 45^\circ\text{C}$  ** with suitable heat sink  * 200 hours operation

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123 VICTORIA PARADE, COLLINGWOOD, N.S., VIC., 3164.
Associated with MULLARD LIMITED, LONDON

Mullard

Amateur Radio, June, 1964
A FEW months ago, I became the owner of one of the above receivers and after trying it out for a few weeks, I came to the conclusion that I either had a "dud" receiver or else that I was being super critical. For general listening, the receiver performed quite well, but I thought it was lacking something. Summarising at the points that I didn't like about it, I came to these conclusions:

(a) Frequency shift of the h.f. oscillator, whenever the i.f. gain control was varied, especially when using the receiver for c.w. or s.s.b. reception. This was due to the varying voltage on the oscillator, caused by the varying voltage drop across the filter resistor R23 whenever the bias on the i.f. stage was varied.

(b) Very unsatisfactory a.v.c. action. The a.v.c., as fitted, is simple a.v.c. and naturally will work on any signal, no matter how weak, thus reducing the sensitivity of the receiver with weak signals.

(c) The noise limiter could be improved.

(d) Impossible to get "single signal effect" on c.w., due to unwanted leakage from the b.f.o.

(e) Very poor image rejection on 14 Mc.

Since curing the above faults in my receiver, I have spoken to quite a few chaps who are experiencing the same trouble and this has prompted me to write this article, and consequently I will type out condensed versions of the above modifications.

The receiver is well made and easy to get at, and the above faults can be attended to in a few hours. With that, I'll cut the chatter, and get down to business, so grab your soldering iron, etc., and we'll get to work.

HOTTING UP THE HE-30 RECEIVER

C. P. SINGLETON,* VK4UX

If you examine the circuit you will notice that the h.t. available to the receiver is only 115 volts. Nothing wrong with this, except that it is a bit difficult to get a VR tube to strike at this voltage. So the first thing to do is to get some more volts. It is also necessary to take into consideration the rated output of the power supply and not to exceed it. The h.t. drain of the modified receiver is within a few mills, of what it was originally. So assuming you have sent the wife out for the day, and have commandeered the kitchen table, let's go . . .

MODIFICATIONS

1. Remove resistor R23 and substitute a VR tube. This can be fitted at the right of the condenser C26-C27. The choke that I used was quite small and fitted in with room to spare.

2. Remove the h.t. connection from the receiver side of the filter choke, and fit a 3,000 ohm 10 watt resistor, between the filter choke and the h.t. lead so as to change the h.t. supply to the 6AQ5 plate, from C27 to C26. Then disconnect the lead going from the UX socket to h.t. The above modification will give approx. 200 volts to the 6AQ5 plate and approx. 115 volts to the 6AQ5 screen and 6AV6 (V7), and also the 6BA6 valves (V5 and V6). See Fig. 1.

3. Disconnect the h.t. plate supply at point "B" (r.f. stage), decouple it right at point "B" with 1,000 ohms and 0.05 *f. and reconnect it to the set side of the filter choke. Also do the same with the mixer plate supply (V2). This tube is already decoupled, but as the decoupling condenser is also the screen by-pass of V2, install another 0.05 *F. at the screen of V2. That looks after the plate supply of the mixer and r.f. stage.

4. Disconnect the screen grid lead of V2 (mixer) from where it ties onto the first i.f. and reconnect it to the lead going to the h.t. and a.v.c. switch. The screen grids of both V1 and V2, together with the h.t. to the h.f. oscillator, are now tied together, and go to the Rec. point on the function switch.

5. Now to fit a voltage regulator tube. Connect a 3,000 ohm 10 watt resistor to the r.f. and mixer h.t. line, also to the UX socket that was originally h.t. (previously disconnected) and C26. On the UX socket side of the resistor, fit a VR105, or equivalent, between this point and earth. The VR tube will fit just in front of the power transformer. This now gives a regulated voltage of 105 volts to the screens of the r.f. and mixer stages, and also the h.f. oscillator. As the "Q" multiplier is also controlled from this switch, it will also have a regulated supply. See Fig. 2.

6. Change the bias resistor of V1 to 68 ohms. You will notice that I haven't altered the i.f. channel. Approx. 115 volts is available to the plates and screens of the i.f. stages and playing around with the plate and screen voltages would upset the bias resistor values, and a certain amount of mucking about would have to be carried out to get the "S" meter to read correctly. Anyway, the i.f. stages work quite well with the original voltage values, so there is no point in altering it.

7. Delayed a.v.c. is a must on a good communications receiver, and the circuit used is quite straight forward. You will notice that the signal for the a.v.c. diode is taken from the plate of V6. This reduces the damping on the i.f. secondary, which would occur if the a.v.c. signal was taken from there. See Fig. 3.

8. The noise limiter I used is a very well known one and easily installed. But if you do not want to go to the bother of fitting it, an ordinary diode such as the 1N34 type of thing connected between the 6AQ5 grid and ground, via the a.n.l. switch, will give results as good as the original.

9. Getting the b.f.o. to operate better is quite easy. With the set up-side down, and the dial towards you, you will see a lead going from a ceramic condenser (C9) to the switch on the back of the selectivity control. Remove this lead and substitute for it a piece of co-axial cable. This will stop the unwanted leakage to other parts of the receiver and make s.s.b. a lot easier to resolve.

10. Getting rid of images can be done in a variety of ways. I took the easy way out and made up a small tuner of two circuits. One parallel and one series, which are closely coupled. The series circuit is connected directly across the receiver aerial terminals. The parallel circuit is just the opposite, you will see how it works. Tune the receiver to the wanted image, and then reject it with the series circuit. Peak the parallel circuit to the wanted signal. A pre-selector would do a better job I suppose, but it would mean switching.

(Continued on Page 5)

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Page 4 Amateur Radio, June, 1964
1.8, 3.5, 7 Mc. PORTABLE TRANSMITTER

P. E. LINDEN, VK3BX

THIS little transmitter is what it was designed to be—the simplest possible combination of components from the junk box, which would put out a mobile/portable a.m. signal on 1.8, 3.5 and 7 Mc.

For the sake of simplicity, and because it was designed primarily for use on the 1825 Kc. net frequency, a v.f.o. was not included. All valves and components used are readily available.

Nothing original is claimed about the circuit except for the output tank coil, which is wound on a ferrite toroid, giving a number of advantages discussed later on.

The crystal oscillator uses a "Modified Pierce" circuit, with the crystal connected between the control grid and screen grid of the 12BY7 pentode. The oscillator is thus electron coupled to the plate circuit which is untuned, with an r.f. choke as the plate load. The 15 pF. and 47 pF. capacitors from the grid and screen to earth are necessary to ensure reliable starting of the crystal at 1825 Kc., and also to provide the correct input capacitance.

The r.f. output from the 12BY7 plate is capacitively coupled to the grid of the 6BQ5, and adequate drive is obtained on all three bands. The 6BQ5 grid current ranges between 2 and 3 mA.

The one possible original feature of the transmitter is the output tank coil, which is wound on a Ducon Q2 toroid, with a surprising reduction in number of turns, as will be seen from the circuit. Only 22 turns were required to resonate with 300 pF. at 1825 Kc.

With the values shown, the pi-coupler will match to a wide range of aerial impedances on all bands.

The modulator is again as simple as possible, consisting of a 6BQ5 as a class A modulator in cascade as a microphone amplifier and voltage amplifier to drive a 6BQ5 as a class A modulator. A 10,000 ohm plate-to-plate speaker transformer is used as a microphone transformer. With a 1:1 ratio, the 6250 ohm load of the final is fairly closely matched to the 7,000 ohm load impedance required by the class A 6BQ5 modulator.

The microphone used is a rocking armature insert obtained from disposals.

Resistance values used throughout the modulator section were selected to give maximum gain and minimum distortion. Full modulation is obtained with the microphone feeding directly into the first grid without a microphone transformer. No gain control was provided, as 100 per cent. modulation was achieved (with excellent quality) when speaking in an ordinary voice close to the microphone.

Results with this little transmitter have been really gratifying. On 1825 Kc., with a 200 ft. long wire antenna, and a good earth, R5 S5 signals have been received in all adjacent States at night, with S9 signals throughout the metropolitan area.

During the day, when operating portable from Phillip Island, from a generator supply and a 100 ft. antenna, S7 signals were received in all adjacent States at night, with S9 signals throughout the metropolitan area.

On 3.5 and 7 Mc. interlobe contacts are easily made with reasonable band conditions.

HOTTING UP THE HE-30 RX

(Continued from Page 3)

it in or out, or switching coils, whereas with this gadget, there is no need to remove it or alter its tuning when going from 14 Mc. to 7 or 3.5 Mc.

You will notice from the modifications that I have made no provision for switching off the h.t. to the r.f. and mixer plates. There isn't any necessity to do this as with no screen voltage on these tubes the set is completely dead.

This completes the modifications. The receiver has very good selectivity on a.m. when using the "Q" multiplier, but as this stage also functions as a b.f.o., the selectivity can be improved as far as s.s.b. and c.w. are concerned. Some time in the future I intend fitting a product detector and another b.f.o. and then the "Q" multiplier can be used as a s.s.b. Although not mentioned in detail in the instruction book, the "Q" multiplier can be used to reject an unwanted signal.
LIKE NEW MIXER CIRCUIT IN THE BC348

P. D. WILLIAMS,* VK3IZ

REVIEWS of new motor cars always look impressive, but no one seems inclined to review them with 12 months’ work behind them. Perhaps the result of such a test would be favourable. There is certainly one electronic article that lives up to the claim made by the authors, at least as far as this writer is concerned.

In "Amateur Radio" for June 1962 an article titled the “Like New Mixer Circuit” was reprinted from “73” Magazine. Investigation seemed to indicate that there were virtues to the idea and a decision was made to attack a BC348Q receiver to see whether the authors’ claims were vindicated.

Owners of BC348 receivers of any model have a good fundamental receiver, but leaving the problem of selectivity aside, all suffer from the one complaint—a noisy mixer, which in the writer’s 348Q was a 6SA7.

It is believed that the justification for this brief note is the number of BC-348s still in use by a large number of Amateurs and S.w.l.s, and also because the principles can be applied to any receiver currently in use.

To work, then, after studying the before and after schematics. You will notice that the “Like New Mixer Circuit” is unaltered but a version of a model have a good fundamental receiver currently in use.

A new bracket to take valve sockets for the 12AT7 and 12AU7 can follow roughly the same shape as the old one and then quite a few of the components can be installed before the bracket is attached to the oscillator box using self tapping screws.

As the faint-hearted have weakened at the thought of what might lie ahead, a blow by blow description is not given of what component goes where. Since there is little space to fit everything 150v. on the plate of the first section of the 12AT7.

There appears little more remains to be said—the circuit performed well from the first switch-on and after a slight realignment, a period of critical listening could not fault the circuit in any way.

To those owners of BC348 E, M, P, etc., using a 6J7 as a mixer and a 6CS as an oscillator, the problem may be a little easier as there would be little point in reconstructing the oscillator circuit. However, no matter what receiver you have, the principle remains the same and the writer has heard of satisfactory conversions on AR7s and others.

The only limiting factor to good listening is the noise level on the bands of late but don’t let this dissuade you.

NEW HEATER RATINGS FOR 6AN7 AND 6BH5

The frequency changer 6AN7/ECH80 and the 6BH5/EF81 variable r.f. pentode were previously manufactured with a heater current of 225 mA. and 200 mA. respectively.

They are now being manufactured with a new heater rating of 6.3v. at 300 mA., included in the Mullard Preferred Range and, to indicate this change, their type numbers will now be known as 6AN7A and 6BH5A.

In most applications the respective increase in heater ratings may be ignored as far as the mains transformer is concerned. Where the 6AN7A or 6BH5A are used in a series heater string arrangement, shunt resistors may be dispensed with.


Page 6 Amateur Radio, June, 1964

AUSTRALIAN V.H.F./U.H.F. RECORDS

As at April 1964

<table>
<thead>
<tr>
<th>Call sign</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>VK3ALE-ZE1FU</td>
<td>1/5/60, 4118 miles.</td>
</tr>
<tr>
<td>VK2ASZ-2-ZL3AQ</td>
<td>8/12/61, 1962 miles.</td>
</tr>
<tr>
<td>VK3BAP-ZE1FU</td>
<td>30/6/61, 298 miles.</td>
</tr>
<tr>
<td>VK3BLE-VK2ASZ</td>
<td>10/6/60, 282 miles.</td>
</tr>
<tr>
<td>VK3ISE-VK3ZGT/3</td>
<td>1/5/61, 835 miles.</td>
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</tbody>
</table>

The AR8, by any imagination, could hardly be claimed to be a receiver pleasing to the eye. It sits squat and square; the front panel lower knobs are arranged in a disorderly manner, while the round vernier dials, situated near the top of the panel, stare out like two golfered eyes.

Electronically, in the raw state, it is no more appealing and quite unsuitable for Ham use without several modifications. However, if one can stand its appearance, it can be improved to perform like a decent receiver.

The main drawbacks with the AR8 are: (a) no bandspread, (b) poor r.f. gain, control of selectivity, and (d) poor audio output.

BANDSPREADING

A good look at the tuning arrangement showed that bandspreading would not be a difficult job. To do this, it is necessary to scrap the l.f. section of the r.f. assembly, retaining only the three-gang tuning condenser, which can be left as is, but is best if all variable plates except two are removed from each section. Bandspreading is then accomplished as shown in Fig. 1.

R.F. GAIN

A 6SG7 was substituted for the original r.f. tube, but any low-noise tube will do. This modification caused the expected to happen... r.f. oscillation. A closer look showed that this was due mainly to the physical layout of the r.f. section in that the plate lead of the converter tube is approximately 4 from the grid connection of the 6SG7. This oscillation can be tamed in three ways:

(1) Placing a small metal shield between the aforementioned socket connections.
(2) Removal of socket and replacement so that the grid circuit of the r.f. tube is as isolated as possible.
(3) Reducing the screen voltage on the r.f. tube.

The latter was chosen for two reasons. It was the simplest, and it allowed some controlled regeneration through the r.f.-mixer circuitry, which reduced images considerably, particularly with one r.f. stage on Band 3, i.e. 14 and 21 Mc.

First-tube bias could be increased to bring r.f. section out of oscillation, but this seriously impairs the signal-to-noise ratio of the 6SG7. The screen voltage was dropped until oscillation just ceased. In this case, approximately 65-70 volts. This admittedly reduced the optimum signal-to-noise ratio a little, but with some regen, the r.f. bandwidth should be narrowed, increasing the signal-to-noise ratio. So what was lost on the roundabouts was gained on the swings. Couple the antenna fairly heavily to the r.f. coil.

I.F. SELECTIVITY

This was accomplished to near s.s. selectivity (approx. S 7/8 to S 3/3) by the simple process of running a lead from the first i.f. across to the second i.f. (just loosely pushed into the top of the cans) until oscillation occurs with the i.f. gain control at full on and set on c.w. position.

Selectivity then is variable, i.e. the less i.f. gain, the wider the i.f. bandwidth. Here again the overall signal-to-noise ratio is improved by adding selectivity because the overall bandwidth is reduced.

It is said that regeneration introduced like this causes instability, as it varies with strong and weak signals. With the AR8 this arrangement worked perfectly, the regeneration being constant over a large section of each Ham band.

If any case, the v.h.f. indications are fairly quiet and should spring to life with lots of QRN and signals on the aerial is coupled. If the set has excessive hiss and noise with no antenna, short out the i.f., converter, and r.f. grids in turn to see which stage is contributing the noise.

There can be criticisms to the above modifications, but we are dealing with an AR8, not an AR88.

Another Little Gimmick

If you have ever wanted to grid dip 7-8 mm. coils in 7/8th inch cans, you have probably found difficulties to that operation.

Faced with this problem in an unknown piece of equipment, having several signal and i.f. frequencies, the pick-up coil shown in the sketch (Fig. 1) was dreamt up.

When tried, results proved to be giving good indications with the g.d.o. and as close as necessary to determine the resonant frequencies of the various coils.

The tight bunch of turns in the small pick-up coil will affect the frequency of the coil under test at v.h.f., but has little effect at frequencies lower than 20 Mc.

An extra heavy audio by-pass condenser on the 6V6 plate (say 0.01 µF, or greater) will allow cut-off of the higher frequencies and greatly reduce noise, etc. The amount of by-pass or cut-off is controlled by the tone control pot.

The tube filaments can be arranged to suit the power supplies (6v. or 12v.) and h.t. is about 250 volts.

These hints represent a no-cost simple approach, which will greatly improve performance. A more sophisticated approach would be to include a Q5er in the i.f. circuitry and a band-pass filter in the audio, and if the optimum in image ratio is wanted on Band 3, add another r.f. stage. However, we are dealing with an AR8 and the latter added electronics are up to the owner.

After the modifications have been done, a rough check on performance can be obtained by turning the receiver gain throughout, well up. It should still be fairly quiet and should spring to life with lots of QRN and signals on the aerial is coupled. If the set has excessive hiss and noise with no antenna, short out the i.f., converter, and r.f. grids in turn to see which stage is contributing the noise.

E. C. Manifold, VK3EM
FOSTER DYNAMIC MICROPHONES
FOR HAND-DESK USE

SPECIFICATIONS:

Output Impedance: 50 ohms or 50K ohms
Effective output level: 55 db. [0 db. = (one) 1V, Microbar]
Frequency response: 200 to 10,000 c.p.s.

OMNI-DIRECTIONAL DYNAMIC:
SIZE: 3” x 2-1/8” x 1”
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Colour: WHITE.
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CAPABLE OF MODULATING ANY TRANS-
SMITTER UP TO THE MAXIMUM POWER
LIMIT, TO ABOUT 80 PER CENT, WITH LOW
DISTORTION. IT REQUIRES NO POWER SUPPLY
OTHER THAN THE HEATER POWER FOR THE
TUBES, SINCE IT GETS PLATE POWER FROM
THE CATHODE CIRCUIT OF THE R.F. AMPLIFIER
WITH WHICH IT IS USED. ALTHOUGH THE
MODULATOR OUTPUT IS CONNECTED IN SERIES
WITH THE R.F. AMPLIFIER CATHODE, THE
MODULATION IS ESSENTIALLY OF THE GRID-
BIAS TYPE. A USEFUL CHARACTERISTIC OF
THE SYSTEM IS THAT IT DOES NOT REQUIRE A
FIXED SOURCE OF GRID BIAS FOR THE
AMPLIFIER.

The speech amplifier uses a high-mu
double triode to give two stages of
resistance-coupled amplification. This
gives sufficient gain for a crystal
microphone. Resistors R3, R7 and R10,
together with C1 and C3, provide de-
coupling and additional filtering of the
d.c. obtained from the r.f. amplifier
cathode circuit.

The output stage uses one or more
6Y6s in parallel; in determining the
number of tubes required to modulate
a particular amplifier, use one 6Y6 for
every 200 mA of amplifier plate current
based on the operating conditions for
c.w. work. The audio output voltage
is developed across L1 and R11 in
series. R11 may be omitted if the d.c.
voltage between the screen and cathe-
ode of the 6Y6 does not exceed the
rated value of 135 volts.

No special constructional precautions
need be observed in laying out the
amplifier. The unit can be built on a
home-made chassis or a standard
chassis. The output terminals are
0 ohms. 2 watt (see text).
R11—2,000 ohms, 2 watts (see text).
R1—2.2 megohms, 1/4 watt.
R5—2,200 ohms, 1/4 watt.
R4—0.5 megohm volume control.
R3, R7—2,200 ohms, 1/4 watt.
R6, R8—0.1 megohm, 1/4 watt.
R9—40 ohms, 2 watt (see text).
R11—2,000 ohms, 2 watts (see text).
L1—Small filter choke, "a.e.-d.c." type satis-
factory.
C4—0.01 μF, 400v.
C5—50 μF electrolytic, 50v.
C6—8 μF electrolytic, 450v.
C1, C3, C8—8 μF electrolytic, 450v.
C2—Can be broadcast gang with half of the
plates removed to double space.

A ZERO BIAS CLASS B LINEAR

Many sideband operators in the past
have found the linear amplifier a
stumbling block with the generally
stringent requirements as to bias and
cscreen regulation. I decided to see how
the zero bias class B 807 circuit, so
popular as a modulator, would perform
as an r.f. amplifier.

The circuit was constructed for 80
metres as per the schematic. Drive was
from a 5763 class A stage from the
d.s.b. output of a balanced modulator
on 3.5 Mc. This output, while scarcely
sufficient to drive the linear to its full
capability, was adequate to show that
the circuit really works.

Reference to the circuit will show
that no screen bypasses are used; in-
deed if they were, the circuit would not
work!


AMERICAN CALL BOOK

The Federal Treasurer, W.I.A., has for sale
a $1 paid-up and up to date copy of "Call
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AMERICAN CALL BOOK

To tune up it is only necessary to carry
feeder or sidetube to the input
and peak this circuit, the plate tank
condenser is then peaked for maximum
load. Standing plate current is, of
course, very low (in the order of 3 mA.
with 600v. applied).

The maximum plate current depends
on the input signal, to a slight degree
on the loading and, if you like, on how
red you can stand your 807s
(approx. 200 mA. at 600v.).

Efficiency appears to be about 70%,
which compares with a theoretical
78.5% for class B. The anode supply
should have fairly good regulation if
this figure is to be realised. No neu-
tralising was found necessary on 80
metres.

Brian J. Warman, VK5BI
HERE IT IS! THE SPECTACULAR
SSB TRANSCEIVER

Featuring the same unmatched performance, reliability and craftsmanship you have learned to expect from Swan Electronics. These units are now in production.

SWAN-406 MINIATURISED
CONTROL UNIT

Miniature design for mobile mounting in conjunction with the Swan-400. May also be used for fixed station operation if desired.

- Phone Band Coverage as follows: 3.8-4.0, 7.1-7.3, 14.15-14.35, 21.25-21.45, 28.5-28.7, and 28.7-28.9 Mc. (These ranges can be easily adjusted to cover other segments if desired.)
- Direct reading dial scale calibrated in 2 Kc. increments. Dual tuning knobs provide choice of fast 6:1 ratio or slow 3:1 vernier tuning.
- Transistorised V.f.o. Circuit with Zener regulated power supply.
- Temperature Stability: Warm-up drift is virtually eliminated due to separation of the V.f.o. from the transceiver's relatively high temperature, and by the use of transistors. Oscillator circuit is fully compensated for wide excursions in ambient operating temperature.
- Voltage Stability: Zener voltage regulator completely isolates oscillator circuit from power supply variations. Input voltage can change plus or minus 50 per cent. with no change in oscillator frequency.
- Mechanical Stability: Extremely rugged construction and precision tuning system establishes new standards in operating smoothness.
- Includes receiver r.f. gain control; thus the 406 functions as a mobile control head, and makes it possible to install the Swan-400 transceiver in the trunk, if necessary.
- Compact size allows installation on the automobile dashboard within easy reach and visibility of the operator. Supplied with mounting brackets and hardware. Only 3" high, 4½" wide, 5" deep, 3 lbs. weight.

SWAN-400 5 BAND 400 WATT

- Operates with the Swan-406 or 420 Frequency Control Unit, and the Swan-117B, 117AC, or 512 DC Power Supply.
- Covers the 10, 15, 20, 40, and 80 metre Amateur bands.
- Transmitter Power: 400 watts s.s.b., p.e.p. input, dist. prod. down 30 db. 320 watts c.w. input, 125 watts a.m. input. P.A. efficiency: 60 per cent.
- Two 6HF5 p.a. tubes, 6GK6 driver stage, 7360 bal. mod.; 17 tubes, total.
- Output Circuit: Wide range Pi Coupler, coarse and fine adjustment.
- Grid Block C.W. Keying. Key jack on chassis rear.
- Provision for Plug-In VOX Accessory.
- High Frequency Crystal Lattice Filter. Common to transmit and receive circuits. 3 Kc. bandwidth. Unwanted sideband more than 40 db. down. Carrier down over 50 db.
- Overall audio bandpass: Essentially flat from 300 to 3,300 cycles, transmitting and receiving.

JUST THREE YEARS AGO Swan Engineering introduced the now famous SW-120/140/175 Single Band S.S.B. Transceiver. Our Company began as a one-man operation with Herb Johnson, then W7GRA, now W6QKI. In three short years we have grown to include a talented management team of 13 licensed Hams, and a top-quality production department. Our success would have been impossible without the tremendously enthusiastic support of Swan owners. We will continue our policy of providing the finest quality control and reliability, top dollar value, and customer service second to none. And now the latest development from the Swan laboratories. We think you'll agree that the Swan-400 is the most versatile, feature-packed Transceiver on the market, regardless of price.

WB8AWJ WAS6DJ K6D3N W6AVC W6QJBL W6KTV
W6VFT W6AOQY K6OUG W6QHI W6TXK W6ZAC K6ZT

Amateur Radio, June, 1964
NEW SWAN-400
5 BANDS - 400 WATS

Separate frequency control heads for maximum stability and versatility, in fixed, portable or mobile operation. Read the following specifications, and we think you'll agree. — The new Swan-400 is for you.

SINGLE SIDEBAND TRANSCEIVER
- Single Conversion Design. Spurious emission and image response down more than 80 db.
- Receiver Sensitivity: Better than 0.5 µV, for 10 db. signal-plus-noise to noise ratio.
- Wide range A.G.C. System. S-meter functions automatically when receiving.
- 100 Kc. Crystal Calibrator.
- Built-in Speaker. Also provision for external speaker.
- 5½ high, 13" wide, 11" deep, 15 lbs. weight.

AUSTRALIAN DISTRIBUTORS —

W.F.S. ELECTRONIC SUPPLY CO.
225-227 VICTORIA RD., RYDALMERE, N.S.W.
Phones: 638-1715, 638-1355

Interstate Agents—

N.S.W.: ATLANTIC RADIO
36 Oxford Street, Woollahra
Phone 31-7811

Vic.: ELECTRONIC SERVICES PTY. LTD.
10b Douglas Street, Noble Park.
Phone 746-8446

South Aust.: TELEVISION & RADIOTRONICS
12a Gays Arcade, Adelaide.
Phone 23-2474

West Aust.: NEIL JAMES & CO.
Barrack Street, Perth.
Phone 24-8961

SWAN-420 FULL COVERAGE FREQUENCY CONTROL UNIT

Designed for fixed station operation in conjunction with the Swan-400 S.S.B. Transceiver. May be installed for mobile operation if full frequency coverage is desired.

- Full frequency coverage of 10, 15, 20, 40, and 80 metre Amateur bands in 20 ranges of 200 kc, each, including WWV range as follows: 3.4-3.6, 3.6-3.8, 3.8-4.0, 7.0-7.2, 7.2-7.4, 14.0-14.2, 14.2-14.4, 14.4-15.0, 21.0-21.2, 21.2-21.4, 21.4-21.6, 28.0-28.2, 28.2-28.4, 28.4-28.6, 28.6-28.8, 28.8-29.0, 29.0-29.2, 29.2-29.4, 29.4-29.6, 29.6-29.8 Mc.
- Direct reading dial scale calibrated in 2 kc. increments. Dual tuning knobs provide choice of fast 6 : 1 ratio or slow 36 : 1 vernier tuning.
- Transistorised V.F.O. Circuit with Zener regulated power supply.
- Temperature Stability: Warm-up drift is virtually eliminated due to separation of the V.F.O. from the transceiver's relatively high temperature, and by the use of transistors. Oscillator circuit is fully compensated for wide excursions in ambient operating temperature.
- Voltage Stability: Zener voltage regulator completely isolates oscillator circuit from power supply variations. Input voltage can change plus or minus 50 per cent, with no change in oscillator frequency.
- Mechanical Stability: Extremely rugged construction and precision tuning system establishes new standards in operating smoothness.
- Matches the Swan-400 in height, depth, and styling. Plugs directly into the 400. 5½" high, 6½" wide, 11" deep, 9 lbs. weight.
- Supplied with mounting base which joins the 400 and 420 in a neat tilt-up arrangement for desk top operation. (As illustrated above.)

Amateur Radio, June, 1964

Page 11
Why a tuned carrier null indicator?

Too often, on a vacation trip with my s.s.b. transceiver, I received the report, "Say, your carrier's showing." This bothered me as there was nothing I could do about it until I got back home.

When you are using a transceiver there is no way you can listen to the receiver portion and check the carrier. Most portable transceivers just don't have provisions for a good null indicator. That's the story of how this little monitor gadget was born.

CONSTRUCTION

None of the parts are critical. The unit is constructed in a box measuring 3" x 3½" x 2". For exciters or low power s.s.b. transceivers up to 175 watts, the break-down voltage of the 68 pF. capacitor should be 600 volts. The meter is not critical, it can be a 0-1 mA. or a 0-5 mA.

All that has to be done after building this monitor is to slip it in series with the antenna coax. line and insert a little carrier while advancing the 2 megohm potentiometer. If the meter goes in the wrong direction, just reverse the 1N34 diode connections. After getting an indication, adjust the slug of LI and peaking C2 for resonance with your 7 Mc. signal. (This can be used on any Amateur band by re-designing the LI and C2 circuit.) After the monitor is tuned, balance out the carrier and advance the potentiometer for more sensitivity to get a good null indication.

Fig. 1.—Circuit of the Tuned Carrier Balance Indicator for the 7 Mc. Band. All capacitors are in pF. unless otherwise noted.

Cl—11 pF. variable.
LI—20 turns No. 26 on 3/8 Inch slug tuned to the carrier. It can also be used to check the output tuning and frequency. The advantage of a tuned indicator is to make sure that the residual signal from any spurious or mixing frequency does not give a false indication. An unwanted signal, even though it is attenuated considerably, can still show on the meter of an untuned indicator. By adding a tuned circuit, the gadget acting as a wave meter helps to make sure that the transmitter is inside of the band. It is very easy, with some exciters, to tune the transmitter to a mixing frequency which is outside of the band of the Amateur.

TESTING

When the unit is finished, put it in series with the antenna co-ax. line and insert a little carrier while advancing the 2 megohm potentiometer. If the meter goes in the wrong direction, just reverse the 1N34 diode connections. After getting an indication, adjust the slug of LI and peaking C2 for resonance with your 7 Mc. signal. (This can be used on any Amateur band by re-designing the LI and C2 circuit.) After the monitor is tuned, balance out the carrier and advance the potentiometer for more sensitivity to get a good null indication.

That is all there is to it! Next time you take a trip, don't take it without this handy gadget. It's well worth the effort to build it.

NEW CALL SIGNS

FEBRUARY 1964

VK1AU—C. G. Harvey, 18 Lynch St., Hughes.
VK2GF—G. R. Fesler, 17 Ingalar Ave., Wahroonga.
VK2IN—R. C. Meadows, 80 Dampier Boulevard, Killarney Vale.
VK2AAT—Alwagah Evening College Radio Club, Regent St., Kogarah.
VK2ARN—W. H. R. Stitt, Station: Underwood St., One Mile Beach Forster; Postal: Cumbijowa, Forbes.
VK2AXZ—W. A. Bell, 4 Bix Rd., Dee Why.
VK2AXU—P. Maloney, 174 Excelsior Pde., Kedron, Brisbane.
VK2GF—G. R. Felser, 17 Ingalara Ave., Wahroonga.
VK2ZHV—E. H. Vaughan, 75 Bonyn Rd., Palm Beach.
VK2ZSW—K. W. Soward, Sidler St., Nimbin.
VK3ACZ—V. C. Zawalinski, 10 Regina St., Ringwood.
VK3PK—E. H. Williams, Station: Airport, Mildura; Postal: P.O. Box 457, Mildura.
VK3XS—E. R. Curtin, 112 Centre Dandenong Rd., Cheltenham.
VK3ZQ—E. Mendendorf, 493 South Rd., Moorabbin.
VK3ZL—J. O. Greenie, 5 Blackshaw Rd., Ormond East.
VK3ZRY—R. L. Harrison, 1 Mary St., North Geelong.
VK3ZUN—A. Lunstedt, 55 Lincoln St., Moa.

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.

"Q-MAX" CHASSIS CUTTERS

BRITISH MADE

SPECIAL SIZES MADE TO ORDER

SAVES TIME — GIVES PROFESSIONAL APPEARANCE

The "Q-Max" range of Screw Type Chassis Cutters serve a most useful purpose where holes are to be punched on chassis where components are already mounted. The SQUARE and RECTANGULAR punches save the hard work involved in transformer, plugs and sockets, I.F.'s., etc., cut-outs.

"WILLIS" CHASSIS PUNCHES

MADE TO ORDER

SPECIAL SIZES MADE TO ORDER

SAVES TIME — GIVES PROFESSIONAL APPEARANCE

The "Q-Max" range of Screw Type Chassis Cutters serve a most useful purpose where holes are to be punched on chassis where components are already mounted. The SQUARE and RECTANGULAR punches save the hard work involved in transformer, plugs and sockets, I.F.'s., etc., cut-outs.
In presenting the results of the 1963 VK-ZL-Oceania DX Contest, the F.C.C. would like to thank all those who participated in the Contest and to congratulate the winners. In the overseas section the various band scores have not been indicated, only the overall totals.

Last year’s Contest saw a considerable increase in the number of logs submitted and it is apparent that it has been growing in popularity, especially among overseas Amateurs. A number of overseas Amateurs commented on the increased activity in the VK-ZL area. (Some thought that it could have been better. Several comments were received on the practice of the VK-ZL operators to use the whole of the bands instead of crowding into a small section of the band. The overseas Amateurs thought that this enabled them to make their contacts much easier and was quite a popular move.)

The 1964 Contest will be organized by the N.Z.A.R.T., and the W.I.A. will be responsible for the Contest in 1965 when we will look forward to your company once again.

—Federal Contest Committee, W.I.A.

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| 15 Metres: 2GR ... 7460 |
| 15 Metres: VK6RU ... 2965 |
| 15 Metres: 2EO ... 7860 |
| 15 Metres: 2GR ... 7460 |
| 15 Metres: VK6RU ... 2965 |
| 15 Metres: 2EO ... 7860 |
| 15 Metres: 2GR ... 7460 |
| 15 Metres: VK6RU ... 2965 |

### RECOMMENDATIONS

- VK-ZL-OCEANIA DX CONTEST, 1963, RESULTS

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Amateur Radio, June 1964
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and at Melbourne • Brisbane • Adelaide • Perth
Correspondence was received from the following during the period ending 11th May, 1964: VKs 5MC, 2AXY, 2AOU, 4XP, 3AIK, 8K, 3AU, 4NS, 2AKK, 3AAW, 20DJ, 3ALZ, 4ZKK, 5PV, 3AP, 5AAG, 2DM, 7ZEH, 7ZAS, 6XU, 4XV, 1LK, 3AHG, 2AXX, SBB, 5ZCR, L3042, L3006, L2280, J. W. Miles, S. E. Wedgery, P. Garde, and D. Gilder.

A formal reply will be sent to those correspondents who are also known to the Committee.

At the May meeting the new '64/'65 Call Book was discussed and it was agreed that the price would remain as before. Supplies are expected within the next three months and should be available some time in July on present indications. The layout of the current Log Book was discussed and it was agreed that the newer vertical style be adopted as a trial and user’s comments would be awaited.

For new technical articles were received but as these are still less than our needs, it was agreed that “A.R.” would republish various technical articles from other magazines. This does not mean particularly those magazines that have access to other overseas magazines, but it was thought that many Amateurs who do not receive other magazines might welcome the opportunity to read these reprinted articles.

The Prediction Charts have not been commenced as the Committee await all States to agree to certain proposals submitted at the last Federal Convention. When these are ratified it will be possible for your Committee to allocate more funds to printing “A.R.” It is the current lack of finance which has temporarily reduced the size of “A.R.”

The Committee expressed their gratitude to those who have volunteered to assist in doing the required drawings for the magazine. In addition, it was reported that to date no suitable volunteer and high-power editor for the temporarily discontinued Sideband Page. Some correspondents are looking at more than that all notes must be received by “A.R.” or on before the 8th of the month preceding publication, late arrival of notes means their omission from “A.R.” In this issue a few notes were published which indicates that they had not been received or were sent in too late for publication.

The Publications Committee will print in this column each month the main points regarding Magazine happenings so that you, the reader, will be fully aware of the facts, Comments are invited upon the introduction of this column.

The Transistor Radio Handbook

The first edition of this handbook by Donald L. Stoner and L. A. Earnshaw, two world famous Hams, is published. The book is a very valuable reference source and provides the basic technical and practical aspects of Amateur Radio.

In twenty-five chapters it deals very thoroughly with the average Amateur’s needs, but due to the higher power permitted for U.S.A. transmitters the book is biased towards such high power equipment that it is not possible for this Committee to allocate more funds to printing “A.R.”. It is the current lack of finance which has temporarily reduced the size of “A.R.”

Every Amateur should have a copy of the A.R.R.L. Handbook and if your edition is many years old, then the current issue is a good buy at 51/6 each. It is one of the cheapest books of its type available and will remain an asset for many years to come.

Our copy from McGill’s Authorised Newsagency, 183 Elizabeth St., Melbourne, Vic., was reported as being out of stock.

Price 63/6 plus 1/9 postage. (If you think this dear, try pricing some of the other Competitors’ books.)
S.W.L.

Sub-Editor: Ian Woodman, WIA-L3006

Those persons supplying notes to this section should note that the new sub-editor for this section will be Chas. Aberneathy, WIA-L2111, and all mail for this column should be sent to him by 20th of month at 30 Urunga Pde., Miranda, N.S.W.

TWO S.W.L. AWARDS

We now have the details of two s.w.l. awards which are available to you. These awards have the approval of Federal Executive, who are supplying an attractive certificate. The awards are: Heald VK1 and S.W.L. D.C.C. The requirements for these awards are as set out below.

The Heard All VK and S.W.L. D.C.C. The requirements for these awards are as set out below.

The Heard All VK award requires one card from each of the following areas: VK1, VK2, VK3, VK4, VK5, VK6, VK7, VK8, VK9 (New Guinea), VK10 (Papua), VK11 (Nauru or Norfolk), VK12 (Cocos Keeling on Christmas Island), VK15 (Herald Island or Macquarie Island), VK16 (Antarctica). A total of 14 cards will be required for the award.

The S.W.L. D.C.C. award requires one QSL card from 100 different countries; these countries may be included in the W.L.A. list of separate countries. A total of 100 cards for the award.

For each of these awards it does not matter what mode of reception was used, but it must be from an A.R.C. station. The information on the card should include the date, time (either G.M.T. or E.A.S.T.), frequency, mode and station worked. The cards do not enter into either award and they must be sent to us. These awards will be issued to overseas S.W.L's as well as VK members. The awards manager is Eric Trebilcock, WIA-L3006, 940 Gillies St., Thornbury, N.17, Victoria.

NEW SOUTH WALES

If the mail to this QTH continues I am afraid that the heading of N.S.W. shall have to be changed. To my great pleasure letters have reached me from VK2, 3, 4 and 5. This is very encouraging, and I extend sincere thanks to those who have given a little of their time to provide so much joy. For those S.W.L.'s who do not now have a b.f.o. on their rx we have a circuit diagram that will enable the information to your set. A copy plus an explanation can be yours for the asking. Also available is a list of all stations that have worked A.R.C. zones and it is available to those who are interested. This list can do nothing but encourage. For more information, please enclose a stamp for postage. Our thanks go to Bill L258 (Director of the VK2 Group) for sending us above two items, as a lot of time went into the drawings which are a credit to him.

Don Levy has not done much listening this year to date, but shall have something for us in the near future. Ross Beckley finds the

YOUTH RADIO CLUBS

Special congratulations this month to Bob SOD, VK5R, for passing the A.O.C.P. examination. Ross Lz211 has received a letter from VK6 QSL via the VK3 Bureau.

The VK Sunday Club is now known as the VK5 Club. He is the founder of the well known "TV Youth Club" which has been part of Methodist Youth work for some years. This is great news, Bob. If you can organise help from your club and others, I think we shall all get some good results. The club leaders who would otherwise feel snowed under before the exam will have a Divisional help will be eagerly awaited.

There is also a new supervisor in VK6—a good type, obviously, because he wrote me a letter of thanks for the work at Wesley College, Perth, where he organises a very active club. There is a call sign in VK6 for such a supervisor, but no suitable gear—did I hear somebody in VK6 with no suggestion? The club is distinguished by having twice been centredly passed L.A.O.C.P.—Ray Goddy, EZ6EG, and Peter Perrington, EZ2EG, who inspired others in VK6 to make the effort.

There are now further details from the Boy Scout High Y.R.C. As well as Stuart, in Broome, our first school girl A.O.C.P., there were two others in the January exams.—Jan Oosterveen and Sheila Beattie. This is a forth from Keith Howard stable—worth an Oscar (Hollywood) in my view. In fact, the W.I.A. Y.R.C. now stands at 10 on my count. In such a short time, this result clearly indicates what could be done with full backing. This is so obvious that one should not be surprised at our next piece of news.

The Secretary of the W.I.A. has received a letter from the Radio Society of Great Britain, asking for details of the Australian Youth Radio Clubs and indicating that a similar project is being considered in U.K. The British have agreed to provide a worthwhile challenge and hope that a minute fraction of Sir Robert's £514 million for science education or, even easier and cheaper, the granting of novice licences would encourage many more people to study our branch of electronics.

John 4UC showed a fine touch in publicity when he put the Chas. Aberneathy, WIA-L2111, on the air (VK4RP) recently. He managed 80 contacts, which is very good for an odd contacts, which is very good for an ordinary class. John was helped by his parents. This is publicity of the beat kind—obvious and takes heart. I am afraid that, in my first letter, the一团乱的 scientific education than in this country, every little bit helps. Also, the U.K. Amateur numbers situation may be something like ours. Compared on a ratio basis with the 250,000 U.S. Amateurs of the present 3,000, you should all do your bit to help. Also, can we ask that a minute fraction of Sir Robert's £514 million for science education or, even easier and cheaper, the granting of novice licences would encourage many more people to study our branch of electronics.

If you are interested in organizing a Y.R.C., or are interested in joining a Y.R.C., or if you are interested in sponsoring a Y.R.C., you should contact a Vic, Qld, N.S.W., or S.A. Youth Radio Club.

As an example, a Y.R.C. in Queensland has been formed at the request of the Assistant Director of Secondary Education, in the Brisbane area, to provide a GSRV antenna. Hope you enjoy the booklet together with articles suitable in "A.R.," in particular containing articles giving the history of your Y.R.C. Photographs will be returned if the sender's name and address is shown on the back of each photograph submitted. Manuscripts should preferably be typed, but if handwritten, please double space the writing. Photographs will be returned if the sender's name and address is shown on the back of each photograph submitted. Please address all articles to the EDITOR "A.R.," P.O. BOX 36, EAST MELBOURNE, C.2, VICTORIA.

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 typed, but if handwritten, please double space the writing. Drawings will be done by "A.R.," staff.

Photographs will be returned if the sender's name and address is shown on the back of each photograph submitted.

Please address all articles to the

EDITOR "A.R.," P.O. BOX 36, EAST MELBOURNE, C.2, VICTORIA.

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BRIGHT STAR RADIO

46 Eastgate St., Oakleigh, S.E.12, Vic. Phone 57-6387

Amateur Radio, June, 1964
Before I start this month's notes allow me to make it known that all DX notes for each column must be in the hands of the editor by the 8th of the month preceding the actual date issue. All information submitted that will con-

Some stations worked: UA0KJA (0800), WJ9RY (0445), SPTHX (1320), UA0KKA (1200), KG6BD (1030), VP6DI (0500), VP6DG (0230), W0-WJ, UDEKAR (1300), TTTITI (1315), VP2DC (1015), K7JR (0945), VP0MG (0615), VP0S (0245), VP2UG (0230), SLAD T0RJ, VPITA, VP0HAG, VP0KL (Chago), VS0AA, YN0RDL, ZC0AL, Z0FFD, SASTW, A1ZG. The above all have 5 W.E. and 5 C.W. on c.w. Simultaneous reports cannot be included in the month's publication.

For the very keen the bands are still offering quite good contacts and with the trough at our back door, Ken 2TL advises he has just had his best month ever. Shift workers and the lucky retired who used 14 Mc. during the afternoon are now getting up to two or three hours of uninterrupted contacts.

VK3AC/Mobile heard just below 7.1 Mc. with GI, GW and GS on the hook all at once. Not bad for mobile s.s.b.

Graham has returned from Norfolk, with his antenna (a wyndom) reported up around the 100 ft. mark, reports noise level very low, and worked some impressive DX. There were many pile-ups although contacts appeared a little spasmodic, plus the fact of the one blackout. Multi-band vertical for 14 Mc. was used.

80 Metres: VP8GL worked on c.w. and a.m. VK3AHO 76 287 VK3BZ 4 231 VK2ACX 8 300 VK3JA 43 252 VK4FJ 32 305 VK3NC 77 283 VK8RU 8 304 VK3HG 3 274 VK39J 5 301 VK3AHQ 79 238 VK3AJ 8 239 VK3FJ 21 278 VK4RW 23 186 Amendments: VK3A9J 80 107

C.W.

The workings of all contributors will in future be grouped in the respective bands to conserve space and to keep the reporting more

LISTED BELOW ARE THE HIGHEST TWELVE

AWARDS:—

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

Listed below are the highest twelve members in memory, new members and those whose totals have been amended will also be shown.

PHONE

W. I. A. S. W. L.'S. AND QSL'S.

Editor "A.R.," Dear Sir,

Following a mail bag containing 38 letters from contacts, I find it necessary to comment on points that have, I feel, become out of control. In replying to most of them.

Out of 38 reports only 2 had included stamped addressed envelopes. This is not a small number, and may I remind the S.W.L. that he is not only the one requesting a QSL. There are many, many others doing the same and boy for the person replying to each report it entails quite an expense.

You may argue that you are doing the Amateur a service in giving him a report and he is indebted to reply. My answer to this is absolutely NO. If only the S.W.L. would stop to think of the Amateur's point of view he might find it is a long time before he reads a report from a Listener in the same city that the Amateur has been working at 5/9. Naturally he expects to be heard, and is not interested in a report.

My way of thinking, a report should be given under conditions, for example, when you are working W and are heard in G, where the report is of interest to S.W.L. and Amateur alike.

The above may be the obvious reason for wantingDX notes, but there is another reason for DX notes in the DX columns which is, to advertise your QSL's. I do not mean that you should advertise your QSL's, but if you have many QSL's to send, it is a waste of space to advertise your QSL's in the column. If you have many QSL's to send, it is a waste of space to advertise your QSL's in the column.

In conclusion, may I say I have found W.I.A. S.W.L.'s generally do this or state QSL's via the Bureau, and for the person replying to each report it entails quite an expense.

S.W.L.'s.

S.W.L.'s. AND QSL'S.

The small archipelago of Kerguelen Island (FB6XX) Marion Island (ZS2MI) and Prince Edward Island and the Crozets (FB-

The present weather station was established in 1948, and its operation has been continued ever since. The tx runs 150w. into a rhombic beamed on Pretoria (South Africa). The rx's are AR88s, 1155s and HROs. Despite

Amarillo communication from Marion Island, using call ZS2MI was first established in March 1948, and its operation has been

The central peak on the Island rises to 3,890 feet a.s.l. There is NO soil on the Island, and the rock top is covered by peat, which is

Amendments:

EDWARD C. PAYNE

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schedule:—will terminate at 0300s on Monday, 17th August. mence on Friday, 14th August, at 1700z and for certificate awards. Operation will complete on Friday, 14th August, at 1700z and will terminate at 0300s on Monday, 17th August.

Mc. equipment, and Keith 2AKX, who spoke...

28 Mc.—K8LBQ/3, 28.6 Mc., a.m. and s.s.b.
3.935 Mc. s.s.b., 3.645 Mc.

All QSLs to K8LBQ. Further info from this Bureau.

The newly formed Radio Club at Teralba is now renting a hall on the premises of the Teralba Bowling Club. The club is situated across the road from the bowling club and is now fulfilling the function of a "club house" for members and guests. The club is well equipped with all the necessary facilities to make it a popular meeting place for members and guests alike.

Our rang* ol quality Intermediate Frequency Transformers covers all freque...
Norm 3EQ is getting going again on 14 Mc. Harry 3AXI is on each week and never misses out along with Bill 3WK, Doc. 3NA and Peter 3FX will be back from their working holiday up in the Northern Territory. They had the Type 3 Mk. II. with them.

The Y.M.C.A. Radio Club is going along nicely at Warrnambool and I have nothing worth mentioning about W.I.A. and all members intended to join the Institute. The Warrnambool Technical College Radio Club is out on a lot of help from Mr. John Ross. This Club is not linked with the Institute, but it is very successful at Warrnambool. (Contrast at any time. Eric 3ANQ puts a lot of time in helping these boys, which is nice as well as being a regular source of income for the Club.)

Also noted that Terry 7CT has been a Council member for a very long time, but only a member of the W.I.A. and all members intended to join the Institute. The Warrnambool Technical College Radio Club is out on a lot of help from Mr. John Ross. This Club is not linked with the Institute, but it is very successful at Warrnambool. (Contrast at any time. Eric 3ANQ puts a lot of time in helping these boys, which is nice as well as being a regular source of income for the Club.)

We are grateful to VK3AAK, Alex Swinton, of Kulnura, N.S.W., for donating some equipment to the Y.M.C.A. Radio Club. This has been sent to Bill Wines as Alex was a native of Warrnambool many years ago. Thanks, Alec. 73, Bill Wines, c/o VKJAAW, Y.M.C.A. Radio Club, Warrnambool.

QUEENSLAND
TOWNSVILLE AND DISTRICT
This month I feel inclined to clean any news as the bands have not been treating me too kindly. No visitors to pass on anything and the Y.M.C.A. radio Club is down south in the big smoke, having a well deserved week off with many of the boys while in the big city.

The Cairns boys are also absent from the action this month, but I guess they are over at the Y.M.C.A. radio Club some time during the holiday period. The footstep of that illustrious writer "Panay" and pad them when the new is due. Speak what he has written. what he says and what he writes. The salary not high enough in these days.

May I hear from you if you have anything to send in for the Y.M.C.A. radio Club?

NORTH WESTERN ZONE
Here we have the same problem that we are facing in the Northern Territory. The Y.M.C.A. radio Club is getting a lot of help from the W.I.A., and all members intended to join the Institute. The Warrnambool Technical College Radio Club is out on a lot of help from Mr. John Ross. This Club is not linked with the Institute, but it is very successful at Warrnambool. (Contrast at any time. Eric 3ANQ puts a lot of time in helping these boys, which is nice as well as being a regular source of income for the Club.)

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TASMANIA
South East District
Only two months plus to go to R.D. Contest! (It soon comes around, doesn't it?) So make a note to clean away the spiders and get the rig cleaned and tuned. Your kids may be coming home to visit. We are all very keen to have them down south in the big smoke, having a well deserved week off with many of the boys while in the big city.

The Tasmanian boys are also absent from the action this month, but I guess they are over at the Y.M.C.A. radio Club some time during the holiday period. The footstep of that illustrious writer "Panay" and pad them when the new is due. Speak what he has written. what he says and what he writes. The salary not high enough in these days.

May I hear from you if you have anything to send in for the Y.M.C.A. radio Club?

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Extra words, 2d. each.

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The valve or sub-assembly under test is pumped out by the equipment shown above and its outer surface enveloped in helium. If there is a leak the equipment indicates the fact by both a meter reading and a loud audio warning.

The equipment supplied to AWV requirements by Vacuum Electronics Corp. of the U.S.A., consists of a high vacuum system which includes a mass spectrometer tube, and electronic and electro-mechanical control systems for completely automatic use in production. The mass spectrometer tube is "tuned" by magnetic and electric fields to respond only to the predominant isotope of helium.

Helium, because of its small atom, its inertness and its rarity (the air contains only 0.0005% by volume), is an excellent gas for detecting leaks. The helium mass spectrometer provides an extremely sensitive and rapid, yet probably the most reliable, means known for leak detection.
FIRST AUSTRALIAN S.S.B. CONVENTION, HAMILTON, VIC., MAY 16-17, 1964

Back Row: (left to right) Harry VK3ZX, Andy VK3UJ, Mac VK3AZM, Lee VK3XM, Arie VK2AYA, Tim VK3TW, Reg VK3QR, Frank VK3ZU, Col VK3RO, Bernie VK0KJ, Thord VK3APS, Ken VK3KC.

Third Row: John VK3JX, Bill VK3XII, Arthur VK3HY, Roy VK2ES, Phil VK3NN, Bill VK3AHT, Bill VK3RE, George VK3AG, John VK3QJ, Shep VK3DC, Harold VK3AHB, Geoff VK2AC.

Second Row: Al VK3MF, Owen VK3AEH, John VK3AWL, Ted VK2AXD, Dudley VK2DQ, Bruce VK3BM, Jack VK3JA, Bill VK3WK, Laurie VK3VH, Ben VK3RD, Coms VK3EF.

Front Row: Dan VK3ADD, Peter VK3APH, Enn VK3AEH, Wal VK3FT, Jock VK3PZ, George VK7XL, Lee VK3XO.
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60 ohm, UR67, 3/8" dia., in 25 yds.
Rolls 25/- or 1/6 yard.

50 ohm, 3/16" dia., 2/6 yard, any length up to 200 yards.
Rolls 7/10/6.

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FEDERAL COMMENT

50th ANNIVERSARY

It is pleasing to record the 50th Anniversary of the American Radio Relay League in this year of 1964. Two other Societies have also recently passed this historic milestone—our own Society, the W.I.A. in 1960, and the Radio Society of Great Britain in 1963. Since its formative years, the A.R.R.L. has become the largest and most influential Society of Radio Amateurs in the world.

One might be forgiven for believing that it is because the A.R.R.L. has such a large membership—now nearly 200,000—that it has “ploughed” its way to the top. Undoubtedly, a healthy membership is a big factor, but the real reason lies deeper than this. The key lies partly in the foresight of its early pioneers, their proximity to the “old world”, their sound foundation for their organisation, and more than a modicum of that innate American ingenuity and persuasive, business sense.

Although it is generally conceded that Great Britain developed radio broadcasting, it was our American contemporaries who saw the future possibilities of this medium and made it a commercial proposition. It was therefore to be expected that the early Radio Experimenters in the U.S.A. would take advantage of commercial components and take a leading part in experiment work and become the major power in Amateur Radio.

It was perhaps natural for the A.R.R.L. to take a lead in the formation of an international union of Amateur Societies in 1926, the year in which the International Amateur Radio Union was born and of which the W.I.A. was a foundation member. Later in 1927, at the Washington Radio Conference, the A.R.R.L., backed by their government, fought almost a lone hand against strong opposition to assign special bands of frequencies for Amateur use. They won the day, and established a precedent for which all Radio Amateurs today may be justly grateful.

The A.R.R.L. and the I.A.R.U. have, through the years since those early days, fought strongly for and defended Amateur privileges, and it is mainly their efforts which enable us to enjoy our hobby today. The A.R.R.L. have been the sole financial supporters of the I.A.R.U. since its formation and can be satisfied the Union now boasts membership from over 50 countries including the U.S.S.R. The A.R.R.L. can be justly proud of its record in Amateur affairs and in this, their anniversary year, of moving into magnificent new quarters in Newton.

It is therefore with gratitude and great pleasure that we associate ourselves with the A.R.R.L. in their Golden Anniversary celebrations and wish them well for the future. The A.R.R.L. has set Amateur Radio a great example over the years—all I.A.R.U. Societies could not do better than emulate this fine example.

FEDERAL EXECUTIVE, W.I.A.

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YOUR PYE REPORTER, PTCA-116, Mk. II.

DAVID PRIESTLEY, WIA-L3163

PART ONE—THE RECEIVER

Due to a large number of Pye Reporters already on the market, and the number that come up for sale from time to time, these instructions are published to enable more of the Australian Amateur fraternity to make good use of these sets, and at the same time give us an Australia-wide 6 metre band net.

These instructions are not to be confused with those that appeared in the September 1963 issue of "Amateur Radio," which were to do with the PTCA-116 Mark I. Lining up procedure for both sets is entirely different as was discovered when trying to line-up according to instructions for the Mark I series.

The signal generator used was a Hewlett Packard with sensitivity of 0.1 of 1 microvolt, and 0.001 of 1 cycle per second accuracy.

The experimental set, owned by the author is sensitive to 1 microvolt, and is accurate, in the receiver, to within 2 cycles per second of the net frequency.

Pertinent details for receiver line-up are as follows:—

Signal frequency .... 53.0320 Mc.
Crystal frequency .... 13.98833 Mc.
1st i.f. frequency .... 11.02763 MHz.
2nd i.f. frequency .... 2.96070 MHz.

Coil numbers are taken from the circuit of the PTCA-116, Mark II.—

L1—7 turns 18 g. tinned copper wire.
L2, L3, L4—6½ turns 18 g. enamelled copper wire.
L5—28 turns 23 g. enamelled copper wire.

RECEIVER ALIGNMENT

Because of deterioration brought about by ageing, it will be necessary to replace Westector diodes 1, 2 and 3 in the circuit. Diode type AA119 will be found to be efficient, yet favourably priced.

Set all trimmers to approximately half mesh and adjust Philips trimmers on T1 to about 1½ turns from full mesh.

Adjust slug in L5 for maximum reactance.

Set signal generator to 2.96070 Mc. and check T2, T3, T4 and T5.

Set signal generator to 11.02763 Mc. and feed into L4 at the joint of C11. Reset Philips trimmers to maximum output level.

Set the Pye connector feed in a signal at 53.0320 Mc. and readjust all trimmers for maximum output.

The result should be quite rewarding.

A quick check around Amateurs in metropolitan Melbourne showed an abundance of circuit diagrams for the PTCA-116 Mark II. Reporters. It is known too that many Amateurs in other States have these circuits, and it was felt that the cost involved of redrawing circuits would not be warranted with this fact in mind.

It should also be noted that the majority of Amateurs using this frequency are using vertical polarisation and that unless a cubical quad or whip aerial is used, nothing will be forthcoming.

In VK3 land, the net is most active during the week-end and good strong signals can be heard coming from all over the metropolitan area, with the occasional foreigner from VK7 land riding the noise.

For a whip aerial we used a piece of stainless steel rod, purchased for about 3/-/o. The rod, of one-eighth inch diameter, was cut to 58½ inches in length and fed into the receiver through 50 ohm coaxial cable.

The impedance of the feeder is critical, and every endeavour should be made to use the correct Pye connector, readily obtainable through disposals.

How to line up the transmitter, what to do and what not to do when doing this very finicky job will appear in a later issue.

KEEPING OUT OF THAT MODULATED MILK BOTTLE

With the advent of more t.v. stations coming into operation, it is a pretty good bet that more and more Amateur transmitters will be putting those unwanted harmonics into these frequencies. Having been through this, may I be permitted to pass on the findings of experiments from here.

Situated approximately 100 miles from the Adelaide transmitters, and with a reading of about 10-40 microvolts during daylight hours, you will see that it called for drastic measures.

Then the following in order was brought about, and over a period of time the interference was brought to a minimum. So much so, that we could go on 20 metres and cause no t.v.i. with 100 watts. I must, in all fairness, say that some nights here the signal is as strong as the viewing in the metropolitan area, however this is rare. T.v. is viewable each night.

So, do not have any shafts that are hot to r.f. protruding out from the cabinet.

Keep your antenna as far away as possible from the transmitter.

A good earthing system is very necessary, with a very short lead.

Once you get to the aerial tuner, it does not seem to matter what type of feed you use to the antenna, as you should not have any harmonics present.

Do not shift frequency without retuning the transmitter.

Watch all diodes you may have in monitors, especially those with a long length of wire to energise them, as these can cause trouble.

The experiments on the above subject are unlimited, but the foregoing should remove most of the interference from most transmitters.

Follow the elimination diagram in the R.S.G.B. Handbook re t.v.

Particular pains should be taken in the by-passing of leads, both h.t. and heaters. Leads that go from compartment to compartment should also be by-passed with disc ceramics.

It is a fascinating subject and a lot of satisfaction can be had when it is eventually conquered.

—Bert Behenna, WIA-L316B

A good earthing system is very necessary.

Keep your grid drive as near as possible to the correct amount, if any—

Obtain your operating frequency with as few stages as possible.

It is a waste of time to carry out any tests without the t.v. transmitter on the air. If you have one particularly bad channel you find is causing you concern, it may be a good idea to insert a series resonant trap at the coax terminal inside the transmitter, tuned to the t.v. transmitter's frequency.

Coaxial output is a must to the tuner, into which must be inserted one low pass filter, but in the case of 21 Mc. it will be better to insert a half wave filter. However this will have to be changed each time you change bands. Reference for half wave filters (July "A.R." 1957).

It would also be advisable to install an s.w.r. bridge in this lead also.

Keep your antenna as far away as possible from the transmitter.

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—Bert Behenna, WIA-L316B
A 5/8 WAVELENGTH VERTICAL FOR TWO*

HERBERT S. BRIER, W9EGQ

WITH all the descriptions and pictures of multi-element v.h.f. beam antennae seen in the various Amateur journals, some Amateurs forget that the simple vertical v.h.f. antenna still has definite advantages for certain types of operation. A vertical antenna, for example, is much simpler to install and far less conspicuous on an automobile than a horizontal antenna. Also the omni-directional radiation pattern of the vertical antenna is highly desirable in local v.h.f., CJD., and local ragchewing nets where none of the stations are very far apart, but who are scattered in every direction of the compass. Under these conditions, a beam is often a disadvantage, since in no matter which direction it is turned, you can’t hear all the stations in the net.

What we really need is to retain the advantages of a vertical for local work, and, at the same time, achieve a little antenna gain—without too many complications. Actually, there is an antenna that meets these specifications. It is the 5/8 wavelength vertical. Although it is 2½ times as long as a 1 wavelength antenna, the 5/8 wavelength antenna has a power gain of almost 3 db., and the resulting length (four feet on 2 metres) is easily accommodated on the v.h.f. bands. Equally important, the antenna is simple to build, as indicated in Fig. 1.

THEORY OF OPERATION

Touching briefly on the operation of the 5/8 wavelength antenna, as a short vertical antenna is increased in length, its radiated power is concentrated more and more at angles approaching the horizon. But, as the length exceeds 5/8 wavelength, a secondary lobe of high-angle radiation develops in the radiation pattern. In spite of this, the low-angle radiation from the antenna increases to increase until a length of 5/8 wavelength is reached. Beyond this length, however, the low-angle radiation decreases, and the high-angle radiation increases. Thus a 5/8 wavelength vertical antenna gives the maximum low-angle radiation possible in a simple vertical antenna.

Because a 5/8 wavelength is a non-resonant length, a small inductance, connected in series with the antenna to increase its effective electrical length to 5/8 wavelength (without changing its radiation pattern). With the addition of the loading coil, the 5/8 wavelength antenna sketched in Fig. 1 has a feed-point resistance of approximately 50 ohms, a close match for 50 ohm coaxial cable.

CONSTRUCTION

To construct the antenna, obtain an inexpensive fibre-glass fishing rod at least four feet long and approximately 1/4 inch in diameter at the large end. Such rods are often available for less than $2.00 during special sales at sporting-good and department stores. Detach the rod from its handle, and remove the ferrules from the rod. On some rods, the ferrules are fastened to the rod with wrappings of cord and are easily removed completely; on others, they are crimped in place. If yours is of the latter type, it may be better to slip off as much as possible of the ferrules, and smooth off the remaining rough edges with a file. Then, measuring from the large end, cut the rod to a length of 48 inches.

Drill a 3/32" hole through one side of the rod an inch from the large end, and thread a length of No. 14 bare copper wire through the hole and out the bottom of the rod (which is usually hollow at this point). Allow about an inch of the wire to protrude at right angles to the rod and parallel to the first wire. Solder the wire to the braid and trim off the excess braid below the wire. Next, tightly wrap the shield braid with plastic electrical tape. Finally, space wind an 11-turn coil of No. 14 wire in the 1/4" space between the two protruding wires on the rod, terminating the ends of the coil at these wires.

INSTALLING THE ANTENNA

For a mobile installation, mount a standard, chassis-type coaxial connector on the automobile fender, roof, or trunk, etc., and screw the antenna to it. The photograph gives hints for constructing a ground-plane base for using the antenna in a fixed-station installation.

The four 5/8 wavelength radials (19½" long) shown in the picture are constructed of No. 12 wire; but, for increased rigidity and improved appearance, No. 10 or larger wire is recommended. Suitable wire in various gauges can be obtained in the form of plastic-covered house wire from electrical supply and mail order houses.

Remove the plastic coating before using the wire, of course. You can also obtain heavy duty solder lugs for mounting the radials from the same sources. Of course, 50-ohm coaxial cable is used to feed the antenna.

ADJUSTMENT

Connect an s.w.r. bridge in the feed-line between the transmitter and the antenna, and vary the spacing between turns in the antenna loading coil for minimum feedline s.w.r., which was just over 1½:1 in this installation. Depending on the actual diameter of the fibre-glass rod used and other variables, it may be necessary to add a turn to or subtract a turn from the loading coil to obtain minimum s.w.r. After the coil is adjusted, solder its ends to the protruding leads, trim off the excess copper wire, and add low-loss dope to weather-proof it and to hold the turns in place.

(Continued on Page 6)
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FOR HAND-DESK USE

SPECIFICATIONS:
Output Impedance ...................................... 50 ohms or 50K ohms
Effective output level ................................ -55 db. \( [0 \text{ db.} = \text{(one) IV. Microbar}] \)
Frequency response ...................................... 200 to 10,000 c.p.s.

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Colour: WHITE.
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SINGLE SIDEBAND:

AN EXPERIMENTAL SINGLE CRYSTAL FREQUENCY SYNTHESIZER*

G. R. B. THORNLEY, G2DAF

MANY experienced s.s.b. workers are looking for an improved method of transmitter frequency control. The conventional v.f.o. using some form of tunable LC oscillator has the merit of simplicity, but unfortunately it suffers from frequency drift. To give some idea of how great this frequency error can be, it is of interest to examine the figures given in the Collins manual "Fundamentals of Single Sideband." These are shown, together with figures of other types of oscillators, in Table 1. It is also important to realise that the errors quoted are for a v.f.o. of first class design and construction made with all the resources of a large factory. The home constructor would be very lucky indeed if he could match these figures—In practice his frequency error is likely to be much worse than the figures given.

So far as Amateur stability requirements are concerned, the crystal oscillator can be considered drift-free. It follows therefore that the ultimate aim is some method of providing the required v.f.o. output, but in some way obtained from, or controlled by, a stable quartz crystal oscillator.

One method of doing this is the result of some experimental work undertaken by the writer in which the output of a stable 100 kc. quartz bar is divided down into 2.5 kc. "steps" and the "steps" given continuous coverage by "pulling" the crystal. (The basic principle together with a block diagram of the associated stages was given in Single Sideband, R.S.G.B. "Bulletin," Nov. 1963.) That part of the equipment associated with the balanced converters, V4 and V5, the bandpass filter, and the harmonic amplifier, will be described later. These will now be described in detail.

Fig. 1 shows the circuit diagram of all stages up to the input of the first converter V4. The first valve, V1, is arranged as a Colpitts oscillator using either an EF80 or EF91 valve. A variable capacitor of 50 pF. is connected effectively in shunt with the 100 kc. quartz bar. This is the fine tuning control, and is used for "pulling" the crystal to the small amount necessary.

Output from the oscillator V1 is fed via the 50 pF. capacitor to the anode of a blocking oscillator V2a. The oscillator repetition frequency is controlled by the time constant of the 500 pF. capacitor and the 330K ohms resistor in the grid circuit. Transformer T1 is used to couple energy from the anode back into the grid circuit to maintain oscillation. Fine control of repetition rate is obtained by the 25K ohms preset potentiometer VR1. The blocking oscillator is adjusted to run at approximately 20 kc. and is held in synchronisation by the triggering pulses from V1 (i.e., every fifth sine wave from the 100 kc. oscillator anode arrives at the right moment of time necessary to initiate the start of the 20 kc. blocking oscillator waveform). The second blocking oscillator V2b is made to run at a lower frequency by the greater value of the grid capacitor—in this case 0.002 µF. Fine control of repetition rate is obtained by the potentiometer VR2 so that the oscillator free runs at approximately 5 kc. It will be noted that the 0.002 µF. grid charging capacitor is not returned directly to earth (as in the grid circuit of V2a) but is returned via a 200 ohm resistor that is also part of the cathode circuit of V2a. This provides the synchronising pulse, and the reason for taking this pulse from the previous oscillator cathode instead of the more obvious transformer side of the valve will be described later.

The third blocking oscillator, V3a, has the time constants of the grid circuit chosen to run at a lower speed than V2b. Potentiometer VR3 is adjusted until the repetition speed is approximately 2.5 kc. The synchronising pulse is again taken from the pre-

---

**Table 1.**

<table>
<thead>
<tr>
<th>Oscillator Type</th>
<th>Error %</th>
<th>Error c.p.s.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>3 Mc.</td>
</tr>
<tr>
<td>Variable Frequency Oscillator</td>
<td>0.007</td>
<td>1500</td>
</tr>
<tr>
<td>Temperature Controlled Crystal Oscillator</td>
<td>0.001</td>
<td>30</td>
</tr>
<tr>
<td>Precision Standard Oscillator</td>
<td>0.0001</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Oscillator Type</th>
<th>Error P.P.M.</th>
<th>Error c.p.s.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P.P.M.</td>
<td>3 Mc.</td>
</tr>
<tr>
<td>Variable Frequency Oscillator</td>
<td>20</td>
<td>60</td>
</tr>
<tr>
<td>Crystal Osc. and Temperature Controlled Crystal Oscillator</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Precision Standard Oscillator</td>
<td>0.01</td>
<td>0.03</td>
</tr>
</tbody>
</table>

P.P.M.—Parts per million.

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Amateur Radio, July, 1964
ious oscillator cathode, but in this case via a 100 pF capacitor to limit the pulse amplitude.

It will be seen that the stable signal source has a repetition frequency of 100 kc. and that V2a, set to 20 kc., is divided down by a factor of five. V2b set to 5 kc. is divided down by a factor of four, and V3a set to 2.5 kc. is dividing down by a factor of two. The total oscillator chain is therefore dividing down by $5 \times 4 \times 2 = 40$ and is therefore producing an output of 2.5 kc. that is locked back to, and controlled by, the 100 kc. stable crystal oscillator.

A basic blocking oscillator circuit is shown in Fig. 2; loosely this can be looked upon as a tuned anode oscillator with a coupled feedback winding of a type commonly used for r.f. application, but so proportioned as to provide an extreme case of intermittent oscillation. This is achieved by (i) making the anode inductance large and using only the valve and distributed capacitance for tuning; (ii) using a turns ratio between anode and grid so that the peak grid driving voltage is high; (iii) using a grid capacitor that is not too large; and (iv) employing a grid leak of sufficient resistance to make the time constant RC large.

![Fig. 2.—(a) Blocking oscillator circuit (point X may be taken to a source of positive potential). (b) Graph showing discharge of capacitor to grid of the harmonic amplifier V2b. This stage is driven positive into heavy grid current that takes the valve into class C operation and a small angle of anode current that is rich in harmonic output. Transformer T4 is resonated at 3.25 Mc, and this feeds a spectrum of 2.5 kc. harmonics—over the range 3.0 to 3.5 Mc.—into the following converter valve grids.](image)

The blocking oscillator transformers used in the prototype were Haynes Radio Type TQ132 connected so that there is a step down from the anode to the grid. Standard inter-valve audio transformers are 3:1 or 4:1, and should be equally suitable.

![Fig. 3.—Blocking oscillator—grid and anode waveforms. Sufficient charge is built up by resonant frequency of transformer primary.](image)

A Five-Eighth Wavelength Vertical for Two

(Continued from Page 3)

In a ground-plane installation, the position of the radials will affect the s.w.r. obtained. As a suggestion, start with them slanting downward from the base of the antenna about 30 degrees. Then, after the antenna coil is adjusted for minimum s.w.r., try bending the radials up and down for a possible further slight reduction in s.w.r.

**ADDITIONAL CONSTRUCTION NOTES**

If you can find a shop where fishing rods are repaired, you may be able to obtain a fishing rod "blank" for much less than the cost of a complete rod. Also look around for a broken rod from which the 48" length can be salvaged. Incidentally, adjustment of the coil will compensate for slight differences in rod length, but don't exceed the specified length.

**RESULTS**

Experience shows that replacing a 1 wave vertical with the \( \frac{1}{4} \) wave type definitely increases transmitting range somewhat, but the greatest improvement is apparent on reception, especially when the antenna is low.
Construction and Calibration of a V.F.O.*  
JOSEPH A. SMITH, W9ZDN

THE usefulness and dependability of a v.f.o. can be greatly enhanced by an accurate calibration to within one kilocycle. To do this, naturally, the first step is to construct a truly stable v.f.o. that possesses both short and long run frequency stability; that is stability over a period of many days, not just one or two days.

This article presents an example of a time proven v.f.o. of this extra-stable type. Its drift over a one-week interval is less than 1 part in 10^8, which is less than 0.04% or roughly that of the usual run of a non-precision crystal.

In other words, although this v.f.o. is placed on standby during reception periods of a QSO, it still does not drift more than 400 to 500 cycles during a week of operation. Naturally, a normal warm-up period is used.

How, you may ask, is this stability obtained? Well, in the following manner:—

1. The Clapp oscillator circuit is used.
2. A combined unregulated and super-regulated power supply is built on 80 in. square from unregulated to the plates of the two buffer stages, and 150 volts (plus or minus one volt) for the oscillator and both buffer stage screen grids.
3. The v.f.o. operates in the 160 metre band, and output is taken from the plate tuned second buffer-doubler stage screen grid.
4. N.p.o. capacitors are used across the oscillator’s silver mica grid capacitors.
5. All oscillator parts are firmly mounted.

CIRCUIT DESCRIPTION

The circuit of the v.f.o. is shown in Fig. 1. Actually it might more accurately be called an exciter for it has considerable output. A 6AG7 is used in a series tuned Clapp circuit in the 160 metre band. A 6F6 untuned buffer follows the oscillator to provide maximum isolation. This stage is followed by a doubler to bring the output frequency into the 75-80 metre band. This circuit will work well with an 80 metre coil in the oscillator tank circuit and double into the 40 metre band with a 40 metre tank coil in the output.

The power supply is super-regulated for the plate of the oscillator and all the screen grids. The plates of the 6F6 buffer and 6L6 doubler operate directly from the filtered 350 volt line.

CONSTRUCTION

The construction techniques used to build this or any v.f.o. are critical. Mechanical construction must be sound. For example, a heavy steel or aluminium panel should be used and it should be thoroughly braced at the ends. Both variables in the oscillator circuit must be secured firmly so that they will cause no instability. There must be adequate ventilation and any shielding must be rigid.

* This stable v.f.o. exciter covers 80 and 40 metres and can, with slight modification, cover 160 also. Part of the package includes a super-regulated power supply and output is about 5 watts.

The bandset variable is a 140 pF. capacitor located under the chassis near the oscillator coil. The bandspread capacitor is a 50 pF. double bearing type from which a number of rotor plates will be removed in the calibrating procedure to follow.

CALIBRATION

The dial used is a National Type N Velvet Vernier and it is calibrated from zero to 100. A scale for subdividing a single scale division into tenths is also affixed above the main dial. The actual frequency calibration is done on a sheet of graph paper 22" x 17". It contains 16 large squares across and 21 large squares down. Each one inch square is further subdivided into 1/16th units. For this calibration each 1/16th division is equal to 2 kc. One kc. therefore is a half of the 1/16th square. Two scales were plotted in our calibration. First the 80 metre band and then the 40 metre band.

The actual calibration procedure requires the use of some standards. An accurately calibrated receiver such as the Collins 75A line is desirable as well as a stable crystal oscillator. With the bandspread variable at about half mesh, adjust the bandset capacitor to zero-beat against a 3.75 Mc. crystal. The accuracy of this crystal can be checked against WWV on 15 Mc., the fourth harmonic of 3.75 Mc.

Next set the bandspread variable to minimum capacity and adjust the turns on the v.f.o. coil so that you are tuned just inside the upper limit of the 80 metre band.

Now, rotate the bandspread capacitor so that the plates are fully meshed. This should bring you close, but inside, the lower edge of the band. If you move outside the band, remove one rotor plate at a time until the frequency drops back into the band.

With crystals in the 80 and 40 metre band check as many points as possible making a listing of dial reading versus frequency. In between points may be checked on an accurate receiver or a BC221 frequency meter, if available. Plot all the points on the graph, dial readings on the horizontal axis and frequency on the vertical axis and connect the plotted points.

Finally, once each week, check the v.f.o. against WWV at 15 Mc. (v.f.o. at 3.75 Mc.) and correct any long term drift with the bandset capacitor.

1,250 FT. TUBULAR MASTS

Contracts were recently signed in England for the construction of the two highest t.v. masts in Europe. They will be 1,250 feet high and located in Yorkshire and Lincolnshire. These masts, unlike the usual kind built of a lattice-work of steel girders, will consist of a steel tube, 9 feet in diameter, with a lift inside to enable the aerials to be serviced.  

—L3O45/HERS185.

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BRIGHT STAR CRYSTALS
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With the co-operation of our overseas associates our crystal manufacturing methods are the latest.
VICEROY MARK I. AND CONTROL UNIT
A. M. CREWTER,* VK3SM/T

Recently I had the job of assisting to put a Viceroy Mk. I. s.s.b. transmitter on the air and struck several problems when it came to connecting up the control box which has four positions: (1) SSB, VOX, (2) tune, (3) c.w., (4) s.s.b. vox, and also a second switch for transmit and receive.

The following faults were noted: (a) the transmitter could not be netted on s.s.b. vox or c.w., (b) when switched to c.w. the transmitter could not be keyed.

The accompanying drawings show the original circuit as supplied with the control unit and the modified unit. These modifications consist of—

1. On switch bank SIA, cut the strap between bank contacts 3 and 4, tie 4 to 1 and 2, and connect master contact of S2C to S1A, 3. (This permits netting to take place on all modes but c.w.) If netting is required on c.w. strap 4 and 5, and connect the external contacts shown open are normally made with the relay inoperative, and the contacts shown filled in are normally open. This completes the modification and the transmitter will now do all the things that the control box said that it should.

I have since modified my own transmitter to this circuit (when purchased I did not get a control unit) and have had no trouble.

(9) Shift the black wire of the cable from terminal 11 to terminal 7 on back of the transmitter.

In the circuit diagrams the relay contacts shown filled in are normally made with the relay inoperative, and the contacts shown open are normally open.

Also, if the 6870 crystal oscillator for the last conversion stage fails, a 6BX6 may be substituted. This calls for cutting the strap between pins 4 and 5 of the socket, removing the wire from pin 6, and fitting it to either 4 or 5 (the one that does not have a wire on it). This modification changes the filament connection to that of a 6BX6, all other elements are in similar position. Also a 6BX6 is already in the unit so this reduces the number of tube types.

Subscriptions
- Please pay your Subscriptions PROMPTLY when due. Failure to do so may result in the loss of Valuable issues of “Amateur Radio.” High costs of production make it necessary to limit the number of extra copies printed each month.

Book Review

ELECTRONIC CIRCUITS HANDBOOK
By Tom Kneitel, WB2AAI

This book is divided into eleven sections, all of interest to Amateurs, who are interested in circuits that work, without going into lengthy details as to why. For an American publication, there is very little in the way of kilowatt equipment, but plenty of low power, even by Australian standards, making it a useful book for those interested in gadgetry for mobile or portable work.

A good buy at $6.60 per copy, posted.

Our copy from McGill’s Authorized Newsagency, 183-185 Elizabeth St., Melbourne, Vic.

Meet XE1CE

Carlos Gonzalez Mejia, Snr., XE1CE, P.O. Box 66581, Mexico, D.F., Mexico.

Carlos is 54 years old, married, has two sons and two grandsons. He is XE1AZ and XE1GJ. Carlos is a chemical and metallurgical engineer. He has worked for about ten years in the mining industry in South Mexico. For almost 25 years in refineries in the oil industry. At present Carlos is in the group in charge of Petrochemicals. Mexico, incidently, produces 350,000 barrels a day in 14 modern refineries. Carlos regularly corresponds with VKs. Very active on s.s.b., Carlos has UT3J, SX10 and SX11, and this feeds into a 3 element Yagi. Carlos considers himself very lucky to possess no less than 50 International certificates, some of which include D.X.C.C., B.E.R.T.A., T.P.A., and C.H.C. The award which has been his pride and joy hangs proudly in his library, at none the less than the W.A.V.K.C.A. award. Congrats, Carlos, our mutual hobby is a better hobby through men like you.—Bert, VK3BB.

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.

Photographs will be returned if the sender’s name and address is shown on the back of each photograph submitted.

Please address all articles to the
EDITOR “A.R.,”
P.O. BOX 36,
EAST MELBOURNE, C.2,
VICTORIA.
A handsome perpetual trophy is awarded annually for competition between States, inscribed with the names of those who made the supreme sacrifice, and so perpetuating their memory throughout Amateur Radio in Australia.

The name of the winning Division each year is also inscribed on the trophy. The winning Division will receive a suitably inscribed and framed photograph of the trophy.

**Objects**

Amateurs in each Call Area (this includes those in Australian Mandated Territories and Australian Antarctica) will endeavour to contact Amateurs in all other Call Areas (VK1 and VK2 are to be considered to be in the one Call Area; likewise VK5 and VK8).

**Date of Contest**


**Duration**


A period of 15 minutes' silence will be observed by all stations on 15th August, immediately prior to the beginning of the Contest, when an appropriate broad-cast will be made and relayed from Divisional Stations.

**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 of the W.I.A. will be eligible for the awards.

3. All Amateur frequency bands may be used, but cross-band operations are permitted.

4. Amateurs may operate on both phone and c.w. during the Contest (e.g. phone to phone, c.w. to c.w., or phone to c.w. and vice versa), but may submit an entry for one only of the above Sections listed in Rule 1.

An Open log will be one in which points are claimed for both phone and c.w. transmissions.

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 their own call sign.

Contestants operating Club Stations other than their own shall be referred to, for the purpose of these Rules, as "substitute operators". Their operating procedure shall be as follows:

Phone contacts: Substitute operators will call "CQ Remembrance Day" followed by the call sign of the station they are operating and the word "log" following by their own call sign.

C.w. contacts: Substitute operators will call "CQ RD de" followed by the group call sign comprising the call sign of the station they are operating, an oblique stroke, and their own call sign.

Contestants receiving signals from a substitute operator will qualify for points by recording the call sign of the substitute operator only.

7. Entries 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 starting from 000 for the first contact and which will increase in value by one for each successive contact. If any contestant reaches 999, he will start again with 000.

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 should be clearly marked "Remembrance Day Contest, 1964" and must be postmarked not later than 20th September, 1964, and addressed to the Federal Contest Committee, W.I.A., Box 638J, Brisbane, Queensland.

Your log could help your Division to win the R.D. Contest Trophy.

**SCORING TABLE**

<table>
<thead>
<tr>
<th>Station</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>VK0</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
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<tr>
<td>VK1</td>
<td>6</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>VK2</td>
<td>6</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>VK3</td>
<td>6</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>VK4</td>
<td>6</td>
<td>1</td>
<td>4</td>
<td>5</td>
<td>4</td>
</tr>
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<td>VK5</td>
<td>6</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>VK6</td>
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<td>3</td>
<td>5</td>
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<td>4</td>
<td>3</td>
<td>5</td>
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<tr>
<td>VK8</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>VK9</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>VK10</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

**EXAMPLE OF TRANSMITTING LOG**

<table>
<thead>
<tr>
<th>Date/ Time E.A.S.T.</th>
<th>Band</th>
<th>Emission</th>
<th>Call Sign</th>
<th>RST Nr. Sent</th>
<th>RST Nr. Received</th>
<th>V.h.f. Bonus</th>
<th>Points Claimed</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 1800 7 Mc.</td>
<td>A3</td>
<td>VK5XU</td>
<td>50001</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>15 2349</td>
<td></td>
<td>VK8RU</td>
<td>50005</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>16 1200 52</td>
<td></td>
<td>VK3OP</td>
<td>43026</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

**EXAMPLE OF RECEIVING LOG (VICTORIAN S.W.L.)**

<table>
<thead>
<tr>
<th>Date/ Time E.A.S.T.</th>
<th>Band</th>
<th>Emission</th>
<th>Call Sign Heard</th>
<th>RST Nr. Sent</th>
<th>RST Nr. Received</th>
<th>Station Called</th>
<th>V.h.f. Bonus</th>
<th>Points Claimed</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 1800 7 Mc.</td>
<td></td>
<td>VK5XU</td>
<td></td>
<td>50001</td>
<td></td>
<td>VKX5XU</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>15 2349</td>
<td></td>
<td>VK8RU</td>
<td></td>
<td>50005</td>
<td></td>
<td>VKAXY</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>16 1200 52</td>
<td></td>
<td>VK3OP</td>
<td></td>
<td>43026</td>
<td></td>
<td>VK3SPA</td>
<td>25</td>
<td></td>
</tr>
</tbody>
</table>
10. Scoring will be based on the table shown.

In addition a bonus of 25 points may be claimed for the first contact in each call area on 52 Mc. or above.

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

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).

Entrants in the Open Section must show the c.w. contacts in numerical sequence.

12. 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.

13. The ruling of the Federal Contest Committee of the W.I.A. will be final. No disputes will be entered into.

14. Certificates will be awarded to the winners of the phone, c.w., open and receiving sections in each call area (Northern Territory and A.C.T. will both count as separate call areas). There will be no outright winner for Australia. Further Certificates may be awarded at the discretion of the Federal Contest Committee.

The State to which the Perpetual 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 dividing the ratio of logs entered to the State Licensees multiplied by the total points from all entries.

Example:

Average of the top six logs +

Logs Entered \times Total of Points
(State Licensees \times from all Entrants)

Acceptable logs shall show at least five valid contacts.

The Trophy shall be forwarded to the winning State in its container and will be held by that State for a period of twelve months.

Note—The F.C.C. emphasizes the need for strict observance of Rule 9 in the Transmitting Section and Rule 3 in the Receiving Section.

RECEIVING SECTION

The Receiving Section is open to all SWL’s in Australia, but no transmissions may enter it.

1. Contest times and loggings of stations on each band are as for transmitting.

2. All logs shall be set out as shown in the example. Logs must show first the call sign of the station calling (not the station being called), the serial number sent by it and then the call sign of the station being worked. The scoring table to be used is the same as that used for transmitting 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, nor is it permissible to log a station in the same call area as the transmitting station.

For purposes of the Contest, VK1 and VK2 are considered to be the same call area, likewise VK5 and VK8.

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 club station. All operators must sign the Declaration.

6. Awards.—Certificates will be awarded to the highest scorer in each section for both phone and c.w. contact logs. Certificates may be awarded at the discretion of the Federal Contest Committee.

5th All Asian DX Contest 1964

This Contest will be conducted in October. The phone section of 24 hours will commence at 1000 GMT on Saturday, 3rd October, and conclude at 1000 GMT on Sunday, 4th October. The c.w. section of 24 hours’ duration will be held on 1000 GMT, Saturday, 10th October and finishes at 1000 GMT, Sunday, 11th October. Full details will appear in the next issue of "A.R."

Publications Committee
Report . . .

From the 11th May to 8th June correspondence has been received from the following: J.M., KHE, JAU, 2EZ, SEG, 2WS, 2AKX, 3IT, 3LU, 3W*, 3AU**, 3AFQ*, 32CK, 3ZFC*, 3ZGF, 3ZOM, 3ZTJ, 4NS, 4RW, 4ZBD, 4ZJB*, 5BB*, 5NN, 5FS, 5XB, 6NJ, 6RY, 7ZBD, 7ZAS, 7L211, L6042, Ian Phillips*. (Asterisk denotes technical article.)

The Committee noted that the VK5 Division agreed to omit the Divisional notes from their Bulletin and include them in "A.R.," an action all readers will no doubt appreciate. This will now mean that the VK5 scribe is, without a doubt, the most highly paid writer on the "A.R." staff, as the Publication Committee has no hesitation in adding another nought to his already magnificent salary.

The shortage of log books was discussed and it was agreed that an additional printing again be put in hand to overcome the current backlog of orders.

As no list has yet been forthcoming from the P.M.G. of new stations, change of address, etc., as required for the Call Book, it will mean that the new issue cannot be ready before August at the earliest.

The Committee have as yet not received the services of a volunteer editor for the sideband column, hence these notes are still omitted from the magazine.

All readers are requested to forward notes to their Divisional correspondent for inclusion in the "A.R." Divisional notes column.

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SMALLEST HIGH POWERED S.S.B./C.W. TRANSMITTER WITH HIGHLY SENSITIVE RECEIVER

Size 6" x 10" x 11"; 13 lbs. weight; internal v.f.o.; dual vernier 12:1-72:1; selectable u.s.b./l.s.b. without frequency shift; a.v.c., a.l.c.; 9.0 Mc. crystal filter; transistor audio/a.v.c.; optional plug-in vox, crystal calibrator and outboard v.f.o.; 300w. peak input to two 6HF5s in final; 500 Kc. coverage per Amateur band.

TWO MODELS–

GALAXY III. 80-40-20 Metres - - £230
GALAXY V. 80-40-20-15-10 Metres £300
(Galaxy Model V. available in August)
Both Prices include Sales Tax.

WRITE FOR MORE DETAILS TO THE AUSTRALIAN AGENTS–

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Phone 394

Foster Dynamic Microphones

SPECIFICATIONS:

Output Impedance ... 50 ohms or 50K ohms
Effective output level ... -55 db. [0 db. = (one) 1V. Microbar]
Frequency response ... 50 to 15,000 c.p.s.

OMNI-DIRECTIONAL DYNAMIC:

Plastic Diaphragm.
Size: 4½" long, 1¼" diameter.
Cable: 12 ft. of P.V.C.

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HAMILTON S.S.B. CONVENTION

THE recent Convention of single sideband operators at Hamilton (Vic.) was a great success, but was not planned. It just happened. This was the first s.s.b. gathering in Australia, the idea for which grew from the fact that Bernie VK6KJ and his son, Kim, were coming East for a holiday in May and Bill VK5XB decided it would be pleasant to take them motoring to Melbourne via Hamilton, the home of three regular members of the 80 metre sideband "sewing circle"—Tim VK3TW, Ern VK3AEJ, and Danny VK3ADD.

The idea of a meeting at Hamilton on 16th May became so popular that the Hamiltonians soon discovered that they were organizing a fully fledged, but unofficial, Convention with a buffet dinner on Saturday evening, followed by a technical session the following morning.

Dudley VK2DQ brought his facilities for producing a circular letter into operation some months previously and this resulted in a roll call of 42 sidebands plus twenty or so wives, friends, and children, who converged on the Western Motel, Hamilton, by about 4 p.m. for the first "fixtures," i.e., contacts between the many mobiles present and the G boys—G3AOO and G16GTK in particular. There was a regular procession of "long-whipped" vehicles in particular. There was a regular procession of "long-whipped" vehicles to a large open field at the local Agricultural College, where they spread out to a mutual separation of several hundred yards and waited for "conditions" to become right, while Tim VK3TW acted as control station at his home QTH.

The said "conditions" did not become as good as was expected, so that the contest to discover whose mobile antenna system works best on 7 Mc. DX was rather inconclusive, however everybody made contact except for Lee VK3XO and Will VK3AMT, who moved on to 20 metres for a good contact with Ross WA6DEX (ex-VK5AJ), home again in Los Angeles after a brief visit to Australia several weeks previously.

The main function was, of course, the dinner, which was such a friendly affair, and how could it have been otherwise as all present had spoken via radio but were discovering for the first time what the other bloke looks like, and whether voice, age and appearance in any way coincided with the mental pictures built up during the past few years. XYLs were taken to the local picture show, leaving the OMs all to themselves until supper time.

The group photograph (see front cover), taken during the evening, is published to refresh memories and give readers of "A.R." some idea of the status and integrity of this august body of sidebanders.

It is interesting to note that the average age of the gathering is well and truly on the "shady" side of 40 years, and that more than half of them had built their own equipment, although many now use commercial gear. This represents a vast pool of radio experience—keen Amateurs who have run the whole gamut of radio from C.W., through a.m. and v.h.f., finally reaching the s.s.b. stage.

On Sunday morning, 17th May, a short technical symposium was held at the Bowling Club, when three speakers presented lecturettes, and morning coffee provided a welcome interlude.

Geoff VK3AC spoke on methods of eliminating ignition and other electrical noises in motor vehicles and came to light with some truly inexpensive, but effective remedies which have not been published previously.

Phil VK5NN gave a short dissertation on linear amplifiers with the unit described in May "Amateur Radio" on display.

Arie VK2AVA concluded with an excellent outline of the recent trends in the development of s.s.b. transceivers, and had a "Galaxy" transceiver there on display, as a typical modern product of the U.S.A.

By midday all seemed to be going their various ways. The mobiles discovered, with some dismay, that conditions to G land were much better than they were the previous afternoon for the whip contest.

Our hosts at Hamilton—Tim, Danny and Ern—were all on the air on 80 metres during the evening to receive reports of safe arrival home, from the delegates.

We thank them all for an enjoyable and memorable gathering, which has re-inforced the old, and made many new friendships in Amateur Radio.

NEW CALL SIGNS

MARCH 1964

VKXU—P. D. Kinnessley, 22 Foxlow St., Canley Heights.
VKAII—A. R. N. Lecky, 74 Orana Court, 255 Old South Head Rd., North Bondi.
VK3AHY—J. Vogel, "Yarrunga," 1a Noonleinnl Crescent, Northbridge.
VK3APY—W. Carr, Lot 5, Mackay St., Norwood.
VK3BGF—G. R. Felser, 17 Ingalara Ave., Wahroonga.
VK3DHI—A. F. Meynards, 602 Manseville St., Ballarat.
VK3QG—T. J. Guthrie, 17 Watsons Rd., Glen Waverley.
VK3KJ—W. J. Ives, 20 Galle St., North Aspendale.
VK3KUK—J. W. Meadows, 18 Leigh St., Huntingdale.
VK4KL—D. L. Kinless (Rev. Bro.), St. Columbans College, Albinon Heights, Briar Hill.
VK4YW—G. Whitehead, 33 Fifth Ave., Bardon.
VK4ZV—J. D. Biren, 729 Brunswick St., New Farm.
VK5MC—J. T. Gardner, Flat 5, 19 Fourth Ave., Ascot Park.
VK5MC—B. A. McRae, 24 Henry St., Port Pirie.
VK5TU—A. Turton, 1 Wallara St., South Plympton.
VK5VB—V. N. Blackmore, 2 Yaralum St., Klem-Part.
VK5ZZM—M. K. Gardner, 55 Regent St., Adel- aide.
VK5ZHL—J. De Prinse, 20 East St., Hector-ville.
VK5ZMC—L. N. Coventry, Lot 52, Creighton Ave., South Yarra.
VK6RT—J. P. Morgan (Rev. Bro.), 1807, Ellen St., Fremantle.
VK5CZ—B. J. Grant, Via Via Ave., Boroake, Port Moresby.

SOUTHERN RHODESIA RADIO PROPAGATION PROJECT

EXPERIMENTAL 50 MC. BEACON TX

A small automatically-keyed transmitter has recently been installed on a prominent hill near Salisbury, some 5.000 ft. above sea level, approximately 1.000 ft. above the surrounding country, at a site 25 miles north of Salisbury In Southern Rhodesia.

The tx., which is running continuously, 24 hours per day, is unattended, but frequently monitored in Salisbury for correct operation. The frequency used is 50,046 kc., and F1 keying of 36-second break of carrier every six minutes to allow receiving stations to check no-signal conditions, and to adjust automatic recording instruments. R.F. power to the antenna is of the order of 40 watts, the antenna being a vertical quarter-wave, with four equally-spaced horizontal radiators acting as an artificial ground (known in Amateur parlance as a ground-plane antenna).

The beacon is of unique design in that the r.f. section is built into the antenna itself, is mains-operated, changing over in a few seconds from a generator supply in the rare event of mains failure.

It is intended to keep this equipment in operation throughout the month of April, the "Quiet Sun," and reports of reception in Cyprus, South Africa and Southern Rhodesia have already been received.

All reception reports on this beacon, which will be appreciated and acknowledged, should be sent to Ivan Wood, ZE3J, c/o. E.S.C. P.O. Box 377, Salisbury, Sth. Rhodesia.

CHOOSE THE BEST—IT COSTS NO MORE

RESIN CORE SOLDERs

O. T. LEMPLE & Co. LIMITED. Head Office: 27-41 Bourdon Street, Alexandria, N.S.W., and at Melbourne, Sydney, Adelaide and Perth.

Amateur Radio, July, 1964
My apologies for the notes not appearing in the June issue. I went down with a bad cold, which was followed by a cold front that was that. So the latest news from Interstate, as supplied by their correspondents, which is rather nice to have v.h.f. activity is far from dead.

We shall cast its shade on 6 mc activity here in VK3. The main source of activity is the 53.032 Mc. a.m. net and a few others, with the signal at one location so lune high, cheap that we are, that the frequency has been observed off these frequencies is not always a certainty. We find it necessary to sort out the signal you are listening to from the various spots caused by Channel 0. For the time being the 143.5 Mc. net is quite popular, particularly 6 mc gang pretty close to the 54 Mc. end and running down towards 53 Mc. to minimise the noise. For the moment.

Of course in other States the problem will not present itself, but the sound on 51.75 Mc. will be the same. Here we are, VK3 beacon yet used. We gather that the tx is now on full power and the signal available at one location is 12 db. up on its nearest rival. So look out for the Melbourne based high in the band, and hope we won’t be doing the same to the VK5 for so many years.

South Australia
30 Mc. activity here seems at a lower level than when we had the 50 Mc. allocation. No DX has been reported since the new band has been available. VK3-31, 6ZCM is having a good deal of trouble from the 2™ channel. We have several reports that Kevin is using an 807 and a 4 el. beam. The 52 Mc. scrambler held on 3rd May was won by Ted 2ZFS, 7ZU. No one has moved onto the 52 Mc. end, and it has been heard back on the band after some time. Geoff 6ZGP has some phase modulation working quite nicely on 52 Mc., and Darryl 5ZKY is working on an all-transistorised tx to run into this frequency. We hope to see what they have, for the moment.

General News: This month (May) was marked by the tragic death of Luke 5LL. Luke was an ever-present face on the 576 Mc. r.f., and was last heard back in the very early 6-mc days. A colourful character, a fellow that many people are going to miss by many kms, both in and beyond the Commonwealth.

VK4, as you know, is now living in VK3 and is expected to take out a VK3 call sign soon. It is a new tx on 52 Mc. and 32 X2 has been added to the band. The use of v.f.o.s., especially heterodyne v.f.o.s, is expected to be used. This is an improvement over the previous situation, which was a signal on the band at 1930 hours every month, and all that is necessary to participate is a 2 mc super-regen.

A tx hunt is held on the first Friday in every month for signals from other bands. It is a less popular signal on the band at 1000 hours without fail.

Higher Bands: Two stations that I know of have just put up a new 50 ft. tower. One has been using a 52 mc tx and the other is a 52 Mc. beacon. 73, 6ZAG.

Finally, I would add that any interested person is welcome to attend the v.h.f. net held on the second Tuesday in each month at 1930 hours.

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80 Metres: No reports for this band received, but if the local contacts are a pointer, it may be possible to work from New York. On 15th July, Bruce 3BM, W6VSS, reports he has contacted, along with 3BM, ZL4LZ, s.s.b. to VP1TA.

40 Metres: Appears to be waning towards early August. W6VSS, using an inoffensive 50 w. at approx. 7.1 Mc. around 0600z, the W signals are workable for a couple of hours. From 0900z a few K96 signals on 10 mc. x.r. were heard, and possibly getting stronger. Due to the QRN on this band it is hard to make one's presence felt. With 20 metres fairly well down during the early evening, it might be an idea to go back to 20 mc. for those interested. No doubt the near 0K6 and VR stations that quite good copy can be obtained, but reports are needed to indicate how often this is done. It is a pity that Arne 2AVA, while visiting Bruce's QTH, contacted WA2SFP on 7 mc. s.s.b., long path, and received 2-3 s.s.b. on 10 mc. on the way back path on contact; the time approx. 2130z. W4AEI reports on 2200z they worked again at Q5 S7. At 0100z they were working Q5 S8 on 14240 kc. Bruce reports using a large Telrex Bertha which is a full size 3 el. on a cedar tree, which he has now topped and the top will be sloping to 40 ft. at the open ends. Arie 5ZK, using a Telrex Bertha, reports on 14240 kc. at about 1100z, both a.m. and s.s.b. 1230z.

30 Metres: The DX scene, although he appears to be carrying on quite well, with signals being heard from time to time. HZ2AMS/8Z5, VE7RN, ZS7R, 6M5MJ, VE7TD (0700), 6Y5MJ (0445), XE1CCW (0430). he has worked YS1JJG (0400), OA4PI (0418). Thanks to those that have their names listed above. Their notes and reports are greatly appreciated by many. All time quoted are GMT unless otherwise stated. 73, Bert VK5BS.

ZL1AGG PASSES ON

In a letter to Tony Grey in New Zealand, I was sorry to hear that his Dad, Chas Grey, ZL1AGG, had passed away during February of this year. His callsign was W1SWX with station W2YR. Among those who worked him was Tony who was his next-door neighbour. His QTH is the signals from the VE stations, which he has now topped, and the structure will now remain at least for the next 50 years. He had been ill for some 18 months.—Chas. Abernethy, L2211.

The African continent is also heard during the early evening, it might be an idea to try with 20 metres, especially on 300w. at approx. 7.1 Mc. lOOOz. Six Ws also appeared who are looking for a DX QSL at 0830z with sigs 5 by 6-8.

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SWL

Sub-Editor: Chas. Abernethy, WIA-L2211
30 Urunga Parade, Miranda, N.S.W.

It has been a long time since I have had such a pleasant task to perform as the one assigned to me—namely to submit a log. This long time SWLing has been at a low level in this country, due possibly to lack of interest. The SWL activity and the public interest in the listening groups in the various States, which are the one and only source of publicity, are the result of the SWLs. good publicity man is to believe in what he is publicising as well as believing in himself. This is a point such man taking over the sub-editorship of the SWL page.

On 10, but plenty of good DX on 20, 40 and 80 metres. The DX on 40 metres is changing owing to the pile up of other countries wanting the desired station in question, so it would be appreciated if SWLs. in various parts of the country, due possibly to lack of interest, lack of DX, will be more than welcome to extend our listening to the various parts of the world. Please keep your DX notes coming in.

PUBLICITY

Publicity is an art, and one attribute of a good publicity man is to be held for twelve months. My acquaintance with Chas. has been short, but in the time I have known him I have come to the conclusion that he speaks and feels sure that our listening members will rally around him and support him as long as we show our interest. On behalf of the boys, Chas., I wish you all the best in this task.

SOUTH WALES

Greg L3138 has not done much listening of late, is busy with the pre-ARRL period, as a new club is to be started from Z58, TQ9, FY1, FO8, DL3, SM3, HK3, G16, UA4, UT5, UI8. Nice work Greg. I shall pass on your address to the VK2 Bureau.

Bill L4401 suggests that SWLs. write to one another and wish them to keep your DX notes coming in. I think it would be good for a raffle of that type. Nice going OM.

VICTORIA

Chas. L2204 has worked a lot of DX on 20, 40 and 80 metres, the DX on 40 metres is changing owing to the pile up of other countries wanting the desired station in question, so it would be appreciated if SWLs. in various parts of the country, due possibly to lack of interest, will keep your DX notes coming in.

QUEENSLAND

Peter Curran lives at Plangil and as a.c. is not available, uses transistor rx with quite good results. Bill, Peter has plenty of space for antenna.

A.M. PHONE RECEPTION

In reception of a.m. phone signals the normal practice is to set the r.f. gain and i.f. gain at maximum, switch on the a.g.c. and heterodyne; sideband splatter, and noise by heterodyning. The best of the news this month is from VK3. Ken Matchett recently had the pleasure of listening to VK9 April. He was married in Sydney in May and now lives there. We all wish you every success, Ken. Mac. Russell L3261 is now mobile with a 8/9 receiver and a long wire aerial. Russell has some ideas which should be of value to you in your efforts to improve your phone reception.

S.W.L. D X L A D D E R


SOUTH AUSTRALIA

Peter L4321 is doing well on the a.g.c. is switched off, using 4420B. He hopes will improve receiving at that QTH. Peter has some ideas which should be of value to you in your efforts to improve your phone reception.

WESTERN AUSTRALIA

Peter L6021, sorry I cannot help you re the Bulletin that you mention, may some of the VK3 boys assist you in the matter. I would be grateful if you could let me know of your doings from time to time.

Youth Radio Clubs

Youth Radio Clubs have been formed in most of the States and are being carried on by the teachers of the country. The idea of this is to bring the youth of the States together and to show the young people that there is much more to radio than just being able to receive and transmit a call. The idea is to give the youth of the States a chance to get a better understanding of radio.
NEW SOUTH WALES
HUNTER BRANCH

Thirty-three members, associates and visitors were present at the June meeting of the branch, held on 5th in the Technical College.

The lecture, entitled "Top Band—Without Tears," was delivered by your scribe, Keith 2AKX, ably assisted by Arie Oosterveen. The lecture was considered by all to be of good publicity for the cause of Amateur Radio and enjoyed by those who have the distinction of being top banders.

She has had several contacts on 80 with local and not so local stations, but because of impending examinations Keith had to keep with a Green Certificate, wisely restricting operations. However, Susan will give her a call if you hear her. Jan Oosterveen, who passed examinations at the same time, has not yet received her call sign, but as soon as he does he will be on 160 as well, looking for contacts. Naturally he hopes for VK3ZJO. With Bill 2ZK, Geoff 2VU and Stan 2AYF, there are now six Hunter members on the Top Band. It is hoped that many more of the local chaps on take advantage of the excellent winter fade-free conditions and join us on 160 for 100 per cent. QSOs.

David 2GF is not quite so happy since he had his call sign listed in the New Call sections on last month's "A.R."

The "Top Band" was listed against the name of another Amateur in this column. The Calls have all been rectified, but it could have been embarrassing had they met on the air. There's one thing certain, this sort of thing could never have happened to Sherwood, he's never on the air.

If this unfortunate occurrence was the result of incorrect copy supplied by the P.M.G. Dept. it is presumed that the call sign should have read VK2GZF, not VK2GF.—Editor.)

It is pleasing to report that the Cessnock Unit 2AKX is now fully operational on the Top Band, in the Civil Defence H.Q. in Main Street. They now have an AT21 and some other powerful gear so signals should not be hard to receive from that area any more. Chris. still manages to put in a few mouthings on Monday nights during the call backs and he has, with the help of Nev. Woods, moved several cassettes to make more listening time.
LOW DRIFT CRYSTALS
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3.5 and 7 Mc.
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CANTERBURY, E.7,
VICTORIA

he has for disposal. When these coil boxes are to hand, the ARs will be offered for ballot in the usual manner.

By invitation, Chas 4UC was present at the Council meeting and he submitted an informative report of the activities of his club to date. Chas has not been at this task very long and the results of his efforts so far show that his enthusiasm is of the utmost. He has established a Youth Radio Club at the school at which he teaches. The club operates under the call sign 4RF. He hopes to have another station operating in close proximity in July and enquires about how to start a Youth Radio Club. Members are asked to keep this date in mind and to come along to the meeting.

May Monthly Meeting.—The May general meeting was held at the State Service Union rooms, Elizabeth Street, City, on Friday, 22nd May. The Chairman was Peter 4P1, our President. Several apologies were accepted, one being from Al 4LT, who is not in the best of health. Over 60 members were present and it was pleasing to see such a large number of our Junior members present. An important item was raised at the meeting, namely, an organiser is required to fill the position of Civil Defence Co-ordinator for this State. Mick 4LA reported on the Scout venture at Napier, which was held over the Easter holiday. A private business was dealt with, Rick 4VR produced his "Electronic Bug" c.w. relaying machine. Rick gave an interesting description of all the parts and how the whole thing was put together during the many years he had been toying with the idea. In particular, a relay sensitive enough to follow c.w. signals, were difficult to obtain. Eventually he obtained, by courtesy of a VK3, a suitable relay and set to work to produce this brain child of his. He gave a varied description of all the different circuits of the machine operating at speeds of up to 44 words per minute.

Son Brian 4RX then got to work with the aid of sketches and gave an explanation of what happens electronically inside the little gadget. The talk and demonstration were very well received by the members. While not many questions were asked, it was very noticeable that practically everybody at the meeting went up after the lecture and had a close-up view of this quite unique machine. A vote of thanks was moved by Stewart 4LA, and thanks to Rick and Brian was shown in the usual manner. The meeting concluded with the News of Our Members. As usual, news of members is sparse. News of others is scarce. News as to where he is to sign the station call now and then. Remember the I.T.U. sits probably next year and readers of "73" will see the things that are happening in U.S.A. I think that Federal Executive should be printing something in each "A.R." of what we are doing in regard to the forthcoming I.T.U., be it ever so little.

Visitors to the shack this month included Bob 4MF, who seems interested in coming back on the air again—this time with mobile gear. Mick 4LA, who is back on the air again—this time with mobile gear. Merv 4ZMD, who, as usual, put on a very capable performance. Bert 4LB returned from holidays in the capital city. He went up after the lecture and had a close-up view of this quite unique machine. A vote of thanks was moved by Stewart 4LA, and thanks to Rick and Brian was shown in the usual manner. The meeting concluded with the News of Our Members. As usual, news of members is sparse. News of others is scarce. News as to where he is to sign the station call now and then. Remember the I.T.U. sits probably next year and readers of "73" will see the things that are happening in U.S.A. I think that Federal Executive should be printing something in each "A.R." of what we are doing in regard to the forthcoming I.T.U., be it ever so little.

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Congratulations to Claude 4UX on the fine article in last "A.R." on the Heath RX500. Very fine individual writer, for one horrible mistake, see end of paragraph head second column. This costs money and is not to be taken lightly. He may be one of the lucky ones.

You chaps on s.a.b. using vox, do not forget to sign the station call now and then. Remember the Regulations. In this regard. Many go well over the allotted time by two or three minutes.

See that the VK7 Division are girding their loins for the November Contest, remembering the old battle cry "Taste expects . . ." So you chaps prove that this still hasn't a fluke by rallying again this year.

73, 4RFW.

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OBITUARY

G. F. (LUKE) LUCAS, VK5LL

It is with much regret that we report the VK5 Division announces the sudden passing of Gillen Frederick (Luke) Lucas, VK5LL. Luke was one of the most active on all bands up to a few hours prior to his death.

LIVING UP and by, the Amateur Code, he will be missed by all with whom he communicated. Luke was a dedicated friend and to his sorrowing wife Pearl we extend our deepest sympathy in her bereavement.

The wild man from Norfolk Islands, you know, the one with a nose through his bones, the one who slogged so hard to take up residence at the Semaphore G.P.O. Little did he think when he used to deliver his daily papers he would one day return as the big noise. From the knowledge that no Divisional notes appear in the magazine it became clear that Divisional notes were out, and Luke realized forth results much quicker than I bargained for. I am sure he would have sold all my notes to buy a newspaper when he realized that the VK5 Division because of the fact that no Divisional notes appear in the magazine, so what about making up it up with? Oh well, I suppose we must get used to it. I will try and get you on Council next year. The VK5 notes will be offered by Ye Ed. to entice me back. Anyway, I notice that "The Admiral," Joe Reilly, is back and is moving the bar on the VK5 journal. The news of the passing of Luke LL came as a great shock to the VK5 boys, as I understand that he was on the air on 2.9 Mc. only a few days ago. I had not seen a letter or a note from Luke in the VK5 journal for some time, but I did notice a letter or two from a number of people, and indeed Luke has been heard on the air a few times during the past few weeks. I wonder if some of our readers know that Luke LL has returned to VK5, and that he is now known as the great misunderstanding and gives us an enthusiastic committee.

Mr. S. T. G. "Squaring off" as the VK5 Division is out with me. S.s.b. is an unmentionable mode, but I succeeded in getting mV share of the VK5 Division when he needed it most, a quality that is not mine, and if rumour is to be believed, the VK5 Division is out with me. The VK5 Division has always been my policy never to "squaring off" either, so why not have regular v.h.f. notes in the journal?

Garry SZK now has a beard 60 ft. tower plus piping to give him a full wavelength appearance. My special agent from Mount Gambier has said, "What's that dear? I have not finished wiping up the dishes?" Oh fie upon me, how could I be so forgetful of the task! My special agent from Mount Gambier has said, "What's that dear? I have not finished wiping up the dishes?"

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WESTERN AUSTRALIA

These notes are the first after a long period and I hope that they will be of interest to all. I am unable to give the details of the QSOs of each month that means they have to be written and for them to be written requires information from all. This information comes from the subscribers to the magazine and if you don’t receive a copy of these notes it is probably because you have not contributed sufficient notes to the magazine.

In the next issue we will be discussing some of the latest developments in the amateur radio field. We are also planning to devote a special section to the use of solar energy in amateur radio. This section will be written by a team of experts in the field of solar energy and will be published in the next issue.

The June meeting was successful and we hope you enjoyed it. The next meeting will be held on the 15th of July and we look forward to seeing you there.

Please ensure that you send in your notes as soon as possible so that they can be included in the next issue. We would also like to hear from anyone who has recently received a new call sign or who has made any changes to their equipment.

The council would like to thank everyone who has contributed to this issue, particularly those who have sent in notes. Without your support, this issue would not have been possible.

The council is always looking for new members. If you are interested in amateur radio, please contact us and we will be happy to give you more information.

TASMANIA

Won’t be long now to R.D. week-end—only need to count the days down. By the middle of last month and have started cleaning out the spiders, etc. If you want log sheets, then let your Council know. We have quite a round-up and some will be despatched pronto.

The June meeting was blessed with an excellent and informative talk on broad-band equipment. The talk was given by Tom 7ZSU and was supported by slides of various types of aerials and equipment, block diagrams, etc. Here is a man who I feel sure enjoys his work. We really got wound up and had to get rid of the desire to be on the air for an hour and a half. But nobody seemed to notice. The talk was on broad-band equipment etc. He started with the tuning wave tubes and klystrons he brought along.

A very welcome stranger at this meeting was also present. He is a pre-war councillor for many years. Don’t make it so long till your next meeting Chum! very well to you all and best wishes. Number one of course is Mrs. J. Batchler, TV1. Our latest addition is Anne Landers, who has taken out her license in the Q. She is married to Michael (7ZAV) towards the end of September, sat for the O.C.A. exam in April for her theory, having got the Regs, at an earlier try. So far the c.w. section has eluded her, but she’s getting to it. She has even if when she goes to the exam in her wheelchair, she’s only eligible for the call sign 70W.

Looks like the Southern Zone is to lose another YL in the coming months. The island as Dave 7ZAY is going to Mt. Wellington, to do a course of duty to his employer. Other tit bits include the fact that m.c.w. can now be heard (and read?) on 2 m,” since Ian 7ZLO has added a 6146 to his gear. Also Phil 7ZAX now has mobile gear in his car, and not just a heap of gear on the back seat.

By the way, the QSY for 7ZAS comes from the June meeting. Congratulations and best wishes to Ian 7ZLO and Phil 7ZAX.

R.Y. is in the Repost. Hospital at time of going to press. He’s around your old self again Ray, and getting out of bed. He’s 97 years old before too long.

Enough for now, don’t forget the R.D. 7ZAS.

NORTH-WEST ZONE

Last meeting the business meeting, main points were a report on the S.b.b. Convention and the possibility of a Youth Radio Scheme in some form.

Most members are fairly active on the bands. Ken 7BL seems to be getting out well of late. Ray 7RK has now got mobile gear in his car, but knowing Phil it won’t work, and not just a heap of gear on the back seat.

Ray 7RK is in the Repost. Hospital at time of going to press. He’s around your old self again Ray, and getting out of bed. He’s 97 years old before too long.

Enough for now, don’t forget the R.D. 7ZAS.

NORTHERN ZONE

The usual look on the boards has continued throughout this month. The only major stations heard have been Dave and Vic 7ZAL and 7ZD. Dave’s station is a call on Flinders Island and who regularly worked into Launceston. Vic worked in the O.C.A. exam working DX on 20 mx on a new quad antenna at the YH. Dave’s station is again working and Launceston with a mobile 2 mx rig. Ray 7RK has just undergone an operation in Hobart. Bob 7ZAZ is on the mend and feeling fine. Used to be following that little white ball for the paper work, then he will become active.

Bob 7ZAZ is soon to come north for six months with his rig. We express a welcome to our friend and we hope that he will be able to participate in the next O.C.A. exam. 7Z, Leigh Pretty.

HAMADS

Minimum 5/-, for thirty words. Extra words, 2d. each.

Advertisements under this heading will be accepted from Hams only. Publishers reserve the right to reject any advertising which, in their opinion, is of a commercial nature. You must also accompany the advertisement.

COLLINS 32S-1 Transmitter, £325. 755s-1 Receiver, £300, or offer. Condition as new. W. L. Jackson, VK3X, 23 Malene St., Ormond, Vic. Phone 58-7291.


FOR SALE: Hallcrafters HT-37. In excellent condition and a real DX gatherer. Will give buyer two new 6146B tubes for increased power output of the final. Price £250. Gilbert Yanow, VK4Y, 6146B, 2A3 drivers, with peak limiter and Moora more often?

FOR SALE: R.C.A. AR88D Receiver with Cent. Elec. Slicer 0.5/32 Mc., good-set up for s.s.b.-a.m.-c.w., £95 or offer. "Sideband Package" u.s.b.-l.s.b., c.w., a.m., p.t.t., vox, working on 80, 40, and provision for 15; Eddy, S.R. Dial, 6050 Commercial, nice looking job, will sell for £65 inc. spare 6146. Little more than parts cost. A. Roudie, Croydon Way, Croydon, Vic. Phone 72-5-3307.

FOR SALE: Swan SW240 Transceiver, full three-band coverage. New in carton. £225. VK2WS.

HAMMARLUND HX-500 Transmitter below U.S. cost. 150w. filter-type s.s.b.-a.m./c.w./f.s.k./f.m., 10-80 m., vox. p.t.t., c.w., built-in p.n.w., condenser antenna, relay, approx 30 hours’ use, £295. VK1JM, J. W., Miles, 129 Mugga Way, Red Hill, A.C.T.

SELL: Eddystone 680X in good condition, best cash offer. Apply 26 Shepperson Ave, Carnegie, Vic.—evenings only.

SELL in 6 ft. standard rack, 250w. a.m., c.w. Tx; v.f.o., 807s, 813 p.a.; 7, 14, 28 and 50 Mc.; mods. Class B 805s, 2A3 drivers, with peak limited speech amp. 100w. 2 mx Tx, 829 p.a. included. Complete xtal mike to coax. relays. £120. VK2BZ, Newcastle, N.S.W. Phone 57-4102.

SELL: Receiver Trio 9R-4J, 4 bands, 550 Kc. to 30 Mc., main and bandspread tuning, i.f. and a.f. gain, noise limiter. 5 meter, speaker and phones, as new in box. Price £55. Signy, W. B. A. P., max Pre-Selector, 3 bands, 3.5 Mc. to 30 Mc., r.f. gain. £35 the lot. VK3ZAN Phone 306-9380.

SELL: Type 3 Mark II., complete with all coils, key, phones, handbook, and full set of spares. As new. W. L. Jackson, VK3XM, 23 Malene Street, Ormond, Vic. Phone 58-7291.
**PICK-UP CARTRIDGES**
RONETTE 284-0 V
Monaural, turn-over type, c/w. Sapphire Standard Stylus and Diamond L.P. Stylus.
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+ 25% S.T. + Pack and Post 6d.
Locally made Macron turn-over Crystal Cartridges c/w. Sapphire L.P. and Std. Stylii.
15/11
+ 25% S.T. + Pack and Post 6d.

**GOLDRING**
PICK-UP ARMS
Wired, with base and rest.
7/11
+ 25% Sales Tax

**SILICON DIODES**
Made in U.S.A. 400 p.i.v. at 1 amp.
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**TRANSISTOR MICROPHONE MIXERS**
Will mix inputs from four High Impedance Microphones. Metal case 6" x 2¾ x 2¾. 9 volt battery supplied.
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+ 12½% S.T. + Pack and Post 1/6

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Fine Pins to suit Jap. Multimeters or Standard Pins suit others.
4/9 set
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**MICROPHONES**
Crystal Type. Made in Italy by Geloso.
Type M1112—Swivel mount, stand adaptor, flex and plug supplied. Plastic case.
44/- + Sales Tax 12½% + Pack & Post 1/-
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**OILERS**
New Swiss made Precision Type LUBRISTYL
- Clips in pocket like fountain pen.
- Always clean. - Leakproof, draws back excess oil.
- Controlled application of oil to any point easily accomplished. Supplied c/w. instructions and two capsules of oil.
13/-
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Encapsulated in epoxy resin. Works from 4½ to 12 volts supply. Output impedance 3 to 45 ohms. Supplied c/w. leaflet of instructions to build various pieces of equipment.
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+ 25% T.S. + Pack and Post 1/3

**KNOBS**
English make Three Spoke Wheel Design
1/6 each
+ 25% Sales Tax. Post Free.

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MALLORY MANGANESE
LONG LIFE CELLS
- Last up to 10 times longer than ordinary dry cells.
- 2 years' shelf life.
- Completely leak-proof.

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<td></td>
<td>MN9100</td>
<td>904</td>
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All above + 2½% Sales Tax. + Pack and Post 6d. pr.

Also available the Mallory Mercury Battery Type TR146 = 216, 9/2 each + 2½% Sales Tax.

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- Open Saturday Morning

 Amateur Radio, July, 1964

• Please include postage or freight with all orders
DESIGNING AN ELECTRON GUN

The engineer in the picture is using a machine called an “electrolytic tank analogue” to trace electrostatic field lines within a television tube electron gun. It is not a normal life-size gun of course, but a large model of a gun that has been cut in half so that a probe can be used inside it. It is a fascinating illustration of the unity of science that this strange mechanical animal can bring to graphical reality the century-old theoretical dreams of Faraday and Clark-Maxwell—it can actually draw the electrical field.

As a matter of fact, it can do more than this—it can trace out the paths taken by electrons flying through the gun on their way to spell out a picture on the screen of a television set. Again, is it not strange that such a device can keep up with the antics of the infinitely smaller electron, millions of millions of millions times lighter than it? (The mass of the electron is about $10^{-30}$ Kgm.) The laws of Science hold over vast magnitudes.

Our scientists and engineers sometimes pause to muse on these matters, while they are pursuing their constant task of applying science to the solution of problems which arise in the design and manufacture of the world’s best valves and picture tubes.
Active YL Amateurs in the Sydney area—
Left to right: Muriel VK2AIA, Mona VK2AXS, Hebe VK2AOK, and Verle VK2MR.
NEW VALVES AT BARGAIN PRICES

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<td>15/-</td>
<td>15 mA, 150 ohms, 150A, 100 W.</td>
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<td>1N5</td>
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<td>1K5</td>
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NEW SPEAKERS

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SLUG-TUNED FORMERS

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FEDERAL COMMENT

CONTEST TIME

As the month of August comes round once more, the thoughts of many Amateurs turn to Contests in general, but the annual Remembrance Day Contest in particular. Although August is still winter, its arrival indicates that spring is near and with it a general improvement in conditions on the Amateur bands—time to turn off the t.v., leave the fireside and “stoke” up the rig again.

This year is the seventeenth year the Contest has been held, and probably many of our younger generation of Amateurs were babes when the inaugural Contest was held in 1948. It is, therefore, conceivable that to them the origin and spirit behind the Contest would have been meaningless had it not been for the opening “on-the-air” ceremony and speeches by prominent Australians.

This Contest, because of its publicity, ceremony and perpetuity, has continued to maintain its popularity with youngsters and oldsters alike. It is this spirit of rivalry and participation that inspired the rules in 1948. It is most gratifying to the Executive that States continue to vie for that Perpetual Trophy which is the crowning achievement of their success.

In entering the Contest this year, you, as a participant, must assist your State by taking a little time after the Contest to mail your log—a little effort, but one that may help your State to win. Carry that sense of competition beyond the end of the Contest—the culmination of your Contest effort is the support of your State.

I.T.U. FUND

At the Sydney Convention in 1962, all Federal Councillors agreed that action should be taken at once to raise funds for the next I.T.U. Conference. The motion carried at that time has since been ratified by all Divisions, and in some Divisions, contributions have already been made.

Although this procedure is different from that used prior to the 1959 I.T.U. Conference, the need is the same. In this instance, an allocation by States has been determined, based on membership. This quota system has been used of recent years in other spheres and has proved to be very successful. We know its present application in Amateur circles will be equally well received by the membership.

Divisions should now become increasingly active in their efforts to meet their quotas, as time has an unpleasant habit of slipping quietly away. Although August has already been said to be competition month—let us continue the momentum, quotas and subscriptions received will be published monthly in this journal to promote and instill that competitive spirit.

FEDERAL EXECUTIVE, W.I.A.

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MULLARD PREFERRED RANGE OF TRANSISTORS

For Entertainment Applications in Australia

When approaching the maximum limiting values, either electrically or thermally, the comprehensive data and curves, as contained in Volume 4 of the Mullard Technical Handbook, should be consulted.

<table>
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<tr>
<th>Type Number</th>
<th>Description and Application</th>
<th>( V_{CE,\text{max}} ) (V)</th>
<th>( V_{CE,\text{max}} ) (V)</th>
<th>( I_{C,\text{max}} ) (mA)</th>
<th>( T_{J,\text{max}} ) (°C)</th>
<th>( P_{T,\text{max}},25^\circ \text{C} ) (mW)</th>
<th>Outlines and Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC125</td>
<td>General purpose audio pre-amplifier and driver of the p-n-p alloy junction type</td>
<td>32</td>
<td>32</td>
<td>10</td>
<td>200</td>
<td>10</td>
<td>90</td>
</tr>
<tr>
<td>AC126</td>
<td>High gain audio pre-amplifier and driver of the p-n-p alloy junction type</td>
<td>32</td>
<td>32</td>
<td>10</td>
<td>200</td>
<td>10</td>
<td>90</td>
</tr>
<tr>
<td>AC127</td>
<td>n-p-n germanium alloy junction transistor for use in complementary Class 'B' output stages</td>
<td>32</td>
<td>32</td>
<td>10</td>
<td>1A</td>
<td>20</td>
<td>90</td>
</tr>
<tr>
<td>AC128</td>
<td>High gain germanium alloy junction transistor of the p-n-p type designed for use in Class 'B' output stages</td>
<td>32</td>
<td>32</td>
<td>10</td>
<td>1A</td>
<td>20</td>
<td>90</td>
</tr>
<tr>
<td>AC132</td>
<td>Germanium alloy junction transistor of the p-n-p type for use in complementary Class 'B' output stages</td>
<td>32</td>
<td>32</td>
<td>10</td>
<td>200</td>
<td>10</td>
<td>90</td>
</tr>
<tr>
<td>AC172</td>
<td>n-p-n low noise junction transistor of the germanium alloy type intended for use as audio pre-amplifier</td>
<td>32</td>
<td>32</td>
<td>10</td>
<td>1A</td>
<td>20</td>
<td>90</td>
</tr>
<tr>
<td>AD139</td>
<td>Medium power junction transistor of the p-n-p germanium alloy type for use in audio output stages</td>
<td>32</td>
<td>32</td>
<td>10</td>
<td>2A</td>
<td>200</td>
<td>90</td>
</tr>
<tr>
<td>AD140</td>
<td>Power junction transistor of the p-n-p germanium alloy type for use in audio output stages</td>
<td>55</td>
<td>55</td>
<td>10</td>
<td>3A</td>
<td>500</td>
<td>100</td>
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<tr>
<td>AF114N</td>
<td>Germanium transistor of the p-n-p alloy diffused type designed for use up to 100Mc/s</td>
<td>32</td>
<td>32</td>
<td>10</td>
<td>1</td>
<td>75</td>
<td>50</td>
</tr>
<tr>
<td>AF115N</td>
<td>Germanium transistor of the p-n-p alloy diffused type designed for use up to 100Mc/s as mixer/oscillator and for use as RF amplifier up to 27Mc/s</td>
<td>32</td>
<td>32</td>
<td>10</td>
<td>1</td>
<td>75</td>
<td>50</td>
</tr>
<tr>
<td>AF116N</td>
<td>Germanium transistor of the p-n-p alloy diffused type designed for use as mixer/oscillator and RF amplifier up to 100Mc/s</td>
<td>32</td>
<td>32</td>
<td>10</td>
<td>1</td>
<td>75</td>
<td>50</td>
</tr>
<tr>
<td>AF117N</td>
<td>Germanium transistor of the p-n-p alloy diffused type designed for use as mixer/oscillator and RF amplifier up to 6Mc/s</td>
<td>32</td>
<td>32</td>
<td>10</td>
<td>1</td>
<td>75</td>
<td>50</td>
</tr>
<tr>
<td>OC26</td>
<td>Power junction transistor of the p-n-p germanium alloy type intended for use in audio output stages</td>
<td>32</td>
<td>32</td>
<td>10</td>
<td>3-5A</td>
<td>500</td>
<td>100</td>
</tr>
<tr>
<td>OC44N</td>
<td>Low noise junction transistor of the p-n-p germanium alloy type for use in early stages of audio amplifiers and as mixer/oscillator in broadcast receivers</td>
<td>15</td>
<td>15</td>
<td>12</td>
<td>10</td>
<td>1</td>
<td>90</td>
</tr>
<tr>
<td>OC45N</td>
<td>Low noise junction transistor of the p-n-p germanium alloy type intended for use in early stages of audio amplifiers and in IF stages in broadcast receivers</td>
<td>15</td>
<td>15</td>
<td>12</td>
<td>10</td>
<td>1</td>
<td>90</td>
</tr>
<tr>
<td>OC74N</td>
<td>High gain germanium alloy junction transistor of the p-n-p type designed for use in Class 'B' output stages</td>
<td>20</td>
<td>20</td>
<td>6</td>
<td>300</td>
<td>90</td>
<td>550</td>
</tr>
</tbody>
</table>

\( T_{\text{amb}} = 45^\circ \text{C} \)

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Associated with MULLARD LIMITED, LONDON
Modifications to Convert the COURIER FM100 TRANSCEIVER from 162 Mc. to 146 Mc.

LINDSAY DOUGLAS, VK2ON

This is a frequency-modulated set of about 8 watts r.f. output, first produced in 1954. It is self contained with vibrator power supply and may be operated on 6v. or 12v. with slight alteration. A separate a.c. supply may be fed in through the 6-pin large Jones socket if the wiring is changed slightly.

1. Ventilation: Some sets have good openings in top and back walls of case. The writer's model needed a hole 4½ x 8 inches cut in top, and another 1½ x 6 inches in centre of back wall, then filled in with wire gauze.

2. Circuit: Study carefully and learn the basic outlines of same. Circuits are available from W.I.A. N.S.W. Division, Box 1734, G.P.O., Sydney.

3. Labelling: Apart from the front panel, the components are unlabelled. To facilitate the various lining-up procedures the different items should be labelled, at least under the chassis. Typed labels were stuck on with resin softening wax with the tip of an instrument-type soldering iron. The slug in L5 allows of some variation in frequency.

4. Re-wire Heaters for 12v. (if necessary) as follows:

   - To top of RW
   - V1-12AT7 mic. amp.
   - L1-1 meg.
   - T5-2.1 meg. (grid windings are on top).

   This procedure takes an hour or two and is well worth while.

5. Re-wire Relay for 12v. and a.c.-d.c. Operation: On 6v. the relay coils are in parallel—wire to A.

   Insert OA210 or similar rectifier between yellow (front) wire and relay coil in correct polarity. Connect 25 mF. (or larger) 25v. working electrolytic between relay coil and chassis. It may have to be placed above the deck. This modification gave 5v. across relay, which was just sufficient to operate it.

6. Alter Vibrator Transformer Connections for 12v. (if applicable):

<table>
<thead>
<tr>
<th>Colored wire</th>
<th>To vibrator transformer.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
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<tr>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

   (6v. Connection shown)

   *Masonic Parade, Gosford, N.S.W.

   Disconnect two coloured wires from 1 and transfer these to 4. Disconnect the yellow coloured wires from 8 and transfer these to 5.

   Bridge lugs 4 and 5 with a short length of wire. The vibrator coil is connected across one 6v. leg of heater chain and causes little unbalance as it uses only 0.15 amp.

   7. Change co-ax output socket. Add a Jones plug to allow operation on battery or a.c.

   8. Install R.F. Metering Circuit to facilitate tuning-up of p.a. This gives tx output on meter position 2 on transmt., and rx "S" meter indication on receive.

   9. Re-arrangement of Jones Socket to allow operation on battery or a.c.

   Disconnect thin coloured wire from 1, 2, 3, 4 and insulate same.

   Connect external 240v. a.c. supply to a Jones plug as follows:
   2. B+ 300v.
   4. Earth and Heater.
   5. Heater 12v. a.c.

   On a.c. supply, the vibrator is removed from socket.

   Complete internal wiring of Jones socket as follows:

   1. To top end of 100 ohm 5 watt resistor at back of chassis, R79 (back bias).
   2. To pin No. 7 of 6X4, 300v. rectifier (K).
   3. To electrolytic No. 3 (nearest back).

   For mobile (battery) operation connect power via another Jones plug to allow operation on battery or a.c.

   Align Receiver Coils as follows:

   1. Fit new coils for L1 and L2, using 10X type socket on front panel.

   2. Remove C35 across L1.

   3. Adjust slugs of T1 and T2 to first if. (12.7 mgs.) with g.d.o., after softening wax with the tip of an instrument-type soldering iron.

   4. Solder four inches of hook-up wire to hot end of each winding in turn—bring g.d.o. close and drape wire around g.d.o. coll. Tune appropriate slug for a dip, with g.d.o. on correct frequency. Top slug tunes grid or secondary winding. These windings may need 10 pF. additional capacity.

   (Continued on Page 6)
JUST ARRIVED! NEW 1964 EDITIONS!

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GETTING STARTED ON 160 METRES

PART ONE

This is the first of a two-part article dealing with quick and easy ways of getting started on 160 metres. In this part I will describe the transmitter I have built and am using on this band.

The transmitter has a two-stage r.f. section, consisting of a Pierce oscillator driving a pentode output stage. The modulator is also two-stage, with sufficient sensitivity for a crystal microphone to fully modulate the transmitter under close-speaking conditions.

This particular transmitter has been crystal controlled on 1825 kilocycles, which is the W.I.A. net frequency in Victoria. I believe there are crystals still available from the W.I.A. disposals. The power input to the final varies between 4 and 8 watts, depending on the h.t. voltage. I have used the transmitter with voltages between 230 and 330 volts. I would recommend not normally going over 300 volts.

The whole unit has been built into a 6" x 4" x 2" chassis, but I wouldn't recommend this unless extreme miniaturisation was the aim. A 6ABB handles the r.f. side of the works. The circuit is quite standard. It will be noted that no r.f. choke is included in the plate wiring of the triode section of the 6ABB, as it was not found necessary, plus the fact there was not enough room for it. The drive to the pentode section should be at least 1.5 mA.

The plate circuit is a standard pi-coupler with a neon in series with a 10 pF. mica capacitor to earth across the p.a. tuning capacitor. This indicates r.f. output and modulation. A 0-50 mA. meter is used to facilitate tuning and loading. The pi network values in this particular unit, with the aerial I am using, work out at 60 turns for L1 on a 2" former, winding with 26 B. & S. enamelled wire. C1 and C2 as per parts list. C4 and C5 will vary with the type of aerial used. With the trimmer, small variations in loading can be compensated for. The plate current will vary between 15 mA. and 27 mA., depending on the h.t. voltage.

The modulator is a 6GW8 valve. The wiring of this is standard, care only being necessary with the grid lead of the triode section, which is shielded. The modulation transformer is a small replacement type centre tapped speaker transformer. The voice coil leads are not used, being taped out of the way.

For netting purposes, a single-pole, single-throw toggle switch is used to switch the oscillator on. To control this unit I have used a relay for the following reasons: (1) 1825 kc. is a net frequency, where press-to-talk is desirable, and (2) I had a suitable relay on hand. Instead of a relay an Oak switch can be used. The heaters are arranged in parallel across the 6-volt supply. The relay is supplied from a separate 12-volt line from the power supply. A 6-volt relay would be better here if available, so that the unit could be used with a power supply with only a 6-volt winding. The relay controls the receiver h.t. through one pair of contacts. Additional ideas for switching and power supply circuitry will be included in the concluding article.

That is the description of the transmitter. It works well, and contacts over several hundred miles have been achieved. This should be an ideal starter for 160 metres due to its simplicity and ease of operation. The power requirements are 230-330 volts at 50-100 mA., 6.3v. at 1 amp. and 12.6v. at 0.1 amp.

A CAPACITY METER

How many fixed capacitors have you lying around the shack, just because the colour code or the markings have been rubbed off? I had about 50 of them, so I decided to do something about it. I do not claim originality of this circuit because the capacity meter was described in March 1952 "QST". The difference being, instead of using an in-built g.d.o., I decided to use the external g.d.o., which I have just completed, in conjunction with the measuring circuit.

If your meter is to hold calibration, reasonable care should be used to make everything solid. The frequency used is not important, mine works at approximately 4.5 Mc. and has a range of 0 to 10,000 pF.

With C1 at maximum capacity, bring your g.d.o. to close proximity and resonate to frequency of capacity meter.

To calibrate, connect capacitors of known size, or combinations thereof, and mark the dial at the grid dip point of C1. No attempt is made to give accuracy. I found a crystal of 1825 kc. Mine was made on a small chassis with the coil protruding off the end, similar to the g.d.o. coil.

J. T. Marston, VK6JA
TUNING INDICATOR FOR SMALL TRANSMITTERS
M. N. O'BURTILL, VK3WW

RECENTLY I decided to "clean up" my fixed portable rig. This included building a good modulator and bringing the chassis into first-class condition. The rig is a modified Command transmitter which operates on 40 and 20, and runs 15 watts input. A small meter was evident. The lack of funds to purchase some was usual.

After much rummaging in the junk box, I decided to try the old fashioned "magic eye". The Command transmitter already has one of these (1289), used originally as a calibration check indicator.

The circuit is quite simple and easy to get going. The 2.2 megohm resistor between plate and target anode can be varied one megohm either way, depending on any condition. The wire used currently was crystal diode will work.

The circuit is quite simple and easy to get going. The 2.2 megohm resistor between plate and target anode can be varied one megohm either way, depending on any condition. The wire used currently was crystal diode will work.

ATTENTION EX-G AMATEURS!

EX-G RADIO CLUB
The Ex-G Club has been in existence since the first issue of the "A.R." in September 1937. Since then there has been a steady growth in membership, and currently the club has over 1000 members.

The club is open to ex-amateurs who have left the amateur service for any reason, and who wish to keep in touch with the world of amateur radio. The club meets monthly, and there are regular sessions of the "A.R." with special guests and visitors.

The club publishes a bulletin monthly, which is mailed to all members. The bulletin contains articles on all aspects of amateur radio, including operating techniques, equipment, and the latest news from around the world.

Members of the Ex-G Club are entitled to special membership discounts on equipment, as well as access to a wide range of other benefits, such as special licensing opportunities and access to special events.

The club is run by an elected committee, and is open to all ex-amateurs who are interested in keeping in touch with the world of amateur radio.

Subscription to the Ex-G Club is open to all ex-amateurs who wish to keep in touch with the world of amateur radio. Membership fees are $25 per year, and include a subscription to the bulletin.

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—The "Sunday Mail," 21/8/64.
VK-ZL-OCEANIA DX CONTEST, 1964

N.Z.A.R.T. and W.I.A., the National Amateur Radio Associations in New Zealand and Australia, invite worldwide 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 qualify each other for Contest purposes.

When? Phone: 24 hours from 1000 G.M.T. on Saturday, 10th October, to 1000 G.M.T. on Sunday, 11th October.
C.W.: 24 hours from 1000 G.M.T. on Saturday, 10th October, to 1000 G.M.T. on Sunday, 11th October.

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.

4. Phone will be used during the first week-end and C.W. during the second week-end. Separate logs for both sections must submit separate logs.

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, the station 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 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 (telegraphy) report plus three figures which may be 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. Logs: (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:

   2nd " 16 1st " 20 3rd " 10 4th " 8 5th " 6 6th " 4 7th " 3 8th " 2 9th " 1

10. Logs: (1) Overseas Stations:—
    (a) Logs to show in this order—date, time in G.M.T., call sign of station, worked, band, serial number sent, serial number received, points, underlined each new VK/ZL call area contacted. Separate log for each band.

   (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 sum of VK/ZL call areas on all bands, while “single-band” scores will be that band QSO points multiplied by sum of VK/ZL call areas on that band.

   (ii) VK/ZL Stations:—

    (a) Logs must show in this order—date, time in G.M.T., 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 station during the Contest, has not strictly observed regulations, or has not observed regulations have been observed.

12. The ruling of N.Z.A.R.T. Executive Council will be final.

13. Awards: VK/ZL Stations: The N.Z.A.R.T. will award certificates to the top scorer on each band and the top scorer in each VK/ZL district, and silver mounted plaques to the top VK/ZL stations in both the phone and the c.w. sections.

Overseas Stations: Certificates will be awarded to each country (call area in W/K, JA, SM, UA) on the following basis:

   1. Top scorer using "all bands".
   2. Top scorer on individual bands.
   3. Other certificates may be awarded, to be determined by conditions and activity.

14. Entries from VK/ZL Stations should be posted direct to N.Z.A.R.T. Contest Manager, 152 Lytton Road, Gisborne, New Zealand, to arrive not later than 31st December, 1964.

Entries from Overseas Stations should be posted to N.Z.A.R.T., Box 489, Wellington, New Zealand, to arrive not later than 16th January, 1965.

RECEIVING SECTION

1. The rules are the same as for the transmitting section but it is open to overseas members of any SWL Society in the world. No 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 the transmitting section except that the same station may be logged twice on any one band—one 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 G.M.T., call of the 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.

4. Overseas Stations may log only VK/ZL stations. 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.

☆

1963 "CQ" CONTEST RESULTS

C.W. SECTION

Over 1,200 logs were received for the c.w. section and contained entries from 110 different countries and territories. That just about makes this the top c.w. DX Contest in the world.

The all-band single operator section was won by SAIYT with 571,750 points. VK5KN came second with 495,248 points. In single band section, on 24 Feb., VK6T was top with 204,773; 7 Mc. VKSK6 was sixth with 16,687.

Single operator results are as follows:

<table>
<thead>
<tr>
<th>Call Sign</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>VK5KN</td>
<td>495,248</td>
</tr>
<tr>
<td>VK6T</td>
<td>204,773</td>
</tr>
<tr>
<td>VK5KN</td>
<td>16,687</td>
</tr>
</tbody>
</table>

PHONE SECTION

Slightly over 170 logs were received from 117 countries for the phone section. That just about makes this the largest Phone DX Contest in the world.

<table>
<thead>
<tr>
<th>Call Sign</th>
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<tr>
<td>VK3ATN</td>
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<tr>
<td>VK3ATN</td>
<td>284,900</td>
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<tr>
<td>VK3ATN</td>
<td>162,100</td>
</tr>
<tr>
<td>VK3ATN</td>
<td>156,000</td>
</tr>
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Amateur Radio, August, 1964
"Q-MAX" CHASSIS CUTTERS
SCREW TYPE
BRITISH MADE
SAVES TIME — GIVES PROFESSIONAL APPEARANCE

Sizes

<table>
<thead>
<tr>
<th>Size</th>
<th>Square Punches (mm)</th>
<th>Rectangular Punches (mm)</th>
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<tr>
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<td>22/1/8</td>
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<tr>
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<td>8/8</td>
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<tr>
<td>8/8</td>
<td>22/-1/8</td>
<td>8/8</td>
</tr>
<tr>
<td>8/4</td>
<td>22/1/8</td>
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</tr>
<tr>
<td>1/2</td>
<td>8/8</td>
<td>22/-1/8</td>
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<tr>
<td>7/16</td>
<td>8/8</td>
<td>22/-1/8</td>
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<td>7/8</td>
<td>8/8</td>
<td>22/-1/8</td>
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<tr>
<td>15/16</td>
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<td>22/-1/8</td>
</tr>
<tr>
<td>18/16</td>
<td>8/8</td>
<td>22/-1/8</td>
</tr>
</tbody>
</table>

The "Q-Max" range of screw type chassis cutters serve a most useful purpose where holes are to be punched on chassis where components are already mounted. The SQUARE and RECTANGULAR punches save the hard work involved in transformer, plugs and sockets, I.F., etc., cut-outs.

MULLARD TRANSISTOR MODULATOR KIT
12.5 Watts Output

Basic components include: PNC31 input transformer, MT26 mod. transformer, five carbon resistors, a carbon adjustable resistor, two OC74 transistors, two OC68 transistors, electrolytic condensers and aluminium oxide capacitors.

Price: £9/18/9 inc. S.T.

Write for original Mullard Design Data. (Ref. A.R., May 1961.)

INSTRUMENT BOXES

Grey Hammertone Finish includes detachable front panel.

Size:

<table>
<thead>
<tr>
<th>Size</th>
<th>9&quot; x 7&quot; x 5½&quot;</th>
<th>20/- inc. S.T.</th>
</tr>
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<tbody>
<tr>
<td>9&quot; x 7&quot; x 5½&quot;</td>
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<td></td>
</tr>
<tr>
<td>5&quot; x 5&quot; x 4&quot;</td>
<td>15/- inc. S.T.</td>
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</tbody>
</table>

WORLD GLOBES

"Replogle" World Globes, especially designed for Amateur Stations. World Call Areas clearly marked. Includes day-night time cursor.

Price: £7/17/- inc. S.T.

WILLIS AIR-WOUND INDUCTANCES

<table>
<thead>
<tr>
<th>No.</th>
<th>Dia.</th>
<th>In. Length</th>
<th>B. A. W.</th>
<th>Price</th>
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<td>7/4</td>
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<td>No. 3014</td>
<td>8/5</td>
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<td>16 3&quot;</td>
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<td>16 4&quot;</td>
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<tr>
<td>6-10</td>
<td>2&quot;</td>
<td>10 4&quot;</td>
<td>No. 3017</td>
<td>13/9</td>
</tr>
</tbody>
</table>

SPECIAL ANTENNA ALL-BAND TUNER INDUCTANCE

(Refer B. & W. No. 3907-7"

7" length, 2" diam., 10 t.p.i., 24/6

PRICE: £3/19/6 (inc. S.T.)

WILLIS MEDIUM POWER TYPE

For use up to 600 watts p.e.p. Matching plate loads of 2,000 to 3,500 ohms (Z) and higher into coaxial cable. Operating Q increases on higher frequencies to increase harmonic suppression enabling practical values of tuning capacity to be used on 10 and 15 metres and allowing for wiring inductance (L). Incorporates extra switch section for shunting additional capacity (C) if required, or switching other circuits. Switch rated for 10 amperes at 2,000 volts with contact resistance (R) of 0.8 milli-ohms.

Price: £12/8/0 (inc. S.T.)

References:

The writer uses the times of low sun activity to re-build his radio station. These periods seem to coincide with major developmental steps, and therefore re-building is also needed to keep up with electronic development. It was 12 years ago that the writer went d.s.b.r.c. with 400% development. It was 12 years ago that all phone QSOs, or at least 60% of the successful callers, work s.s.b. and contests. If we tune in such a signal and knew how to tune in such a signal and was that the few early s.s.b. operators knew enough about the job. If one says that he can't build the gear because he has not a complete radio lab. at his disposal, he never learned Amateur techniques or he does not know enough about the job.

This receiver was first built about 12 years ago and many times modified, especially as far as the front-end is concerned. It was decided to get improved oscillator stability and this could best be obtained with crystal controlled first oscillators and a stable v.f.o. and provide for tuning the oscillators. Some thought was given to possibilities of combining certain transmitter and receiver features without adopting undesirable properties of some commercial sets, especially as far as the amount of skill was required to design around mechanical and electrical problems, and to make best use of the existing chassis, holes already drilled, and spares collected over the years. Most of these steps helped to keep the cost of the reconstruction job down to about £20. Labour is not to be looked at as an expense item but as part of the pleasure of achieving something.

The BLOCK DIAGRAM

The block diagram shows the stages of the receiver and transmitter. The receiver has two r.f. stages. The first mixer contains a triode which is used in the 1 Mc. crystal calibrator oscillator. The first oscillator is crystal controlled and a cathode follower valve helps to obtain the matching to a co-ax cable through which the same oscillator voltage is fed to the second mixer stage of the transmitter. In this way only one set of crystals is required for both the receiver and transmitter. The chance of finding one suitable set is very much greater than the chance of obtaining two sets, which can easily be brought to the correct frequencies. The frequency values shown on the diagram are for 30 metre operation.

With first oscillator frequencies above the r.f. frequencies, the first i.f. must be tuned towards lower frequencies as the r.f. values go up from 14 Mc. to 14.35 Mc. Two problems of the first i.f. is broad banded or if separate capacitor gangs are being used in this case.

With the first oscillator and the second i.f. at fixed frequencies, the need arises also to tune the second oscillator (v.f.o.) to lower frequencies with rising r.f. values. The second and third r.f. tuned circuits are tuned with the same gang which gives the capacitor sections in parallel for the v.f.o. These two segments had to be turned 180° on the axle to obtain the correct frequency shift direction for the r.f. stages and the v.f.o. The capacitor rotors were shrunk on the axle, so that warming up with the soldering iron allowed the segments to be turned 180°.

The product detector contains the b.j.o. stage and s.s.b. a.g.c. amplifier. For a.m. a twin diode is used. A noise limiter, S meter valve, two a.f. stages and the power supply complete the set.

The block diagram of the transmitter will be later described, after this part of the set-up is completed.

The BLOCK DIAGRAM

The block diagram of the transmitter always had two identical capacitor gangs and dials, therefore it was decided to use one to tune the receiver and the other one to tune the transmitter. Two small surplus relays with ceramic insulated circuits are being used to switch the transmitter condenser or the receiver condenser on the single v.f.o. In this way a single Franklin v.f.o. with buffer stage, one coil and one temperature compensating capacitor combination, acts for the transmitter and receiver, but the frequencies are independently adjustable over a 500 kc. range. One calibrated range covers all six bands.

Three low-gain stages with a double crystal filter follow on the second i.f. The product detector contains the b.f.o.

THE BLOCK DIAGRAM

The r.f. part has six bands of 500 kc. each. In this way the number of crystals for the first oscillator was kept to a minimum, and the six sets of coils and trimmers of the Goeier turret could best be used. Splitting the band up even further would have caused many electrical and mechanical problems, operating inconvenience, and difficulties in obtaining the necessary parts.

The first tuned circuit is adjusted with the aerial trimmer of 30 pF., because this trimmer is necessary in any case, and the receiver tuning gang did not have the fifth segment otherwise required. The 6B18 valve is not connected to the a.g.c. circuit, but it may be attached to a manual gain control if...
HERE IT IS! THE SPECTACULAR NEW FIVE BANDS 400 WATTS

SWAN-400 S.S.B. TRANSCEIVER

SWAN-406 MINIATURISED CONTROL UNIT, £55/13/9
Miniature design for mobile mounting in conjunction with the Swan-400. May also be used for fixed station operation if desired.

- Phone Band coverage as follows: 3.8-4.0, 7.1-7.3, 14.15-14.35, 21.25-21.45, 28.5-28.7, and 28.7-28.9 Mc. (These ranges can be easily adjusted to cover other segments if desired.)

PRICE LIST (Including Sales Tax)

<table>
<thead>
<tr>
<th>Product</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>SWAN 912 D.C. Power Supply</td>
<td>£103 3 9</td>
</tr>
<tr>
<td>SWAN SW240 A.C. Power Supply w/- speaker, etc.</td>
<td>£80 8 9</td>
</tr>
<tr>
<td>SWAN V.O.X. Control</td>
<td>£20 2 2</td>
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<tr>
<td>SWAN SW240 Transceiver</td>
<td>£250 0 0</td>
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<tr>
<td>SWAN T.C.U.</td>
<td>£234 15 4</td>
</tr>
<tr>
<td>SWAN 19B Power Supply, fits T.C.U.</td>
<td>£250 8 9</td>
</tr>
</tbody>
</table>

Australian Distributors:
W.F.S. ELECTRONIC SUPPLY CO.
225-227 VICTORIA RD., RYDALMERE, N.S.W. Ph. 638-1715

SWAN-400 5-BAND 400W. S.S.B. TRANSCVR., £292/1/0
- Operates with the Swan-406 or 420 Freq. Control Unit, and the Swan-117B, 117AG, or 512 DC Power Supply.
- Transmitter Power: 400w. s.s.b., p.e.p. input, dist. prod. down 30 db. 300 watts c.w. input, 125 watts a.m. input. Two 6H16 tubes, G40R driver stage, 3856 bal. mod.; 17 tubes, total.
- High Freq. Crystal Lattice Filter. Common to transmit and receive circuits. 3 kc. bandwidth. Unwanted sideband more than 40 db. down. Carrier down over 60 db.
- Receiver Sensitivity: Better than 0.5 uV, for 16 db. signal-plus-noise to noise ratio. 5½ in. highs., 13 in. wide., 11 in. deep.

SWAN-420 FULL COV. FREQ. CONTROL UNIT, £94/3/9
Designed for fixed station operation in conjunction with the Swan-400. May be installed for mobile use if full frequency coverage is desired.
cross modulation is caused by strong near-by signals. The second and third r.f. tuned circuits are tuned with the four-gang capacitor of 6 to 18 pF each. The required bandwidth of 500 kc at the various r.f. bands is obtained by connecting the dielectric variable capacitor and valve electrodes to the hot and earthed side of the r.f. circuit instead of connecting the correct value of fixed and trimmer adjusted parallel capacity. The L and C values have to be pre-calculated, they are then preset in the circuit with the g.d.o. and finally trimmed under working conditions.

The coil details are as follows:
- 80 and 40 metres: No coil tap and total maximum capacity about 100 pF.
- 20 metre coil tap at 4/5 of turns, 75 pF. maximum total capacity.
- 15 metre coil tap at 2/3 of turns, 63 pF. total maximum capacity.
- 10 metres (1): Coil tap at half of turns, 63 pF. total maximum capacity.
- 10 metres (2): Same as above.

The r.f. gain of the second r.f. stage is controlled manually and also via the a.g.c. network. The first oscillator uses a 6AG5 valve, triode connected, in a well known overtone circuit. It was found that the 80 metre range crystal oscillated far more readily in the overtone circuit than in the basic frequency circuit first used. The crystals for the 40, 20 and 15 metre bands are operated at the frequency which is close to the third harmonic (I don’t want to join in the argument of harmonic v. overtone). The crystals for the 10 metre band segments work near frequencies which are near the fifth harmonic. These two crystals will later be replaced by those which operate at a lower overtone, to obtain more oscillator voltage. They were originally for 6450 kc. and the writer ground them down with valve grinding compound on a thick glass plate.

To reduce pulling effects, link coupling is used to bring the c.o. voltage to the first mixer grid. The 9002 valve acts as cathode follower from which the c.o. voltage is fed to the second mixer of the transmitter. A low DC valve, which can take several volts of r.f. without distorting the signal, is being used here. The pentode of the 6S serves as first mixer whilst the triode operates the 1 Mc. crystal calibrator. A Ge-diode causes distortion of the 1 Mc. signal and in this way strong harmonics are obtained for calibrator purposes up to 29 Mc. This method is very much more convenient than the soldering of different TCc capacitors in the circuit without changing the total circuit capacity value. The 12AT7 v.f.o. valve operating in the Franklin circuit, which seems to be the best choice.

The second chassis contains the i.f. amplifier and associated stages. It is advisable to use a fair amount of selectivity in the early stages to guard against far off resonance signals and reduce cross modulation and spurious signals. Therefore, four tuned circuits operating on the first i.f. are used with one low gain valve in between. The other reason is that the low frequency end of the v.f.o. range falls in the high temperature compensation is still not right after two more hours. The warming up time stability and also the long term stability of this v.f.o. is about ten times better than the drift of the v.f.o. in my BC221 which has a separate power supply similarly stabilised. The relay switching is extremely accurate and does not cause frequency jumps as many switches do.

A buffer stage with a 6AK5 valve follows the v.f.o., which has a broad bandwidth plate circuit with a low impedance output tap, from which the v.f.o. voltage is fed to the receiver second oscillator and transmitter first oscillator. The relays obtain 7v. and 100 mA d.c. from the 6.3 filament voltage via a Si-diode and a 300 μF charging capacitor.

The receiver on three chassis reduces the table space requirements and modifications are easier incorporated or whole chassis can be replaced.
frequency part of the first i.f. band, which called for sufficient selectivity to prevent overloading of the i.f. amplifier. No trouble was experienced because the v.f.o. runs 352 kc. below the corresponding first i.f. tuning frequency. This set of circumstances could have been avoided altogether if a different set of oscillator crystals had been available. Such crystals exist which had no low order harmonics and frequency combinations falling in r.f., 1st i.f., or 2nd i.f. frequencies, a requirement prevent beat notes and spurious responses. During a stage of the receiver development a mixer-v.f.o. with only one crystal and other attractive features had been used, but the undesired beat notes “did beat me too” and I gave up.

The coils of the 2nd i.f. tuned circuits are identical, but the fixed parallel capacitors are different in all four cases to compensate valve and circuit capacity differences. A four gang capacitor is used to make the 1st i.f. circuits. The crystal filter has active stray coupling and slight capacitive coupling result in enough bandwidth so that this 1st i.f. capacitor needs only re-adjusting a 100 to 200 microfarad of the trimmer. All i.f. stages are connected to the manual gain control as well as to the a.m. or s.s.b. a.g.c., which may be switched off. The second mixer uses a 6L7 valve — any type will do here—whilst the first mixer tube had to be a low noise t.v. type.

The existing unmodified 2nd i.f. amplifier has been described before in “A.R.” The Telefunken type double crystal filter with two crystals and variable bandwidth is employed. The sketch shows the tap positions in % inductance on the pot core i.f. coils. The i.f. crystal filter is basically very similar to the well known HRO circuit, both using a bridge circuit, phasing capacitor and detuning of the i.f. circuit to vary the bandwidth. Differences are in the following: the 1st i.f. coil is connected to taps of the adjacent i.f. coils to obtain the all important (often overlooked) matching. The correct tap position depends on the crystal Q, the tuned circuit and the frequency of the tuned circuit as well as its L/C ratio. If the crystal taps are too close to the hot coil end, the bandwidth will be too narrow and a deep notch will occur between sharp peaks. If the crystals are placed too far down from the hot end, the selectivity will be far too low and the crystals lose their value. The design of this filter stage is also to be considered in this respect.

The phasing trimmers of 80 pF. are adjusted and fixed. The first trimmer is set in such a way that the pole (notch) of the response curve is placed 1-1.5 kc. below the lower corner of the flat top frequency range. The i.f. bandwidth (3 kc. at —6 db.), whilst the second trimmer is similarly set but above the upper corner frequency of the flat top response band. How deep the notches are (80 to —100 db.) and how little signal shows up outside the flat top response band. How deep the notches are (80 to —100 db.) and how little signal shows up outside the flat top response band. How deep the notches are (80 to —100 db.) and how little signal shows up outside the flat top response band.

On either side of the two crystals are 7-14 pF. air dielectric variable capacitor segments of a four-gang capacitor with insulated rotor and box completely shielded. In both cases one segment tunes the i.f. circuit to a higher i.f. and the other segment to a lower i.f. Thus continuous detuning results in a symmetrical and narrower i.f. passband without affecting the gain. With a bandwidth of 5.7 kc. —80 db. down and 3 kc. to 3.3 kc. at —6 db, this set-up is as good as a set of mechanical filters. This circuit has been used in i.f. amplifiers ranging from 130 to 1,600 kc. The b.f.o. can be used as signal generator and the a.g.c. as v.t.v.m. to align the i.f. circuits.

For a.m. demodulation and a.m. a.g.c. the twin diodes of the 6H6 are being used in the usual fashion. The cathode of the a.g.c. diode has negative bias, so that weak signals do not operate a.g.c. system. The signal diode is connected to a noise limiter “borrowed” from an early Collins receiver.

A third mixer—also called product detector—is used for s.s.b. and c.w. reception. The 6AJ8 valve has a hysteresis loop and can act as mixer and a.f. amplifier and a triode operating as b.f.o. valve. The difference frequency of b.f.o. and 2nd i.f. passes through the RC filter connected to the plate of the triode. Several volts of a.f. signal are so obtained. The load resistor of 200K ohms acts as a voltage divider for the a.f. voltage. The whole voltage is brought through a separating resistor of 100K ohms to a Ge-diode to obtain the desired beat notes. This circuit has been used in i.f. amplifiers ranging from 130 to 1,600 kc. The b.f.o. can be used as signal generator and the a.g.c. as v.t.v.m. to align the i.f. circuits.

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FOSTER DYNAMIC MICROPHONES

SPECIFICATIONS:
Output Impedance: 50 ohms or 50K ohms
Effective output level: -55 db. [0 db. = (one) 1V. Microbar]
Frequency response: 50 to 15,000 c.p.s.

OMNI-DIRECTIONAL DYNAMIC:
Plastic Diaphragm.
Size: 4½" long, 1¼" diameter.
Cable: 12 ft. of P.V.C.
Retail Price 50 ohms: £4/7/9 + Sales Tax 10/11
Retail Price 50K ohms: £4/10/0 + Sales Tax 11/3

A QUALITY PRODUCT FOR TAPE RECORDERS & P.A. USERS

Marketed by ZEPHYR PRODUCTS PTY. LTD.
58 HIGH STREET, GLEN IRIS, S.E.6, VICTORIA
Phones: 25-1300, 25-4556

Manufacturers of Radio and Electrical Equipment and Components


GALAXY S.S.B. TRANSCEIVERS

SMALLEST 300 WATT S.S.B./C.W. TRANSCEIVERS ON THE MARKET
EXTREMELY SENSITIVE RECEIVERS

Optional plug-in units for vox, outboard v.f.o. and crystal calibrator.
Two models, same size, prices include sales tax.
GALAXY III. 80-40-20 Metres — £230
GALAXY V. 80-40-20-15-10 Metres £300

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Phone 394
YOUR PYE REPORTER, PTCA-116, Mk. II.

PART TWO—THE TRANSMITTER

DAVID PRIESTLEY,* WIA-L3163

As a follow up to last month, here is the procedure to line up your Pye Reporter Mk. II. transmitter.

Before I commence, may I give thanks to "The Master", Jack Kelleher, VK3AJI, for the help he gave as far as his time was concerned.

Pertinent details for transmitter line up are as follows:

- Signal frequency: 53.032 Mc.
- Crystal frequency: 58924 Kc.
- Coil numbers are taken from the circuit of the PTCA-116 Mk. II.:
  - L6—2 turns (this is the link).
  - L7—17 turns 16 g. enamelled wire (one turn spaced).
  - L8—5 turns 18 g. tinned copper wire (one turn spaced).
  - L9—5 turns 18 g. tinned copper wire (one turn spaced).
  - L10—2 turns (this is the link).
  - L11—17 turns 24 g. enamelled copper wire.
  - L12—5 turns 18 g. tinned copper wire (one turn spaced).
  - L13—17 turns 24 g. enamelled copper wire.

- Coils L6 and L12 should be dipped for resonance at 53 Mc. The Philips trimmers on L6 and L12 will do this adequately.

- Tank coil L7 is 11/16" in diameter. The condenser C56, which is in series with L7, will need to be slightly higher in value, preferably about 75 pF. These are readily obtained through trade houses.

- Tank coil L7 must be dipped to 17.6772 Mc. That is the procedure to line up your Pye Reporter Mk. II. transmitter.

A Modern DX Receiver

(Continued from Page 12)

It may be necessary to replace the metal rectifiers in the power supply with silicon diodes. The metal rectifiers are worn out but be sure the diodes are of a 1 amp. variety.

Finally, the frequency of the crystal may be slightly off the net frequency of 53.032 Mc. Put a Phillips trimmer across the crystal and the slight amount of null necessary should be fairly readily obtained.

A Modern DX Receiver

(Continued from Page 12)

The frequency and synchronising of oscillation by the crystal was observed at frequencies which were as high as the ninth harmonic of the crystal. With the slug further screwed into the coil, the strength of the signal near the ninth harmonic became weaker, but the frequency was practically unchanged.

Finally, output could be found near the 7th harmonic and the signal near the 9th harmonic disappeared. By screwing the slug deeper in, the same effect was observed near the 5th and 3rd harmonics, but the signal gained in strength as was to be expected.

Switch S2 operates the v.f.o. relay for the transmitter and receiver operation. The switch has a neutral position and vase relay operation on the transmitter and receiver.

The use of c.o. frequencies for the first oscillator, which are for some bands on the other side of the r.f. band, would have caused complications, because then on some bands the 2nd i.f. tuning and v.f.o. tuning would run in the opposite way than on the other bands. When planning this type of equipment construction it is advisable to work out all frequencies of the r.f., c.o., 1st i.f. and 2nd i.f. for both band ends.

The numbers in brackets are contact numbers on the turrct and c.o. range switch.

It is intended to build the transmitter in a similar manner on three chassis of the same size.

How good is the receiver? An amateur friend, a ship's wireless operator, who visited many U.S. amateurs and operated their gear, said, "This receiver handles c.w. and s.s.b. better with more stability and ease of adjustment and receiver flexibility than many very expensive commercial U.S. receivers." The ease of incorporating modifications and not having to worry about re-sale value are further bonus points.
SWL

Correspondence

Any opinion expressed under this heading is the individual opinion of the contributor and necessarily coincides with that of the publishers.

S.W.L. AND QSLs

Editor "A.R.," Dear Sir,

I have read and studied the letter from VK3KK (June "A.R.") in which he speaks of his new appointment as WIA QSL Manager and as such he is keen to hear from those who have received QSLs from 8XAA, UOSPK, G6TA, OH2XZ and DL3RK.

It has been decided to include in the programme a DX programme for stations in other countries in obtaining commercially other names of contributors to give the details of coils used for the benefit of outside U.K. constructors. "A.R." contributors might also take note of this latter remark.

This letter is open to serve as the first letter to get the Editor to consider republishing the two pages concerned.

-A. F. W. Haddrell, VK3ZFC

INFORMATION REQUIRED

C/o P.O. Sunbury, Victoria

Editor "A.R.," Dear Sir,

For some time this Association has conducted a DX programme for stations in other countries. This programme has been aimed primarily at providing up-to-date news for the experienced short-wave listener and information of easy-to-log stations for the S.W.L. beginning in the S.W.L. DX LADDER.

It has been decided to include in the programme a regular monthly service feature directed to those who are engaged in QSLing and the S.W.L. interested in the Amateur bands.

It would be appreciated if you could undertake to provide some information about your work for some time in the programme. Any one who could supply regular monthly information for the programme, under the same conditions, call areas being heard on various bands (including 2 and 6 metres), forthcoming contests, etc., etc., would be much appreciated.


S.W.L.

NEW SOUTH WALES

Attendances at the monthly meetings have been fair, but this is only to be expected when you first get a lot of information into your head and there must be enough active listeners around to make your page worth while. There will be a meeting on the third Friday of the month. If you have something to contribute, be prepared to make a comment or a suggestion. It's as easy as that, so what about it chaps?

ANTENNAE

Due to the fact that any length of free wire in space acts as an efficient radiator or intercepter of radio frequency energy at one fundamental frequency, and the harmonics of that frequency, it is a difficult problem to make an antenna that will give effective results over a wide band of frequencies. All types of all-wave antenna systems for best results use a matching transformer between the feedline and the receiver, and in all cases the r.f. image rejection will be increased.

A simple antenna coupler circuit will be found in "A.R. & others Handbooks." Easy to construct and will fit into a box 5 x 5 x 3 inches. The cost of a kit will be very small. It will only cost you a stamp to address and a one cent stamp to buy a kit. It is assumed that there is a desire for a single wire, its overall efficiency is about 40%.

Graham L4011: Thanks for the circuits on QSLs. We should use them in a later date. Graham uses a Hallcrafters rx, 4 x 3 inch d.p. and is erecting a new antenna at the moment. Lately has been involved in the VK8 group and Intends setting for his ticket early next year. We wish you all the best.

SOUTH AUSTRALIA

Alan L5068: With all that local interference you may not come to a conclusion. But Alan is much better effort. Congratulations on your win in the S.W.L.C. very good. I hope the new three element beam is a success. Alan heard recently JT1 EWI, 8KI, 7KI, 5SI, 4FI, 4BS, 8Y5, 7ZS, 7ZS, 8K4, ROB

WESERN AUSTRALIA

Peter L6021: A glance at the DX ladder will show you that this lad is going to give the leaders a mighty fine lot of chaps. In a very informative effort. Congrats on your win In the S.W.L.C. very good. I hope the new three element beam is a success. Alan heard recently JT1 EWI, 8KI, 7KI, 5SI, 4FI, 4BS, 8Y5, 7ZS, 7ZS, 8K4, ROB

TANZANIA

Mike L7077 (TZA.V), the bug bear of Burnie. Mike has migrated to the north of the Apple for VK7ZL. Mike brings a bit closer to Australia for the first time. Mike has got off the deep end after this year, and believe it or not his XYL to find out what the new venture O.M.

I can thank those members who took the time to pen me letters, also those for the good wishes re the page, and my recent achievements. Without these letters I would never have received copies of the b.o. and time chart J.T. The last letter was written with you next month champs. 73, Chas. L211.

S.W.L. DX LADDER

Countries Zns. S.s.b. W

Sub-Editor: Chas. Aberneathy, WIA-L2211
3 Urunga Parade, Miranda, N.S.W.

Friday.

forget to drop in at our meeting on the third Friday.

has received HK, KL7, WO, VPS, JAS, I1BKK and uses an 8JK 20 metre antenna.

VICTORIA

Recently I had the pleasure of meeting Mac L2699. Mac brought his son to the club and is a success. Alan heard recently JT1, XE1, VT2, TV3, 7KI, 8KI, 5SI, 4FI, 4BS, 8Y5, 7ZS, 7ZS, 7K4, ROB

Keith L2699 tells of the purchase of a t.v. and we wish him luck with it. The receiver is from the company of the author. Until the novelty wears off shall not be doing much more if they were to come along.

Remember for all aerials, "How high is the tower?"}

Sub-Editor: Chas. Aberneathy, WIA-L2211
3 Urunga Parade, Miranda, N.S.W.

Friday.

forget to drop in at our meeting on the third Friday.
There is very little change to report in the state of the bands this month. Very little to report on the usual run of QRN, stability of this band leaves a lot to be desired, you are lucky enough to be on hand when it pops. Generally speaking the noise and in general the conditions prevailing suit the idle rich or the poor shift worker, hi.

The night path to Europe can be had at 2300z during the morning hours and changes daily, still W works with VS9MB who runs very low power, VQ2RB, ZD6PBD, 9Q5AB. Tnx Peter.

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YOUTH RADIO CLUBS

This was a big month—three of my four readers wrote to me and SPS spoke to me three times in his notes!

Keith 2AKX kindly sent me some further details of the Bouragul persons whose most interesting is Susan Brown 2BSB, first schoolgirl A.O.C.P. and first of the VK3-B call signs. We have given some news of Susan a couple of months ago, but she is now on the air. To encourage her, she was given a League Certificate (usually Saturday), so if you contact VK3BSB, you will receive c.w. at 18 w.p.m.

Another Bouragul type is Jan Ostendorp VK3BJO, now working with P.M.G. and working 80 mx. From the same area is Ross Beckly VK3BJU and on the air but doing c.w. test soon for full licence.

But VK2BSB has his new Westlakes Radio Club on Saturdays, doing Y.R.C. certificates and a class of 14 on Wednesday rights doing A.O.C.P. Busy man! We could do with many more like you. I repeat a suggestion I made from the members to the newest clubs: "How many Youth Radio Clubs in such a large centre?"

I have already congratulated VK5 Division for the appointment of Bob 5OD as Y.R.C. Supervisor. As I am fond of asking questions, I ask another one: "What legs are being taken by the Division organisation to help Bob?"

News is eagerly awaited. It is pleasant to hear that Port Pirie Y.R.C. is even more active than ever.

Ken 2TV is regular as ever with his Newsletter containing some interesting news items. It is not being taken for granted. Ken himself went portable, John 3ZP had the boys work mobile from his car, and Ross managed some donated equipment.

Elementary Certificates Issued

Showed above are members of the A.P.I. Radio Club who have passed their elementary certificates. The list is a part of the Y.R.C. scheme, receiving the first Elementary Certificate in the Division. Left to right: Mr. George Munro (Divisional Engineer, P.M.G. Training School, Vic.), David James, Peter O'Neill, Tony Newman, Richard Philp, John Liversay, Fred Mackrewicy, John Newman, and Club Instructor, David Buck VK2XED.

Johannesburg Festival Award

This award is available to all Amateurs who have contacted the required number of Johannesburg stations during the festival period 1 July—October, 1964. This award—considered to be the most attractive one produced for a long time—is descriptive in design and presented on the inside of a folded card. It tells the story of the phenomenal growth of Johannesburg in story and colour illustrations.

DX stations may log only VU2/4S7 stations. Zones 91 stations must contact 5 VU2 stations, zone 38 stations must contact 10 VU2 stations, and zone 36 stations must contact 20 VU2 stations.

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VU2'457 DX CONTEST 1964

The Amateur Radio Society of India and the Radio Society of Ceylon invite Amateur Radio Stations of the World to take part in the first in the VU2/457 DX Contest. The object of this Contest is to enable DX stations to work as many VU2 and 4S7 stations as possible during the two week-ends.

Telephone—October 10—11, c.w.—October 17—18. The commencing time in each station is 0600 G.M.T. Saturday, and the finishing time 0600 G.M.T. Sunday.

There are three main sections to the Contest: (a) mornings and evenings, (b) S.w.i.—telephony, and c.w. (c) S.w.i.—telephony and c.w.

All Amateur frequency bands may be used. The call number will comprise RS or RS report plus three figures, which may begin with 001 for the first contact, and which will increase in value by one for each additional contact. If any contestant reaches 999, he will stop and not contact more stations.

Scoring: For DX stations—Two points for each contact not identified band with VU2/457 stations and 1 point for each contact on a specific band with the rest of the world.

For this Contest the A.R.R.L. Countries log will be used with the exception that all call Area of W, K, JA, SM, UA, VK, 2L etc., will count as "countries" for scoring purposes.

Logs, DX Stations: (a) Logs should contain dates and times of contacts, call signs of all stations contacted, band, serial numbers sent, serial numbers received, and number of points. Different logs must be used for each band. (b) The summary sheet should show call sign, name (block letter), serial number, points and cumulative score by showing total points for all bands, ignoring total number that rules and regulations were observed.

Logs and accompanying summary sheets should be sent to the DX contest manager, Miss Pakistan, Post Box 584, New Delhi-1, India, and should be postmarked not later than Nov. 15, 1964.

Awards: Certificates will be awarded in each country (call area in VK) on the following bases: (a) Most contacts, (b) maximum score, (c) top scorer using one band, (c) those with minimum score, (d) results determined by conditions and activity prevailing.

There is an S.W.I. Section which is open to all amateurs of all licence classes. The rules are the same as for the transmitting section. All logs will take the same form as for the transmitting section and should contain date, time (G.M.T.), call of station heard, serial number of station heard, band, and points claimed. Scoring is on the same basis as for transmitting and the summary sheet should be similarly set out. Certificates will be awarded in each DX scoring section.

DX stations may log only VU2/457 stations.
Winter and its effect on activity is painfully apparent here in VK this year. So far there has been no reports of 6 mc DX up to early July. The level of activity has lost the usual enthusiasts or Channel 0. Ted 3UU and Doug 3ZJJ have just built gear and are ready to log a contact. George 4ZLG, Doug 3ZJJ and Bob 4LI are looking towards a possible 6 mc tx and Bob 4LI is also interested in the v.h.f. bands. Whether the level of activity has lost or gain found is not yet known. However, there seems to be an interest in the v.h.f. bands.

Any of the v.h.f'ers who are expecting QSL cards should read VK2ZGF or 4ZPL.

Predictions: With a little effort on their own behalf and supreme bulldozing effort on the part of others, precipitated by a severe psychological attack to shock the same nerves into a regular action, we confidently predict a smoke test of the area and an informal lecture and the usual refreshments for Oscar and so far has the names of 18 VK4 and VK5 stations. Two call signs appeared this month from all reports this v.f. signal is reaching out from all reports this v.f. signal is reaching out.

QH0/40S he owns? QV06/40S he owns? What is 4Z2R doing with the four QG4/60s he owns? Where is he booked on the ferry over to Tasmania in November. They will be leaving Brisbane on the 7th and returning on 26th. (George tells me he is booked on the ferry over to Tasmania in November. They will be leaving Brisbane on the 7th and returning on 26th. (George tells me)

Mt. Gambler v.H.f. 2aavetissement: Approx. 36 Hams from VK3, some with XYLs and harmonics, attended the Convention which was a big success, and is the first major visit by the VK3 E. h.f. Group hope to have. A very good time was had by all who attended. (See photograph on this page taken at Mt. Gambler.)

General: The monthly meeting of the v.H.f. Group was held on Friday, 19th June, and Mr. G. Kirkpatrick, of the F.M.G. Dauph, gave a talk on Interference in Radio Communications. Although the attendance was down to what it usually is, those present enjoyed an informal lecture and the usual refreshments afterwards.

Queensland: 56 Mc. ARRC. has been very active and there have been no reports of 6 mc DX up to early July. Whether the level of activity has lost or gain found is not yet known. However, there seems to be an interest in the v.h.f. bands.

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East Melbourne, C.2, Victoria.

Amateur Radio, August, 1964
FEDERAL QSL BUREAU

Full rules and log proformas for the 10th Federal Division DX Contest are now on file in the Bureau. Contest periods are: c.w., 0000z, 8th August; phone, 0000z, 15th Aug., to 2400z, 16th Aug.

Stan VK3AWX is now acting as QSL administrator for John, VK1QJ. Stan replaces WHHYG.

Cards from PKE2T are coming to hand via the Divisional QSL Bureau. It might be due to the fact that is or was Johnny DJ4IC and the QTH given was in this country. He mentions the fact that he is now working in a place of wonder and delight. As we have been informed of this we shall look forward to hearing from him.

Major 2RU's lecture on "Receiver Alignment and Servicing" was well received. The hearing by a good number of DXers was certainly a help to the presenters. A good number of the audience were familiar with Tom's vast stock of bits and pieces, so they know just what to expect from him.

One of the members of the club who has been doing much work for the club is Chris 2OK. He has been working hard on his new call. He has made an excellent start signing 2BJO from Awaba at the end of June. His station is one of the most interesting in the country. Many DXers have been listening for him, and he is always on the lookout for the DXers. He is now qualified to write a book "Travel on 80. Your scribe is still making his trip to the States. He has been working hard on his new call, signs 2BJO from Awaba at the end of June. His station is one of the most interesting in the country. Many DXers have been listening for him, and he is always on the lookout for the DXers. He is now qualified to write a book "Travel on 80."

Central Coast Zone

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Commercial transmitters are very popular on the Central Coast. They believe Swans-type signals now emanate from 2NI and 2IN (no misprint). Haven't heard the latter's signal since April last. It was expected that there would be a 160 mobile signal on from hereabouts, but due to an error of the power supply this is now a remote dream. The morse classes at the club have been well attended. The boys should pass the c.w. in January if nothing goes wrong.

Details of the dinner and field day for this year are to be published next month. Members will be well advised to book early, as the accepted practice, costs will be lower this time than last year. Also there will be a further saving for those who book early, but more of this later.

According to the next meeting when Lionel will talk about the converter and transceiver 1.f receiver which was planned for July. We have a good number of these in the store room block. Newcastle Technical College on Friday, 4th August, will also hold an auction of interesting items. It promises to be a beauty. So see you there.

Amateur Radio, August, 1964

NEW SOUTH WALES

HUNTER BRANCH

Winter draws on, as one of our members was heard to remark at the last meeting and since bronze figures still stand until the last, the attendance was below the usual number. We would like to see a larger number of members and visitors present to hear and see the exhibits, which we are always offering.

Many of the local boys are preparing their annual DX contests. The broadcast from 2AWX always includes a list of the expected DX and the expected QTH after a trip to London and all Scandanavian stations.

Mr. Davis, has said that at the next meeting he will offer for sale some of his surplus gear. There is always a good number of items of wonder and delight. As we have been informed of this we shall look forward to hearing from him.

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VICTORIA

The Western Zone has gained two new members, Perce SPA, who comes from Preston, and now resides in Horsham, and Alex Proudfoot, who has moved from Melbourne to the country. Alex has passed his full licence at the last examination. Herb VK4T has worked a number of new stations in the Western Zone who went to the South Australian V.h.f. Convention at Mount Gambier and took part in the contest. Herb VK4T also attended the S.A. Convention at Hamilton when he presented a slide program on V.h.f. The signal was good clear sideband, so the QSO was made with great ease.

On the DX side, Harry ZX2 has worked a number of new stations in the Western Zone who went to the South Australian V.h.f. Convention at Mount Gambier and took part in the contest. Herb VK4T also attended the S.A. Convention at Hamilton when he presented a slide program on V.h.f. The signal was good clear sideband, so the QSO was made with great ease.

MOORABBIN AND DISTRICT RADIO CLUB

Although there has been a lack of news recently, there has not been any lack of club activities. A special meeting was held on 17th May for the purpose of discussing club matters. It was decided that the club should continue to hold monthly meetings and to hold a special meeting every third month. The next meeting is scheduled for 17th August and will be held at the usual time and place. The club is looking forward to a successful year.

One of the members of the club who has been doing much work for the club is Chris 2OK. He has been working hard on his new call, signs 2BJO from Awaba at the end of June. His station is one of the most interesting in the country. Many DXers have been listening for him, and he is always on the lookout for the DXers. He is now qualified to write a book "Travel on 80."

CENTRAL COAST ZONE

Major 2OK's lecture on "Receiver Alignment and Servicing" was well received. The hearing by a good number of DXers was certainly a help to the presenters. A good number of the audience were familiar with Tom's vast stock of bits and pieces, so they know just what to expect from him.

Commercial transmitters are very popular on the Central Coast. They believe Swans-type signals now emanate from 2NI and 2IN (no misprint). Haven't heard the latter's signal since April last. It was expected that there would be a 160 mobile signal on from hereabouts, but due to an error of the power supply this is now a remote dream. The morse classes at the club have been well attended. The boys should pass the c.w. in January if nothing goes wrong.

Details of the dinner and field day for this year are to be published next month. Members will be well advised to book early, as the accepted practice, costs will be lower this time than last year. Also there will be a further saving for those who book early, but more of this later.

According to the next meeting when Lionel will talk about the converter and transceiver 1.f receiver which was planned for July. We have a good number of these in the store room block. Newcastle Technical College on Friday, 4th August, will also hold an auction of interesting items. It promises to be a beauty. So see you there.

Amateur Radio, August, 1964
Friday, 14th August. A Divisional Dinner will be held at 6 p.m. at the Oak Room, Maple Lounge, Edward Street, City, on this date. It is during show week and the coat is only 25/- per member, so we'll see you there!

JUNE MONTHLY MEETING

The June meeting was held on 19th at the usual address, State Service Union Rooms, Elizabeth Street, City. General business was included a fully operational low-band rig, Nam. Classes for Juniors have been started and are well underway. The treasurer will be responsible for remaining business. In particular, the ladies committee is trying to work 10 metre DX into Brisbane recently, but so far without success.

Ken 40F and Peter 4PJ have been busy setting No. 19 tests ready for emergency and mobile use. W.I.C.E.N. is in its infancy here but the club is to be congratulated on the excellent supper and entertainment provided. The master of ceremonies was Brian 4LB, and from what I hear he doesn't even own the blue pencil. President (Phil 5NN), who showed a somewhat jilted-up name of Jumble on the programme, was of course not present. Bert 4FX even talked me into buying an electric razor! The solution being to adopt the American system—no TV channels below 100 Mc.

TOWNsville AND District

Although the drought broke in North Queensland, sorry to say the news reports on Amateur radio activity are still very sparse. In a recent round table talk with some of the northern chaps, the absence of the VK5 notes was very heatedly discussed. The VK5 notes were not sent due to the blue pencil being the cause, but knowing that the VK5s dearly loved having a shot at paper open to some of my caustic remarks. Claude 4UX really snowed under, correcting the various exam. papers for the youth clubs, and has been very grateful for the help. I hope to help out in correcting the elementary papers. Wasn't I lucky in being deaf when all this was being discussed. Bert 4LB very busy painting new cases for the new quad he hopes to put up with the able assistance of Merv. 4ZMD. Yours truly will be there to offer advice and partake of the promised refreshments.

The monthly general meeting of the VKS Contractors to Federal and State Government Departments.

BRIGHT STAR CRYSTALS

FOB ACCURACY, STABILITY, ACTIVITY AND OUTPUT

Our Crystals cover all types and frequencies in common use and include overtone, plate and vacuum mounted. Holders include the following: DC11, FT243, HC-6U, CRA, B7G, Octal, HC-18U.

THE FOLLOWING FISHING-BOAT FREQUENCIES ARE AVAILABLE IN FT243 HOLDERS—

<table>
<thead>
<tr>
<th>Frequency</th>
<th>DC11</th>
<th>FT243, HC-6U, CRA, B7G, Octal, HC-18U</th>
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<tr>
<td>5.500 Kc. T.V. Sweep Generator Crystals, 23/12/6.</td>
<td>100 Kc. and 1000 Kc. Frequency Standard, £8 10/0 plus 12½% Sales Tax.</td>
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<td>Immediate delivery on all above types.</td>
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455 Kc. Filter Crystals, vacuum mounted, £6 10/0 each plus 12½% Sales Tax.

ALSO AMATEUR TYPE CRYSTALS—3.5 AND 7 Mc. BAND.

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Amateur—from 23 each, plus 12½% Sales Tax.

Regrinds £1/10/.-.

CRYSTALS FOR TAXI AND BUSHE FIRE SETS ALSO AVAILABLE.

We would be happy to advise and quote you.

New Zealand Representatives: Messrs. Carrel & Carrel, Box 2102, Auckland.

Contractors to Federal and State Government Departments.

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46 Eastgate Street, Oakleigh, S.E.12, Vie. Phone: 57-6387

With the co-operation of our overseas associates our crystal manufacturing methods are the latest.

SOUTH AUSTRALIA

The monthly general meeting of the VK9 Division was held on 13th, at the usual representative gathering of members (for the benefit of the doubting Thomas' in the north to partake of the tourist weather at this time of the year. Unfortunately not being able to help the club could be impossible to meet them unless they detour. But as Basil said, "we all had a fair share.")

According to a headline in a recent Sunday paper, quite a long discourse was given in relation to v.i. in the Rockhampton area, caused mainly by two-way radio in the various businesses undertaking this. It would gladden the heart of the local Amateur were it not that the manager was being wrongly blamed. The article went on to quote the local radio station manager, that interference could be expected to some extent where there were channels between 2 and 3. The solution being to adopt the American system—no TV channels below 100 Mc.

SILICON DIODES

Guaranteed, Tax Paid, Post Free.

Absolute Maximum Ratings:

<table>
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<th>P.I.V.</th>
<th>Price</th>
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<tr>
<td>500V. - 0.75A.</td>
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<td>400V. - 0.75A.</td>
<td>6/10</td>
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<td>600V. - 0.75A.</td>
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<td>500V. - 2A.</td>
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<td>5/8</td>
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<tr>
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<td>30/1</td>
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<tr>
<td>200V. † - 35A*</td>
<td>50/0</td>
</tr>
</tbody>
</table>

Germanium Diodes, 3/ - each 25/- for ten, £10 per hundred (similar to OA80).

Delivery: One to three weeks.

Discount for orders of 10 or more.

"With heat sink."


Electronic Associates

Department "S"

76 VIEW ST., HOBART, TASMANIA
the details for another couple of pages, perhaps I had better pull my head in, because I have already had my fill of the golden spectacles, still has me on the edge of the seat. I think to him that I am nothing but a padder!

Very little business was transacted, and the late evening meeting got bogged down by character. We will continue that discussion later, when we have a chance to examine the sleeping members, and send them all home to their couches of virtue, and let them await probation, and I would not like him to think so much. I am not the one after all the venerable Ed., you know, the one who was always so quiet and unassuming. I was not present for the details for another couple of pages, perhaps I had better pull my head in, because I have already had my fill of the golden spectacles, still has me on the edge of the seat. I think to him that I am nothing but a padder!

From Leigh Creek on vacation and fluked a night bright on the horizon. I was not present for the details of the 303 on his desk, pointing right at my fallen. Oh, how do you do it, Johnny? Eating peanuts? Oh dear, there's that twist again.

Another ex-officiar at the meeting was Keith SKX, who was last seen leaving the meeting late, with the lights of the Division drop out of office holding and disappeared. I have never heard of them again. What's that? It might not be a bad idea if I disappeared somewhere else.

We have been interrupted on the other day and had to jam on the brakes to avoid running down an athletic young man who was not present for the details of the 303 on his desk, pointing right at my fallen. Am 5JK fully restored to health these days, although if rumour is to be believed, he had the electrical installation in his QTH fiddled with a bit, and the whole scheme is going to be upset. Well, I know you have the installation unfiddled, brought the response that it probably deserved it. Well, I have never heard of them again. What's that? It might not be a bad idea if I disappeared somewhere else.

John SKX reported on being seen on a call that he was not present for the details of the 303 on his desk, pointing right at my fallen. John SKX reported that he was not present for the details of the 303 on his desk, pointing right at my fallen. He confirmed his oft-repeated statement that no matter where we go, one can always bump into the same old characters. I am sure that you will agree. Sorry—Gilbert SGX on the island. Rumour further has it that Gilbert was well and truly loaded down with a parcel of QSL cards, they probably added a touch of local colour to the proceedings.

Called in to see Clem 5GL the other day with a crystal query and whilst there, Doug 2DQ, who informed me that he had been bothered with some health problems, was present. I notice in the last copy of "Info," the official magazine of the Elizabeth Amateur Radio Club, that Tubby 5NO has retired from the position of President, and his position, has been taken by Colin SZHJ. Tubby has done a good job during his long presidency and it is unfortunate that pressure of business caused his retirement. Congratulations to Colin and the best of luck in the job. Tubby, although officially withdrawn from the position of President, has agreed to contribute his services as technical advisor. Nice work.

The re-shuffle mentioned above also means that the position of QSL officer to the club from Colin SZHJ and Ron 5FY, who is still the awards manager. It looks like Tubby will have a bit of push from him. Jokes aside, Ron has done a terrific job for the club and has my admiration for what he has done over the years. Incidentally a reference to President left a vacancy on the committee and there is no sign of a successor. I wonder if the President left a vacancy on the committee and there is no sign of a successor. I wonder if this is the policy of Council and not some other reason.

The re-shuffle mentioned above also means that the position of President has been taken by Colin SZHJ. Tubby has done a good job during his long presidency and it is unfortunate that pressure of business caused his retirement. Congratulations to Colin and the best of luck in the job. Tubby, although officially withdrawn from the position of President, has agreed to contribute his services as technical advisor. Nice work.

Talking of the "Admiral" reminds me that I are you not looking forward to our contact at Oakbank. Thanks OM, but did you have to put "At Last!" on the front page of the "Advertiser"? Their faces when tackled makes me decidedly suspicious. What frequency did you say you were on, Leslie?

Leith 5LG noticed at the meeting sitting quietly and sedately a few rows from me. I think you will agree that there is a difference between a quiet man and a sedate one.

That athletic and photogenic gentleman sitting at the main table industriously writing away, and apparently not under any pressure, none other than Paul "The Admiral" 5ST, who I have never seen at a meeting. Of course, I know him by sight and have spoken once or twice, the name or the call did not occur to me. I am sure he must be in the journal. Anyway, nice work Murray, and Dougal, even if you do cuss a great variety of times on your air time insulating me and your old-fashioned mode of telephony. Gerkahl
noticed a pair of rascals from Port Pirie at the meeting. Yes, you guessed it, Bruce Pick and John Szc. I asked John how he was and he warned myself, and whilst I must admit my ignorance of present trends in fashions, I will attempt to wear such bottomless trousers to any of the meetings. Council will be forced to take a stern view. How would you punctuate a lead to a real bust up if the full outfit "new bottomless evening trousers" was worn? Oh well. They can't say I did not try to do my best. 73, de SPS—Pan Sy to you.

**WESTERN AUSTRALIA**

This month we find not very much news having come forward, so we will have to use the same stocks which have filled and filled the room observations. The general meeting was held on 16th June and the attendance was lower than usual, but when the weather conditions are looked at, we cannot blame the members who stayed away with very strong winds blowing. It was very pleasant to hear that Alyn 7EJ is back from his holiday and he seemed to enjoy talking to the various members afterward while enjoying a cup of tea and biscuits. Just in case you were not aware of it, we hold our meetings every third Thursday and we do have tea and biscuits at all meetings, so what about coming along to swell the numbers and let your Council know what is going on.

We do have some very interesting points brought to our notice by one soul called J.M. Clem 8CW has his tower and beams up and he seemed to enjoy talking to the various members afterward while enjoying a cup of tea and biscuits. Just in case you were not aware of it, we hold our meetings every third Thursday and we do have tea and biscuits at all meetings, so what about coming along to swell the numbers and let your Council know what is going on.

**TASMANIA**

Here it is at last, R.D. month. The week-end of 15th and 16th July will be unforgettable as the opening ceremony will be broadcast from TVI at 1745 hours on the 15th, complete with presentation and log submission is your Council's request. Don't leave it to the other chap. If we do not get it done, it seems we can once again hold that trophy in VK7, so what about it. Let's give other Divisions a run for their money.

This fu we've been having here in Tas to appears to have a vengeance on W.L.A. members. (I thought we'd be pushed to get a R.D. month in 73, de Sy.)

We are told that we should publicise the Amateur Service, however sometimes it pays to think as to how far the publicity goes. Some of the more energetic types made a trip down to the club house called Bluff Knoll. After having struggled to the top of this knoll, some 1½ miles nearly, they found the only party arrived at the top. What should happen but another party, a couple, who were already up at the top and when they asked for all the males exclaimed "Tom!" (6DF)

One should think about who keeps the Division's finances because when the use locks they should remember such things as keys, shouldn't they? Barry 6ZCF happened to wear Alyn overcoated- scale his club meeting room at the last meeting and the obvious happened; he left his car keys in Alyn's pocket, and Alyn went home before Barry. Just as well that someone else with a car was available. Should you be left stranded, be as a taxi.

If you have not got your gear working by this time, you had better arrange to use someone else's for the R.D. Contest as it is only a fortnight away.

Must sign off now chaps, but remember I would like the news written about, so till next month, 73, Roy 6RY.

**HAMADS**

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Extra words, 2d. each.

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**FOR SALE**

Complete Station. SX28 Receiver, 5.5 Mc. S.a.b. Generator, Franklin V.f.o., 1200 volt supply, stable v.f.o. supply, 813 linear. Will not break up. Any demonstration. £125. VK2FM, 27 Wattle Ave., Carramar, N.S.W.

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Glovebox Mobile 7 Mc. Transmitter and Converter, 8" x 5" x 3"½, complete with genemotor, loaded whip, microphone. W2EWL S.s.b. Transmitter as per S.s.b. Handbook, no power supply and microphone. £80. AU7 audio, 5U4G rect., pi network output, coupling 50 to 1000 ohm, xtal socket or external v.f.o. input, large meter, p.a. grid or plate current in opposite park, phone on. £38. H. O. Matthews, VK2DD, 101 Wolds Ave., Hurstville, N.S.W. Phone 54-4511.

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**FOR SALE**

Cell: Murphy B40 Rx £40. 60w. input c.w. or phone, bandswitched 80, 40, 20, 15 and 10, inbuilt mod for carrier control, 810 A.E.F. & T, 12AX7, 12AU7, 5U4G rect., AU7 audio, SU1G rect, pi network output, coupling 50 to 1000 ohm, xtal socket or external v.f.o. input, large meter, p.a. grid or plate current in opposite park, phone on. £38. VK3ZAN, Phone 306-8380.

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Hammarlund Super-Pro Receiver, £25. W2ewl, 65 Words Ave., Hurstville, N.S.W. Phone 4535B, £55. £16. B. & W. 8500 1kW, all band Tuner, £9. 1-14 Mc. Phasing Transmitter with two 811s linear, vox, etc., £90. VK2ADC.

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Georio Receiver Converter, Amateur bands, as new. Commercial cabinet. 455 kc. Panadaptor. Both with Handbook. 551 Rx (rack), regulated bias supply, VQ6,M4, 150 watt, Command 3-8 Rx (rack), power supply and audio, etc. Want C.F. or Tape Recorder. Smith, 7 Howard St., Coffs Harbour, N.S.W.

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RUGGED

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4PR60B AND 715C

ENGLISH ELECTRIC

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**GENERAL DATA**

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<td>Pulse Output Power</td>
<td>330</td>
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NEW VALVES AT BARGAIN PRICES

METERS

<table>
<thead>
<tr>
<th>Model</th>
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<th>Price</th>
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<tr>
<td>M065</td>
<td>0-500 mA, d.c. in. round, bakelite case</td>
<td>37/-</td>
</tr>
<tr>
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<td>0-150 mA, d.c. in. round, bakelite case</td>
<td>33/-</td>
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<td>37/-</td>
</tr>
<tr>
<td>MR2P</td>
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<td>47/-</td>
</tr>
<tr>
<td>MR3P</td>
<td>&quot;VU&quot; Meter</td>
<td>3/17/</td>
</tr>
<tr>
<td>MR4P</td>
<td>50 uA</td>
<td>47/-</td>
</tr>
<tr>
<td>MR5P</td>
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<tr>
<td>MR5P</td>
<td>50 uA</td>
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<tr>
<td>MR6P</td>
<td>50 uA</td>
<td>37/-</td>
</tr>
<tr>
<td>MR6P</td>
<td>1 mA, square face, 1/4 in. round hole</td>
<td>37/-</td>
</tr>
<tr>
<td>MR7P</td>
<td>1 mA, in. square face, 1/4 in. round hole, clear plastic case</td>
<td>37/-</td>
</tr>
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<td>MR8P</td>
<td>1 mA, square face, 1/4 in. round hole, black bakelite case</td>
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<td>MR10P</td>
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<td>MR12P</td>
<td>&quot;F&quot; Meter reads to 9 plus 10</td>
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<td>MR20P</td>
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NEW TRANSISTORS IN STOCK

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<td>OC71</td>
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<td>OC74</td>
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PACKING AND POSTAGE 5d. per valve.

NEW SPEAKERS

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<td>2C-2</td>
<td>1 inch, 15 ohms</td>
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<td>3C-2</td>
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<td>3C-4</td>
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<td>3C-5</td>
<td>3 inch, 15 ohms</td>
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<td>3C-6</td>
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<td>3C-7</td>
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</tr>
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<td>3C-15</td>
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SOLDERING IRONS

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TECH MULTIMETER

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<td>500 p.i.v. 500 mA. 7/6</td>
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<tr>
<td>OA211</td>
<td>800 p.i.v. 500 mA. 10/6</td>
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RECORDING TAPE

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<tr>
<td>Type 144</td>
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GERMANIUM DIODES

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<td>OA79, OA81, OA91, 1N344</td>
<td>4/6 each</td>
<td></td>
</tr>
</tbody>
</table>

HAM RADIO SUPPLIERS

5A MELVILLE STREET, HAWTHORN, VICTORIA

We sell and recommend Leader Test Equipment, Pioneer Stereo Equipment and Speakers, Hitachi Radio Valves and Transistor Radios, Kew Brand Meters, A. & R. Transformers and Transistor Power Supplies, Ducon Condensers, Welwyn Resistors, etc.
FEDERAL COMMENT

WHAT'S IN A NAME?

From his early beginnings the Amateur has been acclaimed for his ingenuity, inventiveness and willingness to experiment. He built his receiver, transmitter and cut and erected his antennas. He built his own test gear and experimented with bread-board layouts before finally building his gear into its eventual chassis. Since the second world war, these activities have largely ceased. The commercial transmitter and receiver and even antenna is now commonplace in the Amateur’s shack.

What are the reasons for this change in perspective? Is it due to the pursuit of Amateur commercial equipment on the market? Is it due to the Amateur now having less time on his hands to build new gear? Is it due to a flush economy in which it is cheaper to buy commercial than build Amateur? Is it due to the demands for more exacting standards in Amateur equipment brought about by large increases in the Amateur world population? Is it due to more complex and elaborate equipment requiring greater frequency stability and flexibility? Or is it due to just sheer laziness?

The only field perhaps that has not been so largely influenced by commercial equipment is in the u.h.f. and s.h.f. fields, although the inroads of commercialism in this part of the spectrum is quite evident, particularly in the U.S.A. In any so styled analysis of this sort, one has to ask the obvious question—is this a good or bad state of affairs for the Amateur? In many ways, the availability of commercially made Amateur equipment is a good thing—it gives him more on-the-air time, he can treat his hobby more as a relaxation instead of labour and he now has a signal that is neither over-modulated or putting out an R.A.C. note. On the debit side, however, he is now less technically inclined, will probably have to send his equipment to the supplier if anything goes wrong and perhaps worst of all is losing his incentive to experiment and improve his gear.

This indictment of the Amateur’s inventiveness and ingenuity is only a general and not an individual one for there are still quite a large percentage of Amateurs who still like to build their own equipment. New fields in Amateur communication have nearly all been due to the experimental work of devotees to the “old ways”—a good example being the building of the Oscar III. translator satellite transmitter of which we should hear a lot more in the coming months. One might also add, in fairness, that most Amateur commercial gear is built and tested by Amateurs for Amateurs. It would also be true to say that many of the Amateurs who have commercial gear today are those older members who have graduated from the old bread-board, now have less time for home construction and like to use Amateur Radio as a relaxation.

Despite the arguments for and against the use of commercial equipment, there is still quite anything to exceed the thrill of switching on the h.t. of the home-brew receiver and hearing that DX signal come in at S9 plus, or the equally glorious sight of the plate meter of the transmitter dipping to plus zero current before loading the “skywire”. There is that inexplicable feeling and sense of grandeur of having created something that really works. We cannot do better than enjoin all newcomers to the Amateur ranks to pursue the old tradition in some small way and experience that sense of achievement which must be kept alive if we are to continue to call ourselves Amateurs.

FEDERAL EXECUTIVE, W.I.A.

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RE-WINDING TRANSFORMERS

IAN PHILLIPS

Passing examinations and being an Amateur are not good bedmates and when coupled with "student pauperism" some of the problems appear insuperable. Here is my answer to one insuperable problem, 300 volts at 500 mA. by re-winding burnt-out television power transformers. It cost me ten shillings for the purchase of the transformer and no more. The voltage doubler is almost unbeatable costwise (with re-winds) when coupled to silicon diodes, and it is on this basis these notes are formulated.

Often these transformers are to be had for the asking, or for a nominal fee. If you get the choice, take the largest one, or the heaviest one, as it will take more turns and handle more power than the smaller ones. In determining the amount of power it will handle, determine the core area, see Fig. 1, by multiplying 1.5" by the stack height and relate this to Fig. 2 to find its power handling capacity. Trying to take more will result in large losses and heating.

TAKING IT APART

When removing the cover plates take care with the leads as they may break off. Undo the bolts and put them somewhere where they won't get lost. Don't worry about the transformer falling to pieces, it won't. Then insert a knife between the top two laminations to break the "goo" holding them and pull out using pliers. Take care not to bend them. Continue this until they are all out and put them away so that they will not get damaged.

Now the order of the windings and which is the damaged one must be determined. An ohm-meter is useful for this and typical readings are shown in Fig. 3. Tag them or otherwise identify the layers to save trouble later. The usual order of winding is, from the core out; primary, high tension and heaters.

Fig. 1.

The winding that usually burns out is the high tension winding, and this can be seen by the layers of burnt paper. Try pulling on one of the burnt leads and if the outer-winding so obtained on to a spool. It may break and drastic surgery will be required to retrieve it. After a few layers of wire have been removed it should be possible to separate the primary and high tension wire from the outer windings and this should be done. Continue unwinding until all of the damaged winding is removed and carefully wound up. Then examine the primary to see if it also requires maintenance, it probably won't, but if it does follow the same procedure as for the h.t. winding, including the number of turns required.

TURNS PER VOLT

Now take the outer windings and remove the protective paper. Several windings in heavy wire will be visible. These are the heater windings and you can use them to determine the turns per volt (t.p.v.) ratio. Carefully count the number of turns on one of these windings and record it. If it is a multiple of five, it is a 5-volt winding; of six, it is a 6-volt winding. Commonly the number of turns will be 10 or 12, but if you find 20 or 24, check again to see if the manufacturer has put two wires in parallel as is often done. If there are 10 or 12 turns, the t.p.v. ratio is 2; 15 or 18, 3, etc. A common ratio is 2 t.p.v.

This leads to the number of turns they must now be put on the secondary. If the t.p.v. ratio is 2, then we require 2 turns for every volt, thus for 150 volts you need 300 turns, and for 200 volts, 400 turns, etc.

WIRE TO BE USED

The gauge of the wire to be used is determined by the current required (see Table 1).

If you are lucky the salvaged h.t. winding will carry the current, either single or doubled. To find its gauge compare it with known wires, or use a micrometer. If it will take the current, then you must start thinking about re-insulating it as the enamel may be badly burnt. If so, it must be enamel-led, if not it can be used as is. The chance of a small bare patch coming against another can be insured against by taping as a joint.

First the burnt enamel should be scraped off by running the wire through a steel-wool pad, taking care not to kink it. It must then be run through a bath of thin enamel, allowed to dry and run through again. See Fig. 4 for a suggested method, although many others will suggest themselves.

Now consult Table 1 for the weight of wire needed. Don't forget, if the wire is to be doubled, double the length. Inter-layer insulation is waxed lunch paper. Try pulling on one of the burnt leads and wind the wire so obtained on to a spool. It may break and drastic surgery will be required to retrieve it. After a few layers of wire have been removed it should be possible to separate the primary and high tension wire from the outer windings and this should be done. Continue unwinding until all of the damaged winding is removed and carefully wound up. Then examine the primary to see if it also requires maintenance, it probably won't, but if it does, follow the same procedure as for the h.t. winding, including the number of turns required.

Example, around the core, 10 inches; inside outer-winding, 16 inches.

Average = (10 + 16) / 2 = 13 inches.

Inches required = 13 x 300 turns = 3900 inches.

Feet required = 325 feet.

Now consult Table 1 for the weight of wire needed. Don't forget, if the wire is to be doubled, double the length. Inter-layer insulation is waxed lunch paper. Wrap and a supply should be cut up beforehand. When winding, go as near as possible to the edge in order to put the maximum number of turns on each layer. In my case I used No. 26 re-painted wire doubled and managed 46 turns on the first layer and about 38

<table>
<thead>
<tr>
<th>Gauge</th>
<th>Weight</th>
<th>Turns per Inch</th>
<th>Feet per lb.</th>
</tr>
</thead>
<tbody>
<tr>
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<td>2.36</td>
<td>22.6</td>
<td>200</td>
</tr>
<tr>
<td>20</td>
<td>3.16</td>
<td>29.4</td>
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<tr>
<td>22</td>
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<td>810</td>
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<tr>
<td>26</td>
<td>0.363</td>
<td>58.0</td>
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<tr>
<td>28</td>
<td>0.228</td>
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<td>32</td>
<td>0.090</td>
<td>113.0</td>
<td>5227</td>
</tr>
</tbody>
</table>

* May be increased 40%.

Table 1.

*179 Abbot St., Sandringham, S.S., Victoria.

This is an often used width for the core, but if you can determine the exact width, so much the better.

Amateur Radio, September, 1964
on the last. This was because of caution about going over close to the edges and was about the best possible.

Wind the wire on tightly, taping it slowly and note down the number of turns on each layer as each is completed, as to forget how many are on, is very trying to the patience.

After each layer is complete, place a strip of lunch-wrap over it and hold it in place with stretch tape. Wind all turns in the same direction (this is important). The high voltage winding is the toughest job and will take a couple of hours. If so desired, taps could be brought out so that a choice of secondary voltages is available and it is suggested that this is done on the edges of the layers to avoid complications. If the wire breaks, don't panic but carefully solder it up and put the joint into an insulated package as shown in Fig. 5.

When the winding is complete wrap several layers of waxed paper around it for mechanical protection, then fill it back inside the outer windings and fix with several pieces of stretch tape (see Fig. 6).

RE-ASSEMBLING

Now the laminations have to be assembled and it is rather simple, just put one E-plate in from one side and one from the other, with the I-plates filling the gaps so left. Probably they won't all go back without extreme force, but don't worry, this small amount of iron will make no difference and to force them in will only damage the windings.

Put the bolts back in and tighten them up, leaving the cover plates off and the leads flying. Now it must be tested.

Testing

To test, apply 6.3 volts from another transformer to one of the heater windings. If all voltages appear normal, then remove the 6.3v. and apply 240v. to the primary (use a fuse) and measure the voltages.

Tough, pick up and drop the transformer about half an inch and repeat the tests. This is to check for intermittent faults. If all is still normal, apply power for two hours and check from time to time for excessive heating. It will warm a bit through losses, but should not get hot. If this is OK, check the voltages again and if all is as it should be, final assembly may be done. If not—heartbreak—it will have to be dismantled and thoroughly checked.

Replace one of the cover-plates and bolt it up tight and prepare a terminal board as is shown in Fig. 7a and attach as shown in Fig. 7b. Thus you should have tailor-made volts and a knowledge of how to roll-your-own for almost nothing.

Note

Care should be taken when selecting the layer insulating paper, as some lunch wrapping papers soften with heat and could allow the tightly wound wire to cut through to the next layer with consequent possible shorted turns. Likewise some "sticky" tapes are hydroscopic, which can cause corrosion of winding wire if moisture is absorbed. This will result in open circuited turns, and more heartbreaks. The above is not just academic interest, unfortunately, but the result of hard experience.—Editor.

DRIVING ZERO-BIAS 807s—VK4ZJB METHOD

J. D. BISGROVE,* VK4ZJB

Up upon reading a previous article on this subject in "A.R." I was tempted to try methods myself. The results of this experiment have left nothing to be desired.

With the advent of t.v., several tubes capable of large audio power outputs have become available. Of these, the 6CM5 is very good in single ended or push pull work. Its plate impedance is 6,000 ohms, which is very trying to the patience. Its plate impedance is very good in single ended or push pull work. Its plate impedance is 6,000 ohms, which is very trying to the patience.

The Institute Badge

The Institute Badge may be purchased from your Divisional Secretary.
Voltage Regulation is essential for industries where production can suffer due to power fluctuations! TRIMAX Voltage Regulators are available with flexible lead entries and 3-pin socket (or with conduct entries). Stock models available in 60 and 250 V.A. capacity. Contact our Sales Department for further data on the range of TRIMAX Voltage Regulators.

Foster Dynamic Microphones

**SPECIFICATIONS:**
- **Output Impedance:** 50 ohms or 50K ohms
- **Effective output level:** -55 db. [0 db. = (one) 1V. Microbar]
- **Frequency response:** 50 to 15,000 c.p.s.

**OMNI-DIRECTIONAL DYNAMIC:**
- Plastic Diaphragm.
- Swivel fits 5/8" 26 t.p.i. Stands.
- Size: 4½" long, 1½" diameter.
- Colour: TWO-TONE GREY.
- Cable: 12 ft. of P.V.C.

Retail Price 50 ohms: £4/7/9 + Sales Tax 10/11
Retail Price 50K ohms: £4/10/0 + Sales Tax 11/3

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On two metre mobile and f.m., the vertical antenna still holds the edge on popularity with its omnidirectional characteristics and simplicity. Add to this, though, a little omnidirectional gain on the order of 5 db. and the vertical begins to look even more enticing than ever.

In case you didn't know it, not all 2 metre activity consists of DX-chasing, meteor scatter, contests, etc. In many areas, I'll grant you metropolitan and suburban for the most part, local and extended-local communication exists on a highly reliable day-in and day-out basis. Mobile operation, quite naturally, is a regular part of this activity. This harkens back to the days of the old 5 metre band where such v.h.f. operation began. As the result, Hamming in these areas becomes a much more personal thing; everyone soon gets to know everyone else. It becomes easy to round up a gang to help put up a tower or a beam for another band.

Keeping in mind that working mobiles is a requirement, you can see that vertical polarisation is a must. Secondly, those who have tried beams quickly realise that, in these centres of high activity, beams are impractical. Too much can be missed off the back end. An omnidirectional antenna characteristic therefore becomes an additional requirement.

Omnidirectional antennae for 2 metres usually fall into two classes: the ground-plane or the coaxial-type. Both of these normally provide no gain in performance over a reference half-wave doublet, with the possible exception of the stacked coax antenna. What we are searching for is a 2 metre antenna which is vertically polarised and which will give us a power gain in all directions. Bear in mind, too, any gain achieved in the antenna system also results in increased range of reception. And, lastly, a high gain omnidirectional vertically polarised 2 metre antenna should be easy to construct at low cost. (This lets out the stacked coax unless you have the facilities of a machine shop available.)

**THEORY**

Gain in an omnidirectional vertically polarised v.h.f. antenna is realised basically by stacking half-wave elements, one above the other. The trick is to phase them properly and to feed them efficiently. This is nothing new; Twenty-five years ago this was called the "Franklin" antenna. Today a somewhat similar antenna is described in the A.R.R.L. Handbook.

From page 703 of the 4th edition of "Reference Data for Radio Engineers" (I.T.T.), the gain of an omnidirectional stacked array is approximately equal to 2L/\lambda over the theoretical isotropic radiator, where L is the length. If we build an antenna of five half-waves in phase, the length, in terms of wavelength, is 2.5\lambda. Putting this into the above formula, the power gain is then 2(2.5) or five times. Since a half-wave dipole is considered to have a gain of 1.64 times the isotropic radiator, the antenna will therefore have a power gain of 5/1.64 or 3.05. This, then, is an effective gain of 4.84 db.

**A PRACTICAL ANTENNA**

Fig. 1 shows the schematic diagram of our 2 metre "gain" antenna. As you can see, it consists of five half-waves in phase, one above the other. There are quarter-wave matching stubs in between each element, and the feed point is at the centre of the middle half-wave element. (Feeding this array in such a balanced manner is one of the tricks in getting efficient operation.) The antenna feeder is ordinary 300-ohm t.v. "twin-lead". (Horroris?) This was done for several reasons. First of all it is low cost, as compared to coax. Secondly, its losses are less than ordinary coax; and, thirdly, because it is a mechanically simple balanced transmission line with readily available inexpensive (t.v.) supporting hardware.

Our antenna was cut to about 147 Mc., and like any co-linear array it is reasonably broad, having a low s.w.r. out to at least 1 Mc. either side of that frequency.

You could feed this antenna in the centre of the middle element directly with the 300-ohm twin-lead, that is if

(Continued on next page)
you don’t mind a standing wave ratio of about 2:1. We did, so a quarter-wave linear matching transformer was installed at the feed point. The results were extremely gratifying. Its installation brought the s.w.r. down to 1.1:1.

Just one more point: Note that, in the interest of balance, the matching transformer is brought away from the feed point at a right angle; and, consequently, the twin-feed line is brought down at least a quarter-wave from the lower sections of the antenna thereby little affecting the feed impedance.

CONSTRUCTION

Our 2 metre gain antenna is built on wood. (Horrors, again?) Using wood greatly simplifies construction and reduces cost. You can’t buy 2 x 2’s twenty-four feet long, but you can buy a 2 x 4 that long. Just a little sweet-talkin’ to the lumber yard man and he will rip-saw it right down the middle for you. Of course you should get him to let you pick out a length as straight-grained and as free from knots as possible. Total cost? Less than $3!

After you get your lumber home, select the half most free from knots for the top section. A few minutes work with a carpenter’s plane on the corners will save you from splinters while you are handling the antenna. It’s time well spent. The remaining half we sawed in two to make the bottom of the classical “A” frame of hamdom. You could gain another 12 feet or so of height if you were to splurge and buy another (ripped) 2 x 4. We didn’t.

The antenna elements themselves we recommend be made of aluminium to keep down the weight. We found some 3/16” solid rod in surplus, but almost any kind of aluminium rod or tubing up to about 3/8” in diameter can be used. Old discarded t.v. antenna elements, for instance. Another good possibility is No. 8 or 10 aluminium clothes line wire. (This hard-drawn wire is stiff compared to the bare aluminium “ground wire” sold in t.v. parts stores.) Since we used the relatively soft solid rod only two ceramic one-inch high stand-off insulators were used with each element. The element was fastened to each insulator with nylon cable clamps, available in parts stores.

It is to a doubt that you have noticed that the quarter-wave matching stubs between each element have been curved around and have had their “shorting bars” screwed down directly to the wood mast. This “Q-bar” section, 20” long, is made from No. 6, 600-ohm aluminium ground wire spaced at 1”. One spreader was installed in the middle. To facilitate the dropping-down of the twin lead feeder, this matching section is given a 90° twist so that the junction point of the section and the twin-lead is horizontal. This junction point terminates on a square bakelite block screwed to the braced strip of wood used to bring the feed point out at right angles to the antenna.

To forestall any possible electrolysis problems and to prevent any loosening of hardware which might be caused by wind vibration, we brushed coil dope on each screw, bolt, and nut, and on the spreaders on the matching stubs. This is real good insurance.

The quarter-wave linear matching transformer at the feed point is much simpler to construct than to describe. This “Q-bar” section, 20” long, is made from No. 6, 600-ohm ground wire spaced at 1”. One spreader was installed in the middle. To facilitate the dropping-down of the twin lead feeder, this matching section is given a 90° twist so that the junction point of the section and the twin-lead is horizontal. This junction point terminates on a square bakelite block screwed to the braced strip of wood used to bring the feed point out at right angles to the antenna.

To forestall any possible electrolysis problems and to prevent any loosening of hardware which might be caused by wind vibration, we brushed coil dope on each screw, bolt, and nut, and on the spreaders on the matching stubs. This is real good insurance.

The actual stubs were made of a continuous piece of No. 14 wire, so there were no mechanical problems between elements, and the solid 1” and three spreaders made from 1” diameter plastic rod were slipped on the wires. The squared-off “shorting-bar” end was directly screwed down to the wood mast since this is “cold” in so far as r.f. is concerned. This resulted in a fairly sturdy halo about 6” in diameter.

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All in all, the week-end we used to put together this antenna was well worthwhile. Since initial tests the wood mast has been lashed to the top of a tree, elements above the tree tops at a height of about 90 feet. The feeder length is now about 125 feet. Mobiles (f.m.) operating on eastern Long Island have been reliably worked out to distances of 30 to 40 miles. And we run only 60 watts input.

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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Page 6 Amateur Radio, September, 1964


**A GUIDE TO IMPROVING V.H.F. PERFORMANCE**

DAVID D. TANNER,* VK3AAU

This article is an effort to demonstrate a way of using limited resources to work over longer distances, and to show what effect various improvements will have on the range over which we can reliably work. Particular reference is made to two metres, but most of the points discussed are applicable to other v.h.f. bands. The improvements quoted apply to those which limit the distance over which we can normally communicate, these can be summarised as follows:-

(a) Transmitted power,
(b) Receiver sensitivity,
(c) Antenna gain,
(d) Path characteristics.

Transmitted power is relatively simple. It depends on our input power, the efficiency of the final, and to a large extent on the loss in the feedline. This latter is one which has been the subject of a lot of discussion.† The choice of feedline depends to a large extent on what you are prepared to pay, but particularly when paths are long, it is of primary importance that the feedline be as lossless as possible. The best value for a limited amount of money seems to be formula III. open-wire t.v. feedline. Care must be taken in its installation to keep it free from sharp bends and to keep it away from metal objects. It should also be kept straunched as tightly as possible. All these requirements limit its flexibility somewhat, but they are absolutely necessary to make the most of its low-loss characteristics.

Next we come to coaxial cables, many of which are not worth buying. The best of the disposals ones seems to be UR/67 with RG-BA/U a close second. If you are visiting Victoria, you can use RG-8/U as a last resort for it is not as bad as RG-8/8/U is not recommended as it deteriorates in the weather with an increase in losses. Thin types should be avoided, particularly in the construction of baluns. 300 ohm ribbon is not recommended as it is a poor performer when wet. Feedlines should be operated with as low a S.W.R. as possible, preferably below about two to one.

The next item on the list is receiver sensitivity, and this is where a lot of newcomers to v.h.f. have the greatest difficulty. A typical example of an insensitive receiver is the ubiquitous SCR522. It falls down in most departments when compared with the crystal locked converter-communications receiver combination used by most advanced stations.

First, the SCR522 has a poor noise figure, the spectral responses for it are poor and its bandwidth is determined by the use of a 12 Mc. if. channel. The usual method used to make these receivers over the two metre band is to disable the crystal oscillator in the intermediate frequency chain and make the last conversion stage into a tunable oscillator at approximately 132 Mc. As this oscillator is generally not very stable, a comparably broad i.f. is needed to hold the signals within it. A better approach is to leave the crystal oscillator in place and raise the conversion stage to 455 kc., using a tunable oscillator on about 11.5 Mc. The 12 Mc. i.f. can then be stagger tuned and possibly resistive loading added to make it insensitive receiver is the ubiquitous s.s.b. only needs to be used on 11.5 Mc. The 12 Mc. oscillator on about 11.5 Mc. The 12 Mc. oscillator is generally not very stable, so that full coverage of the band the four crystal positions would be used. In this way as much selectivity as you like can be built into the i.f. and the receiver can be used to copy c.w. and s.s.b., the advantages of which will now be discussed.

A.m. phone requires a signal to be about 7 db. above the noise in a bandwidth of 6 kc. S.s.b. only needs to be about 3 db. above the noise to be readable and the bandwidth can be reduced to as low as 2 kc. This is a gain of using a full coverage of the band the four crystal positions would be used. In this way as much selectivity as you like can be built into the i.f. and the receiver can be used to copy c.w. and s.s.b., the advantages of which will now be discussed.

Another important part of the installation is the antenna system. This, in common with the feedline, is part of both the transmitting and receiving equipment, and so is also quite important. For effective v.h.f. performance, antenna height is important, and as a rough rule, doubling the height of an antenna will increase the range to 75 miles, and the effective bandwidth of the ear with a 1 kc. beat note is of the order of 500 cycles. This is well worth considering when path losses are taken into account.

Lastly, we come to the problem of path characteristics. This is something over which we have no control, although it helps to keep the antenna system fairly flexible, and those whose totals have been amended will also be shown.

Now compare these figures with two stations using 3 db. N/F converters into narrow band communications receivers, with 150-watt transmitters and 18 db. antennae, 50 feet high. Using a.m. they can work one another at a distance of 310 miles, and this can be increased to 370 miles with s.s.b. and 420 miles with c.w.

Finally, these figures will be modified in practical circumstances by the presence of hills† and temperature inversion effects, but in general they will be found to be quite reliable. The nights contacts between VK52ZR and VK3NN are a good example of this.

REFERENCES

The following references to "QST" will be helpful in amplifying most of the points made above:


Most of these are obtainable through the W.I.A. libraries and the Editor may possibly be coerced into reprinting some of them if sufficient interest is shown.

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

Listed below are the highest twelve members in each section. New members and those whose totals have been amended will also be shown.

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**AMENDMENTS**

VK3AX 68 146

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*Lyne and Dixon Rd., Ripplebrook, via Drouin, Victoria.

† See November, 1964 issue of "QST."
Practical Designs for...  
HIGH STABILITY VARIABLE FREQUENCY OSCILLATORS*

Part One—Considerations Affecting Performance and Survey of Types

PAUL HARRIS, G3GFN

THE performance of modern variable frequency transmitters is, in no small way, dependent on the inherent stability of the initial frequency control oscillator. Ideally a variable frequency master oscillator should possess the following principal features:

(a) Have a short preliminary temperature/time stabilising period;
(b) Maintain its calibration to a high order of accuracy, providing reasonable temperature excursions;
(c) Retain its initial calibration closely after replacing valves;
(d) Be acceptably insensitive to nominal variations in both h.t. and l.t. voltages;
(e) Give high output;
(f) Have low harmonic content; and
(g) Keep well.

While the foregoing features may appear obvious, nevertheless, detailed examination of them when related to design and practical considerations will be found worthy of note.

DEFINITION OF STABILITY

As all simple oscillators exhibit some drift, it is useful to define the amount which must not be exceeded when in the stable state. The amateur pursues a v.f.o. may be considered to have stabilised when the frequency change rate does not exceed 15 parts in 10^6 per hour, i.e. 15 c.p.s. per Mc. per hour.

The layout and quality of components have a considerable bearing on the initial and long-term frequency shift of a variable frequency oscillator, and for this reason it is desirable to quantitatively assess the performance of two theoretically identical oscillators composed from different quality components and constructed in all other ways. However, at this stage we are not so concerned with drift attributable to components and layout, but rather, the inherent stability of a particular configuration.

There are considerable differences between oscillator circuits in respect of the amount of the initial shift, stabilising period and long-term drift.

EFFECT OF CROSS-MODULATION

A particular effect, believed to be due to cross-modulation between the basic oscillator frequency and its harmonics, and the harmonics themselves, produces currents at the fundamental frequency which can be out of phase, and varying in phase angle with the original fundamental frequency currents. These trends tend to shift the frequency of oscillation, depending on the amount by which they occur, and it can be shown that, as excitation is reduced, the magnitude of these currents also decreases and, consequently, the drift also reduces. It follows therefore that the lighter the coupling needed to sustain oscillation, then the higher the stability of the oscillator, particularly initially when changes within the valve will have less reflected effect on the frequency-determining circuits.

CLASSES OF OPERATION

Experiments have indicated that the class of operation of an oscillator has a direct bearing on the initial and long-term stability, and these experiments verify, to a large extent, the cross-modulation theory. The impulses—feedback—applied to the tuned circuit can be such that the feedback current ranges between less than 180° and 360° of the cycle. Depending on the period of the oscillator may be classed as Class A, B or C but in all cases grid current flows for part of the input cycle. Class A oscillators have the lowest harmonic content, shortest stabilising period and excellent long-term characteristics. Class C oscillators on the other hand can exhibit considerable variations in respect of long and short-term stability, and, moreover, have high harmonic content.

CHANGES IN TEMPERATURE

In any apparatus there can be no guarantee that the internal temperature will remain constant over a given period of time, which is true of a v.f.o. which exhibits a continual and slow drift is unacceptable. In c.w. and s.s.b. operation, involving highly selective receivers or precise carrier reinsertion, such frequency shift is intolerable.

UNDESIRED OUTPUTS

At the present time, the transmitting Amateur is confronted with a formidable array of interferences which must be avoided. By this is meant frequencies which are incidentally produced—harmonics—or inadvertently chosen—in multipliers—and which are likely to cause interference to other services. It is only too well known that television receivers are particularly prone to interference, from Amateur transmitters, and, with the greatly increased sensitivity of modern receivers, the price of using a v.f.o. with a fundamental frequency cur- rents is too high. These currents tend to shift the frequency of oscillation, depending on the amount by which they occur, and it can be shown that, as excitation is reduced, the magnitude of these currents also decreases and, consequently, the drift also reduces. It follows therefore that the lighter the coupling needed to sustain oscillation, then the higher the stability of the oscillator, particularly initially when changes within the valve will have less reflected effect on the frequency-determining circuits.

VOLTAGE VARIATIONS

With the rapid short-term changes which can take place in mains voltages, not only is the h.t. likely to follow, but the heater supply as well. Highly accurate stabilisation is both expensive and complicated, but nominal stabilisation where the h.t. can be accomplished relatively simply results through the use of a V.R. 105/30 or V.R. 150/30 or similar gas filled regulator valve. It is important therefore to evaluate the performance of a v.f.o. against variations in h.t. and heater voltage.

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KEYING

While it is accepted as bad practice to key any v.f.o. directly, under certain conditions—such as BK keying for...
example—it is desirable to d.c. switch the oscillator in some manner, unless frequency shift keying is incorporated. If there is a frequency change during the initial recurrent firing within the oscillator circuit, then this will give rise to chirp. An oscillator which meets all other requirements may well show chirp in v.d.c. circuits. This cannot be taken when assessing chirp as r.f. circulating currents due to badly disposed earth points, or reactive decoupling capacitors can produce this effect. In oscillators, however, oscillator configurations have their own individual chirp characteristics.

OUTPUT CAPACITY

Finally, a variable frequency oscillator should have a high output capability, always provided that this is not at the expense of other more desirable features, especially in respect of harmonic content. Having a high output from the v.f.o. is not simply to use all this output and trim down on the following stages, rather to be able to load the v.f.o. lightly and so work it well within its power capabilities. Heavily loaded v.f.o.'s, always show frequency shift as the subsequent stages of the transmitter are tuned up, or as the transmitter is loaded. The frequency differences which occur between stations, allegedly on the same channel, are usually due to pulling of the v.f.o. frequency due to loading effects, rather than inaccurate "nudging".

CHOICE OF COMPONENTS

Having dealt at some length with the main features expected of a v.f.o. circuit, and, inter alia, the reasons for them, it now seems prudent to examine the requirements in respect of components.

No matter how excellent the probable performance of any v.f.o. circuit, stability and drift are still at the mercy of the components employed, not so much in terms of their initial values—which can always be adjusted—but rather in respect of the actual stability of the components themselves and their behavior. Variations through temperature excursions. Often negative coefficient capacitors are employed to compensate for changes which occur in frequency determining components due to heat. While it is acknowledged that, correctly applied, this can be highly satisfactory, it should be kept in mind that, in any event, perfect compensation can only be achieved at one specific frequency, and the greater the amount of compensation applied, the more frequency selective it will become. The usual problem encountered is that the exact value of negative coefficient capacitor is not available, or the one that is has an incorrect temperature/capacity gradient. Under these circumstances the final result is a compromise between perfection and minimum obtainable drift. Hallicrafters have solved this problem very neatly in their HT22 s.s.b. transmitter. In this circuit, which is shown in Fig. 1, a differential capacitor is used in such a manner that varying the differential varies the amount of correction "seen" by the tuned circuit. With this arrangement practically perfect temperature compensation can be achieved.

For most Amateur purposes, high quality components, attention to mechanical stability and component layout can, with a suitable circuit, produce an oscillator which is satisfactory even under critical operating conditions.

With regard to the frequency determining circuit in particular, the coil should be wound under as much tension as the gauge of the wire will allow, taking care when working with fine gauges not to stretch the wire. High grade non-porous formers are essential, and when winding has been completed and adjusted, it should be heavily doped. The use of a former having an iron dust core has much to commend it, as not only are inductance variations simply made by adjustment of the core, but also the physical size of the coil can be reduced. Caution is required in circuits where ferrite cores are employed for, with high power, saturation may take place. However, this is unlikely in most circuits used in the low level stages of amateur transmitters and certainly will not occur in any of the v.f.o. circuits to be described in detail.

Tuning capacitors should for preference be double spaced so that the effect of expansion, and consequent variation in capacity are held to a minimum. General mechanical rigidity is important, as is the method of securing connection to the rotor plates. The quality of the insulation supporting the fixed vanes must be absolutely above reproach as otherwise the tuned circuit may well contain an unstable element.

The resistor which acts as the grid leak, is no longer isolated, if it is to be thoroughly cold in the tuned circuit, or at least one element of the tuned circuit. For this reason it requires as much care in its selection as do the frequency determining components themselves. Not only must it be highly stable in its d.c. resistance, but also in respect of any self capacity or inductance. It should be well overrated in terms of wattage so that any changes which do take place are as result of environment—which can be controlled—rather than the actual current flow through it.

The valve holder requires special attention. Only first grade insulated mouldings with silver plated contacts should be used.

In considering the foregoing comments, it should be borne in mind that we are concerned with highly stable oscillators. Much licence can be, and often is, taken where the application is not critical, the frequency low, or automatic frequency correction circuits employed.

COMMENTS WHICH APPLY TO TRANSMITTER MASTER OSCILLATORS

While this article deals only with local oscillator stability and has been written primarily for that purpose, it is hoped that other readers will have the opportunity to extend its scope to the frequency stability of the master oscillator, or that it will be of some assistance in improving the stability of high power oscillators such as b.f.o.'s and carrier reinsertion oscillators. Despite the general advance in receiver design, only in the Racial RA11, Drake SE and Collins 75A does any serious attempt seem to have been made to match local oscillator performance to other improvements. All too often "domestic" type receiver oscillators are still to be found. In fairness to other manufacturers, there does now seem to be an awareness that these departments have been too long without attention. The increasing use of s.s.b. may well contain an unstable element of the tuned circuit. For this reason it requires as much care in its selection as do the frequency determining components themselves. Not only must it be highly stable in its d.c. resistance, but also in respect of any self capacity or inductance. It should be well overrated in terms of wattage so that any changes which do take place are as result of environment—which can be controlled—rather than the actual current flow through it.

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SURVEY OF TYPES

In the immediate post-war period, v.f.o. circuits were usually of the Hartley (Fig. 2), Colpitts (Fig. 3) or Franklin (Fig. 4) types. With care and attention both the Hartley and Colpitts could be made sufficiently stable for the receivers in use at that time, but invariably they required considerable individual treatment. Some were excellent. In the case of the Hartley, many could claim no polite label. All tended to be fussy as they ran in modes varying between class B and class C with tight coupling between valve and tuned circuit.
circuit. They were excellent for multi-band transmitters as their output contained substantially high levels of close order harmonics. This particular attribute proved to be disaster to many Amateur stations as television spread throughout the country.

Of the three oscillator types mentioned, the Franklin has an inherently high stability characteristic, but as this oscillator requires either two triodes, or a twin valve, and has low output, it did not find the favour which it deserved. In respect of this oscillator, it is interesting to note that one manufacturer is employing it in a receiver of advanced design.

In the late 1940s the Clapp oscillator (Fig. 5) came to the attention of the Radio Amateur and received great acclaim.

The Clapp oscillator—originally developed by G. G. Gouriet, of the B.B.C. represented a major advance in variable frequency oscillator design as it substantially divorced valve capacities, and changes therein, from the frequency determining circuit, and in so doing, removed the major cause of frequency drift.

There is a family resemblance between the Clapp and Colpitts oscillators as examination of Figs. 3 and 1 will show. In the Clapp oscillator the frequency control circuit is arranged for series tuning, and as a result C1 and C2 form part of this circuit as well as being a capacity divider for feedback purposes. In the Colpitts configuration, C1 and C2 are in no way associated with the tuned circuit but are a capacity divider pure and simple, other than from the point of view that the effective capacity of C1 and C2 in series is in parallel with the tuned circuit. In the Clapp oscillator, high values at C1 and C2 effectively swamp valve capacities so that any changes therein are very small with respect to these capacitors.

While achieving a high order of stability the Clapp oscillator has two disadvantages. First, the output drops rapidly if worked over a frequency range in excess of about 1.2:1. Second, while the Clapp can be designed to work at frequencies in excess of 10 Mc., as the frequency increases, the values of C1 and C2 decrease rather rapidly with the result that they no longer effectively swamp valve capacities, and so the principal advantage of this configuration becomes lost.

The Clapp oscillator was the subject of further development by Vackar of the Tesla organisation with results that do not appear to have been appreciated in the same way as was the original Clapp design. This development was reported in the "Bulletin" in some detail. What Vackar did to the Clapp very nearly equals what Gouriet did to the Colpitts. The result is an oscillator that fulfills almost perfectly the requirements stipulated in the second paragraph of this paper.

The Vackar—sometimes called the Tesla—oscillator (Fig. 6) operates over a wide frequency range, 2.5:1, before there is any serious reduction in output, and over the range of 2:1 the output remains sensibly constant. Given due care and attention, the Vackar can be used on a fundamental frequency of 72 Mc. where it shows an order of stability which is quite outstanding.


(To be continued)

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THE "PHASER" FOR TWO METRES*
JOHN A. FREDRICKS, K7GGJ

Many v.h.f. Hams have at one time or another wanted to try their hand at v.h.f. p.m. operation. If you are one of these fellows, then take a look at this. First I would like to point out that this particular rig is not complete in itself as a transmitter, but is rather an adaptor that can be added to any 2 m rig to permit p.m. operation without impairing other modes of operation.

Now let's get on to the diagram, as can be seen in Fig. 1. The crystal oscillator is nothing out of the ordinary. It is, in fact, a modified Pierce-type of oscillator. The triode half of the 6U8 is used as the phase modulator and deviation is set by the capacitor CN. Maximum deviation will be attained at maximum capacity. No attempt to multiply in frequency should be made in either the crystal oscillator or in the phase modulator, as frequency swing at the resultant output frequency will be down. Frequency multiplication should take place only after the phase modulator stage.

I don't believe that much has to be said about the audio section except that deviation is also controlled by the audio gain control and you may not have to build the stage at all. You may be able to steal the audio from the speech pre-amp, stage in the a.m. section of your rig. The reason that I built up the audio stage was so that I could go from p.m. to another mode of operation merely by turning down the gain control in the phase modulator unit.

In my 2 m unit I simply removed the old crystal oscillator and built the p.m. unit in to the rig and now I can utilise the p.m. oscillator. The triode half of the 6U8 is called an audio correction network and performs the following function: When a phase modulator is employed, the equivalent carrier frequency "swing" is in proportion to the amplitude of the audio signal. Rises in the audio signal frequency cause further undesired phase shift in the carrier. The unwanted rise in phase shift is removed by the use of an RC network to lower the amplitude of the audio signal in proportion to the frequency increase.

In this particular circuit a deviation of 50 kc was attainable with the trimmer CN at full capacity, and the audio gain control "wide-open". I have had this adaptor on for about three months with very good reports to get out the sizzling iron and good luck on 2 metre p.m.

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T.V. FREQUENCY CHANGES

The majority of television set owners would not be affected by the alteration in the frequency of the new national television channel to be opened in Townsville in September, the Postmaster-General, Mr. A. S. Hulme, said.

He said that a change in the frequency had been necessary in order that the Townsville station would not interfere with the Rockhampton station in the fringe area around Bowen.

The new frequency will be 87 megacycles for vision and 92.77 megacycles for sound.

He said that this should be within the range of fine tuning of the majority of television sets.
—Townsville Daily Bulletin, 9/1/64.

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Fig. 1.—Schematic of the phase modulator as constructed by the author for 2 m p.m. operation. Coil specifications are included, as you may want to build this unit for other hands (see text). All resistors are 1/8 watt.

---

 Amateur Radio, September, 1964
FOSTER DYNAMIC MICROPHONES
FOR HAND-DESK USE

SPECIFICATIONS:
Output Impedance 50 ohms or 50K ohms
Effective output level —55 db. [0 db. = (one) IV. Microbar]
Frequency response 200 to 10,000 c.p.s.

OMNI-DIRECTIONAL DYNAMIC:
SIZE: 3” x 2-1/8” x 1”.
Cable: 12 ft. of P.V.C.
Switch: on-off.
Desk Stand. Clip folds for hand use.
Colour: WHITE.
Plastic Diaphragm.

DF-2

Retail Price 50K ohms
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7th JAMBOREE-ON-THE-AIR
17th and 18th October, 1964, starting 10 a.m. Saturday

WORLDWIDE interest in this annual event is increasing every year as more and more Amateurs and Scouts become aware of the potential that both organisations can contribute to international understanding and goodwill.

Last year over 300 Amateur Radio Stations were placed at the disposal of Scout Groups throughout Australia.

The Boy Scouts Association is very conscious of the help and co-operation that is being given to the Scouts and their Leaders, and much goodwill and publicity is received by the Wireless Institute of Australia, both overseas and in Australia through the many magazines and other publications of the Boy Scouts Association.

Since we know there will be many for whom this 7th Jamboree-on-the-Air will be their first, we will repeat the rules hereunder.

OBJECTS
Firstly, the objects of the Jamboree-on-the-Air are as follows:

To let Scouts talk or listen to their brother Scouts, whether they be in the next town or in another country, and to learn about their activities, families and homes.

To introduce them to Amateur Radio and Electronics.

RULES
The rules are as follows:

1. License regulations must be strictly observed at all times.
2. Any part of the 48-hour period may be used.
3. Any authorised frequency may be used.
4. To take part, call CQ Jamboree or answer another station using this call.
5. You can use c.w., a.m., s.s.b., or any mode authorised.
6. This is not a contest. There are no prizes given for the most contacts made. A participation certificate will be sent to all Amateurs sending in a log sheet which will be provided by the Scout Group, or by sending a report to the Branch Organiser.

You will probably be approached by a member of the Boy Scouts Association, but if you are not and would like to help a local Scout Group, then write to your State organiser. The Victorian Branch Organiser is Mr. J. G. Nicholson (VK3AAN), 28 William Street, Glenroy, Vic.

ORIGIN OF JAMBOREE-ON-THE-AIR
During the Jubilee Jamboree at Sutton Coldfield in England in 1957, which was organised to commemorate the origin of Scouting, some 50 years earlier, a number of Scout Radio Amateurs got together at the Radio Station there and held what they called a Hamfest. A suggestion was then made and enthusiastically adopted that Scouts should try to contact each other on a fixed date each year by means of Amateur Radio. Thus was born "Jamboree-on-the-Air".

The idea had a lot of merit, for although World Jamborees are held only every four years, the expense unfortunately precludes many Scouts from taking part, despite the fact that it is an experience that cannot be compared with any other Scouting activity — the experience of camping in a foreign country and meeting and making new friends from among the thousands of Scouts there from all parts of the world.

Those who attended the Sutton Coldfield meeting realised this and recognised that the answer lay, to some extent, that it was still possible for Scouts to meet and talk to each other without leaving their own towns. So that as a means of bringing home to the average Scout the true meaning of World Brotherhood, without any expenditure of money, the scheme could not be bettered.

So in 1958, over the week-end of 10th and 11th May, the first Jamboree-on-the-Air was held from Leamington Spa in Mitchell of England, an ex-A.S.M. of the Boy Scouts of America, and himself an enthusiastic Radio Amateur under the callsign of G3KKH, as the Honorary Organiser (With publicity of this initial attempt was given by the World Bureau). It is interesting to record that despite the short notice given the event and the fact that weather conditions did not prove encouraging, quite a number of contacts were made, and the comments of those who did participate was so favourable (From Scout and Amateur Station operator's point of view) that the Organisers were encouraged to start planning for the following year.

As Jamboree-on-the-Air grew to its present proportions, so did the need for greater organisation, and in response to requests from the participants of those early years, the Boy Scouts World Bureau took over the organisation, until it has now become an outstanding event in the World Calendar.

—Jack Nicholson (VK3AAN).
Victorian Branch Organiser.

MEET I1AGI
GINO ANTONUCCI
via Dagnino 25/14, Genoa Pegli, Italy.

Gino, aged 44 years, has been in Radio as an Amateur for only three years. In those three years he has acquired an Amateur Station licence. He is a Scout leader and a Scout. In every day life is a chemist. I don't think it would matter how you called Gino, he could return on the mode you used. Gino has worked 162 countries and has 149 confirmed.

On s.s.b. he has a KW Viceroy plus a linear (1 x 813 g.e.). Receiver is a KW77. On a.m. the transmitter is a home-made 140 watt, using 1 x 813 g.e. and 800 watts on 80 metres. Gino uses an NCX3 on 20, 40 and 80 metres for r.t.t.y. Siemens Hell. The antennae are rotary beams, which comprise three elements on 20, three elements on 15, and two elements on 10 metres. He also has a ground plane for 20, 15 and 10 metres, plus a long wire on 40 and 80 metres.

Good for you Gino and more power to you. Thanks for the neat letter, also one of the best from Scout and Amateur Station operator's point of view.

May we all, through Amateur Radio, get to understand each other much better than we could without it. T3 from VK.

Bert VK5BB.

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Required for maintenance of modern electronic and electrical equipment. Good general experience necessary.

FOREMEN AND LEADING HANDS

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Amateur Radio, September, 1964
ROSS HULL MEMORIAL V.H.F. CONTEST 1963-64 RESULTS

THE Federal Contest Committee takes pleasure in presenting herewith the results of the 1963-64 Ross Hull Memorial V.H.F. Contest.

From the comments received we feel that the deletion of the present scoring system for 40 and 80 metres, and the change of the distance of 50 miles between stations would not be justified. Consequently we will recommend to the Federal Executive that the scoring table be changed in this regard.

Some contestants suggested that the distance be 75 or 100 miles, whilst others thought that a return to the State contacting State system would be preferable. To quote one of the contestants: "Working all local stations in remote areas at a disadvantage to those located in areas of high local v.h.f. population."

The above change to the scoring table would eliminate the daily scramble for numbers in metropolitan areas and at the same time give the country contestant a fair chance in the Contest.

Another suggestion worthy of consideration is that the duration of the Contest remain as at present, but that a contestant may submit a log be reduced from one month to nine days or sixteen days. This may increase the number of logs submitted and increase activity. At present it seems that a number of Hams compete in the Contest for a couple of weeks and then become disinterested for one reason or another and do not bother to send in a log because their chances of winning the Contest are small. One line of thought is that a contestant would be prepared to concentrate his activity in such a 9-day period but still operate over a period of one month.

He would forward a log for the nine consecutive days in which he scored the most points. This suggestion has some merit. What do you think?

This year's honours go to VK5ZDR, M. J. McMahon, with a score of 7,746 points, and was a very fine effort. In conclusion we would like to congratulate the other award winners and thank those who competed and submitted logs.

—Federal Contest Committee, W.I.A.

TROPHY WINNER

VK5ZDR—M. J. McMahon .... 7746 pts.

AWARD WINNERS

Section A—Transmitting, Open
VK2ASZ—R. L. Lear ....... 2051 pts.
VK3QV—D. H. Rankin ....... 1048 
VK4PU—J. D. Purdon ....... 597 
VK5TN—B. G. Tideman ....... 1388 
VK6HK—D. E. Graham ...... 1262 
VK7DK—D. H. Kelly ....... 874 
ZL3RZ—G. Burrell ....... 1210 

Section B—Transmitting, Phone
VK1VP—E. Penikis ...... 2147 pts.
VK2CF—R. C. Norman ..... 2791 
VK2ZJ—K. W. Jewell ..... 2503 
VK4ZEK—D. J. Gennell ..... 5294 
VK5ZDR—M. J. McMahon .... 7746 
VK6ZDT—T. M. Stanicic ..... 2684 
VK7ZAP—W. J. Henry ..... 1858 
VK8ZCX—J. B. Masters ..... 1749 
VK9ZEV—J. P. Hayden ..... 514 
ZL1AUM—C. Maddock ..... 1530 
ZL2AAH—B. D. Gibb ..... 900 
ZL3HK—T. J. McKenzie ..... 1250 

Section C—Receiving
WIA-L2242—D. J. Patterson 1333 pts.
WIA-L3138—G. N. Earl ..... 2276 
WIA-L5049—R. D. De Cean ..... 195 

INDIVIDUAL SCORES

Section A
VK2ASZ—St. Marys ..... 2051 pts.
VK3QV—East Malvern ..... 1048 
3YS—Box Hill ..... 227 
VK4PU—Woombye ..... 597 
VK5TN—Kings Park ..... 1388 
VK6HK—Wembley Downs ..... 1262 
6MM—Nedlands ..... 1052 
VK7DK—Launceston ..... 874 
ZL3RZ—Westport ..... 1210 

Section B
VK1VP—Canberra ..... 2147 pts.
VK2CF—Croydon ..... 2791 
22FB—Armidale ..... 2158 
22FB—St. Marys ..... 1665 
22FS—Goondalba ..... 1098 
22MD—Doveton Heights ..... 185 
22ID—Woolongong ..... 87 
VK3ZJ—Beaumaris ..... 2503 
3ZJQ—Dartmouth ..... 1608 
3ZLG—Melton ..... 1019 
3ZOL—Mendip ..... 771 
3ABP—Altona ..... 483 
3ZGL—Keilor Park ..... 308 
3NN—Yanaka ..... 286 
3ZGL—Goroka ..... 195 
3ZMS—Frankston ..... 191 
3ZOS—Yanaka ..... 180 
VK4ZEK—Hawthorn ..... 5294 
42AL—Deagon ..... 1659 
42BG—Balgownie ..... 1588 
42GA—Ayr ..... 811 
42WL—Cairns ..... 666 
42BC—Cairns ..... 578 
42BO—Graemont ..... 558 
42JM—Gordonvale ..... 247 
42DG—Ayr ..... 84 
VK5ZDR—Henley Beach ..... 7746 
52ZB—Gawler East ..... 3633 
52ZC—Gawler ..... 3258 
52ZH—Gawler Rail ..... 1728 
52DX—Oaklands Park ..... 1600 
52K—Plympton ..... 1524 
52GF—Plympton ..... 1505 
52SG—Seacombe Gardens ..... 1492 
52ZH—Somerton Park ..... 1292 
52JG—Forreston ..... 1107 
5WV—Elizabeth North ..... 920 
5CL—Nerang ..... 780 
5ZEC—MILE END ..... 379 
VK6ZDT—Mt. Yokoine ..... 2684 
6ZDS—South Perth ..... 1422 
6ZCD—Albany ..... 1313 
6ZDB—Nedlands ..... 1255 
6LK—Mt. Pleasant ..... 1021 
6ZAL—Bunbury ..... 192 
6ZAG—Mt. Hawthorn ..... 128 
VK7ZAP—Hobart ..... 1858 
VK8ZEV—Darwin ..... 1749 
VK9ZBV—Port Moresby ..... 514 
ZL1AUM—Auckland ..... 1530 
ZL2AAH—Foxton ..... 900 
ZL3RK—Christchurch ..... 1250 

Section C
WIA-L2242—D. J. Patterson 1333 pts.
WIA-L3138—G. N. Earl ..... 2276 
WIA-L5049—R. D. De Cean ..... 195 

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Page 14
John Moyle National Field Day Contest 1964 Results

The number of logs submitted in this year’s Contest was less than last year and the individual scores were not as high as previously. Very few comments were received regarding the extension of the operating period or the change of the title of the Contest.

It is to be hoped that more operators will be enticed into the field for next year’s Contest to increase the activity.

The logs submitted, generally speaking, were quite good, but some of the S.w.l.’s. claimed points for hearing fixed stations and this reduced some of the claimed scores considerably.

As in last year’s Contest, the Multi-Operator Stations were very active and in most cases used all bands from 1.8 to 576 Mc., using a combination of homemade and commercial equipment. VK3APC had no fewer than 28 operators and junior assistants.

Transistorised equipment was quite popular, particularly d.c. to d.c. converters and transistorised modulators. Several operators used transistorised converters and fed them into car radios, Command receivers, etc.

The troubles encountered by operators were many and varied, and the following are a few selected at random. VK2NA, the Narranderra Radio Club, operated at a spot called Dry Lake and had the misfortune to be washed out by a thunderstorm on the Saturday night. VKSOR, B. H. Bussen-schutt, had transmitter trouble at the start of the Contest due to the unfor-giveable omission (his words) of two vital high tension by-pass condensers in the transmitters.

The aerials used ranged from beams to 300-foot verticals suspended by hydrogen balloons. The G5RV antenna was a popular one.

In conclusion, we would like to congratulate the award winners and thank those who submitted logs and that we will again see you next year.

—Federal Contest Committee, W.I.A.

AWARD WINNERS

Section A (Portable, Phone)

VK1SB—S. E. Brown 174 pts.
2RX—A. R. Hennessy 389
3AAW—W. G. Wines 161
42J—R. M. Feenaghly 666
5TH—T. Mitchell 362
6JO—R. J. Skevington 142
7DK—D. H. Kelly 505

Section B (Portable, C.w.)

VK1SB—S. E. Brown 171 pts.
2ASZ—R. L. Lear 195
3APJ—P. J. Dettman 350
5ZF—I. L. O’Donnell 311
7CH—C. Harrisson 152

Section C (Portable, Multi-Op.)

VK2AWI—V.h.f. & T.v. Group of N.S.W. 597 pts.
3APC—Moorabbin & District Radio Club 2968
5LZ—Elizabeth Amateur Radio Club 3047

Section D (Fixed Stations)

VK1RD—R. Davis 580 pts.
2APK—D. F. Kiesewetter 645
3XB—I. Stafford 470
4LT—A. E. Carter 240
5RR—R. G. Harris 265
7SM—S. G. Moore 580

Section E (Receiving)

VK1—J. Watson 440 pts.
W1A-L2033—W. Shephard 280
W1A-L3043—E. W. Treblecock 695
W1A-L2268/VK4—P. Erwin 165
W1A-L5065—R. Rattery 190
W1A-L6021—P. W. Drew 55
VK7—R. W. Mutton 305

INDIVIDUAL SCORES

Section A (Portable, Phone)

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<td>VK7</td>
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THIS MONTH’S COVER

This is VK52C, A1 Penny, situated at Risdon Park, Port Pirie. A1 runs 150 watts a.m. from the MacMillan transmitter to a G4ZU. The receivers are an E.I.L. and an Edystone 750. A keen and efficient c.w. operator, and for this A1 uses the bug. He is the proud father of one son and two girls. After spending some time at the Channel 7 transmitters in Adelaide, he has returned to the old firm of H. G. Palmer, where he is service manager for their local branch at Port Pirie. Always eager for the chance to join in a contest, A1 has many certificates to his credit. At the moment he’s busy putting oilpaint on the itch that he’s getting from s.s.b.
In August "A.R." mentioned re the response from members towards our page. During the weeks to come a few more may be seen. However, although only a small percentage of our membership are paying us a visit, we wish you all the best OM. Russell L2287

NEW CALL SIGNS

MAY, 1964

VK1V—S. Grimsley, Dist. Astronomy, Australian National University, Mt. Stromlo, A.C.T.
VK2AR—R. G. Ralston. 28 Highgate St., Bexley.
VK3ZBD—C. McK. Cook, 10 Foch St., Ormond, Melbourne.
VK4ZBN—W. M. Bryce, 9 Raymond St., Northcote.
VK5WH—D. A. Campbell, 10 Turnbull Rd., Baulkham Hills.
VK7UX—G. Paterson, 73 Hall St., Enfield Heights.
VK8BB—B. J. Dwyer, 38 Highgate St., Bexley.
VK8BD—F. R. A. Jenkins, 55 Wattle St., Haberfield.
VK8AO—M. Hillard, 89 241 33 35 169 12
VK8BH—A. A. McCullagh, 25 Boyle St., Maroondah.
VK2BB—B. J. Dwyer, 38 Highgate St., Bexley.
VK9BCD—K. Khan, 14 Woodward Ave., Strathfield.
VK1BD—J. Dwyer, 38 Highgate St., Bexley.
VK2BB—Brown (Miss), 64 Marmong St., Marmong Point.
VK2Z—F. R. A. Jenkins, 55 Wattle St., Haberfield.
VK4Z—M. Hillard, 89 241 33 35 169 12
VK5TH—D. A. Campbell, 10 Turnbull Rd., Baulkham Hills.
VK8BB—B. J. Dwyer, 38 Highgate St., Bexley.
VK8BD—F. R. A. Jenkins, 55 Wattle St., Haberfield.
VK8AO—M. Hillard, 89 241 33 35 169 12
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Well this month I have been reading up on DX news published in some editions of "DX listings". I could hardly believe that things were so good and varied in radio operators.

Most of us will remember with a touch of nostalgia those days when the bands were closed for most of the day. This is leading up so I can show you how difficult it was to make contacts and how we had to work very hard to do so.

This month I have written a page about one particular DX news.

We must surely be scraping the bottom of the glass and I wish everyone would take our radio news more seriously by tuning in on DX contacts.

Radio operators.

Radio operators.

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Radio operators.
With the advent of spring and the approach of another v.h.f.
DX season, the number of hours spent by many of us on 2 is
bound to rise for most of us. This is going
to mean a lot of fun, a chance
for more contacts, etc., etc. Even
If your station is capable of getting
into a lot of DX, you simply cannot
get out of as much neighbour trouble, so long as you operate
only at widely spaced intervals and for
short periods. But when the going gets
bad, even the once-easy piece picks up,
so do the neighbour responses.

Some of the discussions heard on the air
show that the Amateur in question has not
the foggiest notion of what causes the
trouble or what to do about it. Too often he
just lets the situation deteriorate, does nothing
to correct it, or help his neighbours. When
this happens they bound to explode eventu-
ally—and being able to prove his transmitter
"clean" will do no solution to the mess
he is in by then.

It may be that the transmitter is not
at fault, but nothing is gained by jumping
up and down and declaring this fact in angry
terms. For some years now, t.v.i. (all kinds)
has been far more a public relations problem
than anything else. We know that t.v.i.
can be cured and that often the cure must
be made at the receiver end. But your neigh-
bour doesn't know it, and you will get no-
thing out of him in the matter of neighbourly
co-operation.

Rule 1: Don't let t.v.i. drag you down. If you
know it is present and you are hot
willing to lean over backwards in the matter
of neighbourly co-operation.

Rule 2: Never lose your temper. Once you
allow your temper to be raised, start shouting at each
other you are done for. No matter how angry
you get, you must keep cool. Better yet, keep
friendly.

Rule 3: Learn the causes and cures for
.t.v.i. The nearest thing to a cure is to know what is actually
causing the trouble and that you know how
to deal with it. The initial cure is to get out of
the shack, where in convincing him, unless you are
willing to argue ourselves in the matter of
neighbourly co-operation.

Further news has arrived regarding the new
144 Mc. record between WEIDNG, Long Beach,
California, and VK8LW, Brisbane, Australia,
which resulted in the first West Coast U.S.A. to
Pacific Ocean v.h.f. QSO on 144 Mc.
It took place on April 12, 1964, and repre-
sents the longest 2麦QSO by Moonbounce.
The WEIDNG CW call was VY1L 090701
Vagis stacked 4 x 2 with an "honest" gain
of 10 db. per bay. This can be elevated in angle
below 90° by 90° by using balanced 50
odd antennae were tried in the cause of
their attempts and 5 one used found to be
the best. The transmitter was 1000 watts c.w.,
the receiver a 468 kHz pre-amp., to a naviator
spirit converter and a 75A4 with noise blanker
sideband. Walter 4ZPW

QUEENSLAND
Last month a number of new call signs
appeared on the v.h.f. bands. Jim 4WA and
Bill 4WPB have both made intelligible
noises on 144 Mc. Ross 4ZRD and Reg 4VX has
called 5ZGZ from the人工ist on 52 Mc. Reg 4VX
takes pride in informing me he is a genuine
refugee from 20 mc. sideband. Walter 4ZPW
is working public service from USM, the Uni-
versity of Queensland. Space is a problem
and he has trouble with the effects of
concrete to have a contact. There is an obvious
to this story. Put a ground plane up, Walter, and give the r.f. a fair
fight.

Ron 4ZK will be operating from VK8 on
52 Mc, every Sunday afternoon and evening
from 1600-1800. He is using a 100w. trans-
mitter and is already known on 2 mx. We also expect 4OS, the Oakleigh
Boy Scouts, to wire up their 2 mx gear in the
near future. John 4ZWB is having trouble with
QRM. Although his GTH is Dalby, about 45
air miles from Brisbane, he is having a
hectic time trying to sort out the call sign
calculations.

At the moment Roy 4ZRM is having a holi-
day. However he also has a broken leg to
keep him occupied and this is the reason for
his stay at home. Roy has been on the air for
a long time now and is still very hot on t.v.i.
problem. However it seems that his tx
was clean, but the 65 Mc. spurious was coming
from his rx.

What has become of the chaps up in Ips-
wick? We still have no reports from these
that direction but reports that he doesn't hear
anything. There is quite a strong body of
v.h.f. activity in Ipswich, and if there are
even seven persons are known to be listening around the

The Jamboree-on-the-Air looks like being
something on the v.h.f. bands this year. In
past years 4VX has been the main man operating from Mt. Cotton and Mick
4ZAA will be at the Sandgate Scout Group.

On 6 mx virtually all the activity is between
25 and 52.5 Mc. here in Brisbane. We have
received skycrutch reports from the south
frequen
cies in use there, but we would be
interested to learn more about these fre-
frequencies so we will know where to look in
the DX season. This applies particularly
to VK3. 73, 4ZPL.

SOUTH AUSTRALIA
Our usual correspondent, AI 5EK (formerly
5ZCR), having now been firmly attached
to the Dry Dairy, I am told, is giving a lot of
love and attention to a honeymoon.
Rumors say he is probably headed towards
the VK8 land. We wish you well, AI, and the
v.h.f. notes will still be available for you to
do with. While at the same time, he is
doing a splendid job of public service. No
news of AI 5EK, the meantime, I shall do what I can to fill the

52 Mc.: Activity still seems to be at a very
low ebb. Admittedly S.A. has had more than
its share of gale-force winds, heavy rain, plus
sundy frosts, enough reason to keep many from
the shack. Reports from the cross-band contacts to 144 Mc. difficult in
areas of strong signal from Channel 9 due to
satellite interference.

This does seem to be more pronounced when
working 100w.

No DX has been reported on the band since
changing from 50 Mc. The report of the long-
est distance by Herb 3NN and Mick 52DR, a distance in
excess of 200 miles, signals 5 x 5 each way, and

THE BEACON BOX

VK5VF
6 Meters — 53.000 Mc.
2 Meters — 144.800 Mc.
One call on c.w. then carrier for 40
seconds, then repeat. Etc. Operation is
almost continuous.

VK6VF
6 Meters — 52.006 Mc.
2 Meters — 145.060 Mc.
Automatic identification every 3 minutes
approximately four seconds key-down
position. Operation: continuous.

VK3: ATV0
51.75 Mc. f.m.
0000 - 2300 hours daily.
(100kw. e.r.p. 2000 ft. elevation)

VICTORIA
Over the past month all bands have been
fairly inactive. A new net has started on 6 mx,
the Flemmish have not had any complaints of
t.v.i. Cyril 3ZCR, Les 3ZPB and Vic 3ZPV
are putting the finishing touches to 6 tx's,
each will be running about 30 watts.

On 144 Mc. there has been a fair amount of
activity held every third Wednesday and are usually attended by
five or six hounds—these are getting more
popular. 5 mc: Scramble: The last 2 mc Scramble
held on 5th. The winner was Ken 3ZJN who worked 19
stations in the 1 hour period.

Lindsay 3ZY and Geoff 3AUX can be heard on
1296 Mc. They are tripping from their 432
Mc. tv's.

A tape of a lecture by an R.I. from the
Department of Defence was soon available
for loan from the VK3 V.h.f. Group.

地址与编者：LEN POYNTER, VK3ZGP
14 Esther Court, Fawkner, N.15, Victoria

Amateur Radio, September, 1966
very steady on 17 July. Mick regularly gets through to the VK2s, 6ZAG and Geoff 5ZCQ now has 120w. to play with, having fixed the bugs in the new modulator, and with a new 300w. rig at home. Wally 5ZEH temporarily at Belair has been confirmed QRV three months. Herb 5NN is being heard almost daily with his new mobile. 5UKA, the University of Adelaide Radio Society in its current form, is still contacts mainly around lunch time.

In Geraldton some crayfishermen have a habit of getting through to land on 6ZBO kt. Recently No. 2 had a ship and was heard on the dual wave set, had to ring through to base, because they were off the air! He was also relaying messages for a couple of hours. A pleasant evening.

Heard Dennis 6AW on 2 mx last week-end, cross-band to 6ZCM on 6. I first heard him in the early weeks of this year, then he was using much 50 Mc. rock. It was some signal.

Talking in training with the P.M.G. get a 5ZB letter from the Director indicating that they get 75 per cent. or more in all subjects. This is better than stripes, eh?

About a dozen chaps have W.I.C.E. mobiles and it is always a pleasure to be able to extend the interest at the next civil emergency.

Sunday, 25 July, the rain and wind storms were in evidence and it is doubtful that one station on the air all day—5BE with a short wave relay of the Wireless Institute news, and he closed down just as the news was getting interesting. One of his harmonics pulled the whole station off the air.

6LR, 6IE, 6AZQ are using 4E2Ts and several are more contemplating it. 15av. at 100 ma.

In the last couple of months include Bob 5ZYX, also has a 60 ft. tower (home made too) and should work much DX this year if his new mast survives the gales.

Set of Five Gold-Plated Matched Crystals

Mounted in HC6U Holders

Suitable for 455 Kc. L.F.s.

Price £16-10-0 per Set

+ 12½% Sales Tax

Full details on request.

Phone 34-6539, write or call

WILLIAM WILLIS

428 Elizabeth St., Melbourne

for GELOSO

Equipment and Components

BRIGHT STAR RADIO

46 Eastgate St., Oakleigh, S.E.12, Vic. Phone 57-6387

is a nice working temp. 6MM will be running a pair in A.B.I. this Christmas with 300w. p.e.p. (500w. 100 ma. idling, 100 ma. max.)

He also has a lot of tower (home made too) and a 5 over 5 stacked yagi antenna. If he doesn’t work those ZLs, who can? If he does it may convince the boys there is summant in s.s.b., but they’ll take some convincing.

52 Mc.: No signals outside local area heard during the last few months. 92GB and 92BV are active again. 9CK has been heard more often and we all welcome a newcomer in Bryan 92BE. 8ZBA is a good contact on the bands even during the day. There is great activity in the construction, as 9CK, 92GB and 92ZD are busy with bigger and better and 92GL, 92AP, and 92BV are busy with converters for Oscar III.

144 Mc.: This band has certainly shown a measure of activity unknown for some time and it augurs well for the warmer months ahead. Stations newly on the band over the past one or two months are—Bunbury 5ZMJ, who reported Jim 5ZMJ shifted 10 truck loads of gear and rubbish, etc., to his changed QTH at Rockingham. John 5ZEP, Mac 5ZLM (new tx), and Leon 5ZMC at Morphettville hopes to be in on 2 or 3 months. Ian 5ZIK is still looking south on 2 mx, but as the signals are very scarce although the grape vine states that he has been keeping schedules on 2 mx and mobile. 5UA, the University of Adelaide Radio Society is still trolled contacts. Brian 5TN has completed his job is complete, especially if the results obtained by Garry 5ZK, who did a similar re-}

...
FEDERAL I.T.U. FUND

As agreed at the last two Federal Conventions, Divisions were given target figures to meet towards financing representation at forthcoming I.T.U. Conferences. To date, the percentage of the target figures met are shown by States—

- VK2 — 28.6%
- VK3 — 33.6%
- VK5 — 23.6%
- VK7 — 6%

The above figures represent monies received by Federal from a donor and not necessarily monies still held by Divisions.

FEDERAL QSL BUREAU

Bob K6MQK requests the assistance of any VK Amateurs equipped to take part in the Moonbounce project. Stations would need the equipment for 15,000 Mc with at least 100 watts and a good antenna. He points out that startling results have already been achieved on lower frequencies and cites 144 Mc, contacts between WENDG and OHINL last April by Moonbounce procedure.
of 160 metres on some nights. This must certainly be near the sunspot minimum. Heard 2ARX and 2KW on 160 the other night.

Wally 2AXH is back on 80 using an AT21. A couple of filters give complete freedom from t.v.i. One is a double-band half-wave 5.6 meg tuned model, incorporating three series-tuned traps for Channel 2. The other is a regular three section, low pass filter which commences at 34 megs. George 2ADZ is having a spell in Concord Hospital, we wish you a speedy recovery George. Phil 2TX is planning a move on his Arcadian location and after that a beam antenna. Alec 2AAK and I will rejoice when about 73, 2QN.

Desynn indicators and their power supplies have been very pleasing. Even though it has upset Bourke's Law trying to get on to 80. It's been winter (and we do have a winter in the Sunshine State) so the Y.R.S. stations in VK4 will be included and the trophy will be shown on the fringes here. Hope to have representation at the next Convention along with portable equipment, for one or two school holiday days. Received a QSL from 4X4LN—no envelope, no stamps—a thought for the local authorities, free passage of all QSL traffic.

This was run out of Keith, kept on upsetting Bourke's Law trying to get on to the Wednesday night zone. New QTH is now LaPer, about midway between Keith and the Coorong; only on t.v.i. Should be on 40 and 40 with 50w. soon, Already on 5150 Me. mobile, and a similar set-up on 3640 Me. mobile.

The members will regret the passing of Luke SLL, who only a matter of weeks prior had asked me to pass on his best to the Zone.

Tony 3ZAI, Bordertown, has done a magnificent job in building his own brick house although I understand he has a little harmonic distortion. Tony notes that the QTH is a very quiet one with activity (radio) from this QTH. Not quite as fluent as Pansy, so best 73, Barry SYB.

GALAXY III. 80, 40, and 20 METRES . . . £230
GALAXY V. 5 BANDS (Delivery Oct./Nov.) £300

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If you are interested in procuring any of the popular American Transceivers, I can help you. For more details contact—

SIDEBAND ELECTRONICS ENGINEERING (ARIE BLES)
33 PLATEAU ROAD, SPRINGWOOD, N.S.W.
Phone 394
TOWNSVILLE AND DISTRICT

Very pleasing to see in August “A.R.,” that the Publications Committee had published the two exerts from the Queensland papers. It only goes to show how our hobby is growing and the year is now almost half-over and our Editor and staff were not so much sickness. Trying early to get the local committee organised for the Scout Jamboree—Queensland Company, Newton 4BQ is desirous of getting to stay the night at Rockhampton, to see the Interest- and response displayed.

Only visitor from the south this month was Newton 4BQ who was visiting the coast from the town, having left the city of “sin, sweat and sorrow”—Rockhampton. Sorry to report that Newton 4BQ is now in hospital with a severe case of “flu” and staying for an indefinite period. He is a fine example of the athletic type SP?—oh well, perhaps I won’t go on—my natural modesty has come in.
Leith remained quite unconvinced despite the old Are plug outside our once meeting place. Personally Leith, they reminded me of the obvious suggestions from Len and was appar-
or mortification, I was not quite sure which.

the time book with the purveyors of the afore-
ing up the old shekels, and nobody would have
again on the next Sunday—Leith, who signs

people in the vicinity of Len's QTH were not
bring two quid, including the bull. What was
smoke—the only redeeming feature being that
photograph through my dark glasses, was to see
the only thing I

I had hardly posted last month's notes away

Brian SCA displayed his recent purchase at
his cheek, that this was due to the sea taking

One of the locals told me, with his tongue in

terrible winter ever experienced. One of the
locals told me, with his tongue in

Some time ago I commented in these notes that

I was not quite sure which.

Leith had his private grizzle—it appears that

I did not include Harry SMY in my list of
oldtimers present at the meeting, mainly because
he was dashing hither and thither scoping up
the old shekels, and nobody would have
believed me that he was an oldtimer, going
careless. It was a pity that he was racing around
the floor. Bad luck that modulation tranny in a
ballpoint. MCM, I must admit that Leith has
ever been on—period.

According to my usual reliable information, it

Twice on a Sunday morning at his QTH, and

Up in despair and suggested that if Brian was

In fact I do not think they mentioned once
around odes of praise for the overall organ-
isation and running of the session on Sunday

Throughout VK there are several public
spiritual Amateurs who conduct Morse code
classes and give talks etc., etc. I don't want to
secure their license. We salute these chaps
for their unfussiness, but we certainly do not
want to see them getting in the way. They can
also be prepared to praise, and with this in
mind I can only assume that the ex mayor
of Lucindale, Arch 5XK, has at last settled
in on the VK3 division. If he does not, it won't
matter because the whole world knows that
I don't argue Arch, these local identities know

One of the locals told me, with his tongue in

The news is that old key-thumper Ray 3RJ. Oh yes, I

heard Len SZF and Leith SLC having quite

Heard Len 5ZF and Leith 5LG having quite

just a little thought on the part of the QRM
makers. I can assure you, to say nothing of the
water front. Perhaps I had better agree with


certainty. The old Are plug outside our once

He is in the throes of getting back on the
air and probably as this is being read, he is
in the office holding phone, both together, trying to make
up for lost time. Well I assure you, what did you do
with your cabin?

By the way, did you cop the photo of the

One should underline with ink the name of Ken
3XM. I am just wondering whether anyone
was able to identify his recent purchase at the

WILLIS MEDIUM POWER TYPE

For use up to 600 watts p.e.p. Match plate
loads of 2,000 to 3,500 ohms (Z) and higher
into coaxial cable. Operating Q increases on
frequencies to increase harmonic
suppression enabling practical values of
withstanding capacity to be used on 10 and 15
metres and allowing for wiring inductance
(L). Incorporates extra switch section for
remote adjustional capacity (C) required,
or switching other circuits. Switch
for use with 3 caps. at 2,500 volts with
contact resistance (R) of 0.03 mili-ohms.

Price: £3/19/6 (inc. S.T.)

WILLIS PI-COUPLET CHOKER

To suit above Pi-Coupler. No resonances
within Amateur bands if spaced diameter of
metal panels. Stands 8 inches high on 1 inch diam. ceramic former. Base
mounting bracket included.

Price: 25/- (inc. S.T.)

GELOSO PI-COUPLERS

Type 4/111 for use with parallel tubes type
6146, 807, etc.

Both Types, Price: 39/- (inc. S.T.)

EDDYSTONE 250 p.f. CONDENSERS

Type 4/112 for use with single ended tubes

Price: 12/- each inc. S.T.

DUCON 25 KY CERAMIC CONCILING CONDENSERS, 500, 1,000 p.f.

Price: 45/- (inc. S.T.)

DUCON 50 KY CERAMIC COUPLING CONDENSERS, 500, 1,000 p.f.

Price: 12/- each inc. S.T.

WILLIAM & Co. Pty. Ltd.
428 ELIZABETH ST., MELBOURNE, C.1
Phone 34-6509

 Amateur Radio, September, 1964Page 23
Hubbard, the cupboard was bare. Have learned since that they now frequent 1.8 Mc. The youth Radio Scheme is progressing in the States. Bert 5ZDV is busy modifying a 522 oscillator and testing; xtal conv., 6ZDW and 6ZBK parked their cars to the Institute if someone had realised that quality was Ye Ed, he used to be satisfied with an occasional new motor or car. Only if you do not see him you will hear you on the bands at some future date. 73, Leigh Pretty.

Western Australia

Here we are again in an attempt to compile some notes out of very little news. Everyone seems to be busy with the formation of a group at Rockbank 4 or 211-7385.

Sales and Wannas:


Hallcrafters HT-37 Transmitter for sale, mint condition, 10-80 mc coverage, s.s.b and c.w. vox. The audio reports given it a chart and it has been excellent. £250 or offer. Also have small rotator with control box suitable for quad or v.h.f. Victoria, 85 Victoria Park Rd., Kelvin Grove, Brisbane, Qld.

For Sale:

- Collins KWM-2 with portable PM2 a.c. supply plus Collins mobile mike MM1. As new, 18 months old, complete with instructions, built on original carton, £725. Home-built 12v. d.c. supply for above £15. VK5MT, Phone 57-5053.

- Collins 7551 with instruction book and 240v./115v. trans., new condition, very little use, £285. VK5MT, Phone 57-5053.

- Current model NC-303 Amateur-band Receiver, excellent condition. £150 or will exchange for suitable all-band Receiver. C. J. Ellis, 12 Chapman St., Gymea, N.S.W. Phone 524-8039.

- Little used Orthonophonic S.P.U. stereo head and matching mid-metal transformers (2000K), £20. Collins 5600a twin channel transistor in dual stereo crystal and diamond, £12. Decca microlight, £1. VK3AXT, Phone Rockbank 4 or 211-7385.

- One 1500v. 300ma. Fawor Transformer, new, £12. One Ben-"dix Compass Receiver, £12. One Heathkit Q Multiplier, £8. Six Valves, 4X150A, 15/- each. VK5ADC, Phone 57-2939.

Electronics

- Heathkit OX-100 Transmitter and also new, B9 Mike on stand, Rockbank 4 or 211-7385.

Wanted:

- General coverage Communications Receiver for S.W.L. Price to about £40. VK3AFU, "Essel-dale," Clear Lake, Vic.

- Personal Morse Tuition at 12-16 words per minute with deible compensation at the usual rates. Phone BW 2328, Melbourne.
WARBURTON FRANKI

**Terrific Bargain in Coil Kits**

**FIVE BANDS**—covers from 520 Kc. to 18.5 Mc.

You Get:
1. Completely wired Coil Bracket with Switch.
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**MODEL LSG10**
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- A.F. output—2-3 volts at 400 c.p.s.

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£12/19/6 inc. freight

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**TRANSISTOR RADIO TUNERS—PK633**
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or 300V. D.C. at 45 Watts max.
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★ EXCELLENT PULSE SHAPE. High and constant peak emission throughout the duration of the pulse is the first requirement of a good pulse tube. The C1149/1 and the C1150/1 cathodes are carefully made and fully activated for constant emission—there is negligible plate current slump during the pulse and flat top is maintained.

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★ RUGGEDNESS. The extremest of vibration and shock experienced in ships and aircraft call for tubes of extremely robust design. No other previous specification calls for the stringent mechanical tests met by these EEV tubes.

★ HEAT DISSIPATION. The factor of unwanted generated heat creates many problems for equipment designers. Bulb shapes of the C1149/1 and the C1150/1 are such as to give low surface temperature and the generous plate size and design of the integral plate terminal ensure good heat dissipation.

★ EMISSION FROM CONTROL ELECTRODES. This has been eliminated by the use of heavily gold-plated grids and processing methods evolved from years of experience in the power tube field.

C1149/1  C1150/1
AMERICAN ELECTRICAL EQUIVALENTS
4PR60B AND 715C

GENERAL DATA

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<tr>
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<td>Pulse Screen Current Approx.</td>
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<td>Pulse Output Power</td>
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<td>OA79</td>
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<td>£18.00</td>
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<tr>
<td>OA210</td>
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### NEW SPEAKERS

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### GERMANIUM DIODES

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### SLUG-TUNED FORMERS

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### 122 AERIAL SETS

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### LOG BOOKS

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### METERS

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### NEW TRANSISTORS IN STOCK

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<td>50 ohm, UR67, 3/8&quot; dia., in 25 yd.</td>
<td>£18.00</td>
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</table>

### HAM RADIO SUPPLIERS

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We sell and recommend Leader Test Equipment, Pioneer Stereo Equipment and Speakers, Hitachi Radio Vaives and Transistor Radios. Kew Brand Meters, A. & R. Transformers and Transistor Power Supplies, Ducon Condensors, Welwyn Resistors, etc.
FEDERAL COMMENT

In Amateur circles, the various months of the year have begun to assume new meanings—for instance, February has become N.F.D. month, August is R.D. month, April is Federal Convention month, October is VK-ZL Contest month, and so on. More recently October has become associated with the Jamboree-on-the-Air as well as the DX Contest.

For those unfamiliar with the term “Jamboree-on-the-Air”, it is a radio get-together of Scouts from all over the world—a radio campfire in which any Amateur, whether a Scout or not, may participate. The article in last month’s journal gives fuller details of the origin, objects and rules. One of the objects was “to introduce them (the Scouts) to Amateur Radio and Electronics”. It is the theme of this object on which we would like to enlarge.

Those Amateurs who in past Radio Jamborees have had young Scouts to their shack and contacted contacts with other stations where Scouts were also present, will confirm the pleasure and interest shown by this younger generation in Amateur Radio as a hobby. Although one of the tests for a Scout Badge Is a Morse Code test, it is very, very rarely that this test is ever put to use. A Scout who is able to take part in a QSO over the radio will be keener than ever to launch out into something beyond the normal Badge test.

The intense interest shown by Scouts and their parents who visited the W.I.A. Amateur Station at the Wonga Park Pan-Pacific Jamboree a few years ago indicated that there was a ready source of budding Amateurs. Unlike the High School Radio Scheme, which is now functioning in nearly all States and rapidly making great strides with the younger generation, a similar approach in the Scouting field has never been attempted.

The coming Jamboree-on-the-Air therefore provides an ideal opportunity to Amateurs to present our hobby to another section of the community who may well retain their initial interest and keenness and proceed to the next step—becoming a licensed Amateur. Another Pan-Pacific Jamboree is planned for the near future and Executive have already been invited to participate by providing an Amateur Station as before.

The Jamboree-on-the-Air scheduled for the 17th-18th of this month will enable a large number of active Amateurs to invite local Scout Troops to their shack and participate in friendly QSOs with other troops in other parts of Australia and overseas. Contact your local Divisional Organiser who will be only too happy to assist. The small effort involved will be found to be richly rewarding and promote the spirit of Scouting in having done your “good deed for the day”.

FEDERAL EXECUTIVE, W.I.A.

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OUR COVER

Gympie (Q’land) Scouts, who contacted 57 stations in the 1963 Jamboree-on-the-Air.

Block by courtesy of “Gympie Times.”
MULLARD PREFERRED RANGE OF DIODES

For Entertainment Applications in Australia

When approaching the maximum limiting values, either electrically or thermally, the comprehensive data and curves, as contained in Volume 4 of the Mullard Technical Handbook, should be consulted.

<table>
<thead>
<tr>
<th>Type Number</th>
<th>Description and Application</th>
<th>Max PIV (V)</th>
<th>I_{PK1} (mA)</th>
<th>I_{PK2} (mA)</th>
<th>I_{PK3} (mA)</th>
<th>T_{Amb} max (°C)</th>
<th>Outlines and Dimensions</th>
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<td>AM/FM detector diode</td>
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<td>BA100</td>
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<td>BA114</td>
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<td>10</td>
<td>—</td>
<td>—</td>
<td>75</td>
<td>TO-1</td>
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</tbody>
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* sine wave = 10msec

Although the reverse breakdown voltage is normally much higher than IV, this device is not intended to be used in the reverse direction.

Mullard
Mullard-Australia Pty. Ltd.
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Associated with
MULLARD LIMITED, LONDON

Amateur Radio, October, 1964
GETTING STARTED ON 160 METRES

PART TWO

RODNEY D. CHAMPNESS,* VK3UG

In the first article ("A.R." Aug. '64) a small transmitter for 160 metres was described. In this article an adaptation of the transmitter is described, combined with a few other general ideas that may help you to get started on this band.

THE ANTENNA

Aerials for this band can be a real headache on a suburban block. A normal half-wave dipole will stretch out to a length of 250 feet, and as many suburban blocks are only in the vicinity of 100 feet long, half-wave dipoles are out. It is felt in general amongst Melbourne Amateurs on this band that a quarter-wave Marconi is perhaps the easiest to install.

My own aerial is a folded quarter-wave mast mounted 5000 ohm t.v. ribbon. By using a folded type aerial, both the fed impedance is increased, resulting in lower ground losses, therefore higher radiation efficiency. The earth- ing system of my aerial consists of the mains earth and also a 130 feet length of insulated wire as a counterpoise (65 feet of 28.0076 twin flex split in two, laid alongside the building around some trees under a lawn and along the front fence. The folded radiator is up as high as I can get it at 25 feet. The first 25 feet is vertical and the rest is horizontal. The point to note is the fact that the velocity factor of the twin ribbon is between 0.85 and 0.9, resulting in the aerial being about 110 to 115 feet long instead of 125 feet or thereabouts. This aerial is described in detail in William Orr's book, "S-9 Signals", which I would recommend. Fig. 1 should give you an idea what the aerial looks like. I might add my location is quite suitable to the above modification, and this is the best aerial I have found to date for this band.

RECEIVERS

Now to receivers. An ordinary broadcast mantle set is quite suitable to modify for 160 metre work. The information on how to modify a mantle set to a serial tuning range is covered in April "A.R." The information is in the s.w.l. section on page 14. If you are going to do this, I would recommend using a sensitive, 5-watt set. Nothing less as signals are nowhere near broadcast station strength. I have not tried this conversion myself, but the results with a good set will be satisfactory. For some time I did use a similar set for the purpose of monitoring mobile bushfire radios on a frequency of 2692 kc. These sets were able to receive mobilies up to 50-60 miles. The mobiles run powers of 7-10 watts and use 9-foot loaded whips. Base stations were heard at distances of a 100 miles or so. These were day-time ranges.

An interesting and economical point about the transmitter described in the previous article is that it can be teamed with an ordinary b.c. set. Using the power from the set, it will run about 5 watts providing the high tension voltage is about 250. Coupling on the receiver power supply heater line can be largely offset by removing the dial lamps or replacing them with lower wattage types. The high tension drain of the transmitter is approximately the same as the receiver high tension drain.

The modifications to the receiver and transmitter can easily be worked out by studying the accompanying diagrams. Most receivers use a resistance-capacitance filter network in the high tension line. The plate lead of the audio output valve usually comes off the first filter capacitor. The point to break the circuit is at the junction of the first filter capacitor, the dropping resistor and the speaker transformer primary lead. The capacitor is left connected to the rectifier cathode.

A lead is soldered to this capacitor and taken to a pin on the chassis mounted 5-pin miniature socket. Another lead is soldered from the junction of the dropping resistor and the speaker transformer primary lead to another pin on the socket. An earthed lead goes to a pin on the socket. A lead from the receiver aerial goes to another pin on the socket. The remaining pin is wired to the active 6.3 volt heater line, which is easily traced from the dial lamp socket. Should the receiver require to be used without the transmitter connected, a shorting link across the two h.t. leads will do the trick.

There are of course numerous modifications that can be done to a broadcast receiver. To further cut down the receiver heater drain, the replacement of the rectifier valve with a pair of OA211 silicon diodes is recommended. HR12 or triode rectifiers can be used in this position if two of them are used in series in each lead. Equalising resistors and capacitors would be advisable across each diode. The value of the dropping resistor will be 

\[ \frac{1000}{\text{set-up voltage}} \] 

and the resistor 100K ohms ± 1 watt.

Quite a number of receivers use 6M5s or similar as the audio output. By replacing these with a 6BM8, 6AB8 or 6GW8, using the pentode section as the audio output, a spare triode section is available which could be used as a b.f.o., and with no increase in overall current drain in the set. An increase in the bias on the output valves won't unduly effect the volume and at the same time a significant saving in high tension current will be achieved.

Now turning to the radio frequency sections. The i.f. valve might be replaced, particularly if it is one of the lower gain types such as the 6LU7G, 6K7, 6A8B, etc. A 6BA6 or EF50 could boost the sensitivity quite noticeably. The i.f. may, however, take off, so neutralisation may be necessary. This is accomplished by putting a 5-10 pF, 500 volt capacitor from the plate of the valve to the top of the a.v.c. capacitor. The a.v.c. capacitor will usually have to be reduced to 60-80 μF for the neutralising to be effective. A small plate may need to be soldered across the valve socket to separate the grid from the plate as much as possible.

Another thought for sharpening the i.f. is to use a 5-valve set and nothing less as signals are nowhere near broadcast station levels. To further cut down the current drain in the set. An increase in the bias on the audio output valve would be necessary. A couple of suggestions here would be a 6AK5 or 6E7H. Isolation between the input and output would need to be good, otherwise it would really "take off". Re-arrangement of the components to achieve this isolation may be required, plus a shield soldered across the valve socket, shielding the input and output would be a must. This shield must of course be earthed to the chassis.

The front-end could also be given a pep up. A converter using one of the older octal tube types might be replaced with the likes of a 6AE8, 6AN7A, 6BA7, or similar. Some of the t.v. tuner type converters were such as the 66C8, 6BL8, 6U8 might also be tried, but it would be needed if a.v.c. is applied to this stage to be sure that the oscillator was not detuned by variations in a.v.c. voltage. Experimentation with the method of signal injection would be needed.

The aerial coil could come in for some attention. If a resonant aerial is used a low impedance aerial coil primary would be desirable. The coil would consist of a few turns, up to a dozen, wound near the tuned winding. Of course if a non-resonant short aerial is to be used this would be an undesir...
trol. The first is the relay supply system. This is a voltage doubler circuit designed to give 12 volts for the relay from the 6-volt supply. The value for C3 should not be decreased below the value stated as its reactance would be too high, causing less than the 12 volts to be developed. The other is the value of C1. This should be kept as low in value as is consistent with low hum and no motor-boating. If this is too large, a squeal will most likely be heard on the changeover from transmit to receive or vice-versa.

If this cannot be overcome and you have a spare set of changeover contacts on the relay, they can be arranged to short out the high tension line of the section not operating at the time. This should be a short through a low value resistor, and not a direct short, or you will find the relay contacts rather burnt after a time of operation. These changeover contacts for the shorting are shown already in Fig. 3 and are the ones with the "X" in the leads to them. Of course this can be left out if yours is only a d.p.d.t. relay, and in any case they may not be required, depending on the particular set.

GENERAL COMMENTS
Well that has described the equipment. Simple isn’t it? 160 metres is the easiest band to get on without exception. It is an ideal band on which to try antenna experiments. Small aerials do work, I believe that some of the chaps are working on some shortened 160 metre aerials, results and descriptions I believe are to be put in "A.R."

As yet I haven’t tried mobile work on this band. John VK3AFU has tried mobile work with the results he has obtained have been most encouraging. Range in excess of 25 miles with no fading or skip are being achieved regularly. Mobiles for this band would be simple to build. A transmitter similar to the one described in August, teamed with a car radio, would be an ideal set-up. The car radio could be altered as per the ways mentioned for mantel sets. If an old vibrator type car radio could be obtained, so much the better. The vibrator power supply could be made to supply the high tension for the transmitter in much the same way as described for modifying mantel sets. The aerial coil in the car radio, if it is to be used solely for 160 metre work, should be removed and replaced with a coil with a low imped-

rance primary winding. An ordinary broadcast band coil could be suitable with the slug wound out or a few turns removed from the secondary winding. As these are wound with Litz wire, be careful to solder all strands.

One interesting thing about mobile work on this band is the simple methods that are effective in suppressing the ignition noise. The usual coil and generator by-pass capacitors and the suppressor resistor in the coil h.t. line will, in most cases, make the vehicle "quiet". A suppressor in the coil h.t. line should only be put in where normal wire cored h.t. line is used. Where radio resistance cables are used, no suppressor is needed in this lead. For more elaborate suppression methods, should they prove necessary, the A.R.R.L. Mobile Manual and the "CQ" New Mobile Manual are recommended.

Results on this band are good, signals are heard from VK2-3-4-5-7 and many of these have been worked on low power both by myself and others. Trans-Tasman isn’t unknown. The ZL allocation isn’t the same as here, being 1875-1900 kilocycles.

Well chaps what about it? Dig out those old receivers, soldering iron and a few bits and pieces and get yourself started on this first class band. I hope I’ll have the pleasure of working you soon on 193 metres!

AMATEUR FREQUENCIES:
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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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With the co-operation of our overseas associates our crystal manufacturing methods are the latest.
HOW many Amateurs remember that a car battery is not only an electrical device, but also a chemical contrivance? In its common form it consists of cells, each comprising positive and negative plates immersed in a solution of sulphuric acid and water. The plates are made by pasting oxides of lead into a lead network framework and when the first “forming” charge is given to the battery in the factory, when the active material in the positive framework turns into lead per-
oxide, and that in the negative frame-
tive becomes more porous and spongy. Both “plates” are reasonably porous so that the electrolyte can penetrate.

As long as the battery remains fully charged, the sulphuric acid component of the electrolyte stays with its companion water outside the plates.

As the battery discharges, the acid leaves its water, and penetrates the active material of the plate, forming a temporary lead sulphate. When the battery is fully discharged, most of the acid has left the electrolyte so that a measurement of its specific gravity would show that it was mostly water, whose hydrometer reading would be 1.000.

You can see that it is active material in the plates that represents battery power, released by the flow of sulphuric acid during discharge. Shedding off of this active material from the plates, whether due to bad design, shock, manufacture, or electrical, mechanical or chemical abuse, will cause a loss of power. Reputable manufacturers go to considerable trouble to produce a plate in which the active material is locked, so as to resist the shedding caused by gas bubbles and mechanical expansion. The object is solely to use the material in the plates and not at the bottom of the case, for as long as possible, for when shedding occurs the days of the cell are numbered.

Just as one shoe often wears out before the other, so often will a car in a battery prematurely fail. The cause of shortened life is not hard to find. Although most cases of failure are chemical, some are mechanical, causing internal shorts or high internal resistance.

By far the most common cause of premature failure is unintentional abuse through lack of proper care. Lead sulphate formed in normal usage is readily removed by one charging, however, leave the plates stand in a discharged condition or continue to operate a partly discharged battery, and the sulphate becomes harder, denser and more unremovable.

An area of hard sulphate cannot be removed by charging, with the result that the whole of the active area of the plates is no longer available, and your battery’s capacity is reduced, permanently.

Another common cause of permanent damage arises from overcharging, which by producing heat and violent gassing evaporates water, and so exposes the tops of the plates. Exhausting heat alters the chemical structure of the tops of the plates which never return to their original state, even if water is subsequently added. This area now acts like a battery to lose its charge by dis-
charge the remainder of the affected plates and ultimately the battery will fail to hold its charge for long and is then usually credited with being “worn out” prematurely.

Heat needs to be watched for two reasons. Firstly, high temperatures tend to soften active material, particularly when the electrolyte specific gravity is high. The gassing which occurs to-
ward the end of the charge is then able to erode this relatively vital component easily. Most manufacturers therefore recommend about 110°F. as the maximum temperature during charging.

Another problem with heat concerns the accuracy of measurement of specific gravity. Battery electrolyte strengths are usually specified as being taken at 70°F. Any variation from this tempera-
ture requires that the hydrometer be corrected by 0.001 for each 2°F. temperature difference from standard. Thus on a hot day, the electrolyte is “stronger” than the hydrometer shows.

Theoretically, VK7s should find a fully charged battery reads about 1.250 whilst our Capricornian VK4 friends should measure values of only about 1.220.

Looking at it another way, a 20 degree temperature rise will tickle up a partly discharged battery as much as an overnight 1 amp. charge.

BATTERY CAPACITY AND DISCHARGE RATES

It is sometimes assumed that measuring the specific gravity of a battery is the only scientific way to establish its condition. This is only partly true, and can be misleading unless it is also recognised that the battery’s capacity for work can only be established by electrical means. To recapitulate, the principal cause of premature old age is a loss of active material on area in the plates, either by shedding or by being covered by hard sulphate.

There is also a secondary cause, oxidation of the grid framework of the positive plates. This is brought about by the decomposition of the water in the electrolyte during charge, into oxygen and hydrogen. Oxygen is now the villain of the piece, as apart from creating an explosion hazard, the hydro-
gen is harmless. The excess oxygen causes the positive plate framework to rust away relatively quickly and is a frequent cause of batteries wearing out.

Now, any discharged battery, whether “worn-out” or only in a low state of charge will register a low value on a hydrometer (because the acid in the electrolyte has gone into the plates). The fact that the specific gravity will again rise during charge simply means that the sulphate has been returned to the electrolyte.

However, note that if half the area of the plates in a battery were affected by fixed hard sulphate, they would for all practical purposes be “dead,” and despite an increase in specific gravity reading after charge, the battery capacity would be no more than half its original capability.

Consequently, unless of adequate capacity originally, it might now be unable to do its normal job of starting a stiff engine properly.

One method of checking an ageing or suspect battery is to allow the battery to stand in a discharged condition or continue to operate a partly discharged battery, and then usually credited with being “worn out” prematurely.

As there is much confusion about battery ratings, it is important to real-
ise that a 100 ampere hour battery will not deliver 100 amps for one hour; in fact, it would not even give 50 amps, for 2 hours before its terminal voltage dropped drastically.

This is because the actual capacity of the battery is not a constant, but varies considerably with the rate of discharge. The capacity given for most batteries is the number of ampere hours available from a fully charged battery, which is discharged to a stated voltage, at a uniform rate over 20 hours.

Thus a 100 ampere hour battery will generally give only 5 amperes for 20 hours. This discharge rate would bring a 12 volt battery steadily down to 10 volts in 20 hours.

Sometimes a rating for 10 hours is given and in this case a 100 A.H. bat-
tery would supply only 10 amperes for 10 hours.

Note, however, that sometimes a battery is also given a “cranking rat-
ing,” which is a short term rating such as 100 amps. for 20 minutes, during which the voltage would drop to 9 volts.

Obviously then, for mobile or field day activities, discharge rates in excess of 10 amperes, demand adequate amp. hour ratings and re-charging facilities.

To recharge a battery to its original rating will require about 20% more ampere hours than have been taken out of it, but surprisingly enough, the higher discharge rate incurred in starting engines and dynamotors are less troublesome in respect of battery life than prolonged usage of lamps and power supplies, etc., which regularly discharge the battery to very low voltages.

This is because a start taking say 200 amperes and occupying 3 seconds
amounts to only one-sixth of an ampere hour. This can be replaced by the average autogenerator in about 1 minute; allowing for losses, it should be possible in daylight running to put 2 ampere hours back into a battery in about 12 minutes running.

Reputable battery manufacturers say the purity of hard distilled water is not brought about by high discharge rates, but by the often haphazard recharge used to restore the battery to its fully charged state. They claim that the battery idea, be discharged at the greatest rate the associated cables will stand without damage and that even at these rates, recuperation will occur rapidly providing the maximum rates are applied intermittently.

The reason for this is that a battery is protected when subjected to a near short circuit because the acid cannot diffuse into the plates quickly enough to maintain a high state of discharge. Additionally, soft sulphate immediately forms, increasing the internal resistance of the cell, thereby restricting the current flow to safe values.

On the other hand, long slow discharge rates denude the electrolyte of all its acid, allowing lead hydrate to permeate the pores of the plates and separators, leaving sulphate coatings which can be very difficult if not impossible to eradicate.

Perhaps Grandpa's "old blooper", with its 201As, horn speaker and all, had the right idea, as an essential component on nearly every radio table in the thirties was an "A" battery and a trickle charger.

**SOME COMMON FALLACIES**

"Never make a practice of operating the starter with headlamps burning at the same time," so goes the instruction in some car handbooks, usually with the pious statement that "this puts too much strain on the accumulator." To quote a well known battery maker, "Who says so?" Examination of the appropriate curves will show that an increase in discharge rate from 100 to 110 amps only drops the terminal volts a tenth of a volt! and guess what, it's the same at 200 amps—if your battery hasn't been poisoned by sulphate and neglect!

"Boiled water is just as good as distilled water." Don't you believe it. The effect of boiling is to concentrate the impurities. For instance, if a water sample originally contained 3 parts chlorine to 100,000, and it was boiled until half the sample had evaporated, guess what—the residue would contain 6 parts!

Remember that no source of natural water can be a permanent certificate of purity, and that in some communities one must be on guard for periodic chemical treatment of the town water supply! For that matter, it is not unknown for analyses of distilled water to show contamination, often by chlorides. Clean pure water is infinitely preferable to pure distilled water, but in the absence of an analysis, beter stick to a reliable commercial brand of distilled water.

"How Often Should The Acid Be Renewed?"

It seems impossible for some people to credit that sulphuric acid does not weaken or lose virtue by ageing, and that it does not evaporate. Thus the maker's instructions say clearly, add clean pure water only, never acid.

"This Battery Will Not Sulphate"

If any lead acid battery is tested during discharge, it will be found that there is a gradual drop in the specific gravity of the acid. If this is so, where has the acid gone to? It has gone into the plates, but it has only done so by combining with the active material as lead sulphate. Thus if there is no sulphation, the cell cannot function.

"When Charging It Is Necessary To Keep The Current Constant"

Not so. Up to the gassing point, and about 110°F., the rate is practically immaterial. After that, it is necessary to keep the rate down to minimise "shedding", caused by convection and violent gassing.

"A Battery Is Short Circuited When Submerged In Water"

Not necessarily so. Absolutely pure water is an excellent insulator. Even when impurities are added to river water, the resistance across the battery terminals would be much too high to affect its performance. The specific gravity of the electrolyte is heavier than that of the water so that there would be no immediate diffusion of the river water into the electrolyte. Foxes in all States, bar VK3, take note! -

The Maribyrnong River is believed to have concealed at least one Fox's Battery in recent years.

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Amateur Radio, October, 1984
Modifications to the AR7

H. A. BEHENNA, VK5BB

ALWAYS wanting a second receiver, and one that lent itself kindly to experiments, I was fortunate to procure an AR7 fairly cheaply. Not wishing to alter the original receiver, and with interest mounting toward s.s.b., this looked the answer to it all.

The AR7, much modified on purchase, looked OK, but on being switched on was certainly a doubtful quantity.

With the aid of the scope iron all was removed back to the second r.f. stage. Starting with the converter, this

was changed to a 6AE6, being slightly better than the 6K6. Next, a strip of the original chassis was removed, which previously held the i.f. sockets, etc., and a new piece of aluminium holding the second r.f. (12AU7) and the 6E6 was bolted over the hole caused by the said strip, being removed.

A suitable socket was placed in the original power input hole to take the leads from the power supply which was kept exterior.

The 6U7s were changed to EF39s, both in the r.f. and i.f. stages, and the circuitry wired. The 6E6 acting as the product detector, half the 12AU7 as the infinite impedance detector, the other half as the a.v.c. amplifier. The 6C66 as a triode and S meter tube and the audio driver and output a 6BM8. You will find plenty of space left to the point. It is as easy as that.

Should you have one of these receivers or any other type that can be bandspread, then I urge you to try this out, especially if your main receiver has no product detector. You will be surprised and mightily happy. When someone on s.s.b. calls you, you will know just what they are saying.

I have left the b.f.o. circuit out of the diagram, you can suit yourself here. Please yourself on tube types, because the ones I used I had in the drawer.

Individual circuits for each stage is standard and can be found in most issues of any good handbook.

Oscillator and b.f.o. are fed from voltage control tube, and a noise limiter is to be added later.

∗

OPTIMISM

There is a peculiarity of man's mental make-up which makes him very prone to give himself the benefit of the doubt, when something he wants to do is in question. The fish that got away is always the largest, the $0 miles he strikes at 2 a.m. when all sane people are in bed and snoring. He has turned up which makes him very prone to give himself the benefit of the doubt, when something he wants to do is in question. The fish that got away is always the largest, the $0 miles he strikes at 2 a.m. when all sane people are in bed and snoring. He has emerged triumphant, after an hour's frenzied listening, to the teeth over an unexpected purple patch of enthusiasm brought him very near to his objective.

This was not deception—it was merely a little optimism.

In some static, a fair amount of fading, and so on, all makes me happy. When nothing more than a speedometer as to the actual performance, and so on. When QSL'ing, always send an honest re-

sponse. It is as easy as that.

To obtain a tape application should be made to the Education Officer, VK2 E, Division, Wireless Institute Centre, 14 Atchison Street, Crows Nest, N.S.W.

The following tapes are available:-

- Special Tape for "Raw Beginners," Letters and Figures with comments.
- No. 1—One hour at 5 w.p.m., plus one hour at 6 w.p.m.
- No. 2—One hour at 7 w.p.m., plus one hour at 8 w.p.m.
- No. 3—One hour at 10 w.p.m., plus one hour at 11 w.p.m.
- No. 4—One hour at 12 w.p.m., plus one hour at 14 w.p.m.
- No. 5—One hour at 15 w.p.m., plus one hour at 16 w.p.m.

MORSE CODE PRACTICE

The New South Wales Division of the Wireless Institute of Australia provides a comprehensive service for Morse practice. Apart from the nightly Morse Practice Sessions on (approx.) 3550 kc. commencing at 7.30 p.m. E.A.S.T. at 5 w.p.m. and finishing at 8.15 p.m. at 16 w.p.m., there is the Morse Tape Service, which has proved very helpful to those who own or have access to a Tape Recorder. Since the C.W. Tape Service was started early in 1963, 580 hours of Morse on Tape has been sent out to interested parties. Figures at the end of last month were—

New South Wales ... 284 hours
Victoria ... 115 "
Queensland ... 81 "
South Australia ... 27 "
Western Australia ... 16 "
Tasmania ... 10 "
A.C.T. ... 17 "
New Guinea ... 30 "

Total hours of Morse Distributed ... 580

Included in this total is 199 hours copied on to "Customer's Own Tapes". The majority of it on to 3-inch reels recorded at 12 i.p.s. Radio Clubs find it better to own and keep their own tapes. Now Morse has been discontinued in the Post Office, chaps are finding it difficult to obtain Morse practice.

The Morse Tapes are on 5-inch reels (1,200 feet) and the recordings have been made at 33 i.p.s. Two hours of Morse are on each reel. The Service is free to anyone wishing to learn Morse. Each user is asked for 1/6 per tape to cover "out of pocket expenses".

To obtain a tape application should be made to the Education Officer, VK2 E, Division, Wireless Institute Centre, 14 Atchison Street, Crows Nest, N.S.W.

CHANGE OF ADDRESS

W.J.A. members are requested to promptly notify any change of address to their Divisional Secretary, not direct to "Amateur Radio."
### AIR-WOUND INDUCTANCES

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HAVING used the Vackar oscillator on a wide range of fundamental frequencies over a number of years, the writer recently undertook quantitative assessment of its performance in order to obtain verification of certain features which had become apparent. Elementary initial tests indicated that a comprehensive study of this oscillator would be well worthwhile, particularly if at the same time optimum values were determined for the amateur frequency allocations and other frequencies used in amateur equipment.

Three oscillators were constructed with basic frequencies of 500 kc., 1.25 Mc. and 5 Mc., and each in turn tuned to beat with the MSF transmission on 5 Mc. After a stabilising period of one hour, the beat was adjusted to precisely 1 kc. and displayed on a direct-reading frequency meter. The oscillator under test was then switched off for half an hour. Upon switching on—both h.t. and l.t. at the same instant—the initial stabilising time to return to the 1 kc. beat, initial drift, and long-term stability over a three-hour period were noted. The results are shown in Table 1.

Table 1

<table>
<thead>
<tr>
<th>Frequency of oscillator under test</th>
<th>Harmonic Initial Frequency</th>
<th>Actual Initial Frequency</th>
<th>Initial shift in fundamental frequency</th>
<th>Initial shift</th>
<th>Further drift over 3-hour period</th>
<th>Long-term stability</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 Kc.</td>
<td>5 Mc. × 10 10 secs.</td>
<td>250 c/s.</td>
<td>25 c/s.</td>
<td>0.005%</td>
<td>5 c/s.</td>
<td>0.001%</td>
</tr>
<tr>
<td>1.25 Mc.</td>
<td>5 Mc. × 4 10 secs.</td>
<td>400 c/s.</td>
<td>100 c/s.</td>
<td>0.008%</td>
<td>10 c/s.</td>
<td>0.0008%</td>
</tr>
<tr>
<td>5 Mc.</td>
<td>5 Mc. × 15 15 secs.</td>
<td>400 c/s.</td>
<td>25 c/s.</td>
<td>0.008%</td>
<td>25 c/s.</td>
<td>0.0005%</td>
</tr>
</tbody>
</table>

**Notes:**
(a) Valve type EF91. (b) All power h.t. and l.t. applied at same instant. (c) H.t. 105v. stabilised by VH165/30.

(c) The cathode of the valve is held at earth potential and is in no way associated with the tuned circuit or feedback path. In the original review of the Vackar oscillator in the R.S.G.B. "Bulletin," as will be seen from Fig. 6 (see Part 1), mention was made of the fact that the circuit required the use of a two-gang tuning capacitor and this may well have hindered its adoption. However, it was indicated that a single tuning capacitor could be employed.

Realisation of the ultimate stability of which the Vackar circuit is capable will be given when a twin gang tuning capacitor is used, for then the oscillator operates under balanced conditions. Nevertheless, with the exception of oscillators constructed with basic frequencies higher than 15 Mc., and over the limited deviation required for the amateur bands, a single tuning capacitor has been found entirely satisfactory. The oscillators evaluated in Table 1 employed single tuning capacitors.

REASONS FOR STABILITY OF THE VACKAR

Why is the Vackar oscillator so stable? Primarily for three reasons.

(a) The valve capacities—i.e., in the Clapp oscillator—are effectively swamped by fixed capacitors forming part of the tuned circuit, but—unlike the Clapp—also with regard to any changes in interelectrode capacities. Due to their arrangement, these capacitors remain sizeable even at high frequencies, so maintaining the stability factor.

(b) The valve operates virtually in class A, so holding harmonic circulating currents and phasing effects to a minimum.

With regard to the circuits which are to follow and the values given in their associated tables, it should be stressed that these are those used in practical oscillators constructed to verify calculated parameters, and where corrections were necessary, the corrected value is quoted in the table concerned.

**Oscillators for 1.5-15 Mc.**

Where the frequency is below 15 Mc., a single pentode type EF91, ZT7 or 6AM6 will give excellent results. These types may be replaced by any similar valve with a Gm of the order of 7.5 ma/v. The circuit is shown in Fig. 7, while Table 2 specifies values for fundamental frequencies of 1.8 Mc., 3.5 Mc., 7 Mc., 8 Mc., 9 Mc., 10 Mc., 11 Mc. and 14 Mc.; those for 8 Mc. to 11 Mc. being included for their utility in v.h.f. equipment.

Table 2

<table>
<thead>
<tr>
<th>B.W.</th>
<th>Trans.</th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>C4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.8-2.0 Mc.</td>
<td>34</td>
<td>70</td>
<td>556</td>
<td>4700</td>
<td>556</td>
</tr>
<tr>
<td>3.5-3.8 Mc.</td>
<td>28</td>
<td>45</td>
<td>500</td>
<td>2700</td>
<td>300</td>
</tr>
<tr>
<td>7.0-7.1 Mc.</td>
<td>26</td>
<td>30</td>
<td>200</td>
<td>1800</td>
<td>200</td>
</tr>
<tr>
<td>14.0-14.3 Mc.</td>
<td>24</td>
<td>15</td>
<td>100</td>
<td>1000</td>
<td>100</td>
</tr>
</tbody>
</table>

**Special frequencies:**

| Mc. | 28 | 30 | 140 | 140 | 140 |

| 8 Mc. | 26 | 26 | 180 | 180 | 200 |
| 9 Mc. | 28 | 28 | 180 | 180 | 200 |
| 10 Mc. | 30 | 30 | 180 | 180 | 180 |
| 11 Mc. | 30 | 30 | 180 | 180 | 180 |

For use with circuit of Fig. 7. For amateur bands 1.5-16 Mc. All coils wound on 5/8 in. diameter formers fitted with 1/8 in. long iron dust cores. Windings sense: from foot of former towards top, depending on frequency swing required. See text.
COMMON CONSIDERATIONS

Notes which apply to all tables are now in order. The values given for Amateur and special frequencies are those which give virtually the same output on each frequency within a similar valve group. That is, the output of an oscillator on, say, 7 Mc. will be of the same order as that from any other in the group—the 1.8 Mc. oscillator for example.

It will be noted that only in the case of the Amateur bands is a value quoted for a tuning capacitor. For other frequency ranges the value will have to be experimentally determined according to the frequency shift required.

### Table 3.

For use with circuit of Fig. 7 for general coverage 1.5-15 Mc.

<table>
<thead>
<tr>
<th>Bands</th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>C4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5-2.5 Mc.</td>
<td>34</td>
<td>70</td>
<td>558</td>
<td>7000</td>
</tr>
<tr>
<td>2.3-3.3 Mc.</td>
<td>34</td>
<td>45</td>
<td>558</td>
<td>7000</td>
</tr>
<tr>
<td>3.2-4.5 Mc.</td>
<td>38</td>
<td>35</td>
<td>300</td>
<td>7000</td>
</tr>
<tr>
<td>4.3-6.3 Mc.</td>
<td>38</td>
<td>30</td>
<td>200</td>
<td>1800</td>
</tr>
<tr>
<td>6.1-8.8 Mc.</td>
<td>38</td>
<td>20</td>
<td>200</td>
<td>1800</td>
</tr>
<tr>
<td>7.0-11.0 Mc.</td>
<td>38</td>
<td>20</td>
<td>200</td>
<td>1800</td>
</tr>
<tr>
<td>10.5-15.0 Mc.</td>
<td>34</td>
<td>30</td>
<td>100</td>
<td>1000</td>
</tr>
</tbody>
</table>

All the coils are iron cored, and with stray capacities of about 10 pF., adjusting the core will bring the oscillator to the special frequency with the core of the coil concerned set at about mid travel. Adding capacity at C4 will lower the frequency by an amount depending on the maximum value of the added capacity. In the case of general coverage coils, the frequency range shown is that over which an oscillator would tune by running the core of the coil from one end of its travel to the other, assuming circuit stray capacities of the order of 10 pF. For any tuning range the coil is selected which will, by adjustment of its core, tune to the highest frequency required. The value of C4 is then determined experimentally to tune the circuit to the lower required frequency.

Two types of 5/16 in. diameter formers are available. One is a straightforward type—Fig. 8—and the other, usually supplied with a screening can and normally used in the construction of i.f. transformers, has a square base fitted with eyelets for wire termination and is threaded for 6BA fixing bolts—see Fig. 12. Of the two types the latter makes coil construction easier, and it has the added advantage that it is available on the surplus market. The length of former required is 1 in. and any excess can be trimmed down with a fine saw.

It has already been stressed that construction and layout hold almost equal importance with the actual circuit used. For this reason precise layout and construction details are provided for both of the circuits given. While these are not the only arrangements which would prove satisfactory, they are those used in oscillators built to check performance and values. In these layouts, account has been taken of the temperature gradients likely to be encountered by components, especially those associated with the tuned circuit.

### Table 4.

For use with circuit of Fig. 11. For Amateur bands 1.8-39 Mc.

<table>
<thead>
<tr>
<th>Bands</th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>C4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.8-3.5 Mc.</td>
<td>26</td>
<td>20</td>
<td>100</td>
<td>1800</td>
</tr>
<tr>
<td>3.5-7 Mc.</td>
<td>26</td>
<td>20</td>
<td>100</td>
<td>1800</td>
</tr>
<tr>
<td>7-11 Mc.</td>
<td>26</td>
<td>20</td>
<td>100</td>
<td>1800</td>
</tr>
<tr>
<td>11-15 Mc.</td>
<td>26</td>
<td>20</td>
<td>100</td>
<td>1800</td>
</tr>
<tr>
<td>15-20 Mc.</td>
<td>26</td>
<td>20</td>
<td>100</td>
<td>1800</td>
</tr>
<tr>
<td>20-28 Mc.</td>
<td>26</td>
<td>20</td>
<td>100</td>
<td>1800</td>
</tr>
<tr>
<td>28-39 Mc.</td>
<td>26</td>
<td>20</td>
<td>100</td>
<td>1800</td>
</tr>
</tbody>
</table>

### Table 5.

For use with circuit of Fig. 11. For Amateur bands 1.8-39 Mc.

<table>
<thead>
<tr>
<th>Bands</th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>C4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.8-3.5 Mc.</td>
<td>26</td>
<td>20</td>
<td>100</td>
<td>1800</td>
</tr>
<tr>
<td>3.5-7 Mc.</td>
<td>26</td>
<td>20</td>
<td>100</td>
<td>1800</td>
</tr>
<tr>
<td>7-11 Mc.</td>
<td>26</td>
<td>20</td>
<td>100</td>
<td>1800</td>
</tr>
<tr>
<td>11-15 Mc.</td>
<td>26</td>
<td>20</td>
<td>100</td>
<td>1800</td>
</tr>
<tr>
<td>15-20 Mc.</td>
<td>26</td>
<td>20</td>
<td>100</td>
<td>1800</td>
</tr>
<tr>
<td>20-28 Mc.</td>
<td>26</td>
<td>20</td>
<td>100</td>
<td>1800</td>
</tr>
<tr>
<td>28-39 Mc.</td>
<td>26</td>
<td>20</td>
<td>100</td>
<td>1800</td>
</tr>
</tbody>
</table>

### OSCILLATORS FOR 14-39 Mc.

Above 15 Mc. a really effective buffer should always be used after the v.f.o. to ensure adequate isolation and freedom from pulling. A cathode follower offers almost complete isolation but at the cost of a slight reduction in total available voltage. Where the Vackar oscillator circuit is employed, this is usually unimportant due to its high output. A useful arrangement utilises the 6U8/ECF82 in which the pentode functions as the oscillator, and the triode as cathode follower. This particular valve also has the additional advantage that substantially the same layout can be used as for the lower frequency oscillators.

Fig. 11 shows the circuit of a Vackar oscillator, employing a 6U8/ECF82, for a frequency range 13.5-39 Mc.
the frequencies of 14 Mc., 21 Mc. and 28-29.7 Mc., and Table 4 details component values. Table 5 provides details of oscillator constants for any frequency in the range 15 Mc. to 39 Mc. The notes given on the point C101 and C102 were determined in any of the standard reference works, and it seems that one either has to make a calculated guess based on previous experience, or live in hope, neither of which seem to be very scientific in this day and age.

In order to further check the performance of the oscillator designs detailed, and to evaluate power output, a simple two-stage driver unit was constructed according to the circuit of Fig. 14. This consists of an EF91/Z77/6AM8 functioning as either a driver or doubler, coupled to a 5763. Table 6 expresses the results of a series of experiments in which the power output of the oscillator/driver/doubler system is shown as grid current to the 5763 through a 22K ohms grid resistor. To make this as comprehensive as possible, the values of C111 and C112 were determined, which produced the usual values of grid current required. As a matter of interest, the details of La and the approximate value of Ca are also included. As would be expected, the smallest difference between the “net” and “load-ded” frequencies of the master oscillator coincided with the lowest value of capacity at position C101, particularly in the circuit of Fig. 7. In the case of Fig. 11, and due to the cathode follower, the value of C101 has but little effect on this variation which was, with this circuit, only of a very minor nature.

In conclusion, it should be stated that it has not been the purpose of this article to write off the Hartley, Colpitts, Franklin and Clapp oscillators, all of which have their applications. Rather it has been to examine closely the whole question of V.F.o. design, to bring the performance of the Vackar/Tesla to the notice of readers, and through the detailed information provided, encourage others to experiment with, and use this circuit which, under present conditions, has much to offer.

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Amateur Radio, October, 1964

Page 11
YOUTH RADIO CLUBS

For the eye that glances here only occasionally, there should be a reminder of the considerable achievements of the Y.R. schemes. In about three years of development in VK2, some 40 clubs have been established and 14 A.O.C.P.'s or L.A.O.C.P.'s have been gained by club members. To press the point about what can be done, the VK2 Honour Roll is listed below. (Other States, especially VK3 and VK4, with a later start, are on their way to similar success.)

(i) Ian Forrest (Booragul High), (ii) George Brotostoy (Lynham High), (iii) Roger Davis (Lynham High), (iv) Vincent O'Donnell (St. Leo's Wahroonga), (v) Phillip Lowe (Epping High), (vii) Harvey Smith (St. Leo's), (vii) Jim Watson (Lynham), (viii) Susan Brown (Booragul High), (ix) Ross Beckley (Booragul High), (x) Jan Osterveen (Whitakers Club), (xi) Michael Macintyre (C.B.C. Woolongong), (xii) Doug Williamson (Club Leader, Bass High), (xiii) Ralph Satchell (former Club Leader, Homebush High), (xiv) Paul Goldsborough (St. Edward's, Gosford).

In about three years of development in VK2, Leader, Homebush High), (xiv) Paul Goldsborough (St. Edward's, Gosford). 's or L.A.O.C.P.'s have been gained some 40 clubs have been established and 14

For present and future club leaders, Bob Guidera (C.R.O.D.) has kindly offered to undertake the stencilling of Form YRS/10 "Suggestions for Club Leaders and Instructors", an 8-page collection of suggestions gleaned from various clubs. To obtain this booklet, send Bob (a) 8d. stamped, addressed large return envelope (full or half foolscap); (b) extra 5d. stamp enclosed in your forward envelope to help with the cost of stencils, etc. On your return envelope, put "printed matter only" on top left hand corner, print YRS/10 in block letters, and enclose your forward envelope to Rev. R. C. Guthbert, P.O. Box 89, Bankstown, South Australia.

All States should notify their State Supervisor now if they have an entrant in the Morse Code Championship for members of Y.R. Clubs, State Championships in over 15 and under 15 grades should be in for the Commonwealth Championship in the middle of December.

This was invented because of VK2 Newsletter No. 1, edited by Jim Webster at Berrigan and published by the Berrigan Youth Radio League (church group). Very first Y.R.S. member to pass inter. Certificate was Greg Dunne (3rd year at Kingsgrove High) with 70 and 70 on written papers and a very well-made superhet with a shortwave scope and a no-valve amplifier as practical training equipment. The latter pass (89%) to Geoff McLeod (Kingsgrove). Junior passes to James Price (Kingsgrove High). Mr. Freeman, of Australian Radio College, has kindly offered a Scholarship to Y.R.S. members. To be eligible, the candidate must hold Intermediate Certificate (at least this year). The Y.R. will give a free course in Radio Servicing, either by correspondence or personal attendance. This should raise some keen competition. Helpful donations of s.w. receiver from Mr. G. King, of Pymble, and five public-address equipment from Mr. Murgatroyd, Bankstown.

For years, Dave 3ZMX writes details of publicity in daily papers for the very youthful stalwarts of Gowrie Park State School, resulting in help in the dance of some assorted gear and enquiries from a local Scout Group. As one looked after his active A.R.I. Club, Dave is looking to put on a display at Bundoolo Christian Brothers.

Now it's the end of a tiring term for teachers (disbelievers are welcome at A.R.I. has been ill and we are all busy anyway. Hope to hear from you all when you can manage it. 73, Ken I.K.M.

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Well chaps, the R.D. Contest is over once again, and by mail received, band conditions as present as during my short period of listening, heard on VK2L, have been recorded. The results were not the best, but large scores were present as during my short period of listening, of my work I travel many thousands of miles, and like quite a few others is going to erect a temporary disturbance of the water surface. I can anticipate on the DX front, and also to have some info on same, as so I can pass it on to other S.W.L's.

A WILL AND A WAY

Today, as it was in the past, many Amateurs first started in radio via the ranks of the Scout movement. As will be noticed we now have two contests, the R.D. Contest and the R.H. Contest. By the nature of my work I travel many thousands of miles, and naturally is doing a fair bit of fishing, and naturally is doing a fair bit of scouting. Russell is not a tree for miles to "string an aerial", but Noel L3101 participated in the R.D. Contest and compiled quite a nice score. Many thanks for letting me see that letter from South Africa. Yes, we are indeed fortunate to live in a land such as ours. Local interference seems to be a problem that we all share, hi.

A newcomer to the LA section is Noel L4034 who holds the position of State Headquarters Commissioner for Senior Scouts in VK4, which means that he was the one who put the idea forward, and Noel uses an HE30 rx with a temporary antenna. His log shows that he is going to try for a better one at a later date, hi. Thanks for your nice comments re the page.

SOUTH AUSTRALIA

As will be noticed we now have two contests to compete in the DX ladder chart OM, I may use it in the page one of these months.

A newcomer to the LA section is Noel L4034 who holds the position of State Headquarters Commissioner for Senior Scouts in VK4, which means that he was the one who put the idea forward, and Noel uses an HE30 rx with a temporary antenna. His log shows that he is going to try for a better one at a later date, hi. Thanks for your nice comments re the page.

WESTERN AUSTRALIA

From Peter L4021 comes the usual West-side story of plenty of activity. "This lad is sure a go-getter so far as the DX ladder is concerned. In the recent R.D. Contest he sat at the dials for 21 hours to clock a very good score. These points were compiled from 80, 40 and 20 mx band very interesting. I hope you an award.

S.W.L. DX LADDER

E. Treblecock 262 40 20 30
D. Grantley 194 73 128 14
P. Andrew 124 29 80 14 3
A. Westcott 103 75 32 40 10
M. Hilliard 38 141 23 35 10
M. Haigh 149 53 22 40 
G. Earl 96 150 31 46 14 
C. Abernethy 53 42 14 20 6
T. Harrison 58 172 31 22 44 37
I. James 51 144 28 122 10
L. Tompkins 32 98 21 61 6
B. Beckley 27 47 19
A. Raftery 23 125 15 6 8
R. Oats 38 8 26 

NEW CALL SIGNS

JUNE 1964

VK2YD—T. D. Withnall, 44 Banks St., Padstow.
VK2AYV—R. L. Thornton, 23 Eley St., Bondi Junction.
VK2BAD—H. Beusch, 58 Charlotte St., Ashfield.
VK2BAR—J. W. Hodgetts, 183 Liverpool St., Sandringham.
VK2BGG—B. G. Burton, 41 Greene Ave., Ryde.
VK2BGG—J. Griffiths, 62 Polwood St., Geelong.
VK2BJO—J. Osterveen, Lot 4, Gosford St., Welshpool.
VK2BJS—L. C. Webber, 58 Shortland Ave., Homebush.
VK2LZL—E. Trebilcock, 5 Kapooka Place, Cooma North.
VK2ZGG—A. J. Gray, 37 Culver St., Kogarah.
VK2ZKD—L. McHugh, Married Qts., 402 Sigs Rest, Wagga Wagga Rd., Wagga Wagga.
VK2ZKO—N. Nikolaon, 49 Waverley St., Balmore.
VK2ZLI—R. Soulie, 17 Jane St., Stanwick.
VK2ZLL—P. J. Lowe, 3 Hockley Rd., Eastwood.
VK2ZPA—F. A. Ament, 46 Sinclair St., Crown Point.
VK2ZXD—G. M. T. Clarke, 2 Beaconview Ave., Balgowla.
VK3GP—M. A. Macfarlane, Ormond St., Balnarring.
VK3UO—J. O. Williams, 25 Wentworth Ave., Sandringham.
VK3WY—J. E. Walker, C/O, O.T.C., Fiskville.
VK3ZKB—B. V. Shields, 72 Lilydale St, Strathearn.
VK3ZGG—A. C. Schroder, Nantilla Rd., Clayton.
VK3ZST—R. S. Tucker, 40 Panorama Rd., North Balwyn.
VK3ZTV—T. Young, 55 Salmon Ave., Essendon.
VK4DS—De La Salle College Radio Club, Scarborough Rd., Scarborough.
VK4JV—F. A. Hazzard, 30 High St., Bundaberg.
VK4MS—M. S. Johnson, Station: Willis Island; Postal: 63 Barrier Rd. St. Pleasant, West Australia.
VK4TE—T. Smith, Station: Willis Island; Postal: N.43 Valley Pde., Glen Iris, Vic.
VK4ZJH—J. D. Hutchins, Lake Manchester, C/O, Mt. Crosby F.O., via Ipswich.
VK5NY—R. S. Bowman, Beau View, Parrakie.
VK5VE—W. N. Thomas, 15 Keevil St., Eliza.
VK5ZS—E. A. Cooling, 2 Blenencote St., Eliza.
VK5ZEX—G. E. Bolt, 2 Birdwood Tce., Plympton.
VK5DT—R. D. Trickett, 53 John St., Cottesloe.
VK5LH—F. C. Rowell, 96 Dalek Rd., Northlands.
VK6GZ—Zepczyk (Rev. Fr.), Catholic Mission, Kavieng, N.G.

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OMNI-DIRECTIONAL DYNAMIC:
SIZE: 3" x 2-1/8" x 1".
Cable: 12 ft. of P.V.C.
Switch: on-off.
Desk Stand. Clip folds for hand use.
Colour: WHITE.
Plastic Diaphragm.

Retail Price
50K ohms
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by Stoner & Earnshaw
Price 63/6 and 1/9 Post.
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"The G.P.O. is opposite"
According to all reports we have now passed the minimum and we start the slow drag towards the anticipated maximum. Whilst we may not be in the position to appreciate this for some time, it will do our egos the world may not be in the position to appreciate this towards the anticipated maximum. Whilst we the minimum and we start the slow drag not listened with the usual keenness.

For some time, it will do our egos the world may not be in the position to appreciate this towards the anticipated maximum. Whilst we the minimum and we start the slow drag not listened with the usual keenness.

For the last few weeks, I must admit that I have not listened with the usual keenness.

Late in the evenings local or approx. 0130z W on most days with signals of varying strength. Later. 0600z- the African quarter can be worked on s.s.b. Some evenings and on the improve is the this month some of the boys saying that they KH. KJ and KC are there for the taking. Americans can also be worked. 0800z W, VE, and GI can be worked on s.s.b. Odd South local time, but from approximately 0600z G this month some of the boys saying that they had given this band a go and most were

Just lately how selective the skip is to a particular area, even with stations only a few hours apart.

It is Javad who had the misfortune to lose his home. Bring back some goodies, Bill.

5,036. In the non-Scandinavian entries, c.w., SM71D, Box 2005, Kristianstad 2, Sweden. A

WIA. DX.CC.

Listed below are the highest twelve members in each section. New members and those whose totals have been amended will also be shown.

PHONE


C.W.


C.W.


C.W.


C.W.


C.W.


C.W.


C.W.


C.W.


C.W.


C.W.


C.W.


C.W.


C.W.


C.W.


C.W.


C.W.


C.W.


C.W.


C.W.


C.W.

QUEENSLAND

What has happened to 2 metres at last? The chicory is running down at last and the appearance of a 5 x 9 signal from Bribie Island. Rose 4ZAT is responsible for it. Tom 4ZBD called and I found that the signal was a bowing south westerly bert. Bert 4CP should be running an 829Bf to its limit by the time you read this. Tom 4ZBD reports that the boys upon the range and he tells me that Keith 4ZKH could not be expected to raising a 2 mx mobile from Picnic Point in the future. A week or so later Tom went down to the South Coast (Operas) to work a couple of the boys and in some words he used, but it seems quite likely that John 4RZ, Arthur 4FX and Bill 4WS may be establishing a 2 mx net with the object of both local and Brisbane DX contacts. Finally, it is reported that George 4WS is on 2 mostly two or three times a week. He is building for 6, a 51.75 Mc. f.m. rocks to 52. The crystal should be ground smoother. Should be useful for changing 50 to 70 Mc. beacon for operation by Gill 6ZBW 52 - 144 - 420 - 576 - 1296 Mc. sub-frequency (?) guys were spread over a couple of hundred kilocycles. Dan 6ZRE has triedetching a crystal with some ammonium bifluoride. 100 Kc. a day in the rate and it slows down as the crystal gets smoother. This should be useful for changing 50 Mc. rocks to 52. The crystal should be ground with paste after 200 kc. shift to avoid irregular etching. 7Z, 6ZBV.

NEW SOUTH WALES

There are some impressive thank-you cards from the Xmas handsome hunters for those who took part in the Easter Scout Venture. It is good to know that the v.h.f. boys are thought of so highly by the Scouts. We thank the Scouts for their kind thoughts and we are only too pleased to make an item available and provide radio communications for the Easter Scout Ventures. All those who went to the last venture will agree that the event was a very fine venture. Perhaps a couple of 2 mx stations will be on this project. Hooray! Finally, we worked Hoy 4ZT on 2 and 3. VK5s were also heard. Actually Tom 4ZAL heard ATVO up here and began calling 1ZRX is on 2 mostly two or three times a week. He is building for 6, a 51.75 Mc. f.m. rocks to 52. The crystal should be ground smoother. Should be useful for changing 50 to 70 Mc. beacon for operation by Gill 6ZBW 52 - 144 - 420 - 576 - 1296 Mc. sub-frequency (?) guys were spread over a couple of hundred kilocycles. Dan 6ZRE has triedetching a crystal with some ammonium bifluoride. 100 Kc. a day in the rate and it slows down as the crystal gets smoother. This should be useful for changing 50 Mc. rocks to 52. The crystal should be ground with paste after 200 kc. shift to avoid irregular etching. 7Z, 6ZBV.

Two V.h.f. Group Newsletters are quite interesting and it is hoped that the VK3 V.h.f. Group will present their newsletter near the end of this month. V.h.f. enthusiasts are working on v.h.f. in the States and I was able to have a 600 ohm QSO with him on his way through Melbourne. Unfortunately was unable to make an enjoyable contact. Any amateurs visiting Melbourne are welcome at the above QTH for an eyeful QSO or cost me as per details in Sept. "A.R." 7Z, 3ZGP.

Wally 6ZAA recently visited the Eastern States and called on 600-ohm QSO with him on his way through Melbourne. Unfortunately was unable to make an enjoyable contact. Any amateurs visiting Melbourne are welcome at the above QTH for an eyeful QSO or cost me as per details in Sept. "A.R." 7Z, 3ZGP.

NEW SOUTH WALES

The following is extracted from the VK3 V.h.f. Group's Newsletter. The V.h.f. 24-hour event based on the ideals of the Remembrance Day Contest is over. It appears that over 80 stations took part and 77 logs returned and it was won by a country station. Proof enough that if a v.h.f. section was included in the constitution this event and hope to see you again to thank each and everyone of you for supplying a country station. There were 27 logs returned for the 24 hours, the activity only stopped between 0200 and 0600 hours. Full calls appeared in the logs. The Group Committee wish to thank each and everyone of you for supporting this event and hope to see you again next year (on a nation-wide effort). The honour of first place goes to Tony 2CTC from Newcastle.

Activities. October 2: Meeting; most likely a week-end of films on Rain Making. Oct. 3-4-5, Porting this event and hope to see you again to thank each and everyone of you for supplying a country station. There were 27 logs returned for the 24 hours, the activity only stopped between 0200 and 0600 hours. Full calls appeared in the logs. The Group Committee wish to thank each and everyone of you for supporting this event and hope to see you again next year (on a nation-wide effort). The honour of first place goes to Tony 2CTC from Newcastle.

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BRIGHT STAR RADIO

52 - 144 - 420 - 576 - 1296 Mc.

Sub-Editor: LEN POYNTER, VK3ZGP, 14 Esther Court, Fawkner, N.15, Victoria

ADDRESS CORRESPONDENCE FOR THIS PAGE DIRECT TO THE SUB-EDITOR
NEW SOUTH WALES
HUNTER BRANCH

The curfew tolls the knell of parting day,
Great George the gloom of evening spread,
The s.s.b. quickens lowery every day,
And those who have them clearly get most joy.

Talk about Gray having energy when he wrote that lot—freely adapted of course—I've gone right along with him. It's great knobs to catch all these new ducktalkers. Farmyard frollicks is right with Joe 2ANL and many a boisterous lie must not be at 2AKX. Was to hear Zulu Lulu on the quackaphone any day now. Lionel 2CS and many confidence tricks on with borrowed and beaten-up rigs. Oh it is a shame and why don't they pay me more money, etc., etc. But the poet is right you know, especially in the last line. Never mind about all these new fangled ideas—stick to what you know. This is certainly shattering news, but it will help out with the dinner and field day.

The certificate is the key to many cards from T.J.S.A. It awards only one certificate to be known that it awards only one certificate and this contributed In no small degree to hearing Zulu Lulu on the quackaphone any day now. There was a certain amount of coming and going with this basis a three element beam was constructed; the wires were held in place by 16 foot separation by nylon cord and suitable spacers. The s.w.r. was 1.05 and this indicated that the device needed six palm trees, and then the tough guy who picked them. He is happy with his AT21 and AR7, still manages to have the simple trick of a 5 element beam for 20. Fancy leaving the tape measure behind?

Phili was forced to improvise and he remembered that from the tip of his nose to the end of his first finger was 35 inches. On this basis a three element beam was constructed. The wires were held in place in 16 foot separation by nylon cord and suitable spacers. The s.w.r. was 1.05 and this indicated that the device needed six palm trees, and then the tough guy who picked them. He is happy with his AT21 and AR7, still manages to have the simple trick of a 5 element beam for 20. Fancy leaving the tape measure behind?

Central Coast

The main news concerns the recent Lord Howe Island DX-pedition by VKs 2AAK, 2AI, 2TX and 2AKX. It occupied two weeks in the latter months of the year and it was a good thing that chief penciller and 2AKX chief observer. There seems to have been half a dozen KWMs and a Drake 2B in use. There was some hollering for use in the summer. Gordon 2ZZG is all space up v.h.f. and very enthusiastic about the 20 meter DX.

Victoria

South Western Zone

Hook-up activity has been fairly spasmodic, due to weather conditions and lack of time. We remind members of our two weekly hook-ups—Thursday 2000 hrs, and Sundays 1000 hrs. The T请选择填空处的内容。
AUGUST MONTHLY MEETING

The main business of the evening was a presentation to Claude, the local Scout Headquarters Commissioner. Claude was presented with a plaque and a cheque for $50. The presentation was made by the local Scout Headquarters Officers.

Claude thanked the people who had helped him with the presentation. He said that he had been very impressed by the support he had received from the local community. He also said that he was looking forward to the future and hoped that the presentation would help to bring about more interest in Scouting.

Bill 4ZBE and Don 4ZDM are anxious to start a class for budding Amateurs. While I would never argue with a class, it is important to have the right qualifications. A few points that should be considered include:

- The age of the students
- The level of their radio experience
- The type of equipment they are using

In conclusion, I believe that the class will be a success if it is properly organised and managed. I look forward to hearing more about it in the future.
Box 5ZDX. V.h.f.: Trevor Martin, for a very s.s.b. rig, followed by a detailed and scholarly home constructed and not of commercial vint-

be looked at twice to determine that it was home constructed and not of commercial vint-

Never can't see it Just how successful was my entry? This year the other topics of the day, in no way related to the Contest or anything else. This year the other topics of the day, in no way related to the Contest, but I also have to fight a running battle again. Friendships have been made and re-

Vayne—Meteorological—oh skip it. Of humour somewhat—get it? Vayne—Meteor-

full ticket He is in the meteorological set-up

I should do with my spark coil, and hollow again. He may be able to give you more information

of transmissions. If I remember rightly, he

He is in the meteorological set-up

I proved to all and sundry that I could

in handy. What a daredevil!

The results of the 1963 "CQ" World-Wide DX Contest gave me the opportunity to spread Publicity to a greater number of readers than is possible in the "Advertiser" column, complete with headlines for the Gramophone. The Gramophone, or Amateur Radio in general, to say that we should have a good chance of getting a good report, which indicate the age of the contest, and I quote—"I just don't know how long he has been in the hobby. All ages will get on", Garry, how could you be so wrong. Everybody knows that I have not hit the century yet, 99 years and 364 days if you please, how did you get it?

Talking of age, and who wants to, I heard Roy said he was 99 and 7 months old. If there is an old timer if ever there was one, although to be fair, if I did not know just how long he has been in the hobby, I would have said he would die next Sunday. Do they still have samples? Not that I care of course.

Lloyd 5K was knocking them off at the high end of 40 mx, s.s.b., or a.m., it made

I notice, with some misgivings, that from the cover of the magazine (for August) with its

bead jill editors, I have a photo of myself shown, with Harold 5ZAB was a bit perturbed on the

is not too sure when he will be resum-

subject of all sins, I called an s.s.b. competitor

it? Oh well, never mind, flattery runs off my

I am used to such tactics. Re-

and expected to

Well, the R.D. Contest has come and gone again.

and I could be wrong, but we certainly had

I am used to such tactics. Re-

and I will not be bothered to even listen

entirely in the Contest ranks as only a token one, due

to the satellite to keep it in orbit.

iastically, on the front cover of the magazine

On one or two of the gang who are battling

 Sailor 5KN has given Amateur Radio away in favour of cultivating vegetables. I dare say he will come back again, bigger and better than ever. Orchids, well did you ever. Pansies yes, but

Oh well, never mind, flattery runs off my

Thirdly, a good number of tapes would be available for the front cover if the clamour

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rise our work for the Y.R.C., and naturally that gives us the green light for further activity. Try that on your glorioschist for site! I also note, again with misgivings, that from the land where they still can't grow a straight banana, that Bill 4ZBD is wondering if I read the news from other States? May I say—Pansy Peruses—Pansy Muses—but more often than not—Pansy just snoozes!

Now before I close for the month, a word to all of you, no matter what your set-up or espionage agents. Attention spics, masks on, hats over the eyes, cloaks well wrapped round the body, a few hisses and groans. Now hear ye, hear ye! Have a gander of page 11 of the September issue of TVR Column 2, the last two lines of Pub. Com. Report. See how he is worming himself in? See his devilish cunning? Not you—will deter him—although he will be a hard job. How low can he sink in his attempts to up-end me? Hiss-hiss-hiss. Sorry we can't give it at this time. It's been a long time, and I will try and win that from you. But I feel that out chaps and you will hear Max and his XYL working from the Ham shacks in ZL where he has many friends. 7Z, TKH.


electronics

**OBITUARY**

**JACK HOAR, O.B.E., VK60R**

It is with deep regret that we record the passing of Jack Hoar, O.B.E., VK60R, 12th September. He was a prominent figure in the VK60R and VK61R clubs in Victoria. He has left a lasting legacy in the world of amateur radio.

WESTERN AUSTRALIA

Have you ever tried to write notes without any information having been passed along? This is what has happened this month, so I hope that what was for a number of years a Chassis of the VKS Division. At the same time, he was also one of the original members of the VKS Division. In 1934, he was awarded the O.B.E. for his outstanding work in this direction, and at the time of his death, he was still very much a key player in the VKS Division.

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Manufacturers of Radio and Electrical Equipment and Components


Amateur Radio, October, 1964
### Maximum Ratings at 75°C

<table>
<thead>
<tr>
<th></th>
<th>IN87A</th>
<th>IN617</th>
<th>IN618</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak Inverse Voltage</td>
<td>30</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>DC Operating Voltage</td>
<td>20</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td>Peak Rectified Current</td>
<td>45</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>Average Rectified Current</td>
<td>8</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>Surge Current (1 sec. max.)</td>
<td>200</td>
<td>500</td>
<td>500</td>
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</tbody>
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### Subminiature Ge Diodes

![Graphs showing reverse and forward voltages for IN87A, IN617, and IN618 at 25°C and 60°C.](image)

Amalgamated Wireless Valve Company Pty. Ltd.

SYDNEY • MELBOURNE

ADELAIDE • BRISBANE

Amateur Radio, October, 1964
AMATEUR RADIO

NOVEMBER 1964
METERS
MRIP 0.1 mA, 1/4" square face, 1 in. round hole, clear plastic case...
MRIP 1.0 mA, 1/4" square face, 1 in. round hole, clear plastic case...
MRIP 5.0 mA, 1/4" square face, 1 in. round hole, clear plastic case...
MRIP 23.0 mA, 1/4" square face, 1 in. round hole, clear plastic case...
MRIP 50.0 mA, 1/4" square face, 1 in. round hole, clear plastic case...
MRIP 250.0 mA, 1/4" square face, 1 in. round hole, clear plastic case...
MRIP 500.0 mA, 1/4" square face, 1 in. round hole, clear plastic case...
MRIP 0.1 mA, 1/4" square face, 3 in. round hole, black bakelite case...
MRIP 1.0 mA, 1/4" square face, 3 in. round hole, black bakelite case...
MRIP 5.0 mA, 1/4" square face, 3 in. round hole, black bakelite case...
MRIP 23.0 mA, 1/4" square face, 3 in. round hole, black bakelite case...
MRIP 50.0 mA, 1/4" square face, 3 in. round hole, black bakelite case...
MRIP 250.0 mA, 1/4" square face, 3 in. round hole, black bakelite case...
MRIP 500.0 mA, 1/4" square face, 3 in. round hole, black bakelite case...
MRIP 0.1 mA, 1/4" square face, 6 in. round hole, black bakelite case...
MRIP 1.0 mA, 1/4" square face, 6 in. round hole, black bakelite case...
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MRIP 250.0 mA, 1/4" square face, 6 in. round hole, black bakelite case...
MRIP 500.0 mA, 1/4" square face, 6 in. round hole, black bakelite case...
MRIP 0.1 mA, 1/4" square face, 9 in. round hole, black bakelite case...
MRIP 1.0 mA, 1/4" square face, 9 in. round hole, black bakelite case...
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MRIP 500.0 mA, 1/4" square face, 9 in. round hole, black bakelite case...
MRIP 0.1 mA, 1/4" square face, 12 in. round hole, black bakelite case...
MRIP 1.0 mA, 1/4" square face, 12 in. round hole, black bakelite case...
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MRIP 1.0 mA, 1/4" square face, 18 in. round hole, black bakelite case...
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MRIP 250.0 mA, 1/4" square face, 18 in. round hole, black bakelite case...
MRIP 500.0 mA, 1/4" square face, 18 in. round hole, black bakelite case...
FEDERAL COMMENT

THE AMATEURS’ ROLE IN CIVIL DEFENCE

Before World War II, the Amateur provided the backstay when emergency communications were required. After the war, the Amateur was instrumental in aiding the establishment and training of communication groups in a number of volunteer organisations.

As these organisations progressed to becoming divided; however, when the Civil Defence School was established at Mount Macedon, Victoria, investigations by communications study groups soon revealed that the Amateur still had a very important role to play in the early stages of any emergency.

Many Amateurs have passed through the School as representatives of either the W.I.A. or organisations employing them. The importance of this training to the community is inestimable.

The recognition the Government has accorded W.I.A. representatives in this important work is both gratifying and significant.

Each State Premier’s Office is allotted a quota for each study group or course. The W.I.A. has always been invited to nominate members for inclusion in the contingent. These study groups embrace every aspect of civil emergency work, and thus representatives of every section of the community take part in general discussions; however, specialised studies or courses are held in every field. In these cases every organisation interested in the particular subject is represented.

All that is asked for participants is that they spread the knowledge and experience gained amongst their fellow citizens. In the case of W.I.A. representatives, dissemination is via W.I.C.E.N., the object being to ensure that a maximum number of skilled personnel will be ready to meet any emergency.

Amateurs willing to help in this work should advise their Divisional W.I.C.E.N. Co-ordinator who will arrange for their names to be added to the list of nominees to be forwarded to the Premier’s Office. The success of W.I.C.E.N. depends entirely upon the enthusiasm of members.

As an example, the Victorian W.I.C.E.N. group are to participate in a large scale exercise this month. The success of this exercise from an Institute viewpoint is important from the accorded status, but even more so from the aspect of the practical application of the Amateur’s knowledge of communications.
AN S.S.B. TRANSCIEVER FOR 52 Mc.

I. F. BERWICK,* VK3ALZ

A comparison of the block layout for the 52 Mc. Transceiver (Fig. 1) with the original circuit of the PT116 shows that four additional major components are required:

1. A 48 Mc. v.f.o.
2. A 4 Mc. crystal filter.
3. A solid state d.s.b. generator.
4. If mobile operation is intended, a new power supply.

Each of these components is built and aligned as a separate sub-assembly. The order in which they are made is of no consequence and can be done according to availability of components, etc. Be prepared to devote quite a few man-hours to each of these assemblies.

Notes on the circuitry, layout and alignment of each sub-assembly appear later, plus diagrams.

The major assembly is the Pye Reporter unit. This is converted as follows:

1. Remove all redundant components and wiring—compare the new circuit with the old for this operation. The following components are redundant:
   (a) Vibrator power supply.
   (b) IFT3.
   (c) IFT1—the can is saved for crystal filter.
   (d) Mike transformer.
   (e) Socket of V10 and its grid wiring.
   (f) Terminal strip for carbon microphone.
   (g) Terminal strip for crystal oscillator V4 and crystal oscillator V12—also crystal sockets.
2. Convert IFT2, IFT4, IFT5 to 4 Mc. Remove 100 pF. across each winding and replace with 33 pF. Then replace IFT2, IFT4, IFT5.
3. Convert Receiver front-end to 52 Mc. This is done as follows:
   (a) Remove coil assembly of L2, L3, L4, re-wind coils with 8 turns 18 B. & S. enamel, wind 2-turn link at cold end of L3. Tap L4 at 7 turns. Replace assembly.
   (b) Remove and re-wind L1 with 9 turns 16 B. & S. enamel. Tap at 1½ turns. Replace L1.
   (c) L1, L2, L4 are now grid dipped at 52 Mc. L3 at 48 Mc.
   (d) Wire in modifications to receiver audio circuitry.
   (e) Mount crystal filter in can of IFT1 and install in position on chassis.
   (f) Fit d.s.b. generator and RL2, RL3 in power supply compartment. A shield partition is fitted to isolate this compartment from the main chassis.
   (g) Fit socket for QQC04/15—a loctal type. This has to be lowered approx. 1" below chassis to accommodate the tube. The original shield across the socket will have to be modified to achieve this—additional shielding is added to completely isolate the p.a. tank.
   (h) The p.a. loading capacitor, an A.W.A. concentric trimmer with screw-driver adjustment, is mounted on the side wall in the p.a. tank compartment. Wind and install new p.a. coil and loading (link) coil.

Fit a shim brass shield across underneath chassis as shown in Fig. 2.

Mount connectors for mic. input, v.f.o. input, and antenna.

Complete wiring of Reporter unit—running all supply wiring in shielded cable.

Refer to drawings for layout of various components (Figs. 3 and 4).

CRYSTAL FILTER ALIGNMENT

The performance of the transceiver is critically dependent on this component. I include in some detail two alternative alignment procedures.

Method 1 is the more speedy and accurate method. The test set-up is as per Fig. 5.

With this set-up the filter response curve is viewed directly on the c.r.o. screen. See Fig. 6.

It is now a comparatively simple matter to correctly align the filter. TR3 and TR4 (Fig. 7) should be resonated at 4 Mc. If the响应不能满足要求, filter will have to be re-built. Proceed as follows:

107 Loongarra Avenue, Glenroy, Vic.

* The author has converted a Pye Reporter FT116 to a 52 Mc. S.S.B. Transceiver. A conversion for any other frequency from 3.5 to 144 Mc. is equally possible.
Dismantle filter, check pole-zero spacing of each crystal. Measure pole frequencies. There should be two $f_1$ crystals (±50 c.p.s.) and two $f_2$ crystals, where $f_1 \approx L = \text{pole-zero spacing}$.

If not, crystals will have to be shifted around until this is so—either by etching or grinding. Frequency can be lowered if desired by rubbing a little solder onto the quartz. Re-build filter when crystals are OK and repeat alignment procedure.

For the average FT243 filter a response of 3 kc. at 6 db. down and 12 kc. at 60 db. is considered satisfactory with passband ripple not exceeding 3 db.

Method 2: Test set-up as per Fig. 8. Proceed as follows:

1. Assuming d.s.b. has been previously aligned, insert carrier by unbalancing VR1 (Fig. 16, d.s.b. gen.)—a smooth stripe should appear on c.r.o. screen (audio generator should be off). Peak TR3, TR4 for maximum stripe width.

2. Remove carrier, inject audio signal (1,000 c.p.s.). If filter correct a nearly smooth stripe should appear. If not, carrier and/or unwanted sideband are present, as Fig. 9.

It is now possible to measure (a) the pass-band response by plotting stripe height in inches or volts (if the c.r.o. is calibrated) against frequency, using $\text{db} = 20 \log E_i - E_o$, where $E_i$ is the maximum stripe height; (b) the stop-band response by plotting stripe ripple against frequency, using $\text{db} = 20 \log E_i + E_o$, where $E_i$ and $E_o$ are as in Fig. 10.

When a picture of the response curve is obtained by this method, the necessary adjustment of TR4 and R can be made to complete the alignment of the filter.

In this discussion no mention has been made of the frequency of the carrier crystal relative to the filter. In v.h.f. it is usual to use upper sideband.

All by-passes 22K pf. unless otherwise stated. C—Philips trimmer.

TR4—18 turns 16 B. & S. enamel on Q2 toroid.

FIG. 8.

RL2 Energised
D.S.B. Generator On

Fig. 4. Under chassis view.

Fig. 5.

Fig. 6.
It is the practice, therefore, to set the carrier frequency 20 dB. down the i.f. skirt of the filter.

This occurs usually when the pole of the carrier crystal is approx. 400 c.p.s. lower than the pole of the l.f. crystals in the filter.

The carrier crystal should be ground to this frequency (i.e. \( f_i - 400 \)) and the alignment as described carried out. If the tests indicate that a shift in carrier crystal is desirable, this may be done at any time after the alignment of the filter.

Alignment Pictures

Method 1—Fig. 11:
- A—TR4 not correctly tuned, unsymmetrical, hump, stop-band pop-up.
- B—TR4 tuned too far in other direction.
- C—TR4 correctly tuned, but R too large.
- D—Correct response, TR4 OK, R OK.

Method 2—Fig. 12:
- A—Smooth stripe, carrier only.
- B—1,500 c.p.s. sideband, ref. level 0 db., suppression of unwanted sideband \&lt; 25 db., carrier suppression 50 db.
- C—500 c.p.s. sideband, ref. level —6 db., s.b. suppression \&lt; 20 db., carrier suppression 50 db.
- D—3,000 c.p.s. sideband, ref. level —6 db., s.b. suppression 35 db., carrier suppression 50 db.

V.I.F.s.

I propose to make a few remarks introductory to this important subject. I hope to make a further discussion at a later date in connection with a 144 Mc. s.b. transceiver I am developing.

A v.i.f. (variable i.f.) is a device which passes a signal tuneable over a specified range without appreciable attenuation, but highly attenuates all other signals outside this range.

Spurious signals from the injection sources which fall in the v.i.f. and pass through unattenuated are called cross-overs. A very important aspect of v.i.f. design is reduction of cross-over energy. V.i.f.'s may be divided into four basic types:
1. Mechanically or electrically ganged to v.f.o.
2. Bandpass.
3. (1) and (2) are further sub-divided into (a) injection v.i.f., (b) signal (or s.b.) v.i.f.
4. I have used type 2a in my transceiver.

I state without proof the rules for v.i.f. design:
1. V.i.f. tuning range (or bandwidth) should be minimal contingent upon other design factors, e.g. 200 kc.
2. The amplitude of a spurious cross-over is an inverse function of its order. Therefore spurious cross-overs should be of high order.

Example:
\[ f_{\text{vir}} = f_{\text{vxo}} + N \cdot f_{\text{XTAL}} \]
and
\[ f_{\text{vir}} = R \cdot f_{\text{vxo}} - S \cdot f_{\text{XTAL}}, \]
said to be of order \( R + S \). For small energy at far, \( R + S \) should be large. Note: \( R, S, N \) are integers.

Readers requiring further information at this stage should consult Collins S.B. Handbook.

It will be seen that in my transceiver tuning range is somewhat greater than is customary, but choice of v.i.f., v.f.o. and crystal are good so that this factor is less serious than it might have been.

Fig. 13 shows the pass-band characteristic of the 48 Mc. v.i.f. This v.i.f. consists of two low pass constant \( K \) sections, cut-off 49 Mc., plus two high pass constant \( K \) sections, cut-off 46.5 Mc., plus shunt traps to give a notch at 52 Mc. (See Fig. 14.)

52 Mc. TX SECTION

This is explained by reference to the circuit of Fig. 15. A top coupled filter is used between 6AU6 mixer and EF91 class A. This, in conjunction with an absorption trap, prevents the 48 Mc.
injection voltage from appearing at the EF91 grid and driving this stage into non-linearity. A similar circuit arrangement is used between EF91 and 6AQ5, the 6AQ5 being neutralized. Parasitic chokes are fitted in the anodes of the EF91, 6AQ5 and QQC04/15.

The final anode tank is designed to match a 50 ohm load to a 12,000 ohm plate-to-plate impedance.

Alignment of this section is straightforward. All tanks are grid-dipped to the appropriate frequencies. Neutralise the 6AQ5 according to accepted practice, peak the 52 Mc. coils for maximum drive at 52.5 Mc., adjust the traps for minimum 48 Mc. feedthrough, and carry out linearity checks of the final according to the approved procedure.

**D.S.B. GENERATOR**

The active components in this section are solid state to save space, and simplify the mechanical considerations. The complete unit is wired on a matrix board which fits neatly in the space vacated by the power supply. All information necessary for its construction is given in Fig. 16.

The diodes should be selected so that their forward resistances are approximately matched. Diodes having low forward resistance are preferable.

Alignment: (1) Check preamplifier for gain and linearity with c.r.o. and audio sig.-gen. Gain should be 25-30 db, which is more than adequate for most crystal microphones. Since only several hundred millivolts are required to drive the balanced modulator, gain can be reduced by lowering the value of the negative feedback resistor.

(2) Grid-dip carrier oscillator and bal. mod. toroid TR1 and TR2 at 4 Mc. Note: Toroids have no external field. Use set-up shown for grid-dipping in Fig. 18A.

Check carrier oscillator frequency and output. Approx. 1.5v. r.m.s. should appear across secondary of carrier oscillator tank (TR1).

---

**Fig. 16a. G.D.D.**

---

**Fig. 16 Parts List**

- Di, D2—OA85s.
- Q1, Q2—OC44.
- TR1—Primary: 14 turns 14 B. & S.; secondary: 4 turns 14 B. & S.
- TR2—Primary: 14 turns 14 B. & S. c.t.; secondary: 4 turns 15 B. & S. Both TR1 and TR2 an Q2 toroids (Ducon).

---

**Fig. 17 Parts List**

All by-passes are 1K pf. ceramic.
- C—Phillips trimmer.
- D1—8 ohms, carbon.
- L2—9 turns 18 B. & S., tapped 1.5 turns.
- L2, L3, L4—8 turns 18 B. & S. L4 tapped at 7 turns. Wind two-turn link at cold end of L3.
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Frequency response .... 200 to 10,000 c.p.s.

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Cable: 12 ft. of P.V.C.
Switch: on-off.
Desk Stand. Clip folds for hand use.
Colour: WHITE.
Plastic Diaphragm.

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£2/10/7
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Amateur Radio, November, 1964
Check carrier balance, the potentiometer is the coarse balance control and the capacitor the fine control. It will be necessary to find by experiment across which arm of the balanced modulator the capacitor should be placed. 40 db. carrier suppression should be achieved without difficulty. (Remember that a further carrier attenuation occurs in the filter.)

Check double sideband output in the receiver or c.r.o. for intermodulation distortion. Linearity should be satisfactory if the operating conditions for diode balanced modulators are adhered to.

**RECEIVER FRONT-END**

Concurrent with modern practice, a stepped attenuator is incorporated. This is mounted on the front panel. The speaker transformer has to be shifted to the rear side wall to make room for this. The 48 Mc. injection amplifier 6AU6 runs all the time. The h.t. to

48 Mc. V.F.O.

This is constructed as an outboard unit designed for mounting on the steering column of a motor vehicle. The 5 Mc. v.f.o. is a modified Command unit. The heterodyning section and the 48 Mc. v.f.o. are mounted in separate

**NOISE LIMITER, DEMODULATOR AND AUDIO AMPLIFIERS**

This section (Fig. 18) is largely unchanged from the original Reporter circuitry. Carrier for s.b. demodulation is injected into the i.f. after the mixer.

This is achieved as follows: When RL2 is de-energised during receive, thus removing the load from the bal. mod. tank, the balanced modulator becomes unbalanced. A Phillips trimmer wired across the contacts of RL2 provides a means of adjusting the level of carrier injected into the i.f.

Carrier derived a.g.c. is shown on the circuit (Fig. 18). An audio derived a.g.c. system on a matrix board sub-assembly is available for fitting, this is not shown as most people seem to have their own preferences with respect to a.g.c. systems.

Shielded compartments at the rear of the modified Command unit. (See Fig. 18.)

The modification to the Command unit is as follows:

1. Remove all wiring under chassis.
2. Remove front panel, disconnect bowden drive to oscillator capacitor.
3. Cut through chassis in a line with front of oscillator capacitor.
4. Mount front panel on the oscillator portion of the chassis so that the tuning gears line up with the oscillator capacitor drive gear.
5. Wire up as per circuit (Fig. 20). The oscillator is a Franklin followed by a cathode follower and then a class A tuned stage.
6. Fit a large flywheel tuning knob.

The construction of the heterodyning unit and v.f.o. is straightforward and the diagrams should be self explanatory. Note that these stages run all the time.
FURTHER NOTES ON WINDING TRANSFORMERS

In his article, "Re-winding Transformer" ("A.R," Sept. 1964), Ian Phillips has stated a way to determine the turns per volt of the windings. I do not wish to be unkind, but his method is misleading.

The turns of a 5 or 6.3 volt winding are not necessarily a multiple of 5 or 6 respectively. A power transformer is designed to give correct heater voltages on load (all windings normally fully loaded).

The following factors are taken into account to arrive at t.p.v.:

1. Flux density (core loss).
2. Wire gauges (copper loss).
3. Increase in wire resistance with temperature rise.
4. The final estimated working temperature above ambient.

These determine the transformer "regulation". A typical design of about 100 to 150 watts rating would probably use a core of the E and I waste-free type, either a 1/4" centre leg and 2" stack, or 1/16" centre leg and 1/4" stack. Core material is a matter of size and temperature rise, and can vary accordingly.

However, to get to the point, the heater winding voltages off load and therefore the turns depend on the factors stated earlier. This may be seen from the figures given in Table 1, and the same applies to other core sizes and areas.

<table>
<thead>
<tr>
<th>Core Leg X Stack (Inches)</th>
<th>Appro. Net Area (Sq. In.)</th>
<th>T.P.V. for Flux in Kgausses*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4 X 1/4</td>
<td>2.3</td>
<td>2.3</td>
</tr>
<tr>
<td>1/2 X 1/2</td>
<td>2.1</td>
<td>3</td>
</tr>
</tbody>
</table>

It will be seen that a winding of 18 turns could be a 5v. or 19 turns a 6.3v. winding. Therefore, with a faulty transformer, it is a little difficult, if not impossible, to arrive at the t.p.v. If not faulty, the turns of the heater winding divided by the off-load volts will give the t.p.v. provided the correct voltage is applied to the primary, and the meter is reasonably accurate. (All secondary windings unloaded.)

The only other way is to assume a normally used flux density, e.g. 11 Kgausses or approx. 70,000 lines, and the t.p.v. is near enough to 6.8 divided by the cross-section area in square inches as measured with a rule. This gives you a fair chance of being "near the mark" or can be used for a complete re-wind.

—Andy Roddie, VK3UJ

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CONCLUSION

A complete transceiver has been described. Enough information has been presented to enable a transceiver to be designed for any frequency—3.5 to 144 Mc.—using Reporter components.

By building one's own along the lines indicated, it is possible to enjoy the advantages of transceiver operation at a small fraction of the cost of commercial units.

Finally I am indebted to VKs SAHL, ZADF and 3ZCN for numerous suggestions which have proved invaluable during the development of this unit.

D.X.C.C. CONTEST

"All the DX you can work in a year" is the objective of the First Annual D.X.C.C. Contest being sponsored by the Long Island DX Association in order to stimulate DX activity throughout the world.

The Contest will begin at 0001 G.M.T., 1st January, 1965, and end at 0000 G.M.T., 30th December, 1965. Potential winners will be notified and will be required to submit their lists of countries worked to "L.I.D.X.A. Contest Committee members via L.I.D.X.A. Contest Committee whose members are: Joe Hellman, WZMES; Dorothy Strauser, KEKJO; Elmer Jones, K2JX; and Max Fricklas, WSQHD. A complete list of winners will be published as soon as possible.

At the close of the Contest, participants will be required to submit just their lists of confirmed countries worked to "L.I.D.X.A. Contest Committee members via P.O. Box 599, Lynbrook, New York, with postmarks no later than February 1, 1965. Potential winners will be notified and will be required to submit just their lists of countries worked to the L.I.D.X.A. Contest Committee whose members are: Joe Hellman, WZMES; Dorothy Strauser, KEKJO; Elmer Jones, K2JX; and Max Fricklas, WSQHD. A complete list of winners will be published as soon as possible.
ROSS HULL MEMORIAL V.H.F. CONTEST, 1964-65

The Federal Contest Committee of the Wireless Institute of Australia invites all Australian and Overseas Amateurs to participate in this annual Contest which is held to perpetuate the memory of the late Ross Hull whose interest in V.H.F. did much to advance the art. A handsome 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 upon 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, framed photograph of the Trophy.

**Objects:** Amateurs in each VK Call Area will endeavour to contact Amateurs in other Australian Call Areas and Overseas.

**Date of Contest:** 12th December, 1964, to 10th January, 1965.

**Duration:** From 0001 hours E.A.S.T. (1401 hours G.M.T.) on 12/12/64 and 11/12/64 respectively, to 2359 hours E.A.S.T. (1359 hours G.M.T.) on the 10/1/65.

**RULES**

1. There shall be three main sections to the Contest:
   (a) Transmitting, Open, 52 Mc. and higher.
   (b) Transmitting, Phone, 52 Mc. and higher.
   (c) Receiving, Open, all bands, 52 Mc. and higher.

2. All Australian and Overseas Amateurs may enter for the Contest, the stations are fixed, portable or mobile.

3. All Amateur V.H.F. bands may be used, but no cross-band operating is permitted.

4. Login Reports will count for points, logs must show the call sign of the station heard (not the station worked), the serial number sent by it, the serial number returned and the call sign of the station operating.

5. Only one contact per band per station is allowed each calendar day.

6. The ruling of the Federal Contest Committee of the W.I.A. will be final. No dispute will be entered into.

7. All contacts must be consecutively numbered in the one number sequence to facilitate checking.

8. All contacts must be recorded on a log for each successive contact. If any contact cannot be verified, the serial number sent by it must be exchanged and acknowledged. If any contact cannot be verified, the serial number sent by it will not be acknowledged.

9. Entries must be set out as shown in the example, using only one side of the paper. Entries must be postmarked not later than one month after the Contest (i.e. not later than 10/2/65) and be clearly marked "Ross Hull Memorial V.H.F. Contest, 1964-65," and addressed to the Federal Contest Committee, W.I.A., Box 638J, G.P.O., Brisbane, Queensland.

10. Scoring for all sections will be based on the attached table. Contestants will have to agree between themselves as to the distance between their stations. Such distances must be shown in their log entry in the column usually used for remarks or bonus points.

11. Logs: All logs shall be set out as in the example and in addition will carry a front sheet showing the following information:

<table>
<thead>
<tr>
<th>Name</th>
<th>Call Sign</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Address</th>
<th>Section</th>
</tr>
</thead>
</table>

   | Claimed Score |

   **Declaration:** I hereby certify that I have operated in accordance with the Rules and Spirit of the Contest.

   **Signed:**

   **Date:**

   **Note:** Entries on the front sheet must be clearly shown in block letters.

   **GENERAL**

   Several suggestions were received regarding the duration of the Contest being too long. It was suggested that the period of the Contest remain the same, but that contestants submit a log for a seven or nine-day period of the Contest. This period would be selected by the individual contestant.

   Before taking any steps in this direction we would like to have a much wider expression of opinion on this matter and comments are invited.

   It is suggested that contestants obtain a large scale map of Australia and of their State and mark on these maps the radial distances from their location in accordance with the scoring table.

**RECEIVING SECTION**

1. Short Wave Listeners in Australia and Overseas may enter for the Contest, but no transmitting station may enter.

2. Contest times and logging of stations on each band are as for the transmitting sections.

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. 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, but additional reports will be of value to the F.C.C.

5. Awards: Certificates will be awarded to the highest scorer in each VK and Overseas Call Area.

**SCORING TABLE**

<table>
<thead>
<tr>
<th>Distances</th>
<th>Between Stations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>52 Mc.</td>
<td>144 Mc.</td>
</tr>
<tr>
<td>Up to 10 miles</td>
<td>1</td>
</tr>
<tr>
<td>Over 10 and up to 25 miles</td>
<td>2</td>
</tr>
<tr>
<td>Over 25 and up to 50 miles</td>
<td>10</td>
</tr>
<tr>
<td>Over 50 and up to 100 miles</td>
<td>4</td>
</tr>
<tr>
<td>Over 100 and up to 200 miles</td>
<td>10</td>
</tr>
<tr>
<td>Over 200 and up to 500 miles</td>
<td>20</td>
</tr>
<tr>
<td>Over 500 and up to 1000 miles</td>
<td>10</td>
</tr>
<tr>
<td>Over 500 and up to 1,000 miles</td>
<td>2</td>
</tr>
<tr>
<td>Over 1,000 and up to 5,000 miles</td>
<td>10</td>
</tr>
<tr>
<td>Greater than 5,000 miles</td>
<td>20</td>
</tr>
</tbody>
</table>

**EXAMPLE OF TRANSMITTING LOG**

<table>
<thead>
<tr>
<th>Date/ Time</th>
<th>Band</th>
<th>Emission</th>
<th>Call Sign</th>
<th>RST/NR Sent</th>
<th>RST/NR Revd.</th>
<th>Distance</th>
<th>Points Claim.</th>
</tr>
</thead>
</table>

**EXAMPLE OF RECEIVING LOG**

<table>
<thead>
<tr>
<th>Date/ Time</th>
<th>Station Heard</th>
<th>RST/NR Sent</th>
<th>Station Called</th>
<th>Points Claim.</th>
</tr>
</thead>
</table>

**NOTE:** State whether Time is E.A.S.T. or G.M.T.
GALAXY S.S.B. TRANSCEIVERS

Galaxy III.—80-40-20 Mx £230
Galaxy V.—Five Bands £300

Accessories (continued):—

Galaxy V.—External Second V.f.o. £40

Accessories:—
Crystal Calibrator £12
Vox Unit £16

12v. d.c. power supply £30
12v. d.c. "Topaz" p. sup. £55
240v. a.c. power supply £30

All Prices Include Sales Tax.

FEATUREING—

• Smallest 300-watt a.s.b/c.w. Transceiver—6" x 10½" x 11½. Weight 13 lbs.
• Full coverage on all bands. Linear tuned V.f.o. covers 500 kc. each band.
• Six-Crystal 9 Mc. Filter, bandwidth 2.1 kc. at 6 db. down.
• U.s.b. or L.s.b. selectable, with illuminated indicators.
• Transistorised a.v.c. audio. Combined S meter and Plate Meter.
• A.I.C. boosts talk power and prevents "flat topping".
• Receiver sensitivity 3 microvolts for 10 db. S/N. Audio derived a.g.c.
• Free from pops and pumping.
• Grid block keying for c.w. Output Impedance: 50 ohms, adjustable.
• Pi-Net range: 40-100 ohms, resistive. Reduced power tune position.

DESCRIPTIVE LITERATURE UPON REQUEST

SIDEBAND ELECTRONICS ENGINEERING (ARIE BLES)
33 PLATEAU ROAD, SPRINGWOOD, N.S.W. Phone 394

CHOOSE THE BEST—IT COSTS NO MORE

RESIN CORE SOLDERs
for reliable connections

O. T. EMMERS & CO. LIMITED. Head Office: 27-41 Seaview Street, Alexandra, N.S.W.
and at Melbourne • Brisbane • Adelaide • Perth

DURALUMIN, ALUMINIUM ALLOY TUBING

IDEAL FOR BEAM AERIALS AND T.V.

★ LIGHT ★ STRONG ★ NON-CORROSIVE

STOCKS NOW AVAILABLE FOR IMMEDIATE DELIVERY

ALL DIAMETERS—⅛" TO 3"

Price List on Request

STOCKISTS OF SHEETS—ALL SIZES AND GAUGES

GUNNERSEN ALLEN METALS PTY. LTD.

SALMON STREET, PORT MELBOURNE, VIC.
Phone: 64-3351 (10 lines) Telegrams: "Metals," Melb.

HANSON ROAD, WINGFIELD, S.A.
Phone: 45-6021 (4 lines) Telegrams: "Metals," Adel.

LOW DRIFT CRYSTALS

FOR

AMATEUR BANDS

ACCU.RACY 0.01% OF STATED FREQUENCY

3.5 and 7 Mc.
Unmounted, £2/10/0
Mounted, £3/0/0

12.5 and 14 Mc.
Fundamental Crystals, "Low Drift,"
Mounted only, £5.

THESE PRICES DO NOT INCLUDE SALES TAX.

Spot Frequency Crystals Prices on Application.
Regrinds £1/10/0

MAXWELL HOWDEN
15 CLAREMONT CRES., CANTERBURY, E.7, VICTORIA

THE NEW "A.R." LOG BOOK

IS NOW AVAILABLE
Larger, spiral-bound pages with more writing space.

Price 7/6 each
including Postage

Obtainable from your Divisional Secretary, or W.I.A., P.O. Box 36, East Melbourne, C.2, Victoria.

Page 10
Amateur Radio, November, 1964 Page 11

SIGNALS SERVICE COURSE

 Held at Macedon, Vic.

The No. 2 Signals Service Course, held at Macedon, Vic., from 6th to 11th September, was attended by 30 members, of these 20 were Amateurs.

Present were: P. A. Alexander (VK2PY), J. B. Batterby (VK3JR), K. C. Benwell (W.A.), L. Blagbrough (VK4ZGL), S. Briggs (VK4SC), T. I. Cairnduff (Tas.), G. C. Casboult (Tas.), Major E. Collett (VK2RU), R. P. Fuller (VK5RM), W. W. German (VK4ZCM), R. G. Harris (VK5RR), R. H. Hildred (VK4RE), Sergeant R. G. Holdway (Qld.), T. A. Holmes (Vic.), B. P. Jackson (Vic.), A. D. Love (N.S.W.), M. J. McDonald (VK6MM), M. M. Mc-Grane (VK4M2), B. A. McRae (VK5MC), P. L. Mahan (N.S.W.), L. A. Maschette (VK6ZDM), D. E. Melbourne (Vic.), C. A. Middleton (VK5GCO), R. A. Murphy (VK5ZDX), M. C. Owen (VK3ZEO), Rev. Bro. T. Radcliffe (N.S.W.), R. V. Saunders (N.S.W.), Major R. L. Topp (VK6QY), B. E. Wearne (N.S.W.), E. C. West (N.S.W.), J. W. W. (A.).

It is the first time that a course has been attended by so many people with a hobby as a common bond. The others are all connected with communications in one form or another.

The purpose of the course is to instruct the members of the duties of Signals Officers for the Civil Defence Services in Australia.

A background of nuclear, biological and chemical warfare was given.

Message writing, field telephones and cable laying, signal centre duties and records, radio procedure and exercises, and planning radio exercises were covered by the course.

One of the major factors evolved from this course was that no matter what form of communications you are using, the procedure in message handling must be standardised, so that confusion does not arise. A badly controlled and confused communication system is worse than no communications at all.

With the development of Civil Defence in the various States, Amateurs may be required to assist in the training and operating Civil Defence Signals Sections. We must attempt to get the most from our members who are operating these courses and there will no doubt in the future be others attending similar courses.

We all know that communications are the backbone of any service, be it private, public or civil. These Amateurs and the others are doing their best to prepare for natural and other disasters.

What are you doing? Contact your local W.I.C.E.N Co-ordinator and offer your services.

—Alyn Maschette, VK6ZDM.

NEW CALL SIGNS

JULY, 1964

VK1AXX—I. W. Hutchinson, C/o. Department of External Affairs, Administrative Office, Parkes, A.C.T.
VK1EM—E. J. Mulholland, Plat 11, Block 14, Northbourne Flats, Braddon, A.C.T.
VK2UJ—L. A. Sandiger, 23 Hollis Ave., Goulburn.
VK3AB—D. C. Boundy, 201 Kennedy St., Randwick.
VK3DZ—W. A. Martin, Banksta St., Orange.
VK3HH—E. L. Campbell, 229 Shepherds Hill Rd., Mount Druitt.
VK3JI—A. J. Jones, 10 McAllister Ave., Engadine.
VK3NQ—P. Mack, 78 The Crescent, Cheltenham.
VK3LL—W. W. Burch, 12 Good St., Balnres.
VK4AC—J. R. Smart, Mts. High St., Kew.
VK4AV—W. E. A. Broad, 18 Kenby Rd., Heathmont.
VK4KX—Geelong Radio and Electronics, Guild Hall, Myers St., Geelong.
VK5ZCA—A. F. Lawrence, Harcourt.
VK5ZDD—L. Lebrun, 17 Warty St., Fortitude Valley.
VK4ZFW—W. Spring, St. Leo’s College, St. Lucia.
VK4ZTT—C. Thompson, Boys’ Grammar School, Rockhampton.
VK5FA—E. F. Brandon, C/o. Dpt. of Civil Aviation, Oodnadatta.
VK5FU—J. S. Burns, 4 Arthur St., Yarralla.
VK5QM—M. W. Higgins, 15 Beta Cres., Panorama.
VK5ZB—G. Downings, 4 Bella St, Gawler East.
VK5ZDB—J. Bates, 23 Allen Ave., Blackwood.
VK5ZZ—E. R. Dunkley, 54 Radstock St., Kiketon.
VK5ZF—G. C. Adams, 223 Shepherds Hill Rd., Cheltenham.
VK6ZGH—G. L. Armstrong, C/o. Station Manager, Mackay.
VK6ZEM—M. McDonald, Station: Munthulla Farm, Williams Plains; Postal: P.O. Box 47, East Williams Plains.
VK6JF—J. B. Merson, P.O. Box 81, Rabaul.

R.S.G.B. 21-28 Mc. TELEPHONY

CONTEST—DECEMBER 5-6, 1964

Radio Amateurs throughout the world are again invited to take part in this year’s R.S.G.B. 21-28 Mc. Telephony Contest to be held this year on December 5-6. Attention is drawn to changes in the scoring system described in detail in Rule 8. Contestants are advised that in previous years many points were lost by those who did not read this rule carefully.

Duration: The Contest will start at 0100 G.M.T. on Saturday, December 5, and end at 0000 G.M.T. on Sunday, December 6, 1964. The Contest is open to licensed Amateurs in all parts of the world.

Contacts may be made using any telephony system for which the entrant is licensed. One contact on each band may be made with a specific station, whether fixed, portable, mobile or alternate address. Duplicate contacts must be logged and clearly marked as duplicates without claim of points.

Contest Exchanges: An exchange of RS reports followed by a three figure serial number starting with 001 for the first contact and increasing by one for each successive contact.

Rules: (a) should be clearly typed or written on one side only of foolscap or international A4 size paper; (b) must be ruled in columns head (in this order): (i) Date/Tim, (ii) Call Sign of Station Worked; (iii) I sent him; (iv) He sent me; (v) Band; (vi) Distance Points; (vii) Points claimed; (c) must be addressed to the Contest Committee, Radio Society of Great Britain, 29 Little Russell St., London, W.C.1, Belgrade, the name of the Contest being clearly shown on the top left hand corner of the envelope, which must be ruled in increasing by one for each successive contact.

Certificates will be awarded to the leading station in each VK call area.

The usual cover sheet and declaration must accompany each log.

Phone 34-6539, write or call WILLIAM WILLIS

428 Elizabeth St., Melbourne

for GELOSO

Equipment and Components
Page 12

As we predicted last month the bands have really gone for the big change and 20 metres has finally completely reversed with regard to W and Europe, Asian and Russians areas. The changes are coming on in such a way as to make unexpected DX contacts possible as the exchange on 20 has continued to be surprisingly excellent with some amazing new results. The North American areas have been particularly good this month and are making some surprising and definite contributions to the quality of DX.

---

**DX**

---

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

Listed below are the highest twelve members in each section. New members and old names that have been amended will also be shown.

---

**PHONE**

---

**C.W.**

---

**OPEN**

---

Ken VK3KL reports the 20 mx band is really open to Africa during the afternoon from about 1400z. The following was heard on 14200 kc. with the following on 14200 kc. and after 1430z.

---

**Address**

---

**Sub-Editor:** H. A. BIEHLENS, VK5BB,

---

**Crystal Brook, South Aus.**

---

**ADDRESS CORRESPONDENCE FOR THIS PAGE DIRECT TO THE SUB-EDITOR**

---

**Page 11**

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** Amateur Radio, November, 1964**
432 Mc.:—
2300 Mc.:—
50 Mc.:—

luck and DX."

course, you know what can be done.

and rig designs available here and would be

you are interested, we have many antenna

Channel 2 (54-60 Mc.).

"We also have the television problem on 50
Mc., but it isn't because the t.v. station Is

element beam up about 40 feet. So far my

with a single 4-125A (4D21), and have an eight

to 0900 local time, and the best path seems to

gation seems to be early in the morning 0600

interesting that you are using the u.h.f. fre-

azine, 'Amateur Radio,' and am glad to see

contains some interesting news from U.S.A.

VK3: ATV0—

approximately four seconds key-down

30B/P. We trust the Amateurs concerned will

and s.s.0 problems. With luck quite a few of

George’s earner caused a heterodyne but his

value. Also I have

even "gravel voice" Claude 4UX from up north

Paul 4UL has been convinced that he should

make a noise (Roy 4ZRM did the convincing).

We gather the expression "not worth 2 bob"
can't apply here also as we have seen the unit

and rig designs available here and would be
glad to share them with you. For now. good

John's address is P.O. Box 472, Fortun',

California.

We have and VK5 notes have not been re-
ceived for some time, would these Divisions
please consider a new correspondent? 73, 3ZGP.

LATEST LIST OF V.H.F./U.H.F. RECORDS
FOR AUSTRALIA
50 Mc.:—

VK3ALZ-XEI-1/1-5-59--4.616 miles.

VK3ZP/ZL1ADE and ZL1AU.—54/12-63--1.351 miles.

432 Mc.—

VK2OB/3-VK2ZAV/3-1/8-1/6-97.3 miles.

576 Mc.—

VK2ZDS/6-VK2KL/6-15/12-63--10.1 miles.

1215 Mc.—

VK3ZAC-VK3ZCF/2-4/6-48.6 miles.

2300 Mc.—

VK3A-VK3ANW/1-1/2-50--6.0 miles.

3300 Mc.—

VK3ZGT/VK3ZGK/3-VK3ZDQ/3--1/4/12-63--
6.35 miles.

THE BEACON BOX

VK5VF—

6 Metres — 53.000 Mc.
2 Metres — 144.800 Mc.

One thing that is certain, if you wait for 40
seconds, then repeat, etc. Operation is almost
continuous.

VE6VF—

6 Metres — 52.000 Mc.
2 Metres — 145.060 Mc.

Automatic c.w. identification with ap-
proximately four seconds key-down position.
Operation is almost continuous.

VK3: ATVO—

51.75 Mc. f.m.
0900 — 2300 hours daily.
(100kw. e.r.p., 2600 ft. elevation)

VICTORIA

This past month has seen a rise in activity on
the bands as winter’s long and cold nights
seem to have increased, no doubt so will the
problems. Most of the stations in the above list are

52.104: 3ZGP (fixed and mobile); 52.20: 3ZCO;
52.65: 3ZDO; 52.66: 3ZPA; 53.00 : 3WI
3ZCO. The following stations are v.f.o. or
v.x.o. controlled: 3IM, 3UU, 3KC, 3AHL, 3ALZ,
3AV, 3MC, 3AQ, 3ZDL, 3ZFS, 3ZGG, 3ZHM.

George 4ZLG was quite astonished recently
when he heard that 4WF is going mobile on 52 megs.
It is hoped soon to produce a "V.h.f. News-
letter" in VK3 and if our plans are realised we
hope to keep more in touch with you per
this means. It seems that some of us either under-
draw or don't know that the VK3 V.K beacons
are being dropped below 52 mcs.

Of the other VK Divisions: 50.62: 3ZDN, 50.62;
3ZQO; 50.65: 3ZQG; 50.66: 3ZPA; 50.66: 3WI
stand-by freq.; 50.67 a.m. net: 3WI, 3ZQO,
3ZQG, 3ZPA, 3ZQD, 3ZQ1, 3ZAU, 3ZAU.

with inputs of 5, 12 and 15 watts. These units

The antenna has two nulls—one is in the

20 k.w. e.r.p.) is f.m. and
can vouch for the fact that there is more

The antenna at Ferny Creek in the Dandenong Ranges, about
25 miles east of Melbourne. It was quite a
down that we will play bold in the years to come.

V.H.F. Convention. The V.h.f. Group held

The really keen 6 mx enthusiasts are work-
ing on their gear, ridding themselves of Chan-

from a well known brand of mustard tins.

George's earner caused a heterodyne but his

With all this talk of full licence operators,

With the increasing number of new voices that have been
heard on the bands. Lately it seems that many

The only way to reappear with the approach of the summer months is to hold
a re-building programme during winter or just plain hibernate. Bands have been
continuously active last month and many new contacts have been had.

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draw or don't know that the VK3 V.K beacons
are being dropped below 52 mcs.
Arthur did tell of his many efforts trying to make contact on 6x from Normanton to New Guinea when he was stationed up there.

New Guinea... 144 megs. While calling Bert 4CF... 73, 4ZPL.

The Ipswich Amateur Radio Club has accepted a position at the local b.c. station. Bill 4ZWS has been working on a tx and two suitable sites have been selected. The Ipswich Amateur Radio Club has accepted a position at the local b.c. station. Bill 4ZWS has been working on a tx and two suitable sites have been selected.

Toowoomba, he was called by 2WQ in Grafton. The grape vine has been very active lately and I had words with Jim 4ZRA who hopes to... His Amateur Radio, writes that Paul passed his Amateur Radio, writes that Paul passed

The fox was well hidden and quiet too, using his old call sign. The fox was well hidden and quiet too, using his old call sign.

If recently you heard the “Duke of Deagon” you were listening to a... He called several stations which never came back and would like to swing the beam north next time.

The Jamboree on the air v.h.f. wise was a big event... He called several stations which never came back and would like to swing the beam north next time.

The Turin is in a ‘field exercise being conducted by some young people. The Turin is in a ‘field exercise being conducted by some young people.

Some items from VK2: Some details are now available about the latest schoolboy A.O.C.P, which are likely to be acceptable—some discussion has been started. Some items from VK2: Some details are now available about the latest schoolboy A.O.C.P, which are likely to be acceptable—some discussion has been started.

The field day over 12th-13th Sept. was a big success. There are now 15 registered clubs. 4PE at Padua College went on the air on 19th Sept. with Bruce 4ZD in charge and local dignitaries and club member Bob Stroud (operating) making comms on 40 metres. 4PE at Padua College went on the air on 19th Sept. with Bruce 4ZD in charge and local dignitaries and club member Bob Stroud (operating) making comms on 40 metres.

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Helen 6ZRC managed to extract him after they had quite a stay in hospital and by the time they have decided to close down the office Helen 6ZRC managed to extract him after they had quite a stay in hospital and by the time they have decided to close down the office.

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TIT-BITS FROM TIM

In QSLing to a broadcast station even the smallest like ‘I heard your sta-
tion, please send me a card,’ will nearly always receive a speedy return of something
from the station. In fact, it is almost like the sun. B.c. S.W.Ling is easy as stations want
your notices to prove their mere existence.

The same is not the case when replying to an Amateur. A report like ‘I heard you work-
ing the particular signal which would pass a
window’ will not get very far. Your details must be good. They may be mundane but
that is what you are. If the over S.W.L. has a
return better than 5% of the number sent out,
he is lucky. Cards cost money, so be on the
lookout for these.

Lloyd L3141: Sorry to hear that the wind pluck-
ed your antenna one more time. I like that
idea of your QRM problems. Thanks for the copy
of the Long Island DX Bulletin, very good
indeed. You still return it a later date.

From the Black Rock boy, Greg L3128, comes the usual compact letter which contains
plenty of activity, plus the result of the V.F.L.
final, 91. It’s a pity they don’t play the N.S.W.
grand final. Certainly buy a V.F.L. footy ticket,
Editor.) Latest QSLs received: OZ9, UA0,
UA1, YN1AH, CR7, FU8, UA1, etc., whilst
heard covers quite a nasty variety.

Drew L4144, another keen lad who uses a
walkie-talkie has had some luck near some
20 ft. That was a very impressive list of
receivers. I was very pleased to hear from you.

Adamin L3077 is a s.w.b.c. listener and sent
quite a long list of stations received on those
bands.

SUNSPOT ACTIVITY

The Publications Committee reports that all
inwards Divisional notes, etc., received at P.O.
Box 36, East Melbourne, C.2, have been
published in this issue of “A.R.”

In addition correspondence was received from
VK5AV, AN3, SLK and others. Technical
Articles written by—I.AU, JD, FT, 3T and
Z2EL.

A matter from VK2AVA was referred to the
Victorian Division Council for decision regar-
ding policy.

The Committee discussed the publication of
a “History of Communication” from J. R. Cox
and agreed it should appear in serial form in
“A.R.” as it covers the whole field. The “Call
Book” have been returned to the P.M.G., for
authorisation to publish and it is anticipated
that the new edition should be available late
in November. As already explained, the late
calendar publication was due to depletions with
the P.M.G. and next year the “Call Book”
will be issued in June-July.

Mr. Bill Roper was welcomed to the Com-
mitee and will act as technical article reader
and v.h.f. adviser.

The question of publishing the Christmas
issues of “A.R.” was discussed and the view
of the holiday period shut-down at the print-
ers the following will be publication and issue
dates:

DECEMBER 1964: Copy required by 8th De-
scember for release on the 1st Decem-
ber.

JANUARY 1965: Copy required by 1st De-
cember for release on the 1st January 1965.

FEBRUARY 1965: Due to the fact that this
issue will be set up during December
1964 for issue in mid February 1965,
will not be possible to publish any Divisional Notes, SWL, VHP, DX Notes
etc., nor any Hamada. This will apply
February issue will be devoted to technical
articles.

All readers are particularly requested to
note the above changes in the issue of “A.R.”
for 1965.

Finance of “A.R.” was discussed and it was
agreed to maintain the current budget which
may show a slight deficit for the year.

No “A.R.” wrappers were returned from the
October issue, hence the Committee can only
conclude that all wrappers are correctly
addressed. Members of the W.I.A should notify the Admin. Secretary, W.I.A.,
not be returned to the W.I.A. or the P.O.
Address. Direct subscribers should write to the
Address to the W.I.A., C/o. P.O. Box 36,
East Melbourne, C.2. All licensed Amateurs
must notify the P.M.G. of any change of
address. The above changes in the Divisional
in addi-
tion “A.R.” should also be advised.

Correspondents are again advised that ALL
correspondence, except ads., should be
dressed only to P.O. Box 36, East Melbourne,
C.2, Vic.

SUNSPOT ACTIVITY (or lack of it)

We should all know that a “Zurich Sunspot
Number” is an indication of the level of solar
activity. We can thus say that the sunspot
numbers are near rock-bottom, so as to speak—and because of such a situation, the
longest activities were during the last 26 years.

m.u.f. for world-wide radio contacts is rela-
tively high.

How many of you readers are aware that
the Zurich Sunspot mean number (daily) for
August 1964 was 14.6? For August 1962, it
was 39.4, and for August 1964, 8? (Analyse it for yourself, and recollect the 1966 feeling, or you
new-comer, this is what it must have felt like
in 1958!!)

The experts” are now forecasting that December 1964 could well be the current
sunspot minima month—for after that there will
be a slow climb back towards (we hope) the 1965
maximum level (and the good old DX days).

—Eric Trebilcock (WIA-L3042)
RESIN ENCAPSULATED TRANSFORMERS BY TRIMAX...

Designed for specific applications such as High Voltages, direct burial in the ground or other extreme environments! We’ve developed (and time proved) these construction techniques at “TRIMAX” using Epoxy resin for encapsulation! Leave your transformer problem to our skilled design team and we’ll solve it! Illustrated at left (A) Airport Runway Lighting Transformer, (B) Telephone Isolation Transformer, (C) Telephone Drainage Coil, (D) Telephone Longitudinal Retard Coil.

FOSTER DYNAMIC MICROPHONES

SPECIFICATIONS:

Output Impedance .................. 50 ohms or 50K ohms
Effective output level ........... -55 db. [0 db. = (one) 1V. Microbar]
Frequency response ............... 50 to 15,000 c.p.s.

OMNI-DIRECTIONAL DYNAMIC:

Size: 4 1/2” long, 1 1/4” diameter. Colour: TWO-TONE GREY.
Cable: 12 ft. of P.V.C.

Retail Price 50 ohms: £4/7/9 + Sales Tax 10/11
Retail Price 50K ohms: £4/10/0 + Sales Tax 11/3

A QUALITY PRODUCT FOR TAPE RECORDERS & P.A. USERS

Marketed by ZEPHYR PRODUCTS PTY. LTD.
58 HIGH STREET, GLEN IRIS, S.E.6, VICTORIA Phones: 25-1300, 25-4556

Manufacturers of Radio and Electrical Equipment and Components

FEDERAL
I.A.R.U. NEWS
Region II. Divisions
From 14th to 16th April, 1964, representatives from 16 I.A.R.U. Societies in Region II, met in Mexico City to form a region. The I.A.R.U. Societies in Region II (Argentina, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela) are the countries from which the members of the Region II are drawn, to which we heartily concur.

The desire for short-wave broadcasting. Our Amendment to the call book address. Oh those compliments again. Confidential reports the ladies enjoyed it too. So why not next year? It certainly was the formula for success.

Those appointed were:
Chairman: Antonio Pita, XEICCP.
Secretary: Gustavo Teusens, OA4AV.
Treasurer: Noel Eston, VECJ.
Member: Robert Denniston, W8NWX.

The new division looks forward to receiving further membership from countries not represented at the inaugural meeting.

U.S.A. Reciprocal Operating Privileges
On 28th May, 1964, President Johnson signed a bill on reciprocal operating for amateurs 2AYF proposed a vote of thanks to Keith at the S.B. A.R.R.L. (Visitor from Sydney), amateur T.V. licence E6, radio amateur C682 and an s.s.b. transceiver. As can be imagined, this his “crystal ball night” and he chose the occasion by the approval of the U.S. Department of State, the 70 Mc. licence, and the China Radio Association (C.R.A.) to the A.R.S.B. and the Radio Society of Ceylon (R.S.C.) as new members of the I.A.R.U. Calendar 65 also announces proposals for the Amateur Radio Society of Barbados (A.R.S.B.) and the Chins Radio Association (C.R.A.) to become members. The W.L.A. has voted in favour of the A.R.S.B., but not in the case of the C.R.A., as this in all cases of the qualification and directions of the C.R.A. have not been met. The main point being that of 1,500 members of the C.R.A. only one is a licensed Amateur. It should also be noted that the old Association des Amateurs-Emetteurs du Maroc (A.A.E.M.) has changed its name to the Association Royale des Amateurs Emetteurs du Maroc (A.R.A.E.M.).

Amateur Band Intruders
In the afternoon 2 mdhunt, known as the “ducktalkers” equipment for the ducktalkers. A top band eliminator: Mac 2ZMO, a two md tx for the table. The way was prepared and we had directed our interest towards telecommunication authorities in the U.S.A. and england to amuse the practice of commercial companies by sending complimentary copies of “QST” to many administrative and technical offices.

The above includes many words of wisdom with which we heartily concur.

Retirement of OWL
After 32 years as secretary-general of the I.A.R.U. and has consented to retirement of OWL on December 31. Clarry was one of the leading lights in the founding of the Region I. Division. He had served as Region I. Division chairman and, following the more formal de- claring of the 2ND, he will continue as secretary of its Executive Committee. The A.R.B.L. in celebrating its 50th anniversary this year is fortunate in highlighting the anniversary the next day and his trophy a c.r.t. money the next day and his trophy a c.r.t.

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up. Flat supported under a monstrous whip did some mobile working on this band. You wouldn't believe it, but Frank says it'll be even better next year.

Thanks to all who helped, especially Kevin, Norm, Chris, Bill, Varley and any other I've missed—you're the chaps who made it what it was.

It seems that that little bit has taken up all the space that Hon. Editor will allow, so we must bid you farewell until the next meeting. November 6 is the date, and the place is room 8 in the classroom block at the Tighes Hill Tech. We are to be treated to an unusual and most revealing lecture on Microminiaturisation. To be given by Col. H. J. Trick, head of the Military Products Division of A.W.A. He is bringing some new equipment, and this will be the first showing to the public in Australia, we are told. No, don't miss it, whatever you do. We start at 8 p.m.

I'm a bit unhappy really. All these lucky chaps on holidays, Bill 2XT in Japan, Lome 2CS here, and everywhere, and—no I promised I wouldn't say the other. Still, suppose there are compensations, I won't miss the meeting. By the way, did you know that our Arie has a new name—your ask him. And that two of our members are waiting for a long letter In the affirmative from the examinations branch. Best of luck, chaps. 72, 5AKK.

VICTORIA

WESTERN ZONE

Quite a nice gathering took place in Nhill on September 29th. About 30 members and their families braved the rather wintry conditions. We were sorry that because of bad flying weather the flying group of the South Western Zone were unable to be with us. However we will order a day to suit next year, and the Microminiaturisation. To be given by Col. H. J. Trick, head of the Military Products Division of A.W.A. He is bringing some new equipment, and this will be the first showing to the public in Australia, we are told. No, don't miss it, whatever you do. We start at 8 p.m.

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SOUTH AUSTRALIA

The monthly general meeting of the VK5 Division was held as usual in the club rooms to a well-below average gathering, due to the absence of the lecturer for the night being Rob 5RG and the subject, 'Spurious Radiations.' Rob had been called upon to undertake something of a more serious nature, and the lecturer for the night was also present to take his turn. However, there were still a few people around, and the atmosphere was quite friendly.

The report of the day was that of the VK5 Division, and the discussion was quite animated. It seems that the VK5 Division is progressing well, and there is a lot of interest in the club. The club is planning to hold a major event in the near future, and everyone is excited about it.

The officers elected for the following year were: President, J. W. Edmonds, 3AUF; Vice-President, W. K. Semoruk, 3AUS; Sec. and Treas., W. J. Kinsella, 3AKW, re-elected. A special committee was formed to organise W.A. and Victoria meetings. They are: 3AUF (Clear Lake), 3AKW (Kobe), 3ADS (Adela), 3AOS (Telangatuk), 3ATN (Birchip).

The a.s.b. chaps seem to be the most active, with a number of meetings held in the area. The club is also planning to hold a large rummage sale in the near future, and everyone is looking forward to it.

SYDNEY

With all the talk of Queensland's progress, it is necessary that this Division progresses also. This will not stand still however. With this in mind, we are excited to announce that the production of "QTC" for September is another way of saying that the typewriter is still going strong. Paul Rodukoff talked about his experiments and also perhaps to make it possible for Amateurs to live with nearby fellow Amateurs. Also, there is emphasis on 7 Mc. He is still getting around the usual business side of the meeting being held, either Federal or General, despite the vociferous objections of grumpy old Parsons BPS, who was amably disposed of by the President in the conclusion of smoke-oh without any of the vocal objections of grumpy old Parsons BPS, who was amably disposed of by the President.

The vote of thanks to the lecturer was ably and somewhat humorously given by Gibb 5GK, and the applause was again sufficient indication of the good job performed by Rob.

The meeting was adjourned.

ROBERT KENNEDY, Sec. and Treas.
nature of which I am in complete ignorance. Swiss cheese by all means, but Swiss Quads, that he had recently attended a lecture at Swiss cheese by all means, but Swiss Quads, eating double ice creams In the main street of eating double ice creams In the main street of telling Uncle Tom (STL) of the incident on cutting up his beam control cable. Heard him telling Uncle Tom (STL) of the incident on cutting up his beam control cable. It went below the belt, or should I say below cutting up his beam control cable. It went below the belt, or should I say below cutting up his beam control cable. Well I was, see, and I did. not listening in. Well I was, see, and I did. not listening in. As a hobby I have had a number of disappointments, such as, when they took my coherer plate at any time is enough to give me an As a hobby I have had a number of disappointments, such as, when they took my coherer plate at any time is enough to give me an As a hobby I have had a number of disappointments, such as, when they took my coherer plate at any time is enough to give me an As a hobby I have had a number of disappointments, such as, when they took my coherer plate at any time is enough to give me an As a hobby I have had a number of disappointments, such as, when they took my coherer plate at any time is enough to give me an...
swears that the walls and mirror were moving one night. This could have been caused by movement of the walls, however.

Activity on the various bands is very patchy, but one can find quite a number of signals on 80 most evenings. This will probably change however with the approach of summer and its high temperatures. Twenty metres has been a very popular band for this reason, with signals coming from Europe and India. American signals have also been coming in quite well.

Once again this month information has been very scarce and I would very much appreciate anything of interest being passed on to me. I am told that the Grid Reference System demonstration of the cornering ability of a Freeway, they should be much more frequently heard on this band.

Bernie 6KU was travelling up to Perth and was on 80 most evenings. This will probably change however.

Tasmania

It is strange how little information a scribe starts out with when writing for this column this month, anyway but, after a ten-minute QSO via 600 ohms with a certain person who seeses a great deal of the west coast, it seems to think I've just about got enough to make a showing.

Quite a few well known call signs have been heard on the air of late, some of them after quite considerable gaps. Bernie 7KU, for instance, is back from VK4 after an absence of about 10 weeks. "Up there to work," so he said, but otherwise he picked the winter months to go. His "long time no hear" signal is from Brian 7BH, who I am told is back on specific-duty to Oatlands in the course of his employment. Eddie 7ZBM has not been sighted out of Tarraleah path has been found by Eddie 7ZBM out of Tarraleah and we hear he has his shack finished now, so he should be heard more often. After quite a few weeks of trying a sure fire method of keeping in touch with his friends in the form of a cw station that haven't quite given him the return day in and day out that he desires, he is back from the lower midlands when he gets his antenna farm organised.

Another one is Tiny 7JD whose signal at any QSO to heaven was with his radio receiver, he believe he has his shack finished now, so he should be heard more often. Donal 7AAB out from New Norfolk to Oatlands in the course of his employment. So has Brian 7BH, who I am told is back on specific-duty to Oatlands in the course of his employment, so has Doug 7AAB from New Norfolk to Oatlands in the course of his employment. So has Brian 7BH, who I am told is back on specific-duty.

TASMANIA


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THE ENGINEER in the picture is using a machine called an "electrolytic tank analogue" to trace electrostatic field lines within a television tube electron gun. It is not a normal life-size gun of course, but a large model of a gun that has been cut in half so that a probe can be used inside it. It is a fascinating illustration of the unity of science that this strange mechanical animal can bring to graphical reality the century-old theoretical dreams of Faraday and Clark-Maxwell—it can actually draw the electrical field.

As a matter of fact, it can do more than this—it can trace out the paths taken by electrons flying through the gun on their way to spell out a picture on the screen of a television set. Again, is it not strange that such a device can keep up with the antics of the infinitely smaller electron, millions of millions of millions times lighter than it? (The mass of the electron is about $10^{-30}$ Kgm.) The laws of Science hold over vast magnitudes.

Our scientists and engineers sometimes pause to muse on these matters, while they are pursuing their constant task of applying science to the solution of problems which arise in the design and manufacture of the world's best valves and picture tubes.
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Publishers:
VICTORIAN DIVISION W.I.A.
Reg. Office: 65a Franklin St., Melbourne, Vic.

Printers:
"RICHMOND CHRONICLE," Phone 42-2419.
Shakespere St., Richmond, E.I, Vic.

FEDERAL COMMENT

RETIREMENT AND AMATEUR RADIO

In this modern day and age, how many times are we asked "Have you made provision for your retirement?" Generally speaking, these enquiries are made by representatives of insurance companies anxious to sell us superannuation policies!

Finance is only one of the problems we must face when the time comes. One very important question which must be eventually tackled is how to spend all that time. Can you think of a more rewarding way of spending a large portion of that time than by the pursuit of Amateur Radio? Chatting away with friends all over the world—keeping abreast with life from the comfort of your own hearth? "Is then you will really appreciate the wonderful gift of friendship which Hamdom, with its lack of barriers, geographical, colour, creed or ideology, has to offer.

During the first flush of youth as an Amateur our enthusiasm runs to DX, Contests, Awards and late nights! A little later our greatest satisfaction is derived from the technical perfection of the home-built rig or the perfect aerial system. Then comes a time when the problem of providing for and raising a family dulls the interest in our hobby. Sooner or later the old urge reasserts itself and our excursions into Hamdom become more frequent with the emphasis on ragchewing, especially when our domestic responsibilities lessen.

Finally, comes the finest times of all—retirement—when we can achieve our greatest reward for a lifetime devoted to our hobby of Amateur Radio. We have all the time in the world at our disposal, have sound financial position and can then enjoy the pleasures which have never quite been satisfied before. At this time, in our twilight years, is perhaps the best time to give back something to Amateur Radio as well as take something from it.

This is the time when we can devote more time and energy to promoting better understanding and goodwill to our contemporaries in other countries, to cementing friendships born of casual contacts and in making new ones. This is an appropriate time of the year to be contemplating "peace and goodwill to all men", and in retirement we hope this sentiment carried down through the ages will be with you.

FEDERAL EXECUTIVE WISHES ALL AMATEURS A VERY HAPPY CHRISTMAS.

FEDERAL EXECUTIVE, W.I.A.

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THIS circuit is primarily intended as a guide to the conversion of the "old type" A.W.A. Carphone, which uses a 20-megacycle series type oscillator crystal, and the main object of the change is to bring these units into line with the later types of equipment.

This is achieved by re-wiring the oscillator chain and substituting a 10-megacycle parallel resonance crystal. At the same time provision is then made for switching to additional channels and providing individual frequency adjustment for each crystal.

When completed, the general circuit is similar to the later A.W.A. MR3A "Carphone Junior" circuit and the actual switching details may be adopted to convert these sets for multi-channel switching.

CONVERTING CARPHONE

To convert the old type Carphone, it is firstly necessary to re-wire the receiver oscillator chain in accordance with the circuit of Fig. 1. This involves the interchange of the existing 6J6 oscillator and multiplier with the 6AU6 tripler. In the re-arranged circuit, the 6AU6 becomes the oscillator and the 6J6 the doubler and tripler. It is suggested that some re-orientation of the sockets will be necessary for best wiring layout.

The circuit shows a second winding in the tripler coil can and this is an additional coil wound (with one turn less than the existing coil) loosely coupled to the existing single winding to also resonate at 120 Mc. (The slug in the original is removed.) If you feel so inclined a second winding in the oscillator plate coil will provide a means of increasing the spurious response rejection of the receiver (see insert diagram, Fig. 1), but several units have already been converted without this change and perform quite satisfactorily.

There is quite a fair amount of room in the Carphone receiver and space to house receiver and transmitter crystals and switch can probably be accommodated beside the receiver oscillator chain on a small sub-panel. The transmitter crystal oscillator circuit can be extended across to this point and a twisted pair is usually satisfactory for this purpose.

A similar arrangement to that suggested for the MR3A "Carphone Junior" would probably be quite adaptable for the "Carphone" (Fig. 2) and a general description of this is given below. However, any suitable arrangement could be used and remote relay switching would be quite adaptable to any of the units.

SWITCHING IN THE "JUNIOR"

In the MR3A "Carphone Junior" multi-switching arrangements can be housed by mounting a small sub-panel above the microphone transformer. On this panel are mounted six "D" type crystal sockets and six of the improved Philips' trimmers (see Fig. 2). In front of this is mounted a double bank three-position three-pole wafer switch. This is housed in the space previously occupied by two electrolytic capacitors which are replaced with under-chassis pig-tail types.

To help in wiring the sub-panel supporting the crystals and trimmers, a large cut-out hole (noval socket size) is made in the centre and the interwiring socket to trimmers, etc., passes through this.

A short flexible Bowden cable passes through a hole drilled in the "panel-lamp and switch bracket", and comes out at centre between the receiver and transmitter.

(Continued on Page 16)
USING THE OSCAR III. V.H.F. COMMUNICATION SATELLITE

WILLIAM I. ORR, W6SAI

OSCAR III, the third in a series of space communication satellites designed and built by Radio Amateurs, is being tested in a pre-flight prototype package in preparation for a launch during the winter months of 1964. The Oscar III. satellite is a battery-powered high frequency translator operating in the internationally assigned 2 metre band (144-146 Mc.) in accord with the new Amateur space allocation granted at the recent I.T.U. Space Communications Conference held in Geneva.

In brief, the Oscar III. satellite permits two-way v.h.f. communication to be achieved by Radio Amateurs which contains the curvature of the earth (Fig. 1). The main portion of the transistorized equipment in the satellite listens to a 50 kc. segment of the 2 metre band centered about 144.1 Mc. and instantaneously translates this portion of the spectrum to a 50 kc. segment centered about 145.9 Mc., retransmitting the latter band segment to the ground observer. This radiated by the curvature of the earth and will generally have longer communication time than stations located on an east-west line, moreover, will generally have longer communication time, as the Oscar III. satellite will probably have a north-south (polar) orbit. The length of time the satellite remains within a common communications area between two stations depends upon the distance between the stations and the angle at which the satellite cuts across the area. For short distance contacts (stations separated by 500 miles or less, Fig. 1C) the satellite traverse time across the common communication area may be as much as six to eight minutes, whereas for extreme distances the traverse time may be a matter of only a few seconds.

USING OSCAR III.

Various types of experiments may be conducted by Radio Amateurs during the forthcoming flight of Oscar III. Passive, "listening experiments" are useful, as well as attempts to achieve two-way v.h.f. communication via satellite. In all cases, however, it is well to plan the operation in advance so that valuable time will not be lost during the period that the satellite is within radio range, estimated to be about eight minutes or less.

Telemetering Measurements: A more sophisticated form of telemetering is incorporated in Oscar III. than was used in the first two Amateur space satellites. The original Oscar beacon telemetered internal package temperature to earth by means of a temperaturesensitive element that varied the "HI" rate in such a way that a simple count of the rate by the ground observer could be translated into package temperature. Based on this figure and upon experience gained with Oscars I. and II., a radius of ground resolution of the satellite turns out to be about 1,000 miles. Thus, two stations within 2,000 miles of each other are theoretically just within communication range via Oscar III. (Fig. 1B). At this distance, however, contact would be problematical, as the common communication area for both stations is extremely small.

Stations 800 miles apart or less, however, stand a much better chance of communication as the satellite remains within the common communication area for a greater length of time. Stations located along an east-west line, moreover, will generally have longer common communication time, as the Oscar III. satellite probably will have a north-south (polar) orbit.

The area for both stations is extremely small. As Oscar III. will probably have a north-south (polar) orbit, stations located on an east-west line will generally have a longer communication time than stations on a north-south line. The length of time Oscar III. remains in the common communication area depends upon the distance between the stations and the satellite cuts across the area.
perature. The “HI” rate of Oscar III, will be nearly constant and used only as an identifier, broken regularly by bursts of telemetering. The telemetering data, including temperature. The “HI” rate of Oscar III, as an identifier, broken regularly by transmitted intelligence. Observing the width will be a measure of the transmitted intelligence. Observing the width will be a measure of the transmitted intelligence.

Several thermal points will be monitored within Oscar III. and the measurements will be transmitted in sequence, as will be described in a future article. The Oscar III. thermal temperature data. Several thermal points will be monitored within Oscar III. and the measurements will be transmitted in sequence, as will be described in a future article. The Oscar III. thermal temperature data.

The 145.95 Mc. beacon may be used for Doppler data by ground observers. The beacon signal will be a measure of the Doppler shift, suitable for long-term measurements. It is hoped that some observers will maintain a 24-hour watch on this beacon, as various observations made on Oscar II point to unusual modes of v.h.f. propagation that permit extremely long distance reception of the satellite, well beyond the usual line of sight. A continuously-running receiver couple in a tape recorder may very well turn up a permanent record of long-distance reception as-yet-unexplained modes of v.h.f. propagation. In addition, Doppler measurements may be made on this beacon to determine orbital parameters and predictions of future passes.

**Doppler Measurements:** The 145.95 Mc. beacon may be used for Doppler data by ground observers. The beacon signal will be a measure of the Doppler shift, suitable for long-term measurements. It is hoped that some observers will maintain a 24-hour watch on this beacon, as various observations made on Oscar II point to unusual modes of v.h.f. propagation that permit extremely long distance reception of the satellite, well beyond the usual line of sight. A continuously-running receiver couple in a tape recorder may very well turn up a permanent record of long-distance reception as-yet-unexplained modes of v.h.f. propagation. In addition, Doppler measurements may be made on this beacon to determine orbital parameters and predictions of future passes.

**PASSBAND MONITORING**

The translation equipment in Oscar III will work properly, provided that the satellite is in a quiescent state (no signals being received) the output of the satellite is in a quiescent state (no signals being received) the output of the translator consists of circuit and received noise, and may be readily identified by the ground observer as a hiss or "white noise" which covers the 50 kc. output frequency spectrum. The satellite may, in fact, be readily identified by the ground observer as a hiss or "white noise" which covers the 50 kc. output frequency spectrum. The satellite may, in fact, be readily identified by the ground observer as a hiss or "white noise" which covers the 50 kc. output frequency spectrum.

The output noise drops and the translated signal may be heard by a ground observer monitoring the output range of 145.875-145.925 Mc. As the satellite passes by, ground observers may tune back and forth across this range, logging the presence or absence of translated signals, which are repeated by Oscar III. Even though the observer possesses no transmitting equipment he will be capable of making a valuable contribution to the Oscar III. effort. As the satellite passes by, ground observers may tune back and forth across this range, logging the presence or absence of translated signals, which are repeated by Oscar III. Even though the observer possesses no transmitting equipment he will be capable of making a valuable contribution to the Oscar III. effort. As the satellite passes by, ground observers may tune back and forth across this range, logging the presence or absence of translated signals, which are repeated by Oscar III. Even though the observer possesses no transmitting equipment he will be capable of making a valuable contribution to the Oscar III. effort.

The primary objective of Oscar III. is to permit two-way Radio Amateur translator satellite communication between other stations. Maximum communication distance is limited by the orbital height of the satellite, which will be unknown until after launch, but it is hoped that continental or transoceanic contacts may be had by well-prepared Radio Amateurs. Experiments conducted by Amateurs living in the San Francisco area with a preliminary Oscar III. model, mounted atop a tower at the home of W6VMH, proved that the satellite permitted two-way satellite-to-earth transmission.

For illustration, let us assume a hypothetical pass of Oscar III. between two v.h.f. stations that desire to achieve two-way satellite communication. The problem is defined in this manner:

1. Where does the satellite approach the propagation path between the two stations, and how long will it be clear of v.h.f. range of both stations?
2. What will be the line of position of the satellite between the stations at it moves along its orbital path?
3. What should be the transmitting frequency of each station, and to what frequency should each station receiver be tuned in order to hear the satellite-transmitted signal of the other station?
4. At what critical times will each station listen and transmit?

It would be reasonable to assume, until proved otherwise, that calling
In this article, satellite frequencies are given in megacycles, and ground station frequencies are given in kilocycles.

(5 elements, approximately 10 decibels) rotatable in azimuth only, controlled by a second operator whose job is to keep the beam antenna aimed on the satellite by virtue of the early-warning receiver tuned to a satellite beacon signal.

Information from the Oscar Communication Centre has notified our two DXers that the satellite will be approximately between them, on a north-south path during the time period of 1400-1407 G.M.T. The tactical situation is shown in Fig. 1C. W9XXX aims his antenna to the east of north, and W3YYY aims his antenna to the west of north.

Both stations have agreed beforehand to transmit 144,110 kc. plus or minus one kilocycle. They know that the Oscar III translator will invert their signals and retransmit them back to earth on 145,880 kc. W9XXX will start transmitting as soon as he hears the beacon signal, which will be heard at 145,890 kc. at the proper satellite repeated frequency of 145,890 kc. As a starter, therefore, the early-warning receiver of each station is tuned to the beacon frequency 145.890 kc. The communication receiver is tuned to 145,880 kc. As the fateful hour approaches when Oscar III comes within range, the two stations quickly run through their individual "script". If the bandwidth of the communication receiver is going out of range, and sure enough: contact between the two stations is abruptly lost. W9XXX's transmission, clearly audible above the "white noise".

When the 30 seconds are up, W9XXX signs over and starts to listen near 145,890 kc. for W3YYY. This second operator at W3YYY faithfully continues to track the satellite beacon with the early-warning receiver, making any necessary adjustments to the frequency, in attempt to locate the beacon signal at maximum strength. W3YYY is calling W9XXX on c.w., and shortly, the operators of the latter station are thrilled to hear the translator-repeated signal of W3YYY calling them close to 145,880 kc! W3YYY passes a signal report to W9XXX and the QSO starts to resemble a normal low-frequency contact via a DX path. Eventually, both second operators note that the satellite beacon signal is going out of range, and sure enough: contact between the two stations is abruptly lost. W9XXX's transmission, clearly audible above the "white noise".

It is hoped that Amateurs in areas of the world having little v.h.f. activity will supply beacon signals that will assist in satellite and remote-area v.h.f. repeater communication. A v.h.f. beacon transmitter in the Azores, for example, may activate Oscar III. over the North Atlantic area so that such passes may be achieved by those remote-area repeaters. The possibility exists that the satellite may be badly overloaded near areas of intense v.h.f. activity and remain silent but receptive over areas of the world where little v.h.f. activity is present.

REMOTE-AREA "BEACONS"

It is hoped that Amateurs in areas of the world having little v.h.f. activity will supply beacon signals that will assist in satellite and remote-area v.h.f. repeater communication. A v.h.f. beacon transmitter in the Azores, for example, may activate Oscar III. over the North Atlantic area so that such passes may be heard on both sides of the Atlantic. A similar beacon near the Fiji Islands and one near India will activate the satellite over Pacific and Asian areas.

It is readily apparent that this new advance in communications is a voyage into the unknown, and no member of the Oscar crew really knows all the answers, or has a complete picture of the capability of Oscar III. Surprises fall all the time when Oscar III. goes into orbit, and Radio Amateurs world-wide join Project Oscar in looking forward to a successful launch and an exciting future for this 30-pound package of surprises.

ACKNOWLEDGMENT

Thanks to Don Nargaard, W6VMH for advice and assistance in the preparation of this article.
SOME ASPECTS OF SPURIOUS RADIATIONS FROM AMATEUR TRANSMITTERS

R. S. Gurr* VK5RG

FROM time to time Amateurs experience criticism on their transmissions from other Hams, broadcasters, newspaper viewers, and sometimes from the P.M.G. The criticism is usually the result of some malf-adjustment of the transmitter, or may be due sometimes to the poor design, while the original construction.

I think we all know the implications of complaints of t.v.i. and b.c.i., etc., and generally are able to see the problem through to some satisfactory conclusion. My main purpose in this article is to awaken Amateurs to the implications of complaints from other Amateurs.

We are short of frequencies for our experimental, and general communication, and we are at present setting up a fund to fight for their retention—even in this magazine you read the implications of complaints of t.v.i. and b.c.i., etc., and generally are able to see the problem through to some satisfactory conclusion. My main purpose in this article is to awaken Amateurs to the implications of complaints from other Amateurs.

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TUNES 80, MODEL 4/102 V.F.O. UNIT.

All Geloso V.F.O. Units are supplied complete with calibrated dial, pointer and perspex escutcheon. Price £2/11/9 (inc. S.T.)

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Phone 34-6539
Suppression tolerances and checks
To measure the amount of attenuation with normal Ham transmitter design takes a lot of time and accurate equipment. The most practical tolerance is 30 decibels below the fundamental are easily obtained, but don't do it on your Ham receiver "S" meter or you will finish up with stronger spurious signals than the original! With 80 or 40 metres and the local 200 yards away can hear you on 80 or 40 at S3 or better, you have more work to do. If hear you on 15, also return this to your soldering iron, but if he complains of an S3 on 10, then he will have to put up with it, because this is good suppression.

If your signal is living at a mile hears you on any band but 20 metres, then you have not achieved all it is possible to achieve.

With respect to splatter and key clicks, if you throw all your selectivity in (and 500 c.p.s. bandpass is not impossible), tuning through a c.w. signal should produce clicks only when the signal is on the linear and the local放大器—adjust the r.f. input (by aerial attenuator if possible) to the receiver until the "S" meter reads some high but normal value. (An "S" meter allows you to see the relative bandwidth—adjust the r.f. input is the best in my opinion.) Now if the receiver is detuned 3 kc., and the key clicks are kicking up to a value 50 db. below the original, then obviously, although they still exist, the spurious signals are well attenuated.

This assumption can only be made when a receiver of "knife edged" selectivity is used, and for the purpose of the above observation, the "window" or "knife edge" are looking through at the frequency band of the transmission, is very much smaller than the actual transmission width. That is, a receiver not very much of check even further, if we had a receiver of 100 c.p.s. bandpass and tuned 2 kc. away from the edge of "clicks" 3 kc. above the speech transmission, we would see little "splatter" at all.

Checking your key clicks and splatter by this means can also be done by using the image of your own transmission in your receiver. The bands 10, 100, and 1000 Mc., my own Eddystone 680X is of course completely blocked at this frequency, but when I tune it to 13.9 Mc., I can view my own signal as that of a remote one. With crystal filter in and bandpass down to minimum, speech modulation and key clicks can be adjusted until listening 5 kc. outside the transmitter "occupied band", they are reduced to nothing. Try it sometime.

Testimonials
I unfortunately don’t completely practice everything I preach in this field for a number of reasons. However, I am involved in, wherein I have proved to myself and others, that it is possible to live with your Ham neighbour—even more so if he recognises his transmitter and receiver deficiencies and correct them—

(1) Macquarie Island 1952 (VK1RG): A720A transmitter, 400 watts of high level modulation on 14415 kc. At a distance of 200 yards, I could operate a 50 watt output a.m. rig on 14350 kc. with no mutual interference, i.e. I did not know the Commercial rig was on and neither were the Commercial operators aware of my signals on 14350 kc. away before any sign was noticed on the Commercial circuit. (14350-14400 kc. was still Amateur territory in those days) 1600 Walter VK5XV, 400 watt rig influenced reception 50 kc. or so from its frequency.

(2) VK5ZL/VK5RG, 1954-57: Steve and myself are 400 yards apart and we used at this stage 100 watts each and two different types of 807 or 6146 with a pi-network tank, each 30 ft. high. Steve had the Geloso driving a pi-network tank and himself is very much smaller than the actual transmitter "occupied band", they are reduced to nothing. Try it sometime.

(3) VK5ZL/VK5RG, 1954-57: Alber has more power than Steve, but is about 2000 yards apart. We have existed together on the same band only 50 yards apart, on phone, and no need to close down! I beam right at him when I fire at the States and he at me when he has a chance. These are test results.

(4) VK5ZL/VK5ZL/VK5LR: The three of us have used 20 metre phone continuously in Remembrance Day Contests over the years and have simultaneously had contacts between 1410 kc. and 14200 kc. with Interstate stations and no mutual interference. There is no sign of either 5ZL or 5ZB at 5RG when I listen on 40 metres while they are working 5ZL.

(5) VK5Ro/VK5XX: Russ and myself were about 400 yards apart in Port Moresby, both keen on phone and c.w. and also contests, yet no need ever to close down because the other was on the bands. I have worked others on frequencies as close as 5 kc. from Russ on c.w. and we were each unaware of the other until later, when discussing our frequencies.

(6) VK9Ro/VK9AT: Tests on 40 metres on a Geloso driving a pi-network to a 40 metre dipole coax. fed. VK9Ro heard by Eddie at half mile on c.w. and signal was being picked up by an aerial coupler, using Faraday shielded link on antenna coil, no sign of VK9Ro on 20 metres.

(Continued on Page 16)
For More Sock in Your Signal, Build the...

ANTENNA ANALYSER

HERB FRIEDMAN, W2ZLF

We know a fellow who abandoned his Ham gear for a while to spend his time sticking pins into the egg-bag of his next-door neighbour. Why? Because the neighbour’s flea-powers outperformed his super-duper, high-priced outfit every time.

If he had spent less time with the pins our friend might have realised all he had to do was get his antenna system tuned to razor’s edge. Think it’s a task to be dreaded? Well, listen. “E1’s” Antenna Analyser can determine antenna and feedline resonance, system impedance, s.w.r. and radiation resistance (and supply resistance) quicker than you can say voodoo!

The Analyser requires an input signal which can come from your v.f.o. or g.d.o. A one or two-turn coil placed on R2 (first), and set transmitter’s low-power stages, or from your g.d.o. coil, will pick up a sufficient signal for the Analyser.

The Analyser’s range extends up to 30 Mc and it will work with twin-lead or open-wire line. If you use coaxial cable, replace S02 with a coax connector.

CONSTRUCTION

Except for M1 and S02, use the components specified. If you use short direct leads and are careful about parts placement, the range can be extended up to 54 Mc. But on 2 metres, both M1 and R2 must be individually shielded with aluminium foil. Mount M1 as close as possible to the top of the U-section of a 2.5” x 3” x 2” Minibox. This will leave the greatest panel area for the knob and calibrations.

M1 should be at least a 200 microampere meter. If you can afford a 100 microampere meter, so much the better. Such meters are still available on the surplus market at low prices. Don’t use an inexpensive imported instrument in this application—they are too stiff for critical adjustments.

R2 must be insulated from the cabinet with a half-inch length of 3/8-inch i.d. plastic tubing. Cut the tubing so the ends are square (aperture) and thread it on R2’s mounting bushing with Q-dope, taking care that it does not get into the control. Push the insulator on to R2’s bushing (screw the mounting nut all the way on, and set transmitter’s low power stages, one end of the tubing will have threading moulded in it. Re-coat R2’s bushing with Q-dope and force the unthreaded end of the plastic insulator on R2. When the tubing dries, the insulator will be permanently attached to R2. Then push

the plastic shift into R2 and fasten the assembly to the panel with a standard 3/8-inch panel bushing.

Position input connector S01 and antenna socket S02 so their lugs line up with R2’s terminals. Make certain D1’s polarity is correct and take care that it is not overheated when soldering. Complete all wiring except the connection from R2 to S01 which will be made after calibration.

CALIBRATION

If you plan to use a g.d.o. as a signal source, use the resistor specified for R4. However, if you use your v.f.o. or a link pick-up from the transmitter, M1 may be driven off scale. To prevent this, change R4 to 47,000 ohms. If you think you may use either a v.f.o. or a g.d.o., R4 should be a compromise of about 24,000 ohms.

Set R2 full counterclockwise and connect an ohmmeter across it. Rotate R2 until the ohmmeter indicates 25 ohms, then put the 25-ohm mark on the front panel. Do the same for 50, 75, 100, 150, 200 ohms, etc., up to 500 ohms. Since R2 is linear, in-between points can be easily added. If you are only interested in a limited range of impedances (such as 25 to 100 ohms), use a 100-ohm pot. Full clockwise rotation will now correspond to 100 rather than 500 ohms.

After calibration connect R2 to S01 and check the calibration by inserting carbon resistors in S02. Connect the signal source to S01. A v.f.o. can be fed directly to S01. If you use a g.d.o., connect a one or two-turn coil to the Analyser and slip it over the g.d.o.’s coil. Move the loop over the g.d.o.’s coil until you get a maximum deflection on M1. Rotate R2 until M1 indicates the null. If the unit is correctly wired, the null will be at absolute zero or very close to it. If you get only a partial null, the wiring in the Analyser may be sloppy. If the calibration is consistently off, readjust the knob on R2’s shaft or re-mark the dial. If calibration is off badly, lock for a wiring error.

OPERATION

You’ll get greatest accuracy from the Analyser when it is connected to the antenna through a half wavelength (or multiple of a half wavelength) feedline. The half wavelength line acts as an impedance matching transformer. If you connect a 50-ohm impedance to one end of the feedline, the other end will appear as 50 ohms. To keep the power-transfer loss low, feedlines should always be a half wavelength, or multiple thereof, long.

Here’s how you use the Analyser to determine the exact length of the half wavelength feedline. Cut the line a little longer than the calculated length. Connect the line to S02 and feed a signal at your operating frequency to S01. Set R2 to zero ohms and short the open end of the line. M1 will indicate up-scale. Cut off small sections of line, then short the line. When the line is exactly a half wavelength long, M1 will null. (The length of a quarter-wavelength section of line is determined the same way except the frequency end is not shorted.)

Now for antenna measurements. Connect your antenna to the free end of the half wavelength feedline and rotate R2 for null. This setting is the antenna’s radiation resistance (impedance). A complete null means the antenna is resistive and is precisely tuned to your operating frequency. If the null is not perfect, the antenna is reactive and not resonant at the operating frequency.

S.w.r. can be determined by dividing the antenna impedance by line impedance. If the antenna impedance is 100 ohms and you are using a 50-ohm line, the s.w.r. is 100/50, or 2. If the answer comes out less than 1, invert the formula so the larger number is on top.

To use the Analyser to peak-tune an antenna or matching network, connect the antenna (with a feedline) to S02, and set R2 to the desired impedance. Feed a signal at your operating frequency to S01. When you have adjusted the length of the antenna or its tuning device (gamma-match) and obtained a null, the system will be properly tuned.

(Continued on Page 11)
TRANSEQUATORIAL PROPAGATION RESEARCH

C. G. McCUE*

There have been many reports since 1947 of unusual v.h.f. propagation over very long distances, sometimes exceeding 8,000 km., in directions more or less transverse to the equator. The frequencies involved have been as high as 80 Mc. during sunspot maximum and are usually in excess of any frequency which would be expected to propagate over these distances.

As an Australian contribution to the International Quiet Solar Year (I.Q.S.Y.) 1964-65, the Weapons Research Establishment, Department of Supply, has commenced a study of transsequatorial propagation (T.E.J.) in collaboration with the Radio Research Laboratories (R.R.L.) of the Japanese Ministry of Posts and Telecommunications, the United States Army Signals Corps on Okinawa, and the Townsville University College (T.U.C.) in North Queensland.

*Box 1424H, G.P.O., Adelaide, South Australia.

In part of this work, three lkw. transmitters using Yagi aerials transmit on 32.85, 49.00, and 72.71 Mc. from Darwin and are received by R.R.L. engineers at Yamagawa in southern Kyushu in Japan. The transmissions are c.w. with the call sign VLS5A, repeated every ten minutes.

The author visited Japan during May and June in connection with this experiment. While there, he met Messrs. T. Kuwahara (JA1CR) and Y. Naguchi (JA1MKX) on behalf of the Japanese Amateur Radio League. They informed the author that many Japanese Amateurs have agreed to observe the Darwin transmission on a regular basis and to report their observations to Mr. S. Hara (JA1AN), who is organizing this work. Mr. Hara will forward the reports to the scientists at R.R.L. The voluntary efforts of the Japanese Amateurs in observing the Darwin transmissions will add considerably to the knowledge to be gained from the Japan-Australia experiment. The Amateurs will present the scientists with data covering a geographical spread not otherwise obtained.

Table 1 lists the call signs of Japanese Amateurs known by the author to be co-operating with Mr. Hara, the frequency which each will monitor, and the schedule which they will follow. The schedules are explained in Table 2. It should be mentioned that "World Days" are days when scientific and engineering in the fields of ionospheric physics, radio, geomagnetism, meteorology, aurora, cosmic rays, airglow, aeronomy, and solar activity make specially concentrated efforts to obtain data. World Days are listed in Table 3.

During the I.Q.S.Y., the Japanese Amateur Radio League is continuously operating three 50w. transmitters from Tokyo on 29.0 (Amateur), 30.5 (A1), and 145.35 (F3) Mc. The aerials are simply horizontally polarized Yagis which rotate once a minute. The station call sign is JA1IGY.

Table 1.

<table>
<thead>
<tr>
<th>No.</th>
<th>Call Sign</th>
<th>Schedules</th>
<th>Letter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>JA1YEN</td>
<td>A,B,C</td>
<td>49.00</td>
</tr>
<tr>
<td>2</td>
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Table 2.

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<td>A</td>
<td>Observe on world days from 2000 to 2400 hours J.S.T.</td>
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<tr>
<td>B</td>
<td>Observe on world days from 2400 to 3000 hours J.S.T.</td>
</tr>
<tr>
<td>C</td>
<td>Observe on Sundays from 1000 to 1200 hours J.S.T.</td>
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<tr>
<td>D</td>
<td>Observe on Sundays from 1200 to 1600 hours J.S.T.</td>
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<td>E</td>
<td>Observe on Saturdays from 2000 to 2400 hours J.S.T.</td>
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<tr>
<td>F</td>
<td>Observe irregularly but keep a log of times.</td>
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<tr>
<td>G</td>
<td>Use a pen recorder during observing periods.</td>
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Table 3.

<table>
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Table 4.

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<td>1200 to 1600</td>
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<tr>
<td>JA1JPD</td>
<td>2000 to 2400</td>
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</table>

ANTENNA ANALYSER

(Continued from Page 10)

Sometimes (as with mobile whips) you do not know what the antenna's resonant impedance should be. To determine it, connect the antenna to the Analyser with a half wavelength section, and set the generator to your operating frequency. Adjust the antenna as you turn R2 back and forth (at this time you are not interested in exact impedance) until you obtain a null at some setting of R2. The antenna is precisely tuned at the null. R2 indicates the antenna's radiation resistance. Knowing this, you can use the tables in the A.R.L. Antenna Book to determine the correct length for a matched antenna system. Remember, it's only when the antenna system is matched and tuned for resonance that all transmitter power is coupled to the antenna. Don't forget that the Analyser must always be connected directly (or through a half wavelength line) to the device under test.
THE STANDARD in PRECISION & RELIABILITY!

QUALITY TRANSFORMERS

by

A & R
MELB. AUST.

"The Transformer People"

SUPPLIERS OF A COMPLETE RANGE OF...

POWER, AUDIO & STEP DOWN TRANSFORMERS

FULL RANGE OF DATA SHEETS AVAILABLE

FOSTER DYNAMIC MICROPHONES

SPECIFICATIONS:

Output Impedance ... ... ... ... ... ... ... ... ... ... 50 ohms or 50K ohms
Effective output level ... -55 db. [0 db. -- (one) 1V, Microbar]
Frequency response ... ... ... ... ... ... ... ... ... ... 50 to 15,000 c.p.s.

OMNI-DIRECTIONAL DYNAMIC:

Plastic Diaphragm.
Size: 4½" long, 1½" diameter.
Cable: 12 ft. of P.V.C.

Swivel fits 5/8" 26 t.p.i. Stands.
Colour: TWO-TONE GREY.

Retail Price 50 ohms: £4/7/9 + Sales Tax 10/11
Retail Price 50K ohms: £4/10/0 + Sales Tax 11/3

A QUALITY PRODUCT FOR TAPE RECORDERS & P.A. USERS

Marketed by ZEPHYR PRODUCTS PTY. LTD.

58 HIGH STREET, GLEN IRIS, S.E.6, VICTORIA

Phones: 25-1300, 25-4556

Manufacturers of Radio and Electrical Equipment and Components

SERIES AND PARALLEL MODE CRYSTAL OPERATION FOR V.H.F.*

JOHN J. NAGLE, W3JES

A n interesting and informative article has recently appeared concerning the performance of overtone crystal controlled oscillators when operated in a high impedance or anti-resonant mode. The use of overtone crystals in a low impedance or series- resonant mode offers several advantages over parallel mode operation. It is the purpose of this article to describe these advantages. This will be done by explaining the principal differences between series and parallel mode operation and examples of both types of circuits will be given. It is the author's belief that the biggest stumbling block to the use of series mode crystal controlled oscillators has been the difficulty in adjusting the oscillator for true series operation of the crystal. A method for doing this is also given.

The author of the above mentioned article describes the use of overtone crystals when operated in a high impedance or anti-resonant mode. The circuit described has the advantage of simplicity and economy of parts. However, it also has the disadvantage that the frequency is dependent on the capacity that is in parallel with the crystal. The major portion of this capacity is the input capacity of the oscillator tube; this capacity, in turn, is composed of grid-to-cathode capacity which is usually constant plus the grid-to-plate capacity multiplied by the voltage amplification of the tube (Miller capacity). Since the voltage amplification depends on the value of load impedance, the frequency of oscillation depends on the load impedance.

SERIES MODE

Before proceeding further it is desirable to consider the difference between series and parallel operation of a quartz crystal unit. A quartz crystal unit may be represented by the circuits shown in Fig. 1. The components Lx, Cx and Rx represent the piezo-electric effect of the quartz crystal. The capacitor Cs is a physical capacitance caused by the capacity of the electrodes on the crystal, the stray capacity of the crystal holder and socket, and the input capacity of the oscillator tube or other device connected to the crystal. At a frequency known as the "series resonant frequency" of the crystal, Lx and Cs are resonant. From the definition of series resonance the impedance of the LxCsRx arm becomes Rs so that the impedance looking into the terminals of the crystal is Rx and Cs in parallel. Typically, the value of Lx is several henries (not millihenries or microhenries, but henries); Rx is less than 50 ohms for overtone crystals operating in the 30-60 Mc. range. The author has measured the resistance of one 40 Mc. third overtone crystal to be 8 ohms! Since Lx and Cs are resonant at the operating frequency, the value of Cs must be a small fraction of Q. (Q = Xi./Rx.) It is this exceptionally large Q that makes the quartz crystal so useful in frequency control and filter applications.

It should be noted that the frequency of oscillation is not only upon Lx and Cs which are intrinsic properties of the quartz crystal itself; this frequency does not depend upon the value of Cs and hence the frequency is independent of the circuitry in which the crystal is used.

PARALLEL MODE

If the frequency is increased from the series resonant frequency the reactance of the series arm becomes inductive; this is because the reactance of the inductance, Lx, increases with frequency while the capacitive reactance of Cs decreases with frequency so that the difference between the two is no longer zero but shows a net inductive value. At some frequency above the series resonant frequency, the inductive reactance of the series arm will become anti-resonant (or parallel resonant) with the shunt capacity Cs. This frequency is known as the "parallel resonant frequency" and the crystal circuit appears as a high impedance at this frequency.

A crystal controlled oscillator may be designed to operate at either the impedance rise at parallel resonance or the impedance dip at series resonance. The same design will obviously not operate at both series and parallel resonant frequencies.

Two points should be borne in mind: First, the parallel resonant frequency is always higher than the series resonant frequency. Second, the parallel resonant frequency depends on the stray capacity that the circuit places across the crystal while the series resonant frequency depends on the parameters of the crystal unit itself. If it is desired to operate a crystal at its parallel resonant frequency it is necessary to specify the value of load capacity that the crystal will see. Within the last few years this value of capacity has been standardised at 32 pf. for most applications. A crystal grounded for parallel operation will oscillate at its name-plate frequency (within its tolerance) when the circuit presents a load capacity of 32 pf. across the crystal terminals.

Amateurs using surplus crystals, especially World War II surplus, should use caution where accuracy of frequency is important. At the time World War II. crystals were manufactured, a standardised value of load capacity had not come into general use and where high accuracy was required it was customary for the crystal user to supply the crystal manufacturer with a sample that the manufacturer then tailored the crystal. Since most Amateurs do not have access to equipment for accurately measuring frequency, especially in the frequency region where overtone crystals are most likely to be used, and since the input capacity of an oscillator tube is not easily determined, operation of the crystal in a manner such that the capacity across the crystal has only a small, if any, effect on the frequency of oscillation has certain advantages.

Typical examples of oscillators which use crystals in the parallel mode are shown in Figs. 2 and 3. Fig. 1 represents the most commonly used circuit. It is a modified form of the tuned-grid tuned-plate oscillator in which a parallel resonant crystal is substituted for

* Reprinted from "CQ." April 1964.

Fig. 1.—The equivalent circuit of a quartz crystal oscillator. Cs represents the holder capacity plus the input capacity of the oscillator circuit.

Fig. 2.—The Miller crystal oscillator circuit is a modified form of the tuned-plate tuned-grid circuit.
the grid tank circuit and is known as the Miller oscillator. Fig. 3 is the well known Pierce oscillator and has the advantage that no tuned circuits are involved. Most of the other parallel mode circuits are modifications of either of the above.

A good example of an oscillator using a crystal in its series mode is the Butler oscillator, shown in Fig. 4. Here the crystal serves as a series coupling element. At the series resonant frequency the crystal impedance is the lowest; the feedback is a maximum and the circuit oscillates at this frequency. At all other frequencies the crystal impedance is higher; since the crystal is a series element in the feedback path, the feedback will be reduced. If the circuit is properly designed, oscillations will take place only at the series resonant frequency.

Perhaps a more familiar oscillator circuit using series resonance is the Clapp oscillator 3, shown in Fig. 5. Although this circuit is usually seen as a variable frequency oscillator it was originally developed as a crystal controlled oscillator for a broadcast frequency monitor. The characteristics of this circuit that make it so popular as a variable frequency oscillator apply equally well to the crystal controlled case.

There are many other circuit configurations using series mode crystals, too numerous to describe here. However, a modification of the Miller circuit to use series mode crystals will now be described.

As mentioned above, the series resonant frequency of a crystal will depend only on the crystal unit itself; the stray capacity across the crystal will have only a very minor effect on the frequency of oscillation. The Miller circuit can be easily adapted to use a crystal in its low impedance (or series) mode by use of an artificial quarter-wave line.

TRANSMISSION LINES

It can be remembered from transmission line theory that a quarter-wave section of transmission line has an impedance inverting property. In Fig. 6, if the load impedance $Z_L$ is less than the characteristic impedance $Z_0$ of the quarter-wave section, then the impedance seen at the input terminals of the line, $Z_{in}$ is greater than the characteristic impedance of the line. Mathematically:

$$Z_{in} = \frac{Z_0}{Z_L}$$

The reverse is also true. The equivalent of a quarter-wave matching section can be made from lumped constants in the form of a pi-section network shown in Fig. 7 where $X_c$ equals $X_0$ at the frequency of operation. The characteristic impedance of such a section is given by $Z_0 = X_L = X_c$.

For our purpose we will place a crystal, operating in the series mode, at one end of the network; this will be transformed into a high impedance looking out the other end of the network. The high impedance end will be connected to the grid of the oscillator tube as shown in Fig. 8. In order to obtain as high an impedance as possible at the grid end of the network Equation (1) shows that (a) the crystal series resistance should be as low as possible, and (b) the characteristic impedance of the quarter-wave section should be as high as possible.

Condition (a) above implies that the crystal unit should have as high a $Q$ as possible. Condition (b) states that the shunt capacity should be as small as possible and the series inductance should be as large as possible, bearing in mind that the inductance and capacity must be resonant at the operating frequency. The minimum possible shunt capacity is equal to the input capacity of the tube, so that by making the input capacity of the tube the shunt capacity of the network, one physical capacitor is eliminated. In practical cases the series resistance of the crystal unit will be small compared to the reactance of the physical capacitor shunting the crystal so that this capacitor can also be eliminated. It is also necessary to add a grid resistor so that the net effect of the crystal unit since a typical value of grid resistor is 100K ohms, while the series impedance of the crystal unit is typically less than 50 ohms. The circuit is now as shown in Fig. 9.

COIL DATA

The only problem that remains is to specify the coil. The coil must resonate at the operating frequency with the input capacity of the tube. As mentioned above, the input is difficult to determine exactly so that the coil must be made adjustable.

The impedance inverting coil used is $\frac{1}{4}$ long by $\frac{1}{4}$ diameter close wound with No. 20 enameled wire (8 turns); the slug is green-dot iron. If the best adjustment seems to be obtained with the slug in the maximum inductance position, the inductance is probably too small and the coil should be rewound keeping the same dimensions but using the next size smaller wire. If the best adjustment seems to be with the slug removed the coil is probably too large and it should be rewound using the next size larger wire again keeping the same dimensions. Keeping the same physical dimensions and changing only the wire size insures that the inductance is changed by controlled amounts. I have found that this is a better procedure than changing size and changing the coil dimensions.

If the coil is to be made adjustable, some indication must be provided to tell when the proper adjustment has been made. It is believed that this "proper adjustment" problem has been...
the principal reason that the performance of series mode overtone oscillators has not been as good as it should be.

**ADJUSTMENT METHOD**

When the oscillator is operating on the proper frequency, the crystal will be in series resonance and the r.f. voltage across it will be a minimum. Hence by placing an r.f. voltmeter across the crystal and adjusting the grid coil for minimum voltage, operation of the crystal at its series resonant frequency can be determined. For convenience, the voltmeter circuitry can be made a permanent part of the oscillator and a d.c. test meter connected to test points for tune up. A complete oscillator and voltmeter circuit is given in Fig. 10. The voltmeter has an input impedance of approximately 50K ohms; since the series resistance of the crystal unit is less than 50 ohms, the effect of the voltmeter is negligible. In fact, when testing, connecting the d.c. voltmeter to the crystal no change in the oscillator beat note could be detected by ear.

The absence of any output at the fundamental frequency or multiples thereof (except of course the desired overtone and multiples of the desired overtone) insures that the crystal is operating in the proper fashion.

Use of the minimum voltage adjustment procedure previously described will give optimum performance of the oscillator.

Although overtone crystals are not capable of dissipating as much power as crystals operating in the fundamental mode, it is possible nevertheless, to obtain, from properly adjusted and controlled overtone oscillators, a reasonable amount of power with a minimum number of envelopes. As an example, the oscillator-buffer-tripler combination used by the author to go from 48 Mc. to 144 Mc. is shown in Fig. 11. In this arrangement the triode section of a 6U8 is used as the buffer operating on 48-98.3 Mc. The pentode section of the 6U8 is used as a buffer amplifier. The drive for the buffer is tapped down from the oscillator tank circuit to avoid overdriving the pentode section and to provide better isolation between the pentode and the oscillator. The output of the buffer amplifier is more than sufficient to drive a 5763 as a tripler to its full output of approximately one watt at 144-148 Mc. The d.c. current through the 100K resistor in the r.f. voltmeter circuit is less than 2 micro-amperes; the crystal resistance was measured to be 15 ohms so that the crystal dissipation is only 0.03 milliwatts. Thus in two envelopes it has been possible to use an overtone crystal oscillator, with the crystal operating well below its maximum ratings, to go to the two metre band with sufficient power output to drive a high power amplifier. This arrangement has the advantage as far as v.t.l. is concerned; no harmonics of the oscillator fall in a television channel and v.t.l. problems are simplified.

The same basic oscillator circuit can also be used in the 6 metre band with excellent results.

**SUMMARY**

In conclusion the difference between the series and parallel modes of a quartz crystal unit has been described; examples of oscillators using each mode have been presented. A modification of the Miller oscillator using an impedance inverting quarter-wave transmission line, and a method for adjusting the oscillator to true series mode crystal operation and for measuring the crystal dissipation has been given. It has further been shown that the series resonant frequency of a crystal depends only on the crystal itself, while the parallel resonant frequency depends on the capacity placed in parallel with the crystal.

![Fig. 11.—The oscillator-multiplier chain above uses a series mode overtone crystal. Only two tubes are required to provide an approximate one watt output in the two metre band.](image-url)
transmitter indicator lamps on the front panel.

This system will allow for the three channels which at present are envisaged and/or operating in Victoria and N.S.W., and we hope other States will adopt these common frequencies as equipment becomes available to them.

F.M. NET FREQUENCIES

The present frequencies and crystals are as follows:

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* Crystal requirements are to a tolerance of 0.0025% or better and the stated crystal frequencies are as measured with a load of 30 pF.

When ordering crystals, specify the equipment that it is to operate in.

Present occupation of channels is:

- Victoria: A and B
- New South Wales: A and B

Suggested working arrangements for Victoria are as follows:

Channel A—General working. Mobile to Mobile, Mobile to Base, Base to Base, but with preference to general calling and Mobile to Mobile operation.

Channel B (main W.I.C.E.N. frequency)—Mobile to Mobile, Mobile to Base, Base to Base, but with preference to Mobile to Mobile operation.

Channel C (second W.I.C.E.N. frequency)—Base to Base, Mobile to Mobile, Mobile to Base, but with preference to Mobile to Mobile operation.

All channels may, of course, be used in a real W.I.C.E.N. Emergency, but W.I.C.E.N. exercise traffic will move onto Channels B and C as these come more into use.

Six Metre F.M. Nets

Channel A: 52.525 Mc. (active)
Channel B: 52.845 Mc. (projected)
Channel C: 52.765 Mc. (projected)

50 Centimetre F.M. Net

435.0 Mc. (active Geelong and Melbourne).

All channels and frequencies use normal 15 kc. deviation and frequencies have been "netted" to the stated frequency by the Melbourne P.M.G. monitoring station at South Morang.

Spurious Radiations from Amateur Transmitters

(Continued from Page 8)

(7) VK5RG/VK5ZB, 1964: My 7 Mc. transmission via 70 ohm/300 ohm balun to 7 Mc. folded dipole produced an S8 20 metre harmonic at 400 yards. Using an antenna coupler in place of the all-band balun, the second harmonic was reduced to S3.

Hence I have proved to myself and have had proved to me that it is possible to live with your Ham neighbour. Next time you feel like switching off because yours is all over the place, look at your own rig, your own receiver, and then when you are sure your spurious signals are of a reasonable level, approach that neighbour and start up a conversation along these lines and try to convince him there is plenty that he can do to help.

Another big bonus won when lower frequency spurious signals are reduced is the additional chance of escaping b.c.i. complaints. Do you put up ten spots on the b.c. band when operating on 40 metres? Probably nine of them would go if you eliminated the 80 and 20 metre signals you are putting out simultaneously.

CONCLUSION

This is not a complete article in itself, but it is hoped it may spur some to have another look at the problem of spurious signals. It may also inspire some of the more scientific types to write to "A.R." and tell the fraternity just how to do it.

REFERENCES

(5) Wireless Telegraphy Act and Regulations.
JOHN MOYLE MEMORIAL NATIONAL FIELD DAY CONTEST, 1965
Saturday, 6th February, to Sunday, 7th February

DATE
Saturday, 6th February, to Sunday, 7th February, 1965.

DURATION
From 1600 hours E.A.S.T., 6th February, to 1600 hours E.A.S.T., 7th February, 1965.

OBJECTS
The operators of Portable and Mobile Stations will endeavour to contact other Portable/ Mobile and Fixed Stations in Australian and Overseas Call Areas.

RULES
1. There shall be five sections in the Contest:
   (a) Portable/Mobile Transmitting, Phone,
   (b) Portable/Mobile Transmitting for C.W.,
   (c) Portable/Mobile Transmitting, Multiple Operators, Open only.
   (d) Fixed Transmitting Stations working Portable/Mobile Stations, Open only.
   (e) Reception of Portable/Mobile Stations.
2. All Australian Amateurs may take part. Mobile or Portable Stations shall be limited to an input of 25 watts to the final stage. This power shall be derived from a self-contained and fully portable source. A Portable/Mobile Station shall not be located within one mile radius from the home(s) of the operator(s), nor be situated in any occupied dwelling or building.
3. Portable/Mobile Stations may be moved from place to place during the Contest.
4. All Amateur bands may be used, but no cross-band operating is permitted.
5. Amateurs may enter for either (a) or (b), or both, in the Portable/Mobile sections.
6. One contact per station for phone and one for C.W. per band is permitted.
7. Two transmitters of a Multiple Operator Station are permitted to operate on the same band at any time.
8. The following shall constitute Call Areas: VK1 and VK2 combined, VK3, VK4, VK5 and VK8 combined, VK6, VK7, VK9 and VK0.
9. Logs shall be set out under the following headings: Date/Time (E.A. S.T.), Band, Emission, Call Sign, RST/No. Received, Points Claimed. Contacts must be listed in numerical order.
10. Scoring shall be as follows:
   (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 Stations outside entrant's Call Area: 15 points
       - For contacts with Portable/Mobile Stations within entrant's Call Area: 10 points
11. The decision of the Federal Contest Committee of the Wireless Institute of Australia is final and no disputes will be entered into.
12. Certificates will be awarded to the highest scorer in each Call Area. Additional Certificates may be issued at the discretion of the F.C.C.
13. Return of Logs:
   All entries must be postmarked not later than 7th March, 1965, and be clearly marked "John Moyle Memorial National Field Day Contest, 1965," and addressed to—
   Federal Contest Committee, W.I.A., Box 685J, G.P.O.,
   Brisbane, Queensland.

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. Logs shall take the same form as for Transmitting Stations, but will omit the serial number received.
15. Logs must show the Call Sign of the Station heard, the serial number sent by it, and the Call Sign of the Station being worked.
16. Only one lot of points can be claimed for any one contact between two stations, for example: VK2AA/P calling VK3XX/P and exchanging numbers. Points can be claimed only for VK2AA/P working VK3XX/P. No points can be claimed for VK3XX/P working VK2AA/P during this particular contact.
17. Scoring will be on the same basis as for Transmitting Stations. It will not be sufficient to log a station calling CQ. A station may be logged once only for phone and once for C.W. in each band.
18. Awards.—Certificates will be awarded for the highest scorer in each Call Area.

IS THIS A RECORD?
(From "Radio ZS", June 1964)
ZS6BCX decided, when well on in his 70s, to take his Amateur licence. This inspired his daughter to follow suit, his son joined in as well. His grand-daughter and her husband refused to be left out, and also took their tests. Now the latter's son (the professor's great-grandson) has taken a test to use his parents' rig.
This gives: ZS6BCX, 6BFO, 6BJN, 6BGB, 6BFN and the Junior op.—all in one family. Can anyone top that?

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"Q" Max, Model GDO-2
Made in England
Eight Frequency Ranges from 1.5 Mc. to 300 Mc. May also be used as:
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2. Phone Monitor.
3. Oscillating Detector.
4. Signal Generator.
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The Historical Development of Radio Communication

PART ONE—INTRODUCTION

Radio communication is the modern expression of man's primeval passion for communication with his fellows. Throughout the past, human beings have concerned themselves with hastening then extant means of communication.

The main purpose of this thesis is to track the development of radio communication from its beginning to the present day. It does so by recounting how radio started, has, and still is improving to meet the ever-present need for greater efficiency in the transmission of information.

For the purpose of this thesis this search has been divided into:

1. The era of experimentation.
2. The era of formulation.
3. The era of commercial and technical expansion.
4. The era of commercial and technical expansion.

It must at once be emphasised that the thesis is not concerned with an anecdotal and historical account of phenomena of radio, but has been made of technical data to enhance its meaning. The underlying theme is man's ingenuity in meeting the age-old need for communication with his fellows. The result of his labour, enthusiasm and improving on what he has thus far produced. Scientists and professionals alike have responded to this challenge and the search has been divided into:—

1. The initial amalgamation of the two—electrical means and means of sound. Forming the basis of the first named section were runners and horsemen. Visual means and means of sound. Forming the basis of the first-named section were runners and horsemen. Visual means and means of sound.

2. The era of formulation. During this time a long line of primary investigations yielded findings which formed the basis of the first-named section. It does this by providing tested components and technical know-how easily adaptable to wireless systems. Following the successful operation of wire telegraphy, the vision of a wireless scheme conjured speculation. In 1865 James Clerk Maxwell foretold the possibilities of electro-magnetic waves if they could be produced. His calculations predicted that electro-magnetic waves should be able to be sent over long distances through space. Maxwell's theoretical model is entitled to distinction as pioneers of wireless. Within the period of collation, wire telegraphy was established and its growth assisted the development of wireless communication. It did this by providing tested components and technical know-how easily adaptable to wireless systems. Following the successful operation of wire telegraphy, the vision of a wireless scheme conjured speculation. In 1865 James Clerk Maxwell foretold the possibilities of electro-magnetic waves if they could be produced. His calculations predicted that electro-magnetic waves should be able to be sent over long distances through space. Maxwell's theoretical model is entitled to distinction as pioneers of wireless.

The emergence of wireless communication from this amalgamation took a hundred years or so, covering two eras that have been termed the "Collation Era." During this period a long line of primary investigations yielded findings which formed the basic fundamentals upon which wireless operation depended. Hence men who were unaware of the feasibility of wireless equipment, or of wireless communication, assisted its coming. Galvani, Stephen Gray, Oersted and Faraday all belong to this group and are entitled to distinction as pioneers of wireless. Within the period of collation, wire telegraphy was established and its growth assisted the development of wireless communication. It did this by providing tested components and technical know-how easily adaptable to wireless systems. Following the successful operation of wire telegraphy, the vision of a wireless scheme conjured speculation. In 1865 James Clerk Maxwell foretold the possibilities of electro-magnetic waves if they could be produced. His calculations predicted that electro-magnetic waves should be able to be sent over long distances through space. Maxwell's theoretical model is entitled to distinction as pioneers of wireless.

Following Maxwell's postulations came Heinrich Hertz's practical verification of them. Hertz's work ushered in the commencement of the next stage stretching from 1874 to 1896, and which is the most recent way and before its advent man depended upon the more obvious media at his disposal. Resources utilised formed three main divisions: namely, visual means, visual means and means of sound. Forming the basis of the first-named section were runners and horsemen. Visual means and means of sound.

3. The era of commercial and technical expansion. Within the period of collation, wire telegraphy was established and its growth assisted the development of wireless communication. It did this by providing tested components and technical know-how easily adaptable to wireless systems. Following the successful operation of wire telegraphy, the vision of a wireless scheme conjured speculation. In 1865 James Clerk Maxwell foretold the possibilities of electro-magnetic waves if they could be produced. His calculations predicted that electro-magnetic waves should be able to be sent over long distances through space. Maxwell's theoretical model is entitled to distinction as pioneers of wireless.

The era of commercial and technical expansion is the most recent way and before its advent man depended upon the more obvious media at his disposal. Resources utilised formed three main divisions: namely, visual means, visual means and means of sound. Forming the basis of the first-named section were runners and horsemen. Visual means and means of sound.
household and just under one receiver per person. The world total of wireless receivers was surmounted in 1957, and this figure, for the first time in history, exceeded the estimated fabricating capacity of 250 million. From an audience of a few in 1896 to 350 million in just under seventy years is a staggering truth. There is no reason to believe that this is the ultimate. The coming of the transistor has, and will still, increase the accessibility of wireless communication.

APPENDIX 1
CHRONOLOGICAL DEVELOPMENT OF WIRELESS COMMUNICATION

The Era of Experimentation:
To the period of mounted messengers, vocal 1700 relays and visual means—torches, beacons.

The Era of Cables:
1729—Gray—establishment of electrical conduits.
1876—Bell—visual semaphore bar system. Von Sommering introduced electrical currents to the German military, 1877. Tens of thousands of miles were laid.
1920—Oesterd introduced telephone between London and Paris with field effect and conversation between groups seems to fit perfectly with the work of the Scotney Laboratory. There is a field here for those who can make contact.

The feature story, as you might say, is the rapid rise to fame of the Audion. In 1904, Fleming—first thermionic valve. The two-electrode element "Ionised Gas Detector" has been made possible by the rapid evolution of pulse method of 1925. From an audience of a few to just under one receiver per person, America.

1921—First successful two-way trans-Atlantic transmission.
1925—Appleton proved existence of ionospheric expansion.
1895—Popov used a long wire to detect natural electromagnetic disturbances.
1890—Branly used a coherer to detect Hertzian waves.
1901—First trans-Atlantic transmission.
1899—First trans-Channel transmission.
1904—Fleming—first thermionic valve. The two-electrode element "Ionised Gas Detector" has been made possible by the rapid evolution of pulse method.
1925—Armstrong concluded experiments on frequency modulation with the perfection of a satisfactory system which eliminated static.

The Transistor Period
1948—Shockley, Brattain, Bardeen introduced the transistor.
1958—Molecular concept program commenced in U.S.A. 

YOUTH RADIO CLUBS

Boy Scout Jamez-an-on-the-Air created a great deal of interest among school groups. Scouts were on the air—a fine thing this, and everybody could lend a hand. The idea has spread with field effect and conversation between groups seems to fit perfectly with the work of the Scotney Laboratory. There is a field here for those who can make contact.

Many of the members from VK2 and VK3, thanks to their Newsletters, have heard indirectly that there is a VK5 Newsletter but are not sure where to look.

The feature story, as you might say, is the rapid rise to fame of the Audion. In 1904, Fleming—first thermionic valve. The two-electrode element "Ionised Gas Detector" has been made possible by the rapid evolution of pulse method of 1925. From an audience of a few to just under one receiver per person, America.

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## NEW CALL SIGNS

**AUGUST, 1964**

<table>
<thead>
<tr>
<th>Call Sign</th>
<th>Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>VK1KW</td>
<td>A. H. Vontethoff</td>
<td>32 Rivett St., Hackett, A.C.T.</td>
</tr>
<tr>
<td>VK1QL</td>
<td>D. Weatherly</td>
<td>25 Millen St., Hughes, A.C.T.</td>
</tr>
<tr>
<td>VK1US</td>
<td>R. O'Connor</td>
<td>53 Colvin St., Hughes, A.C.T.</td>
</tr>
<tr>
<td>VK2LL</td>
<td>M. A. K. Penton</td>
<td>41 Robinson St., Kogarah, S.W.</td>
</tr>
<tr>
<td>VK2AG</td>
<td>E. A. Jones</td>
<td>10 McAlister Ave., Zengadina, S.W.</td>
</tr>
<tr>
<td>VK2ZUDE</td>
<td>R. W. Bruce</td>
<td>15 Tiller St., East Caulfield</td>
</tr>
<tr>
<td>VK2ZWF</td>
<td>J. Weatherley</td>
<td>25 MlUen St., Hughes, A.C.T.</td>
</tr>
<tr>
<td>VK2ZEF</td>
<td>R. E. Blrley</td>
<td>24 Goodchap Rd., Chatwood, S.W.</td>
</tr>
<tr>
<td>VK2ZWL</td>
<td>J. P. Lowe</td>
<td>1 Dunbar Close, North Beaconsfield</td>
</tr>
<tr>
<td>VK2ZMG</td>
<td>M. J. Garth</td>
<td>&quot;Demelza,&quot; 24 Chester Rd., Beverly, S.W.</td>
</tr>
<tr>
<td>VK2B9C</td>
<td>H. D. Russell</td>
<td>14 Moulden St., Speers Point, S.W.</td>
</tr>
<tr>
<td>VK2AYD</td>
<td>D. G. Taylor</td>
<td>C/o. 301 Sig. Rd., Croydon, S.W.</td>
</tr>
<tr>
<td>VK2ATG</td>
<td>Kurlngai Civil Defence Radio Club</td>
<td></td>
</tr>
<tr>
<td>VK1USL</td>
<td>P. R. O'Connor</td>
<td>33 Colvin St., Hughes, A.C.T.</td>
</tr>
<tr>
<td>VK1USR</td>
<td>J. Weatherley</td>
<td>25 MlUen St., Hughes, A.C.T.</td>
</tr>
</tbody>
</table>

## From Our Reading

**"QST." September 1964**

An interesting issue containing articles about a small five-band, transistorised converter for use in very low power, v.h.f. stations, with several suggestions; a stable, transistorised, heterodyne v.f.o. with output in the 150, 80, 40, and 20 metre bands; constructional details of Monimatch Mark III. and Mark IV.; the effect on directional patterns of verticals; the use of 15 and 20 metre antennae on 80 and 40 metres; an unusual electronic keyer using a neon bulb relaxation oscillator as the timing element; and a description of a phase-lock detection method suitable for satellite or moon-bounce communication.

**"CQ." September 1964**

Apart from the usual monthly columns, this issue contains articles about a 6 metre J antenna; neat packaging of a complete Ham station; modifications to the Collins 75S-1 receiver; a computer like push-button electronic keyer; part two of the series on Lasers; part two of R.T.T.Y. from A to Z; and an interesting review of the Heathkit SB-300 receiver.

**"Break In," September 1964**

A three-band mímbeam, called the VK6 Joybeam, is described in detail, and part 10 of the Receiver Series discusses noise limiters and S meters.

**R.S.G.B. "Bulletin," September 1964**

The first article deals effectively with a transistor pre-amplifier, included diode clipping, for use as a speech amplifier; and other articles include a description of a light-weight aerial feeder; a simple converter for 70 Mc.; and notes on the G2DAF s.s.b. receiver. Technical Topics deals, amongst other things, with silicon controlled rectifiers, tunnel diodes, a multiband dipole, transistor transmitters, and a transistor speech compressor.

**R.C.A. "Ham Tips," Summer 1964**

This issue details an interesting and unusual approach to a low cost, high efficiency, plate and screen modulator with an output of 50 watts.

**"Short Wave Magazine," Sept. 1964**

A number of interesting articles in this issue include a mobile/portable 2 metre transmitter using a transistor modulator; a simplified electronic keyer; a sensitive r.f. monitoring unit; part five of the series on the practical applications of semiconductors in the Amateur station; modification of an L-F band transmitter for the H-F bands; and a design for a ten-watt modulator with a restricted frequency response.

### 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.

### BINDERS

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JOHN MOYLE NATIONAL FIELD DAY CONTEST
Editor "A.R.," Dear Sir,

For some time now, the subject of how the Moorabbin and District Radio Club should participate in the multi-operator section of the John Moyle National Field Day Memorial Contest has been discussed among members.

These discussions culminated in a policy being determined at the Club's general meeting of 15th May, 1964.

We would like to use your correspondence columns to publicise this policy as it will affect Moorabbin members in field events over the next few years.

Since the 1881 National Field Day at least top honours in the multi-operator section have gone either to the Elizabeth Club VK5LZ or the Moorabbin Club VK5APC. During this period, we at Moorabbin, have viewed with some alarm the steady reduction in the number of small multi-operator clubs entering the contest.

We think this may in part be due to the growth of a feeling that the section has become the purview of the large clubs. We have reached the conclusion, therefore, that in the best interest of the interests of the Moorabbin Club will, for a period, not compete as a club station.

Rather it will promote the entry of three or four smaller groups, each operating independently of the other, under the call sign of one of the group members, with each trying equally hard to gain the highest score. We feel this may in part be due to the growth of a feeling that the section has become the purview of the large clubs. We have reached the conclusion, therefore, that in the best interest of the interests of the Moorabbin Club will, for a period, not compete as a club station.

We feel that these aims are, we feel, those of Field Day Contests themselves, i.e. to provide a test of the best radio operation that can be used in times of emergency. We feel that our best defence in the fight to regain lost frequencies is to prove that we have -is to be able to render some public service. Emergency work of any kind is the best way to do this.

—Harold I. Hepburn, VK5APQ, Secretary, Moorabbin and District Radio Club.

JAMBOREE-ON-THE-AIR
Editor "A.R.," Dear Sir,

I have before me my copy of "Amateur Radio" (October issue) and am delighted to see that you were able to use the block we sent along for the front cover of your very good magazine. At the same time I should like to thank you for the very excellent editorial which I feel went a long way towards helping make this year's Jamboree-on-the-Air such a successful venture.

E. J. Peer, President, Australian Boy Scouts' Association is deeply indebted to the Amateur Radio movement, particularly the members of the Wireless Institute of Australia who rallied to our call and without whom Jamboree-on-the-Air would just not be possible. Our aim also, through this excellent journal, the Jamboree is given wide publicity and this year has been no exception.

I should like to take this opportunity, therefore, to thank all of our members who gave so much assistance from the Jamboree-on-the-Air, of expressing our deepest and most sincere thanks. Thank you then, from our Chief Commissioner (Mr. C. R. Nichols) down to our humblest Cub. May we continue to enjoy this most happy association.

—Noel Lynch, National Organiser, Jamboree-on-the-Air.

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CO-OPERATION
Editor "A.R.," Dear Sir,

During the month I received a letter from Bryan Prosser, in which he wrote on behalf of two keen S.W.L.'s in his area. These lads, 17 and 18 years of age, had been in wheelchair for the past seven years, and up until June of this year were using an antiquated set for their listening. A lady of Clarenceville, in W.A., generously gave them a very nice receiver, but the lads found that, owing to their position, could not have easy access to the controls. Members of the W.I.A., W.A. Division, came and took the set away, cut the cabinet to size, completely overhauled the set, and returned it to the lads. Now the boys, who, by the way that time were not members of the W.I.A., have been set up and can really enjoy their hobby. These lads have since joined as associate members.

This spirit of co-operation is a great inspiration to associate members, and is prevalent not only in W.I.A., but also in other States, as each month I hear of some S.W.L. who has had assistance from fellow members.

Recently I placed a request in the VK2 monthly "Bulletin" for a receiver for a junior S.W.L. Mr. Adams of Tootley, some 70 miles from my QTH, kindly offered to give, and rail the set to me. I informed Mr. Adams that I was going to Newcastle, so he personally took the set to the address to where I was going, which was about 30 miles from his QTH.

No doubt many of us who write will tell of such help, but I felt that I must let these two fine gestures be made known.

—Chas. Abernethy, L2211.

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<table>
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<tr>
<th>Cat. No.</th>
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<tr>
<td>817</td>
<td>Min. Cap. 11 pF., Max. 270 pF.</td>
<td>£4.5/- (Tax included)</td>
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<tr>
<td>617</td>
<td>Proof Voltage: 1,100 Volts.</td>
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4 Alfred St., Milson's Pt., N.S.W. 2096
48 Bowen Street, Brisbane, Qld. 4000
196 Brown Street, Perth, W. 27-9090

Page 22 Amateur Radio, December, 1964
Over the past month or so, the bands have shown a decided improvement, DX-wise. While this is primarily due to the fact that DX stations are operating in various parts of the world, there is, however, the erratic nature of each band. One never knows when DX conditions will next present itself, and from where it will come. Listening is still the ace in the hole. With good operating and good clean signals, you will become popular on the bands and will be sought after. It seems to indicate that this band is still the old reliable, but 7 Mc. seems to be gaining in popularity from many of the boys, whilst 3.5 Mc. is showing some promise on occasions. 21 Mc. is either open quite a bit, or it’s a bit hard to follow its habits. It takes a contest to show whether these bands are workable or not. During the last 4 Mc. over 14 Mc., during the pre-lunch period or around midday local time. P.S. Did you hear a builder: UF, AF, JA, KG, KW, HL, SM, HM, 3W8, VK0, KC4, ZL, VR, KC, XX, etc. On any normal summer day, it is almost a certainty that one can hear is VK or ZL. This undoubtedly shows a potential of DX activity rather than bad band conditions.

**ACTIVITIES**

3.5 Mc. is now proving its worth for those who would like a chance to get into DX, as around 2000z. on various evenings one can hear the South Americans, Peru, Columbia and most of the Indians.

YN1AA, of Managua, Nicaragua, on this band seems to attract a lot of attention, but he is always busy making QSOs on all modes for DX Morse.

A.D.L. announces a further addition to their D.X.C.C. Countries List with the Saudi Arabia/Iraq Neutral Zone. Operation from this Zone is taking place, and most of the QSOs are with England, France and the United States. He adds in the prefix of 52A.

From John VK5LV: that he is the only HM2 who has a permit to operate on 14 Mc. for QSL: P.O. Box 8, Sosa, Korea.

UB4UN has a visitor from this club, namely Bob WINDB/UB5, who is with the American Exhibition at Kiev. They are very active, and VK9DR, Radio Officer at Christ Church, is a good one to catch, as he is operating most nights on 14 Mc. CW.

From 2nd January, 1965, the band decides to show any life, which I expect will. Good hunting Ken, I hope to work you there. All QSL activity will come from his home QTH at Smiths Road, Temple City, California, U.S.A.

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

Listed below are the highest twelve members in each section. New members who are listed will have their call signs amended as soon as possible. From David SVQ, John SLV, 73, Bert VKSB.

**PHONE**

From Colin VR4CB tells of a forced stay in VK4, a lapse in hospital, and an operation. More news is good. He will be forthcoming on 40 and 20 Mc. and an eye on the band. He reports that operation from these last remaining countries.

A parting word of thanks to those that sent us so many cards and call signs it is a pleasure to do business with them: Ken STL, Al 4SS, David SVQ, John SLV. Thanks for dope. Ken.

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FOR HAND-DESK USE

SPECIFICATIONS:
Output Impedance .................................................. 50 ohms or 50K ohms
Effective output level .............................................. —55 db. [0 db. = (one) IV. Microbar]
Frequency response ................................................ 200 to 10,000 c.p.s.

OMNI-DIRECTIONAL DYNAMIC:
SIZE: 3" x 2-1/8" x 1" ........................................... Retail Price
Cable: 12 ft. of P.V.C. ........................................... 50K ohms
Switch: on-off. ...................................................... £2/10/7
Desk Stand. Clip folds for hand use. ....................... + Sales Tax 5/3
Colour: WHITE. ................................................... A QUALITY PRODUCT OF EXCELLENT DESIGN
Plastic Diaphragm. ................................................

DF-2

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I would like to take this opportunity of thanking all those who have contributed to the VHF section in the past, the number of whom it is impossible to mention, but I feel that they will continue on with the good work. It is gratifying to see that VHF and 52 Mc stations in many cases are at least not missing for quite a few months. We hope that having taken out his "Full" certificate he will not go away and continue his many DX contacts on 52 Mc. He was one of the 5 mx gang in days gone by and surely deserves to be missed by many. 52 Mc: Activity is increasing rapidly as more and more of the bands are being worked at 52 Mc. He was one of the 5 mx gang in days gone by and surely deserves to be missed by many.

All three active stations have gear for Oscar 3. The bonus can only be claimed once per field use. The certificate can only be endorsed once, the certificate must be endorsed by the Publicity Officer. The following rules will apply. One contact per band where at one stage he had 85 Scouts camped around him. There was so much radio activity there that it deserved to be.

As can be seen in the VK4 notes, Channel 1 at 144Mc and a 4/20 final on 432 and 144 s.s.b. are all near the lower edge of 144 Mc. They will be around 6 a.m. at this stage.

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Dandenong where the engineers on duty gave tours of the station to the Scouts. A special bonus of 3 points per mile for each contact is made. A certificate will be awarded to the winner of the competition. Operation must be within the terms of the Amateur licence. The QRM in the near future. Dave 4ZJH using battery power from Lake Manchester, is putting in as many months on 2 mx and is getting tired of calling. Bert 4CP is pumping out the watts on 52 Mc. He was one of the 5 mx gang in days gone by and surely deserves to be missed by many. 52 Mc: Activity is increasing rapidly as more and more of the bands are being worked at 52 Mc. He was one of the 5 mx gang in days gone by and surely deserves to be missed by many.
With yet another year drawing to a close, we find that during the past months, increased DX listening has been evident all around. DX was active in all States. We lost a few contributors to our ranks, but gained many more from the number of non-members who read our page and by answering the questionnaires sent out, number of new members.

We know of nothing, nothing is gained unless one is prepared to work to achieve that which one sees. QSLing is no exception to this rule. It returns, spend time on your report, and make it of some value to the person concerned. Whether sending reports, you must include the call sign of the station heard, date, time G.M.T., frequency, QRM, QRM, QSO, noise, signal strength, weather, mode of transmission, your type of receiver, frequency injection, and so forth. In the present day, there are very few portion of the QSO as confirmation. Reports to Overseas Commonwealth countries can be sent by surface, with the other countries an International reply coupon, whilst in Australia a stamped addressed envelope may assist in getting you a card in return. The above coupons are available at all post offices.

SENSITIVITY

The sensitivity of any receiver is the amount of r.f. input voltage needed to produce a specified amount of audio output power. It is measured over the entire frequency range of the receiver. With the exception of very-low-frequency (VLF) equipment, the sensitivity of the receiver is measured in microvolts (µV) for a given noise level. The sensitivity of a receiver can be improved by increasing the input impedance of the receiver, reducing the noise figure of the front-end stages, and using wideband amplification. The sensitivity of a receiver is important in DXing, as it determines the minimum signal level that can be received and heard. A receiver with a low sensitivity will require a stronger signal to be heard, while a receiver with a high sensitivity will be able to hear weaker signals.

VICTORIA

The VK3 S.W.I. Group conduct a radio construction night on the second Friday and a general meeting on the first Friday of each month. During the past few months the Group visited a number of amateur radio construction studios, both visits being of immense interest to all who were fortunate to be present.

Bruce L2283, welcome to our page OM. Do not forget to mention QSL cards, as they can often be a long time in arriving.

V.S.W.L.

Ray was using an ART rx with Mac L2074 has received QSLs from OA4, 5Z2AG, DX9, F1PACL, and UM6KAA. He reports good conditions to W land on 21 Mc. During October, with only L3006.

Henry L271 is busy trying to get on the phone more often. Letter was found for him in Ipswich in VK4. I would be interested to hear more about it OM if you can manage to get a QSL from him.

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FEDERAL

FEDERAL ITU FUND

As agreed at the recent N.S.W. Federal Conventions, Divisions were given target figures to meet towards financing representation at forthcoming International Conferences. To date, the percentage of the target figures met are shown by States:

VK2 — 25%
VK3 — 25%
VK5 — 30%
VK7 — 50%

The above figures represent monies received to date and it is likely that following not necessarily monies still held by Divisions.

AFRICAN I.T.U. CONFERENCE

In the middle of October a special conference, convened by the I.T.U. aimed at drawing up a medium-term plan for Africa, attempted to exclude Portugal and South Africa from the Conference. Both countries claimed the decision was illegal and refused to leave the hall following a vote to exclude them. Other African and Arab delegates walked out of the Conference. Western countries sponsoring South Africa and Portugal, were Britain, France, Belgium, Luxembourg, Italy and the Netherlands. The I.T.U. Secretariat also supported the example of the West and without the agenda being discussed, the conference ended a week earlier than expected.

ILLNESS OF FEDERAL SECRETARY

Mr. Jay Lancaster, VK3JL, the Federal Secretary, has had a serious bout of pneumonia and has spent the last few weeks in bed. As a result, some outstanding correspondence has been dealt with now, so please bear with us a little longer if you are awaiting an answer to your letters. The姉ood news is that he is making a rapid recovery and returns to good health once more.

NEW MEMBERSHIP CERTIFICATES

A new membership certificate has been prepared and already small quantities have been dealt with now. More certificates, quantities will be forwarded progressively to all Divisions, as the signing and sealing is no small task.

FEDERAL QLD BUREAU

Bruno Bostert, HB9QO, who has been working in VK2 and VK3 during 1964, returned to Europe by sea in November. Bruno was engaged in the installation of remote control power switching equipment associated with Snowy River Hydro-Electric scheme. He will arrive in HB just in time to assist his family to move from Nottwill to Brunnen. Bruno visited VK2, VK3, 3, 4, 5 and 7 during his stay in Australia.

Len Smith, VK4TE, currently on Willis Island (1469) from 14th February, c.w. and s.w., mainly at week-ends. He is not presently interested in QSLs, but may reconsider when he returns to His home QTH in June 1965.

The Long Island (U.S.A.) DX Association is sponsoring San Diego's AF 13DX Contest. Details of this marathon contest appeared in November A.R. (page 8) and further information may be had from the QSL Bureau.

Details of the following newly announced winners: Colombia 9W1 Award; Angola 236A Award; Spain, Annee Saint de Compostelle 1955; Argentina, Annee Saint de Compostelle 1955. Australia also has a current issue of the C.H.C. Directory of Certificates and will be pleased to send copies to interested members.

Ken Matchett, VK3TL, has completed all arrangements for his one-man DX-pedition to Norfolk Island. The operation will cover the whole of January 1965 and Ken has been issued with the call sign VK9TL. Ken will use s.s.b. and c.w. on 7, 14 and 21 Mc. bands. All QSLs should be sent to VK9TL either direct or via Federal Bureau. Ken’s home QTH is Smith’s Point, Botany Bay, N.S.W.

The above items were published in the Federal monthly news reports (Send correspondence direct to Divisional Reporter named at Para. End).

NEW SOUTH WALES

HUNTER BRANCH

The November meeting of the Hunter Branch was held on Friday, 6th November. The guest lecturer for the evening was Col. H. J. Trick, of the University of Newcastle where he spoke on Microminiaturisation and Military Electronics. The speaker’s address was well attended and a request made for a copy of his lecture notes. The Branch expressed its gratitude to Col. Trick for this informative lecture.

TALK IN THE W.A. DIVISION

Jim Corbin, M.B.E. (VK2YC)

The name of Jim Corbin and the call sign VK2YC were prominent in the life of the Federal Bureau. Jim was a Full Member on obtaining his Amateur Experimental license on 1947, and as a member of the Federal Bureau since 1953.

Jim was an Honorary Federal Manager from 1953 to 1955.

Jim was appointed N.S.W. representative of the R.S.G.B. and the B.E.U.R. during several terms as N.S.W. Federal Councillor. Jim served as N.S.W. Federal Bureau President in 1963 and 1964 and was Official Observer in Sydney and Adelaide.

Members will remember the features "The DX Zone" which Jim had in the A.R. with the activities of Amateurs in the N.S.W. Division.

Jim was a member of the Institute for "Amateur Radio" during World War II.

Jim's pharmacy at Earl St Leichhardt became the centre of several activities. Jim was one of the most interesting characters and he had a great influence on his fellow members. Jim left the N.S.W. Division in 1938 and 1947.

This award he always insisted was "The Jim Corbin Award for Amateur Radio" during World War II.

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Belmont Bob is doing the right thing and has a morse class going at his place of resid-
dence. He doesn't have the money to go to class but he can copy Bob's sending—which is more
than some of us used to be able to do. Do you remember Sig, Ellyth? I do. Max has been
burning some midnight fuel at the clubrooms and now has the complete morse set-up in
for the A.O.C.P. class. This has ten positions
and enables the operator to talk to any of
the students individually or collectively and
for them to practice in any group size they
wish. This means that the boys are going
on space with the morse and some are
to try for the January exam.
Len 2Z3D reported the other night that he
is almost ready to roll on 432 Mc. and Des
2ZDN is still having the same success with
the miniature 6 and 6 metre rigs. So much
that he almost blew Mr. ZKW's speaker out.
Geoff said it was the loudest and broadest v.h.f.
signal he's heard. Which reminds me, we
haven't heard from the Oriental Jaunter for
a month or three and it has come to my ears
that the lecture for the December meeting is
to be given by Australia's most disappointed
athlete. He didn't get a gold medal. But he
did make some pretty pictures, so what about
coming along to see them. The meeting place
has changed for just this once and will be in
the dining room of the Prince of Wales Hotel,
4PJ, the Rooms of the Social Services Institute at
see you, have a Happy Christmas and I'll see
you, as we're having a buffet type supper. It
has changed for just this once and will be in
coming along to see them. The meeting place

Amateur Radio, December, 1964

TOWNSVILLE AND DISTRICT

Very sorry that I missed last month's notes,
due to the fact that I was not feeling the
best owing to my old complaint "bad back".
Nevertheless, this has left me, hence the
few lines this time.

Owing to the fact that I am not hearing
much on the bands, must be that I am losing
my touch in not being able to pick the right
times to listen. Witness the fact that Bert
4LB is working the Europeans around mid-
night, yet when I listen at this time on my
suitable shift, it all seems dead or that the
few are hardly audible. The other night was
able to work Jim GI3JIM after many years
since last QSO.

Charlie 4BQ has the 40 metre Quad going
and certainly shows up on the skyline. Seems
to be an added attraction to Townsville Cen-
tenary Year. Vern 4LB being honoured with
a Dinner in appreciation of his long time with
the Flying Doctor's Service. Certainly nothing
is a trouble to him to help out in the time
of need.

Not having met the boys in Townsville
of late, am unable to give any news on what
is happening. What with no local club, seems
that all of this country is tended to by one
one-eyed monster. Maybe when the sunspots
get like the measles and DX returns once
again, there will be a renewed outburst of
energy to get things as they were in the
days gone by.

As I will be in Melbourne on annual leave
as these are being read and will miss out on
the New Year Notes, unless Bert 4LB fills in
meantime, I wish each and everyone the Sea-
son's Greetings, with a fervent wish that the
coming year will be on the up and up. 73,
Bob 4RW.

Queensland
NOTES FROM DIVISIONAL COUNCIL

The October Council meeting was held at the Rooms of the Social Services Institute at
Victoria Point to honour two members of the
Padua Youth Radio Club operating under the
call sign 4PE. They told me quite confidently
about their equipment, a Galoeho v.f.o., refer-
cence to the year 1902! George had with
him a syllabus of exam, questions from the
early days. How would you go if you were
asked how many volts are necessary to make
a spark Jump Vt" across two needles? Further,
asked how many volts are necessary to make
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OBITUARY
NORMAN COLTMAN

The VKS Division announces with sincere regret the sudden passing of Associate Member, Norman Colman, on 16th October, 1964. For many years Norm was Associate Members' Representative on the VKS Council and an active worker in the VKS Division. He will be missed by all with whom he came in contact.

For his charming wife (Gwen) and his two sons we extend our heartfelt sympathy in their sudden and sad loss.

Bob SRL, not heard here for quite a while, was also heard on 3.5 Mc. with his new Viking, and again playing around with opening his gate, using a model aircraft type of transmitter, plus motors of course. Was intrigued to hear him say that the radiator grills of his Falcon several times in the past and much as I regret not being able to pad a little at the expense of his health, I do have a conscience. True as true! Suffice it to say that he was working himself fit, and fit for anything. He had his gate open again, and was to go ahead. Honestly, I was not game to stand up, I was quite bullied

It was announced at the meeting that the Federal Salvation Army in Balaklava way as I am led to believe he was working anything much, and he said he was a sort of a “jacks” person. I could not imagine that there was any difference between the usual Cubans, South Americans, Mexicans and the like. However, he had worked a South American that afternoon on 7 Mc.—a somewhat of the VKS if I might say so. What was the report from Peru, Gilbert?

Talking of unusual DX, I asked SRL if he was working anything much, and he said he had heard some “sounds” from abroad. Is the ex-Mayor of Lucindale? Can it be that...? SRL was at home, working a few clutches, or is it that the Largs Bay cockles are on the run again? For some time he enjoyed a little twinkle of the outer Harbour oysters occupying his attention. I wonder where are you Arch 5XK?

Talking to Arthur SHY, after he had finished talking to his new “Welsh” aerials, I noticed a listener’s report card from the VKS Division, and it was rather interesting. The listener was using a Maria Maloca aerial. For goodness sake, what next will they use for aerials? Must say that’s really terrible, I suppose.

Comps SRF was at the meeting and remained tight lipped in my presence, evidently determined to keep me in the dark. I complained to Les SAK about this, and he bunched back at me, quickly saying, “You couldn’t understand him if he did talk.” Well, how is that, these Gawler boys must have had vinegar in their blood, for a change?

A welcome visitor at the meeting was Arthur ZFR, over from Leif 5LG’s place. He met Les SLC who told him about the meeting night. Nice to meet you OM. Also nice to know that you are well and truly up on the beam.

Heard the two Jacks—JJS and 5LN—in QSO on 1.7 Mc. on the other Sunday afternoon, and the comments from Jack SJS on current happenings in the radio world made merry listening. Apparently he had been bargain hunting again, and was well pleased with his purchases.

The end of the QSO and was well rewarded by hearing Athol SLL come up and call Jack SLN and take him to task and being at the air time the previous day. Have been trying to hear them for about 6 months, and apparently they had been very elusive and decidedly canny in their remarks. A nice pair, these two, and definitely not ones to be trifled with. Athol had a little trouble hearing Athol say, “You tell her that I kept my mouth closed, and that you kept me later.” How low can one get?

Also heard Howard 5XA and the Admiral 5SG in contact, and I wish to say that they were very much enjoying themselves, and a good time was had by all. No business was conducted, general or Federal. We were still trying for a QSO with anyone. That is a warning glare in my direction, that if anything happens, it’s rather late.

Incidentally, five out of the nine Council members are with E.T.S.A.

GeoF SczQ, our worthy Federal Councillor, is the scribe for the above-mentioned magazine. His work never ceases to be believed, the VKS Division have a ready-made sub-editor for “A.R.,” magazine in their midst should I ever decide to throw in the towel. He tells me that his XYL now has her driving licence and the car, so the days of the “driving licence monster” are over. I would much rather resign from the job than be put to this.

As mentioned last month, the family castle has been in the process of being brought up to 17th century living conditions, and one of the carpenters on the job soon located my shack and was suitably impressed with the contents. It did not take long to wake up that he was another of that army of frustrated would-be Radio Amateurs who would have liked to be but never quite found the time. He had had a few DX-peditions from Poland, had a name that was a cross between a mackerel and a herring. In fact, when he discovered a QSL card on my wall from his home country, in fact in the same street as he was born, we were buddies for life. I could not hope to pronounce his first name, and had to tell him that I had twisted my arm enough to give him a running description of my shack and its contents. Now although he thought it was a little overdose, I was worth showing off, in fact the late Doc EDM always said that it was the most technical looking shack in VK5, and the least used, but then he was always flitting away.

I think it a little short of length, what a story. The thing is that I was quite prepared for Bill to go into some sort of a snit and throw in the towel over my crystal in display, but our beautiful friendship came to a fast and short stop when the first thing Bill’s wife said to him after the shack was, and I quote, more in sorrow than in joy;” Please. I told him that I was most interested in getting a look at your s.s.b. equipment!!! I learned later on from one of the painters, who fortunately had no interest in Radio, that they thought that the aforementioned Bill had a diploma in electronics from some university or college in Poland. S.s.b. Indeed, we now curtly greet each other should I not see him first!

The news of the passing of Associate Member Norm Colman came as something of a surprise to many.

Bob SRL, not heard here for quite a while, was also heard on 3.5 Mc. with his new Viking, and again playing around with opening his gate, using a model aircraft type of transmitter, plus motors of course. Was intrigued to hear him say that the radiator grills of his Falcon

CLOSE TOLERANCE GOLD PLATED CRYSTALS FOR AMATEUR APPLICATIONS

To his sorrowing widow (Gwen) and his two sons we extend our heartfelt sympathy in their sudden and sad loss.

I told John SKX at the meeting that I was short of news for this month and could find nothing for his world tour earlier than next June. He said it was OK by him, but not to bring him back any earlier. Now what does that mean?

I notice that in the Electricity Trust of S.A. magazine I saw that all the licensed Amateurs working for E.T.S.A., which leads me to ask does the W.I.A., E.T.S.A., or does E.T.S.A. support the W.I.A.?

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CRYSTAL DIVISION

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shock to me and many others, especially as I had only alluded in the notes last month that there seemed to be a tendency to let the work on the way up from his recent glaucular trouble. Norm, for many years, was a keen amateur radio enthusiast. Now he is quite fit and working on improving his skills. He was the members' representative on Council last year, and was to attend the annual picnic, and could almost be counted on for any active assistance in the club's activities. When I went to see him in 288 Mc., he spent most of his time on that, but time is a commodity in short supply and he deserted Amateur Radio for the Masonic Order. I came in contact with him, both in hospital and outside, and he will be missed by many. So It Be.

I notice that Ben 4RV—recent notes. Interestingly, Ben is finding the going tough for news these days, and whether he pointed out that none of the previous notes have had a new bit of news for the last year. I will never know, but this month has been the worst month for news for quite some time. I have a long and uneventful career as a newsgatherer. I threatened to make up the notes to suit our needs. I warned that my supply of noughts would cease when my notes collection did not host their tasks. I even tried to squeeze some news from our worthy President, Phil 8NN, but to no avail, as at the last meeting I threatened to resign the job as sub-editor unless he was going to provide me with some news. I found that the sounds of rejoicing that greeted this threat quickly made me change my mind about this, as I have no sympathy for anyone who is going to carry on. However, I must confess that I was rather surprised when Phil restrained this month, in fact I am leaning a little way towards the theory often expressed by Ye Ed, that I have a slight tendency to pad these notes. Heaven forbid.

I have heard several chaps on the air asking what the next meeting is. At 5AKR's suggestion, I have had no news of him for a long time, and I was overjoyed to hear from him. None other than L4024, and included a love note. If these notes, I suggest that he come out from under and give me something to write about.

Understand that W.I.C.E.N. had an exercise on the 21st. If I understand the square and the square band, and a mighty successful exercise it turned out to be. My only remarks of his way to tell me that the 80 m.x.s.b. was still in use. He was concerned with the chest blown up like a pouter pigeon. What makes them think this is okay, when all their fowls lay square eggs?

Right in the middle of the re-building operations at my castle, my XYL went down with pleurisy and pneumonitis and was placed in hospital, followed as a natural course, and my XYL, with tears in her eyes, informed me that she intended to lay at death's door—her words, not mine or the doctors'. How could I face the hospital, the hospital, was more concerned in scrunching the plastic syringes from the doctor for coil to her own. She was in a deteriorating condition. To compound matters was a visit from the hospital, he made a special visit to show his finest remarks and jokes as to where the needles were jabbed! Nobody understands me—yeah right.

Received a letter from a VK4 S.W.I. this week. He wrote a very nice QSL card printed by the Ipswich City Council for the local radio club. Although a little off-standard for QSLs in physical size, the card is a splendid job and even has a white face on it! He said he would receive one would be more than pleased, to say nothing of being interested with the club's activities. He also pointed out that details of the city, L1242, or to give him his proper title, the VPX, was going to be 9DN when he was over here visiting our salubrious city (VK4 please note!) and we both agreed that he needed another room, and he turned out to be quite a guy. From you Ben, Will, be writing you soon. By the way, I am not that sweet with the Ye Ed. as you suggest—it is just that when you put it together without any notes, it is much harder to write. More noughts on the horizon—maybe.

Our most gracious and noble President, Phil 8NN brought me in a bundle of Divisional bulletins this week with the suggestion that we might want to discuss them in the next meeting. It must be said that he has a keen interest in the activities of the club. The VK8 bulletin impressed me most of all, probably my financial editor showing me the way. The only thing impressed, on account of the discreet use of language, is that we do have a lot of busy hams who are keen to work a Divisional contest. On that note, I suggest that John 5JC phoned me this week with the suggestion that he submit a log. Let's make it interesting and see what can be done.

Due to pressure of professional business, Tubby 5NO has had to relinquish his position as President. Due to the results of the last meeting, the club decided against participating in the Elizabeth Birthday Celebrations, due to the commercial nature in which they have been conducted. Tubby and the club are now concentrating efforts on club meetings.

Our December v.h.f. meeting this year falls on Dec. 16. It is to be held consisting of odd items held by the club. The v.h.f. season is upon us once again and readers the best Xmas and New Year Greetings from the Nine.
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