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THE AUSTRALASIAN
RADIO WORLD

Devoted entirely to Technical Radio

and incorporating

ALL-WAVE ALL-WORLD DX NEWS

★ EDITOR

★ PUBLISHER

★ PROPRIETOR—

A. G. HULL

336 Waverley Rd., East Malvern, Vic.

★ SHORT-WAVE EDITOR—

L. J. KEAST

23 Honiton Rd. West, Carlingford, N.S.W.

★ HAM NOTES By—

D. B. KNOCK (VK2NO)

43 Yanko Av., Waverley, N.S.W.

★ ADVERTISING REPRESENTATIVE—

W. J. LEWIS

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EDITORIAL

It is high time the authorities took a more realistic view of the relationship between radio and foreign spies.

Twenty years ago it was reasonable enough to expect to find that every enemy spy, in books of course, had a radio transmitter with which to pass on the secret codes. But in these enlightened days it is quite ridiculous to find that a special form has to be filled in before a type 807 valve can be purchased, apparently to prevent it being put to nefarious uses by enemy agents! Any person with the remotest knowledge of radio transmitting should be able to appreciate that any old 6L6 will do exactly the same job as the 807 for the brief space of time which a spy would need to send his messages. The 807 would have a life of so many thousand hours, whilst the 6L6 would be so overloaded that its life might be curtailed to a few hundred hours, but would that worry the spy? Any spy worthy of the name could make up a most effective transmitter from receiver parts, so why the fancy forms for the poor 807, for condensers of high voltage rating and so on?

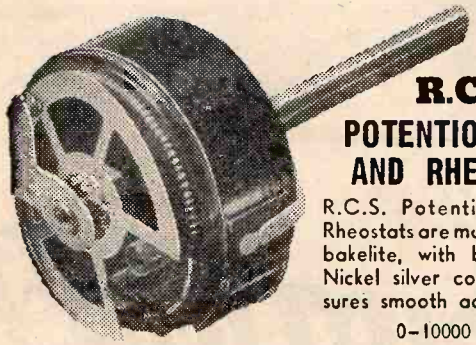
Then again in the matter o... alties.

If an over-enthusiastic lad can't wait to turn 18 in order ... licence and goes on the air as a pirate, he ... far worse than burglary or arson. Apparently ... of the bad old days when spies used ...

... decades ... Those-in-Charge ... on Goodm... (W... tran... or of th... "... hobby for intel- ... 144 ... cles. ... re, taken in ... s. Hull ... R.L. Headq... HULL.

Back Again!

THE POPULAR R.C.S. DA7 RADIO DIAL



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0–10000 Ohms.

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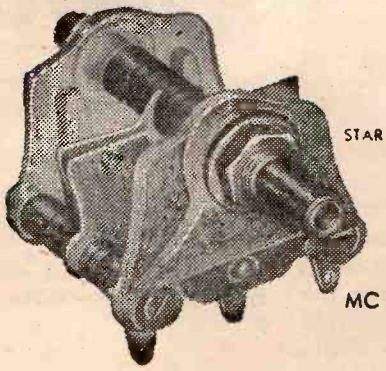

		Max. Cap. MMFD.	Min. Cap. MMFD.	Plates
STAR	CV34	10	3	2
	CV35	15	3	3
	CV36	25	3.5	4
	CV37	35	4	5
	CV38	50	4	7
	CV39	70	5	9
	CV40	100	6	14
MC	CV41	10	3	2
	CV42	15	3	3
	CV43	25	3.5	4
	CV44	35	4	5
	CV45	50	4	7
	CV46	70	5	9
	CV47	100	6	14

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174 CANTERBURY ROAD, CANTERBURY

VON LUCKNER WAS A POOR SPY

HE MISSED OUT ON RADAR!

If Von Luckner was really out in Australia on a spying mission for Germany, he made a poor job of it.

A few years before war broke out, Von Luckner was in the headlines of the Sydney papers, mainly because of his reputed ability to tear the telephone book in half with his bare hands. The Von Luckner yacht lay at moorings in the Sydney Harbour and offered positive hospitality to some and negative hospitality to others, as you might express it in radio terms.

At the time there was a division of opinion among the men-in-the-street as to whether Von Luckner was on a spying mission or merely a friendly trip.

I don't know whether it was ever proved conclusively, but I understand that it is now accepted that Von Luckner was a spy and engaged on a spying mission at the time.

Later events proved that Von Luckner made a poor spy. If he had only known it, he was within a few feet of learning a lot about radar technique, and such knowledge would have been of great assistance to Germany in the war. Later events proved that Germany was way behind on radar technique and paid dearly for this with the loss of many battleships and planes.

The occasion was the opening of the new studios for 2CA at Canberra in 1937. I was a guest of the management there, together with about a hundred others from the advertising and broadcasting world, including Jack Davey, Jack Lumsdaine and other prominent radio personalities.

Von Luckner was also at Canberra.

He was in the lounge when the radio crowd were discussing the features of the afternoon's trip to the Mt. Stromlo observatory where they had been hearing from those young Australian scientists who were bouncing radar signals off the Heaviside Layer and keeping track of them on the screen of a cathode ray tube.

Von Luckner was within hearing distance of the writer when the future possibilities of signal-bouncing were being explained to Frederick Daniell and a group of other men from the broadcasting world. Had Von Luckner's ears been a little keener there is no saying how different might have been the history of the World War No. 2.

—A.G.H.

HAMS

(Continued)

technique we might run over some of the outstanding features of this ultra-high superhet. The intermediate frequency used is about 25 megacycles. The tuning of the signal frequency circuits is achieved by varying the inductance by the movement of a copper vane adjacent to the tuning coil, a fixed capacity being used, instead of a variable as with normal tuning. A triode valve is used in the mixer stage. There is no amplification at the intermediate frequency. The second detector is of the super-regenerative type. The use of polystyrene becomes imperative and this material is used for insulating the terminals, valve sockets and coils.

In this regard it is fortunate for us that the manufacture and moulding of polystyrene was greatly encouraged in Melbourne for radar purposes and now is readily available here for use by amateurs.

As a final indication of the nature of the ultra-highs we quote the article: "No coupling is shown between the mixer and oscillator because the capacity between grid pins on the valve socket gives adequate oscillator injection."

It is the technical policy of "Radio World" to go out after the new technique as soon as circumstances permit, but unfortunately there are so many factors which limit our ambitions. For example, just try to rent a suitable lab. in either Sydney or Melbourne, not to mention personal accommodation!

FREQUENCY MODULATION

American listeners have been advised by a member of the Federal Communications Commission to buy a combined AM and FM receiver when purchasing a new set. It is pointed out that the speed with which FM develops will depend on "how rapidly listeners accept this new method of transmission."

CIRCUITS — THE SOBER WAY

A Practical Man bracks at the Theorists

MANY articles have been written about amplifier design, but nearly all of them have treated the problems from the theoretical, scientific viewpoint with plenty of curves, diagrams and calculations. But radio is heard, not seen (to modify the well-known anti-T.B. advertisement). We, the ordinary

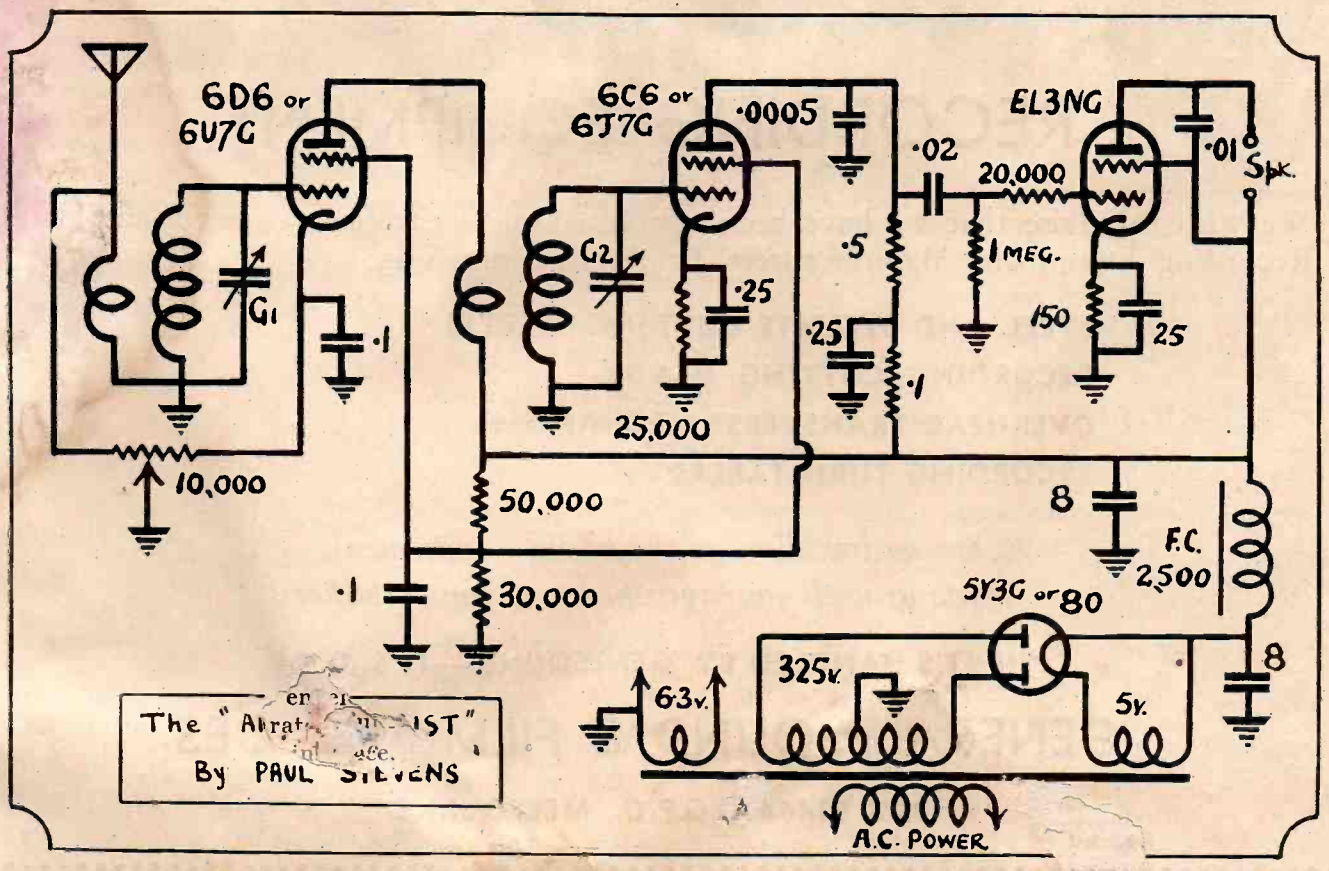
By
PAUL STEVENS
21 Fletcher's Avenue
Bondi

human beings, listen to it by means of those two irregularly-shaped gadgets attached to either side of our head called ears. They are foolproof and the only attention they need is an occasional wash. But there are others who deliberately disregard the evidence of their ears. They enjoy radio by means of signal generator, output meter, oscilloscope and graph paper. They look at the frequency response curve of an amplifier and decide whether it is good or bad. And the fiascos these theoreticians have suffered in recent years serve them right. I will just remind you of the resounding flop of the high-fidelity amplifier when it was put before the public; or the wonderful wide-range response sets reproducing frequencies up to 10,000, which Mr. Public quickly eliminated by turning the tone control to mellow and then leaning back with a sigh of relief. Another typical case is the result of Mr. Straede's amplifier contest, in which, according to the "Radio World" the judging by the audience so radically differed from the jury, the former giving all their favours to the mellower triode output, the judges to the harsher pentodes. All this indicates only one thing: A majority of technicians is trying to force upon the average listener one thing he definitely rejects—high frequency response. Their argument is: High audio frequencies are present in natural sounds. To reproduce them and make our radios and amplifiers sound as true to life as possible is our aim. But they overlooked one essential factor: With the production of high audio frequencies not only high notes and harmonics, but also harmonic distortion, record scratch, all sorts of noises, such as valve noise, statics, etc., are coming to light and this harshness is what the ordinary human being so thoroughly dislikes.

Science Has To Be Applied

Science today is able to produce rockets faster than sound, but before many problems are solved it will not be possible to use them for the transport of human beings. Science today is able to produce audio amplifiers for the reproduction of 10,000 c.p. sec. and over, but before the problems of high-pitched noise are overcome, these

(Continued on page 8)



CIRCUITS

(Continued)

amplifiers can only be regarded as being in the experimental stage without real practical value. And so they will remain, until we are able to make scratch-free records, resonance and distortion free pick-ups, microphones, speakers, distortion and noise free valves, static-free reception. Only when all these things have been achieved or are near enough to solution for all practical purposes then the wide-range amplifier will find the approval of the public. Until then we have to make the best of what we have got. There are pleasant and unpleasant distortions and we can use a pleasing sort of frequency distortion (cutting of high notes, boosting of basses) to counteract the harsh effects of harmonic distortion until there is just enough of it left to give life to the reproduction without making it so muffled that speech starts to get unintelligible. The disappearance of s, sh, ch is a sign that we have already gone too far. If we have finally, by high cut, bass boost and application of multistage invers feedback, finally got to a nicely-balanced result that 9 out of 10 people will approve of, then it is definitely O.K. And in fact it is this type of amplifier we find in practically every good commercial radio receiver, mostly with the addition of a tone control to make the tone still "mellower" to match the characteristic of the human ear for soft reception. They are designed by down-to-earth, realistic men to give to the public what the public wants. Thus, by preferring the lesser evil of attenuated high-note response to the bigger evil of harmonic distortion (harshness) and noise, we have decided on a standard for present-day amplifiers, nothing new to commercial designers, but something to scoff and frown at for those who think that the only way to radio heaven leads over the high frequency end of the audio spectrum.

Detection

Detection is another matter theorists talk a lot about. Leaky grid detection is pretty rotten for distortion and nobody will disagree. The bias or anode detector will take bigger loads, but otherwise is not much better, they say, but there I am of different opinion. Bias detectors admittedly can be designed to give distortion, but they can also sound as clear as a bell on our standard "semi-mellow" amplifier. I have, for instance, noticed that a particular bias detector, when put on a B-voltage of about 100 volts (connected to the screens of other valves) gave a softer, but clearer reception than when its .5 plate resistor was on full 250 volts. It was a 6C6 with

its screen on 100 volts in both cases. The cathode resistor was 25,000 ohms. An old T.R.F. set with screen grid valves and a 38 output recently surprised me by its excellent full and balanced tone, and I still maintain that many of these old-timers, when in good nick, can do as good as quite a few of the latest extra special super-doopers of our days, as far as the quality of tone goes.

That is a fact any unbiassed radioman and many others can verify. By now you will be asking yourself why I am trying to sell you the bias detector, when, for the last 10 years or more, diode detection was the accepted standard. I do so because I have something in the back of my mind, and that is the revival of the old T.R.F. 4-valver. Since the new Permaclad coils appeared on the market, this simple type of radio with pentode R.F. and bias detector and an EL3 as output becomes a real, practical proposition. I compared the one I built with a new post-war 4-valve superhet for performance and it proved to be as good as its equal on local stations, the selectivity of the two Permaclad tuned circuits being sufficient to separate them completely. At Bondi I was able to listen to the there weakest local, 2CH, without the slightest interference from 2UW, which is only about 4 miles distant from there. I admit, however, that close to a strong station the selectivity of this set may not be sufficient and one will have to use band pass input or a wave trap for interference-free reception of adjacent stations.

A definite advantage of the bias detector over the diode is its practically infinite input resistance, which does not load the tuned circuit connected to it and thus gives better selectivity and gain than the diode. Those who are still worried about distortion can sacrifice audio gain for quality and add inverse feedback to the detector, which finally leads to the "infinite impedance detector," which is almost free of distortion, but has no amplification whatsoever. Like the diode it requires an extra driver stage, which can be in the same envelope, a duo triode with separate anodes, like the 6C8G, for instance. For A.V.C. purposes an extra diode is necessary, which, incorporated in the I.F. valve, can in the usual way be fed from the plate of this valve through a small condenser.

A.V.C.

A.V.C. is the one detail of a radio set where we are most apt to make mistakes in designing. The effects of these mistakes are not very spectacular and so they mostly go undetected. They concern these two points: (1) Initial biasing of valves through the A.V.C. network; and (2) Application and delay of A.V.C.. Point 1 has nothing to do with the A.V.C. action itself; nevertheless, it should be mentioned here, as any valve regulated by A.V.C. derives its initial bias through the potential difference between its cathode and the return point of the A.V.C. line. Too often we find the following condition: The valves of the tuner section are all nicely adjusted to an apparent minimum bias of three volts by resistors, placing their cathodes 3v. above chassis. This practice is quite O.K., as long as the A.V.C. return point is on chassis potential. But A.V.C. is often taken directly off the signal diode, the return point now being the cathode of the diode-triode used in the audio section, which itself is lifted 1½v. above chassis by its cathode bias resistor. The resulting initial bias for the tuner valves is now 3v.-1½v. = 1½v. only; but it can be zero or even positive, if the type of diode-triode valve used requires higher bias voltages like the 6Q7, EBC3, CBC1, etc. The common result is whistling between stations, caused by instability. Modern sets often do away with the cathode biasing by returning the cathodes directly to chassis and using a back bias resistor, which puts the A.V.C. network 3v. below chassis. This in itself very recommendable system sets a trap for the unwary on dual-wave sets. With the exception of the 6K8G, now out of fashion, all converters show a certain amount

(Continued on page 11)

of frequency shift when A.V.C. is applied on short waves, and so it is common practice to work converters on a fixed bias on this band.

This is simply achieved by returning the S.W. grid coils to earth. With the converters cathode on the same potential, however, it now works without any bias at all and the result is bad insensitivity on short waves. As a way out, the short-wave coil should be returned to the -3v. back bias point, or else the converter worked on cathode bias, which should be shorted out on the broadcast band to prevent over-biasing. Most of the sins, however, concern the application and delay of A.V.C. Before we go into that, let us ask ourselves the question: What are the purposes of A.V.C.? In the first place, it helps to level out the volume of stations of various strength. The ordinary bias volume control has to be turned up for weak locals, and distant stations; turned back for strong locals.

Problems of A.V.C.

The audio volume control fitted to sets equipped with A.V.C. requires far less adjustment. Its second purpose is to eliminate fading of remote stations by automatically adjusting the set's sensitivity to the strength of the incoming signal. With these two facts in mind, let us tackle the practical problems of A.V.C. Let us start with our standard 4-valver. This set feeds the signal after detection right into the output valve. It therefore requires a signal strength on the diode equal to the one we usually find in the plate circuit of the driver in a 5-valve set. To obtain this, we have to advance our volume control. But if our set has A.V.C. that may not be sufficient, for the A.V.C. cuts the sensitivity down to an extent where even a fully-advanced volume control will not give sufficient output. We therefore have to delay the A.V.C. to a point where it will allow a weak signal to pass through the tuner on full gain, and only cut the amplification back, when stronger signals reach the diodes.

If this condition is properly fulfilled, A.V.C. will only go into action on locals, while on weak or remote stations the set will work with maximum gain, just as if no A.V.C. at all has been installed. A.V.C. is thus completely frustrated in its fading eliminating purpose and partly so in levelling out the difference in signal strength of various stations. Add to this, that 4-valve sets are almost exclusively used for local reception and we come to the conclusion that A.V.C. in this type of receiver is nothing but an expensive luxury and a simple bias volume control would serve the purpose just as well. But bias volume control smells old-fashioned, and so designers, just for the sake of being up-to-date, incorporate A.V.C. in their 4-valvers, much to the detriment of many sets where the delay voltage is too low.

Spare Range Needed

Weak locals are then only available at medium strength with the volume control flat out. Four-valve sets are generally too weak for proper shortwave reception, but whenever S.W. are included (more as a sales point than for practical purposes), A.V.C. was, of course, completely ineffective due to the low signal strength of oversea stations and the ensuing strong fading makes the reception rather poor. With a 5- or more valve set, the position is entirely different. These sets' sensitivity reaches, when properly designed, the limits, where further amplification is practically useless, as the ever-present static and valve hiss drowns any signal below a certain strength. Here A.V.C. can be fully utilised. If we have a driver valve with a gain of, let us say, 50, we can bring a signal 1/50th of that of the 4-valve set to equal speaker strength with the same volume control setting. We therefore need only 1/50th of the delay voltage needed before and, if the necessary delay was 5 or 6 volts for the 4-valve set, it is only 1/10th volt or practically non-existent now.

Modern Practice

Many firms are using undelayed A.V.C. on their dual-wave sets, which will regulate even a weak SW signal till it fades into that background noise, which is the limit of all reception. Others, however, still use delay voltages up to three volts, arguing that the graphs for delayed A.V.C. show a much flatter and better regulation. This may be true, but it is also true that their argument defeats the basic purpose of A.V.C., the elimination of fading, which is a privilege of remote and therefore weak stations. In fact, the regulation is not much better than in the firstmentioned 4-valve set. You still have to twiddle your volume control quite a lot, just a fraction of a turn from zero for strong signals and nearly full on for weak ones, such as overseas stations. Every now and then a firm or designer tries to use normal

(Continued on page 22)

SECRET "ALL-ELECTRIC" TORPEDO

Another secret weapon used successfully against the enemy, the Mark 18 all-electric torpedo, is credited with sinking over 1,000,000 tons of Japanese shipping, some 300 ships, ranging in size from 500-ton cargo vessels to 42,500-ton battleships.

The Navy Department has announced that the torpedo, its electric motors powered by specially-designed storage batteries, speeds just below the surface of the water, leaving no tell-tale wake to warn the enemy in time to manoeuvre out of the torpedo's path.

The boiling wake left by old-style torpedoes points a finger of bubbles to the approximate position of the submarine, and destroyers have but to charge back through the torpedoes' course and drop depth charges in the area before the slow-moving submarine can move off to safety. Submarines, if not destroyed by the depth charges, frequently suffer damage caused by the concussion of the exploding charge.

Designed specifically for underwater firing, the Mark 18, less able to withstand the impact of striking the water in above-the-surface firing, is not used by PT-boats, torpedo bombers or destroyers. Gyroscopically controlled, it is over 20 feet long, weighs about one and a half tons and contains some 2,000 parts.

The first attack by an electric torpedo fired by a U.S. submarine was made in September, 1943.

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Unit lined and tracked during manufacture. No padding or matching; simply trim pointer to local highest frequency station.

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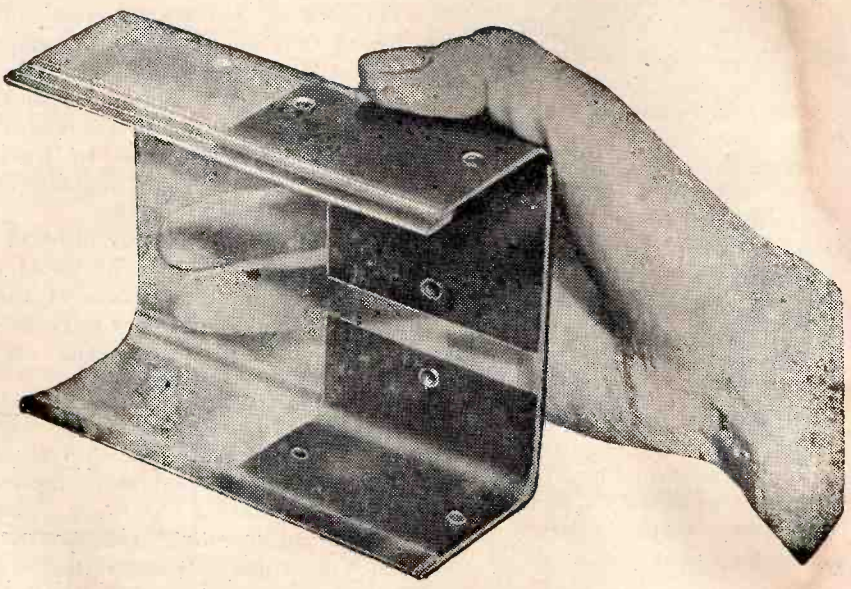

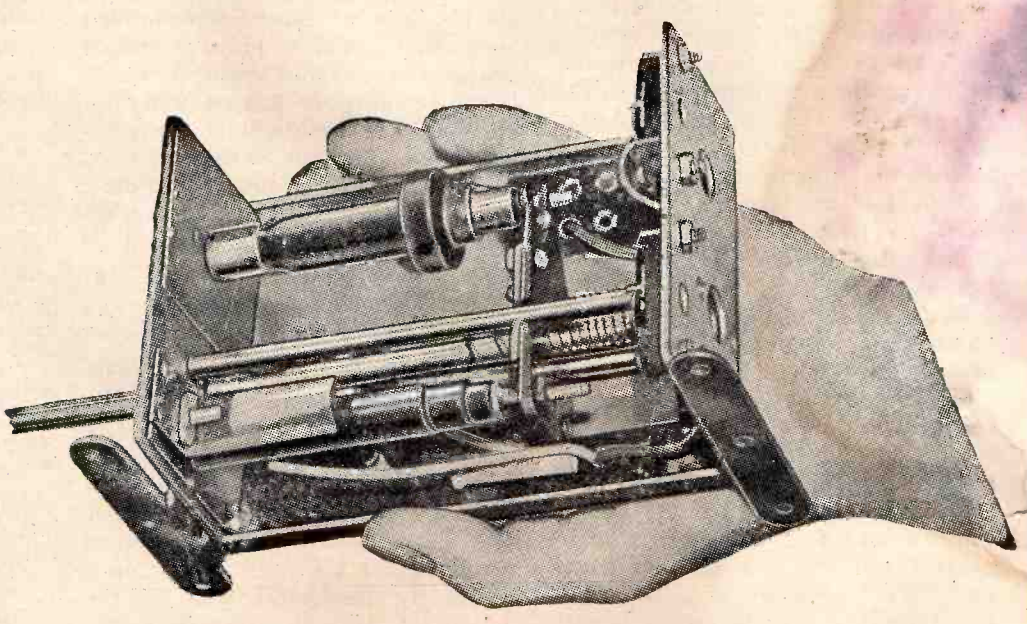

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FROM AUSTRALIA'S LEADING DISTRIBUTORS

KR1255

IMPROVING DX PERFORMANCE

Some hints for those who are interested in getting long distance

IN DX reception the greatest of annoyances are fading and interference. As a result, many tempers become ragged when listening for an elusive call-sign.

The following are a few suggestions which will help to overcome these problems.

Improving A.V.C. Operation

When A.V.C. is applied to the I.F. stage the plate and screen currents decrease and thus lower the transconductance (Mu) of the valve, and decreases the stage gain.

In a circuit similar to Fig. 1, the plate potential remains fairly constant, but the decrease of screen current, due to A.V.C. bias, will decrease the voltage drop across the screen resistor. This raises the screen potential, which, in turn, increases the plate current.

By
S/Sgt. L. J. FEENEY
A.I.F.

Thus, for a given A.V.C. bias, the change in plate current is not as great as when the screen voltage remains constant.

The Mu of a valve is equal to the change of plate current for a change of one volt in grid bias. If the screen voltage can rise, it counteracts to some extent the control of the valve Mu, exercised by A.V.C., and thus the decrease of Stage Gain is not as large as it should be. The screen voltage can be held fairly constant by using a voltage divider, as shown in Fig. 2.

The change in current flow is small in comparison to the current flow through the voltage divider.

Frequency Drift

Frequency drift in a receiver is caused by several factors, two of the main ones being changes in Oscillator plate and Mixer Screen potentials.

When the Osc. Plate, Mixer and I.F. Amplifier Screens are fed through a common dropping resistor, such as shown in Fig. 3, the change in voltage drop across the resistor is proportional to the change of current flow through it when A.V.C. is applied. Therefore, any change in screen current will change the Oscillator Plate potential. This is noticeable in a receiver, as inability to tune to the centre of the received carrier wave.

When tuning to a fairly strong station, especially on short waves, it sounds as though the side bands are being cut. On tuning to the carrier, A.V.C. voltage is fed to the I.F. amplifier and mixer valves. This in turn decreases the screen current, which will increase the oscillator plate potential, and detune the oscillator.

To minimise this effect it is advantageous to feed mixer screen and oscillator plate through a separate voltage divider and adjust the tapping to 100 volts.

Sensitivity and Selectivity

This article is not intended as a guide in planning a new receiver. Its purpose is to help the home set-builder to get maximum efficiency from his existing set. So as far as I.F. transformers are concerned, there is not much to be said. The most important thing is to make sure the coils are aligned correctly, and to the right intermediate frequency. If they are not, there will be a loss of sensitivity, and also a lack of selectivity due to the wide band-pass of the I.F. channel.

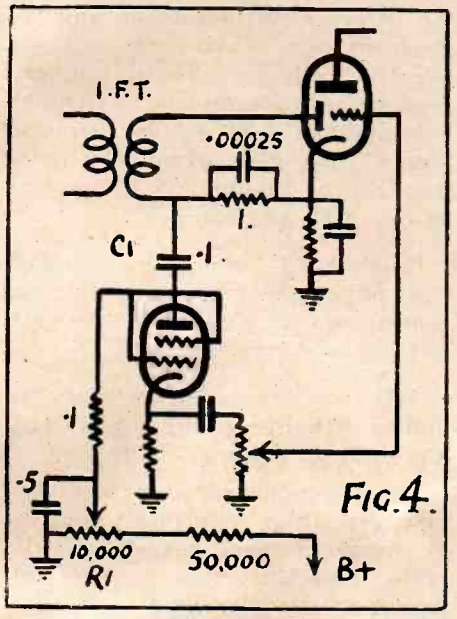


FIG.4.

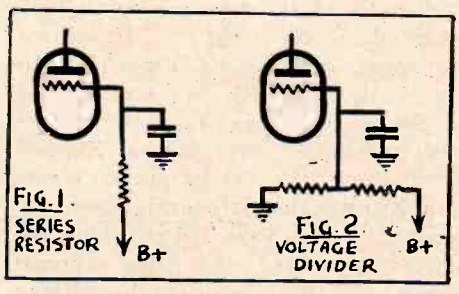


FIG.1. SERIES RESISTOR

FIG.2. VOLTAGE DIVIDER

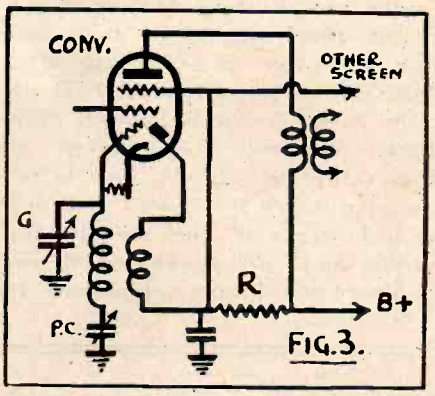


FIG.3.

The aerial used is one of the factors governing the efficiency of operation of the receiver and maximum results cannot be expected from an aerial which consists of a few feet of wire around the picture rail or hanging from the roof.

Use an aerial at least fifty feet in length, if possible, and raise it as high as possible above the ground.

There are two reasons for this: One is that larger R.F. voltages will be induced in it, if it is clear of surrounding obstacles, such as trees, houses, etc. The other is that it will help to minimise interference pick-up from power lines.

Noise Limiting

Noise limiting is quite simply added to the audio section of any normal receiver.

It is necessary to use another valve. A 6J7G, 6B6G or any similar one will do. It is connected as a diode as shown in Fig. 4.

The action of it is as follows:

When an R.F. carrier is applied to the diode a voltage is developed across the diode load resistor R1, which is proportional to the carrier

(Continued on next page)

WIRELESS SET NUMBER TEN

Remarkable British set with pulse modulation on centimetric wavelength

Details of the wireless set, which enabled Montgomery in Luneburg to speak directly to Mr. Churchill in Whitehall, with the security of a closed telephone line, and which was used by the Royal Signals throughout the campaign in Western Europe, have recently been released by the War Office. This receiver provided the only speech communication across the River Maas and the Rhine for several months and Tactical H.Q. was not out of touch for more than one hour with the whole of the 21st Army Group and the War Office up to the surrender at Luneburg, even though Tactical H.Q. moved at short intervals. Known as "Wireless set number 10" it was designed by technicians at the Ministry of Supply and in appearance it resembles Army Radar equipment. It is mounted on a four-wheel trailer with two circular mirrors mounted on top. It operates on a centimetric wavelength and this is the first time that such have been used for transmitting speech. It transmits its radio-beam in the form of short pulses.

The sets are used in pairs, set number 1 sending out its pulses of short waves on which have been impressed the speech modulation and set number 2 receiving them.

Since set number 1 sends out its pulses in groups of eight and because set number 2 is able to sort these out into eight separate lines, no less than eight separate conversations can be relayed simultaneously between one pair of sets.

Although this alone would not provide complete security, the great advantage of centrimetric waves is that they make possible the use of a very narrow beam, not much wider than that of a searchlight. Although this beam is not affected by darkness, mist or rain, it is arrested by any fair-sized solid obstruction. This means that any pair of "10 sets" can only operate over a clear unobstructed path varying between 20 miles and 50 miles. The sites, therefore, which need to be carefully selected, are often mounted on towers or on the roofs of tall buildings.

It was at the end of 1942 that the first experimental two-stage link was set up between a building in Horsham and the roof of Berkeley Court, in London. Later a link was made between Ventnor, Isle of Wight, and Beachy Head. The first operational link was between Ventnor and Cherbourg. Finally a chain of 10 "10 set" links was set up from Luneburg to Brussels, whence a normal land line connected it to Whitehall. Full information regarding this set, it should be recorded, was passed to the U.S.A.

UNDERGROUND GERMAN RADIO FACTORY

Technicians investigating for the R.A.F. Air Disarmament Flight of B.A.F.O. found that a radio valve factory was built by the Germans under the old Reichstag. The factory had been constructed 60ft. underground, and was a subsidiary of the Telefunken concern.

Germans are now working for the R.A.F. clearing and tabulating the stock for the British Mission.

Air Chief Marshal Sir Sholto Douglas has also instructed that special attention be paid to the great Siemens factory in the British zone at Berlin, where already 150,000 radio valves, waiting delivery for the Luftwaffe, have been located and collected on our behalf. More than 500,000 partially-completed valves have been found by our investigators.

IMPROVED DX

(Continued)

strength. The diode voltage is negative in respect to the cathode, due to current flowing through the diode. When the carrier is modulated, it causes the negative diode voltage to vary according to the modulation frequency.

This varying voltage is fed to the plate of the noise limiter, via C1, and modulates the plate current of the limiter, which will, in turn, be reproduced in voltage variations across the cathode resistor and is fed via C2 to the A.F. amplifier. In Fig. 5 the letter A indicates the steady limiter current in respect to earth, and B indicates the current when modulated or varied by the detected signal.

Potentiometer R1 in Fig. 4 is adjusted by sound until the negative half-cycle of detected audio voltage applied to the plate, nearly cuts the limiter off; that is, reduces the plate current close to zero. This is accomplished by raising or lowering the limiter plate voltage.

When ignition or atmospheric pulses or transients are received, the detector rectifies them, and reproduces their wave form as large negative voltages. These voltages reduce the limiter plate current to zero and the result is that no noise larger than the signal can pass through the limiter and be applied to the A.F. amplifier.

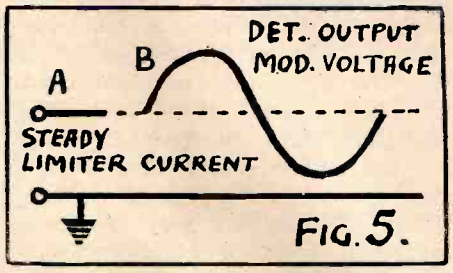


FIG. 5.

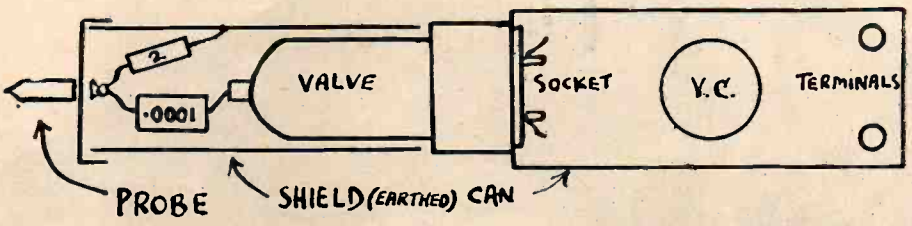
Good A.V.C. operation is a distinct advantage when using this arrangement, as the signal strength is kept relatively constant.

After a few minutes' use the limiter action is readily appreciated, especially in noisy localities.

If it is adjusted to a level too low, distortion will result, due to squaring of each negative half-cycle. This distortion becomes apparent in reproduction.

SIGNAL TRACER IN MINIATURE

Hand-held tool with infinite uses



Section of the signal tracer which is built into a hand-held tool.

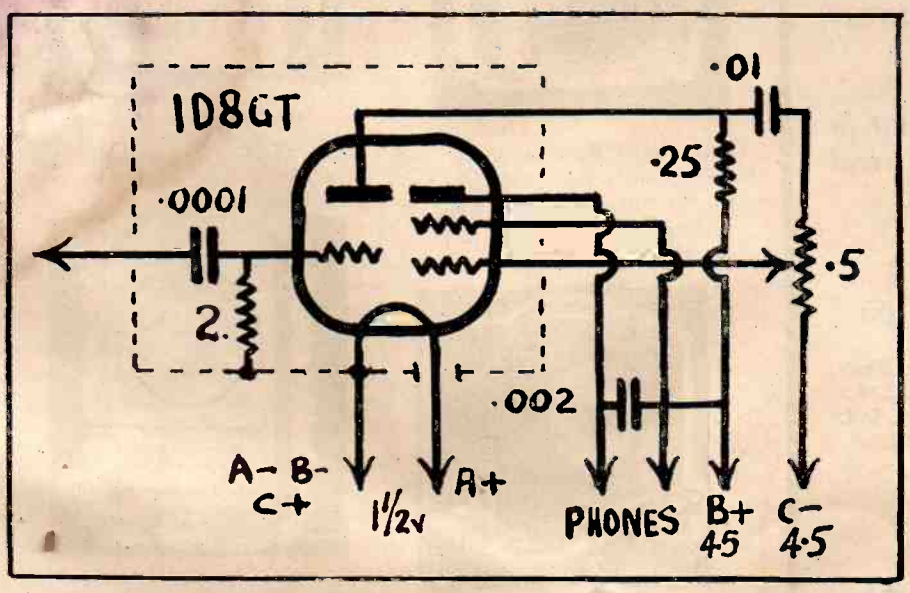
AMATEUR constructors who have made two or three receivers or amplifiers usually have sufficient practical knowledge to service their own sets and those of their friends. The most common methods used are voltage measurement with cheap voltmeters or signal tracing with condenser and headphones.

It is believed that the device shown on the sketch will appeal to many constructors because of its simplicity, low cost and effectiveness. The instrument is easy to build and the diagrams will give a fair idea of the very compact form; though each individual will probably devise his own, from the materials available.

By
H. L. BAILEY
46 Robert Street
Wallsend, N.S.W.

It is a hand-held tool, having a probe for introduction into the chassis of the set under test, and two leads, one going to the battery block, the other to headphones. The probe may be applied to R.F., I.F. or audio circuits. It can be used to listen to the signal at any point. Distortion, hum or noise can be traced to the stage at which it first occurs. The tracer will show filtering hum at the output of the filter if that unit is defective; if screen and cathode by-passes are effective no signals, or very weak signals, will be found at these points. Noisy valves and crackling resistors have been eliminated. The tracer is so sensitive that it need only be brought close to the grid or plate lead of any high level stage. Oscillation of the mixer valve is readily determined, as a signal is obtained from the oscillator grid or plate, which differs from the output signal by the intermediate frequency (that is, if a broadcast of sufficient strength, at the oscillator frequency, is receivable by the set. Signals may be detected at the aerial coil with the tracer volume control well advanced. Batteries are used because of the simplicity and cheapness of the method. The batteries are wired to a valve socket, and the cable from the tracer terminates in a plug which is pushed in the socket when required. No switch is then needed.

I can assure everyone of the convenience and ease of operation which this instrument affords me, and from my conversations with constructors and servicemen, I believe a real need is met by it. Certainly any amateur who services two or three sets of his own would find it a cheap accessory. With the addition of a coil, condenser and an aerial, it becomes a very powerful one-valve set, for B.C. or D.W.

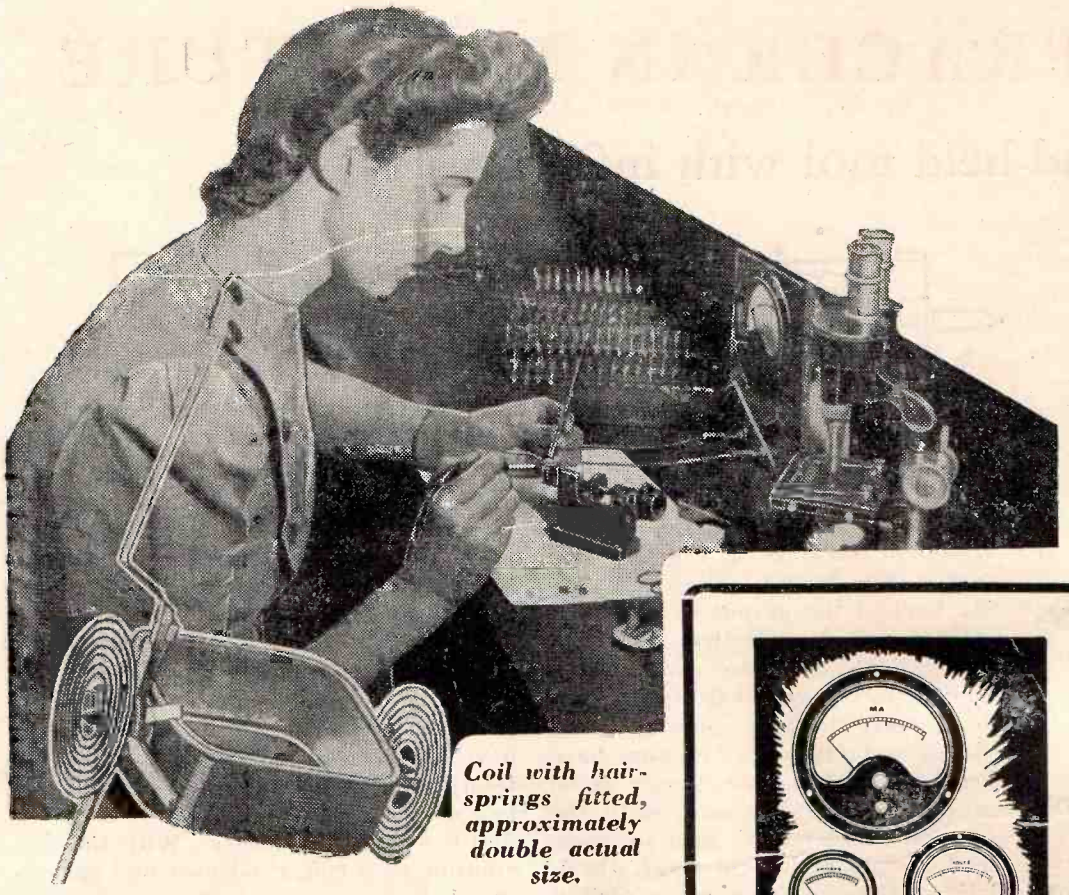


Circuit of the instrument which can be used with any type of set.

RADIO IN NORWAY

Six of the sixteen broadcasting stations in Norway were destroyed during the war. They are those at Porsgrunn, Notodden, Vigra, Vadsoe, Narvik, and Bodoe. As a result, listening conditions in many districts, particularly in the north, are very poor. To alleviate the difficulty a transportable 20-kW transmitter has been erected at Vigra until the new 100-kW transmitter is completed. New transmitters are being constructed as well as replacing those destroyed. Among the new stations is a 50-kW short-wave transmitter, which will replace the present 5-kW station, and is intended particularly for Norwegian listeners abroad.

Wireless sets valued at about 120,000,000 kroner (approximately £6,000,000) were confiscated by the Germans in Norway in 1941. A large number of these have now been restored to their owners, but many more are needed to meet the demand. The present policy is to import the components and manufacture the sets in Norway. The Norwegian Broadcasting Service has, therefore, ordered components for 120,000 sets, some of which are expected to be on sale at Christmas.



Coil with hair-springs fitted, approximately double actual size.

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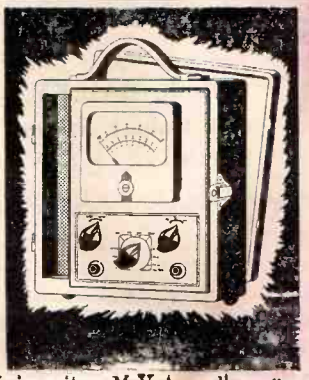
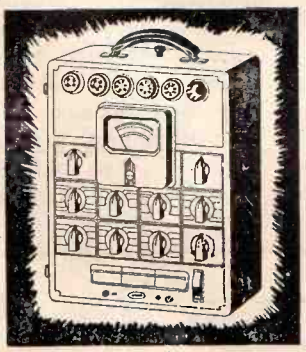
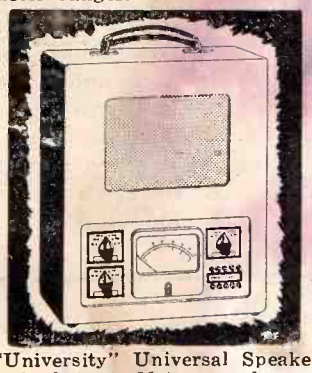
University meters include voltmeters, ammeters, milliameters, micro-ammeters, etc. Sizes 2", 3", 4" and 5".



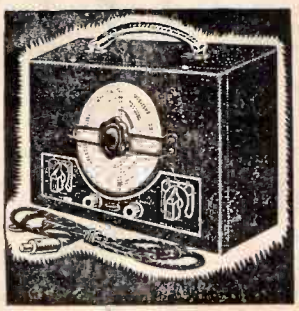
University M.V.A. all-purpose Multimeter (bench or portable) giving complete AC/DC measurements together with output meter ranges.



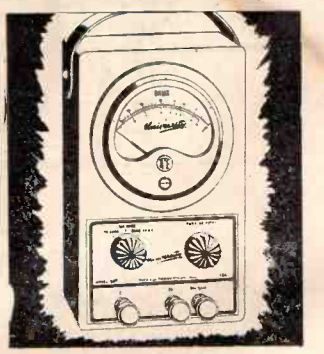
University Supertester is an extremely versatile Valve and Circuit Tester featuring an extraordinary valve and condenser roller test chart.



"University" Universal Speaker and Output Meters make set testing quick and easy. No power connections required, just plug in to any type speaker socket.



A new "University" five band oscillator for the alignment of all types of radio receivers.



University Earthing Resistance Tester is much sought after by maintenance electricians, and is typical of University's industrial test gear.

Fully illustrated literature available upon request.

16/163

HOW RADIO SIGNALS ARE BROADCAST

or the Phenomena of Electromagnetic Wave Propagation

By
CHARLES ASTON
21 William Street
Double Bay

ETHER is an intangible substance but its existance is generally accepted for explaining the phenomena of electromagnetic-wave propagation. Without such a supposition it would be necessary to conceive the ability of a force to act on a distant object without the assistance of any intervening medium.

Ether is said to permeate all space. Even a vacuum can be simply demonstrated to "contain" ether so no substance can be freed of it.

Maxwell, one of the greatest mathematicians, showed mathematically in 1865 that if an electric force at a point is altered, the magnetic force is also altered, which results in an electromagnetic disturbance in the surrounding ether and is propagated from the point as a wave motion. This calculation was made some years before being carried out experimentally and was probably one of the greatest calculations of the century, although very little heard of by the average person or radioman. The practical experimenters received the publicity for the "discovery" of radio transmission.

Electromagnetic waves cover an extremely wide range of frequencies, as can be observed from a frequency spectrum chart. As inferred by its name it is comprised of electric and magnetic fields and when one field has been given a motion it cannot exist without the other.

A stationary magnetic field, say, around a wire, exists without an electric one. When a relative movement is given, the magnetic field with respect to a conductor, an E.M.F. proportional to the number of lines of force cuts is induced in the conductor. When the conductor is moved further from the influence of the magnetic field, less lines will be cut per unit time and a smaller E.M.F. will be induced in the conductor and so on. It is now evident that when relative movement is imparted to the magnetic field a potential gradient in the surrounding ether is produced, thus an electric field.

This explanation requires a little thought to be understood, but it is difficult to put in simple language. The example used was to demonstrate the existance of the electric field and the use of the conductor is just to show this point and has nothing to do with the production of the electric field.

Aerials

A method is necessary to transfer large portions of E.M. currents into ether disturbances, and an aerial is invariably used for this purpose.

An oscillatory circuit with its varying magnetic field will radiate small amounts of E.M. waves. The fields produced by an inductance coil and an artificial capacity are of a concentrated form, so, as the oscillatory current falls, so the concentrated fields developed return to the circuit before a field of opposite polarity is produced.

An aerial may be described as an "open" oscillatory circuit, as it possesses both self inductance and capacity and, as a result, has a resonant frequency. Fig. 1A illustrates an aerial of the vertical type and a radio frequency current is applied across it and earth, the aerial acting as one plate of a condenser and earth the other. Fig. 1B shows the electrostatic field on an antinode of oscillatory current. When this current begins to fall, so the electrolines begin to collapse and return into the circuit. However, all the electrolines do not collapse before the next half cycle is applied, developing electrolines of an opposite polarity (Fig. 1C), "cutting off," as it were, the former electrolines, which are propagated through ether. This propagation will continue while the exciting current is applied.

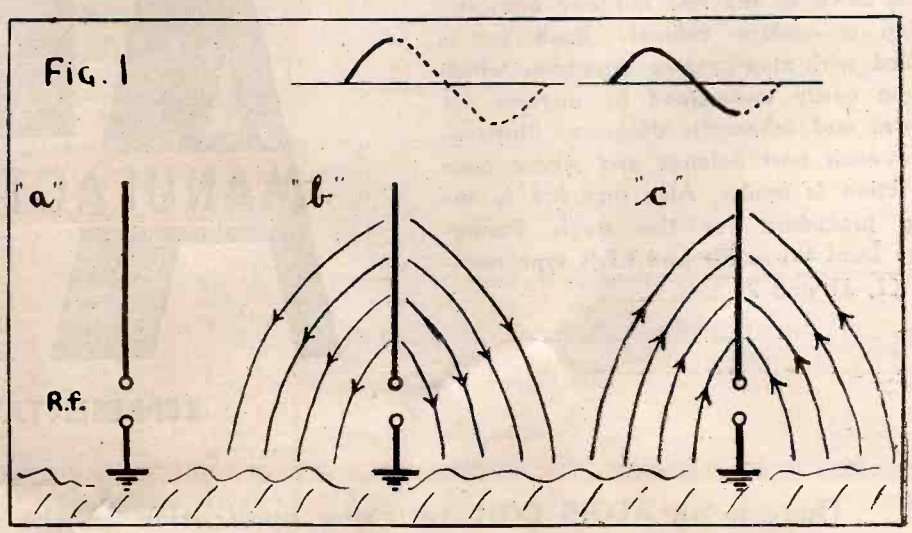
The frequency of the applied oscillatory current has a great effect on the amount of energy propagated. If the mains frequency, 50 c.p.s., were applied to the aerial, the amount of energy radiated would be extremely small, as the frequency is so slow that most of the electrolines would collapse back into the circuit before the next half cycle produced lines of opposite polarity. The greater the frequency the shorter the time before opposite lines of force begin to be produced, resulting in proportionally greater numbers of lines being cut-off.

Fields

Two fields are produced around an aerial—the induction field and the radiation field.

The intensity of the induction

(Continued on page 19)



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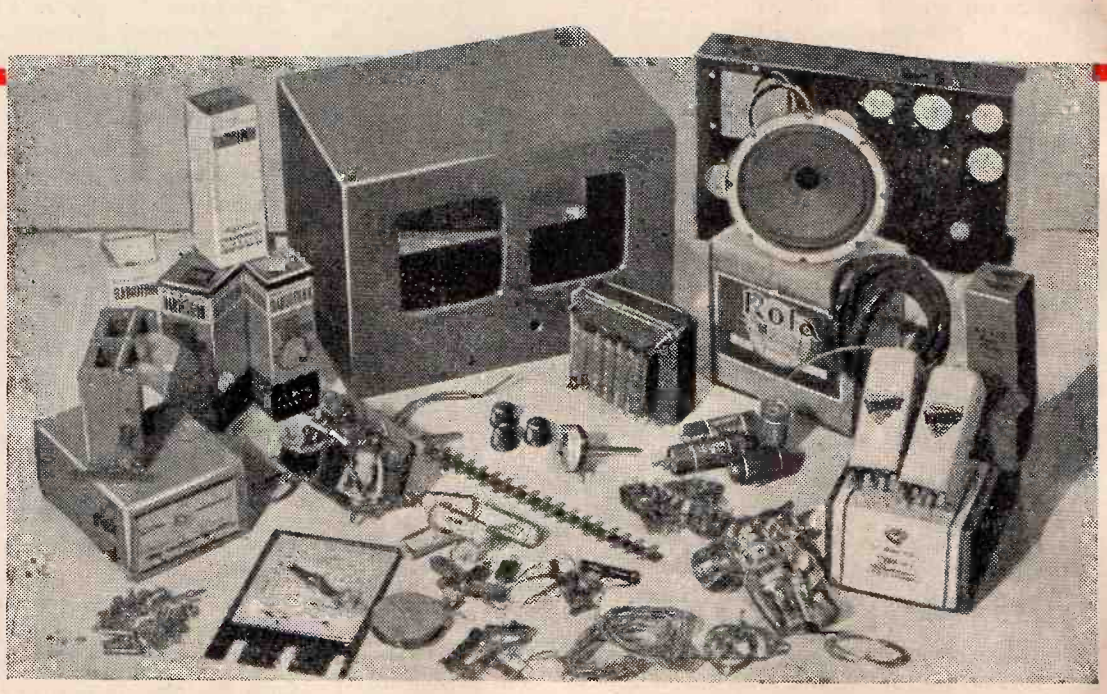

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WAVES

(Continued)

field diminishes rapidly as the distance from the aerial and is of no consequence at a distance great compared to the wavelength. It becomes more important as this distance is decreased. This field develops energy and returns it to the aerial each half cycle and is of a similar nature to the field produced around a coil inductance.

It can be shown that at a distance of one-sixth of a wavelength from the aerial both fields are of equal amplitude and for lesser distances the induction field is the greatest.

The radiation field is the one of consequence for long-distance communication; its field intensity diminishes directly as the distance from the aerial and represents the energy radiated from the aerial.

The ability of a substance to convey a wave-motion is dependent on two factors, which appear to be characteristics of ether—elasticity and inertia.

Elasticity is the strong tendency of the "particles" of ether to return to their former position after the passing of the wave motion.

Inertia is the ability of the particles of ether to overshoot their original position when displaced.

Phase Relation

The existence of electric and magnetic fields has been shown and are said to be in "space quadrature," which means that they are at right-angles or 90 degrees with respect to each other. The fields are dependent on each other; if energy is taken from one, energy from the other balances this loss, so the energy content of the two fields is always equal.

Polarisation

Polarisation was a phenomenon discovered in optics before the propounding of the E.M. theory and was based on experimental findings resulting in the electric field being referred to as "plane of polarisation." A vertically polarised wave is one in which the electric field is vertical with respect to earth; horizontal polarisation is the electric field horizontal to earth. In the former, the magnetic component is horizontal and, in the latter, vertical, as they are in space quadrature to the electric field.

An aerial that is vertical with respect to earth will produce a vertically polarised wave and a simple horizontal aerial will produce a horizontally-polarised wave. As a result of this, it is common to refer to the aerial as being polarised, thus a "horizontally-polarised aerial."

Wavelength and Frequency

Wireless waves are propagated through free ether at the speed of 300,000,000 metres per second, which is 186,000 miles per second and is the same velocity as light.

The number of oscillations per second applied to the transmitting aerial is the radiated frequency. The distance occcupied in ether by one complete oscillation is the wavelength and is usually expressed in cycles per second (c.p.s.), kilocycles per second (kc/s) or megacycles per second (mc/s).

The relationship between the wavelength in metres and the frequency in c.p.s. is: wavelength in metres equals 300,000,000, divided by the frequency.

The intensity or field strength of a radiated wave is measured in milli- or micro-volts per metre. If a frequency of wavelength, 1 metre, induces a voltage of 10 microvolts, the intensity of the field at the conductor is 10 microvolts per metre.

The electric field intensity of the wireless wave decreases inversely as the distance from the transmitting aerial, which is to be expected from the spreading of the wave.

The maximum field strength that may be expected for a ground wave can be calculated from the formula:

$$E = 9{,}500 \frac{\sqrt{P}}{d}$$

where E is the field strength in microvolts per metre; P is the radiated power in watts; and d is the distance in kilometres.

This formula is correct when no losses are involved, but energy dissipation in the ground greatly reduces this result for most frequencies.

Ground Waves

The transmitted wave which follows the surface of the earth is the ground wave and the effect of the earth on the wave varies greatly with the frequency. At low frequencies, up to, say, 50 kc/s, the earth is a good conductor and there is only slight attenuation other than that due to spreading. The actual result closely approaches that of the formula. For this reason frequencies in this range are used when a maximum service area is required, but due to spreading very high powers are necessary.

Above 50 kc/s. the earth is no longer a good conductor and energy is absorbed from the wave in the form of eddy currents in the earth. The energy losses increase rapidly with the frequency and vary with the type of ground being passed over. Losses are greater over ground than sea water.

At high frequencies, wave points of opposite polarity are closer together, resulting in a larger current component flow in the ground with greater energy losses. At still higher frequencies complex effects occur as the earth acts as a dielectric.

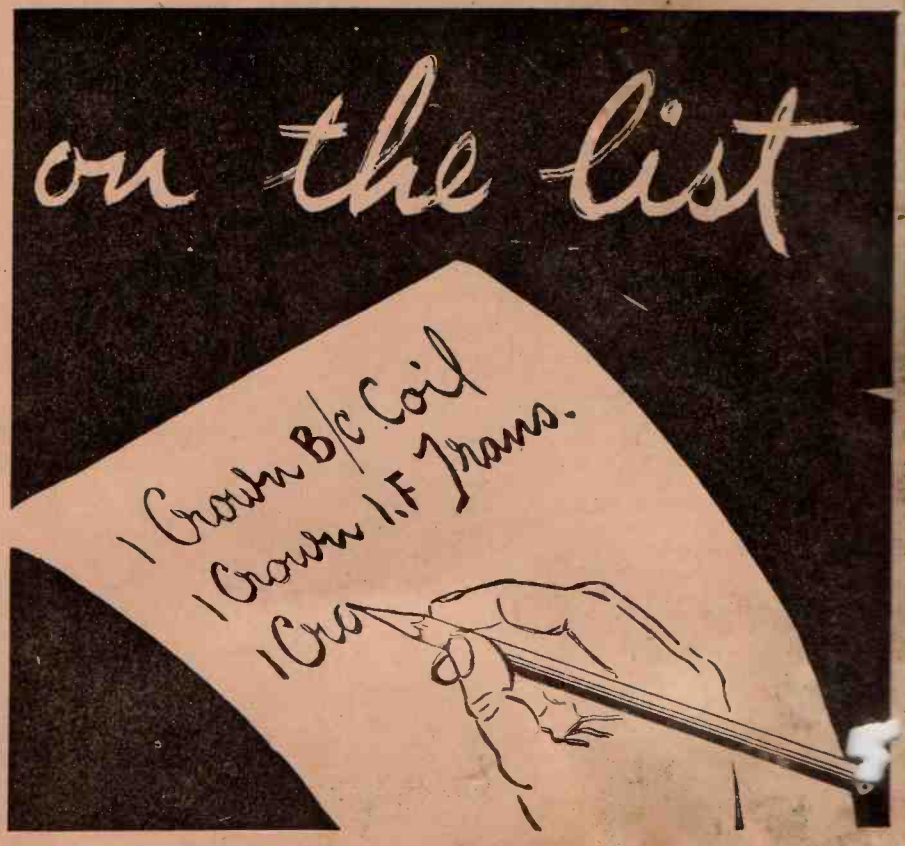
From the above it can be seen that the ideal result is unobtainable and the actual result depends on the frequency of the radiated wave and the conductivity of the earth—the low frequency ground waves provide a large service area without undue losses, while high frequency ground waves provide a comparatively small service area with relatively high attenuation.

It should be remembered that,

(Continued on page 20)

First on the list

FOR SET BUILDERS



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WAVES

(Continued)

for a limited area, it is usually more economical to use medium wave bands, as a greater portion of energy detaches itself from the aerial.

The Ionosphere

Observations showed that all wireless waves were not received directly along the surface of the earth and, as the signals had suffered only little attenuation and were of frequencies subject to earth losses, precluded the possibility of the wave travelling along the surface of the earth or through it. This led to the discovery of an ionised upper layer concentric with the earth in the year 1902 by Oliver Heaviside.

The upper atmosphere is believed to be composed of very rarefied gases, thus when ionised will remain in this state for a considerable time, the rate of reunion being less than the rate of ionisation. This ionisation is probably brought about by the sun's ultra-violet radiation.

It has since been found that other ionised layers exist above the Heaviside layer, three being important for radio communication. The E (Heaviside) layer, 62 miles above earth, and the F (Appleton) layer, 150 miles above earth. Sometimes the F layer exists as two separate layers about 50 miles apart—the lower being known as the F_1 layer and the higher the F_2 layer. The actual height of the layers varies from day to day and is dependent on several factors, such as the season and the number of sun spots. With the rising of the sun, ionisation increases and is at maximum at about noon. Recombination begins after sunset and its degree is dependent on the maximum ionisation for the day, also the season of the year. At high levels the rate of recombination is so small that a state of ionisation remains.

Sky Wave

The ability of high frequencies to be used for long-distance communication is due to the "bending" effect of the ionised layers on the sky wave returning it to earth at considerable distances from the transmitter with little loss of energy.

When the wave enters the ionosphere its electrostatic field attracts and repels the free electrons, causing them to oscillate at the frequency of the wave.

The energy lost by the wave in causing the free electrons to oscillate is mainly of a temporary nature as the electrons re-radiate most of their energy in the form of the original. The velocity of the re-radiated wave is different from the original, but the two combine in such a manner that the wave is deflected from the higher electron density regions to the lower electron density region (downwards).

A certain amount of energy is required to make one electron oscillate, so it will require greater energy to make several electrons oscillate at the same frequency. The higher electron density will abstract more energy from the wave producing a greater proportion of re-radiated energy and hence a greater deflection of the wave. A lower frequency wave has a longer time to set free electrons oscillating and, as before, a greater amount of energy is imparted to the electrons for reradiation. Thus, the higher the electron density and the lower the frequency of the transmitted wave the greater the possibility of reflection, and means that the wave is deflected more with low than high frequency and this deflection increases as the electron density increases.

In the above it is assumed that there are no losses involved, but due to collisions between oscillating electrons and gas molecules small losses occur and it is obvious that the greater the number of molecules present during the bending the greater is the loss incurred in a manner that does not deflect the wave.

Frequencies in the "broadcast" band may have their sky wave deflected in the E layer to a region where there is a large number of gas molecules where no further bending will occur and the energy of the wave is absorbed. Any resulting reflections are of a very weak nature. Between sunset and sunrise the E layer practically disappears and reception of the sky wave at these frequencies is possible.

Because the free electrons are in the magnetic field of the earth, they are capable of altering the polarisation of the wave and a wave that is transmitted up with vertical polarisation may come down horizontally polarised.

HUMAN WAVES

As reported in the New York Times, micro-waves can be reflected from the human body and made to flow through pipes like water, Prof. George B. Hoadley (Polytechnic Institute of Brooklyn) recently told the American Institute. The micro-wave band of the spectrum is sandwiched in between the frequencies suitable for radio broadcasting of sound and the heat and light frequencies. Using a 24-ft. tube of ordinary 4-in. pipe, with an elbow joint in it, Hoadley showed that micro-waves can pass with undiminished power through the tubes and around bends, like water. He demonstrated that micro-waves polarise like light.

HOLDING THE CHASSIS WHILST SERVICING

In my service department I find the following a very safe and easy way of holding a receiver chassis in the upside-down position. It is merely a length of strong cord or aerial wire, attached at each end to hooks in the ceiling, so forming a loop.

This loop, which can easily be adjusted for length by twisting one end round its hook, carries the chassis in sling fashion by means of volume control spindles, reaction spindles, etc. Either one or two old H.T. batteries (or a block of wood) support the back end of chassis on the bench.

Alternately, the fixing lugs on chassis can be used for slinging, the cord or wire being either threaded through the fixing screw holes, or looped behind bolts loosely screwed or dropped into these lugs.

I also find it much easier to work on a chassis held in this slightly sloping position than if it is stood upright on its one end on the bench. An electric light bulb can easily be arranged to hang low over the work. The bulb should preferably have a deep opaque reflector, thus obviating dazzle.

Practical Wireless (Eng.).

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CIRCUITS

(Continued from page 11)

super control pentodes for audio A.V.C. to get the regulation curve completely flat. But the distortion introduced this way does not make up for the small disadvantage of having to adjust the volume control a little when tuning in to various stations. And here again Europe is years ahead of America and us. As far back as 1938, the EFM1 and EFM11 appeared on the continental market, a combination of tuning indicator and variable mu audio pentode, especially designed for audio A.V.C., with a maximum distortion of less than 1.5 per cent. With these valves it is possible to get very near the ideal horizontal regulation characteristic without any noticeable extra distortion.

The Tuner

Talking about the tuner just means starting my old song again; the same things I have said in some of my former articles in the "Radio World": That the efficiency of the tuner, its selectivity, sensitivity and noise level hinges on the efficiency of valves and coils and that continental type valves (EK2, EBF2, etc.) and Permaclad coils are a combination so superior to anything America has yet produced that there should not be any doubt in the minds of unbiased radiomen of what to use. It is about time for a majority of our radio technicians to set an end to their unconditional surrender to American ideas and thoughts, blindly using American valves, coils and standards, and, apparently under U.S.A. hypnotic influence, overlooking anything better sponsored by England and the Continent.

Talking to these U.S.A. worshippers about continental achievement is like talking sex to an old maid. But what is the good of all this talk? As long as there is a 6A8 and 6J8, EK2 or ECH4 will never be recognised as standards. Buy an oscillator coil and it will always be for the "standard" 6J8 or 6A8. Read a certain radio-and-other-things monthly and you would think that valves of the E series have never existed; not a word of them in more than 12 months' publications. Why things are as they are I do not know, and I therefore leave it to my readers to draw their own conclusions. In my opinion the business interests of some powerful combine are behind all this, but that is only the result of my own private investigations, circumstantial evidence I may call it. The new series of single-ended American valves to be made in Australia certainly looks promising. The mutual conductance is now better in many cases than their continental equivalents from 1936, but the plate resistance of the RF pentore types still lags behind. But, who knows? There is still a real possibility of progressive U.S.A. catching up with backward Europe and England in a few years' time, if progress on the Continent could be effectively stopped!

BABY BATTERY

An American midget 22.5 volt battery considerably smaller than a pack of cigarettes, opens the way for renewed interest in the field of portable sets. The new battery is the No. 412 "Everready" Mini-max "P", weighing 2.5 ounces and measuring 2 x 1½ x 23-32 inches.

THE GROWTH OF THE RADAR CHAIN

A DEVICE used for tracking ships as well as aircraft, one of value in the air as well as on the ground, a spy on the activities of the enemy even over his own territory—that is "Radar." It was Radar that guided the Hurricanes and Spitfires which smashed up the Nazi formations during the day and night Battle of Britain; it plotted the progress of Rudolph Hess when he flew to Scotland and baled out; it detected

By
S/Leader VERNON NOBLE
(Royal Air Force)

the Nazi cruisers, "Scharnhorst" and "Gneisenau," when they slunk out of hiding on the French Atlantic coast and fled up the English Channel. Radar "watched" the enemy laying sea mines and directed the mine-sweepers to clear them.

Whe nthe Focke-Wolfs tried their tip-and-run tactics on the south coast of England, darting low over the water to attack the seaside towns, it was Radar which gave the defending fighters sufficient warning to enable them to take such a toll of the enemy raiders that they soon abandoned the game. Radar also detected the flying bombs which were hurled across the Channel; and plotted their tracks throughout day and night, so that the defences were ready to meet them before they reached London. It was Radar that revolutionised navigation and also enabled accurate bombing to be carried out through cloud.

These are only some highlights of the Radar story.

From Three Men to Thousands

Built up from a score of stations in 1939, the Radar organisation now has a chain of 100 stations. From the original three Servicemen who were selected to learn the intricacies of the new science and pass their knowledge on to others, the number now employed in Radar, directly and indirectly, in Britain and overseas, has reached hundreds of thousands.

When the first Radar towers and masts went up in Britain there were many speculations among villagers and farmhands living near the sites, but the temptation to answer their sometimes fantastic surmises was always resisted. The story got around one village that the high towers were topped by colossal claws which were designed to snatch hostile aircraft out of the sky. Some airmen evaded their questioners by hinting that the masts, hundreds of feet high, were intended for training parachute jumpers.

A Radar operator is sworn to secrecy, and thousands of British parents whose sons and daughters have worked in Radar for years still have no idea how they are employed. Secrecy is preserved even within the Service. W.A.A.F. officers who have visited Radar girls in hospital and have casually asked what was their job have been told: "Special duties, Ma'am."

As far back as 1935, it was foreseen that girls could be trained as Radar operators. They have proved a great success, working with some of the most complicated apparatus ever invented, and coolly passing on information and making calculations, often while bombs were falling.

A flight-sergeant of the W.A.A.F., only 24 years old, was awarded the Military Medal in 1940 for carrying on as bombs were dropping around her. While the walls of the building were shaking from the blast of explosions, she continued plotting the course of the bombers. She passed on their position to the filter room, and then said over the telephone: "The course of the enemy bombers is only too apparent to me, because the bombs are almost dropping on my head."

Early in 1939, it was decided to disclose the progress of Britain's Radar experiments—then known as R.D.F.—to France. This was one of the topics discussed at the staff talks during General Gamelin's visit to England. All Radar production, however, was kept in England, and orders were placed to cover French requirements. A chain of stations was planned to extend from Abbeville to the Mediterranean.

The French already had a system known as Detection Electro Magnetique, but it was inferior to the British R.D.F., having an approximate range of only 30 miles, and not giving satisfactory results for more than one aircraft. This system gave no immediate directional data, nor was it accurate in height-finding, and it gave poor cover against aircraft flying at medium or low heights and was slow to evaluate results.

The only Radar apparatus available for the British air forces in France when war broke out was a mobile set used for research and development purposes, and this started operating between Calais and Gravelines on September 24, 1939. Other sets followed, and each station was provided with an electrical exploder, detonators and gun cotton so that it could be destroyed if the Germans broke through. When the necessity arose, stations were blown up and equipment was hacked to pieces with axes, so that the enemy could not learn our secrets.

In Britain, scientists and R.A.F.

(Continued on next page)

RADAR

(Continued)

experts were making on a scale which the pioneers of nine years ago scarcely thought possible.

For Attack as Well as Defense

Radar has now been so far developed and the organisation so perfected that, within seconds, the position of enemy aircraft, their height and the direction in which they are heading, can be passed to the appropriate filter room while the aircraft are still more than a hundred miles away, and, within minutes, the information is transmitted to the patrolling fighters.

After five years of war, this complex organisation for obtaining information, assessing it and putting it into circulation was working with magical smoothness. By means of Radar, the Luftwaffe was robbed of every advantage of surprise; its movements were known almost as soon as they were initiated. Whether flying at many thousands of feet, or skimming low over the water, the enemy was observed and his course tracked as clearly as if he were transmitting a radio commentary on his journey.

Radar has an offensive as well as a defensive purpose. In the European War, not only were Allied bombers warned that enemy fighters were rising to meet them, but British fighters could be directed towards the enemy while they were over his own territory. There was an occasion when R.A.F. fighters were carrying out an offensive sweeping over Flushing. A Radar station in England detected an enemy formation some miles away, and the fighters were informed. They turned on the Germans and destroyed nearly all of them.

There are three types of Radar station, each with its allotted area to cover. One sends out waves of energy and is responsible for detecting high-flying aircraft. Anything which comes within its radiation reflects back energy, which is received and made apparent on the screen of a cathode-ray tube. The other two use a revolving beam, one for picking up low-flying aircraft, and the other for detecting such extremely low objects as aircraft skimming the water and ships.

The receiving room at a Radar station presents an orderly array of metal and glass gadgets, with moving blue and yellow lights and tiny figures which flash on and off in red, green and yellow. Miles of wire and thousands of minute metal connections lie behind those grey-painted boxes and cabinets.

Men and women sit at the cabinets containing the cathode-ray tubes. The tops of these tubes are exposed, and it is here that the "echoes" or "pulses" from the objects caught in the radiation can be seen. These responses are made visible in two ways:

(1) By a line of blue light moving rapidly round a circular screen,

PETROL AND RADAR
They Don't Mix

Petrol being transferred from one container to another in the vicinity of radar equipment in operative condition represents a serious fire hazard. High-frequency current is induced into the containers and sparks jumping between them can cause an explosion and fire. Any transfer of fuel made in the vicinity of radar sets should be made with the equipment inoperative. — "Q.S.T."

like the minute hand of a clock, and illuminating any object which comes within reach of the revolving aerial with which the line coincides. On the circle, or globe, is the outline of the British and enemy coasts, and as the radius of light moves round, it leaves in its wake faint yellow glows representing such permanent obstructions as sandbanks and high land, and impermanent objects such as aircraft and ships. From this screen, a planned position can be read.

(2) By an illuminated panel on another tube, which gives the ranges of aircraft caught in the radiation, at distances beyond the scope of the circular screen. Here, also, permanent "echoes" are recorded as well as moving ones. The "echoes" are lines of green light, like a tremulous graph, darting and flickering as moving objects are picked up. To the operator, the up and down movements of the lines are as intelligible as if he or she were viewing the approaching or receding aircraft through a telescope, with the advantage that the "vision" is extended to beyond a hundred miles.

The operator at each tube is connected to the filter room inland, and he provides an uninterrupted flow of information on the movements of aircraft, hostile or friendly, and on the position of ships. He is also able to indicate, on a panel over the plotting table, the plan position: the exact spot on a gridded map of any aircraft whose presence is recorded. The number of aircraft can be shown, and their height is automatically worked out from the recorded angle of elevation, while a clock connected with the tube panel registers their speed.

The function of the Radar stations is to obtain information of movements out at sea. Once aircraft cross the coast, the Royal Observer Corps takes over and follows their track. The British Isles are divided into fighter groups, each group having its own Radar stations, its filter room and its operations room. Each group in turn is divided into a number of sectors from which fighter aircraft are directly controlled from the sector operations room.

A Constant Picture

Information is fed to the group filter room from the Radar s[tations], and this information, having been collated and assessed, is passed on simultaneously: to the operations room at headquarters of Fighter Command; to all group operations rooms; to Observer Corps centres; to gun operation rooms; to bomber groups; and to the Navy. In this way, a constant picture of aerial activity is spread within a few minutes, and action can be taken by whatever organisation is concerned.

Early in the war, when search was being made for the right type of people for responsible jobs in the Radar stations, it was decided to recruit men from the London Stock Exchange as filter officers, men accustomed to making rapid decisions and quick assessments when dealing with continental markets. Such men, in their normal work, had had to make instantaneous decisions involving large sums of money, and their nimble brains were admirably suited to the jobs which the R.A.F. had to offer.

Now both the R.A.F. and W.A.A.F. officers work as filterers. The entire system, with all its complications and widespread ramifications, has been gradually tightened and smoothed, so that the margin of error has been reduced to the minimum.

Radar has become a vital weapon of war. As the chain of stations was growing up in Britain, Radar was introduced first to Malta, and then to Egypt and the Middle East. Wherever the British armies and the Air Force operated, there went Radar stations—to work on foreign cliffs, on desert sands, on the fringe of jungles, to provide early warning of enemy approach.

After Years of Extensive Research and Thousands of Secret Wartime RADAR and ULTRA-HIGH-FREQUENCY applications—

ETHOLEX POLYSTYRENE

The Phenomenal Low-Loss Insulating Material is available in sheets and rods.

ETHOLEX POLYSTYRENE, which has the dielectric strength of high-grade mica—the low loss factor of fused quartz—insulation resistance of 10^{17}–10^{19} ohms per centimetre and excellent dimensional stability, is not only the best insulator FOR SHORT-WAVE RADIO TRANSMITTERS AND RECEIVERS: ETHOLEX POLYSTYRENE is the best insulating material for ANY application where electrical efficiency is required.

The following characteristics of Etholex Polystyrene are practically constant from 40 deg. F. below zero to + 176 deg. F.

ELECTRICAL

Volume Resistivity ohms: C.M. 10^{17}-10^{19}.

Dielectric Strength: Volts per mil. .010" thickness = 2,500 .120" thickness = 550-650

Freq. cycles	Dielectric constant	Power factor
50	2.5-2.6	.0001-.0002
50^3	2.5-2.6	.0001-.0002
10^6	2.5-2.6	.0001-.0004
10^{10}	2.5-2.6	.0002-.0004

MECHANICAL

Tensile Strength, lbs. per sq. in.: 5.500, 7.000.

Compressive Strength, lbs. per sq. in.: 11,000-15,000

Elongation, per cent.: $\frac{1}{3}$.

Hardness, Rockwell: M75-M90.

Impact Strength, izod: .3-.6.

Specific Gravity: 1.055.

Refractive Index: 1.59.

THERMAL

Softening Point: °F220-240.

Distortion Temp.: °F175-190.

Transition Temp.: °F180.

Ignition Point: F1350.

Thermal Expansion Coefficient per °C: 7.2×10^{-5}.

Thermal Conductivity, cal. per sec. per °C.: 3.2×10^{4}.

Specific Heat, cal. per gram per °C.: .32.

CHEMICAL

EFFECT OF—

Water: None.
Weak Acids: None.
Strong Acids*: None.
Weak Alkalies: None.
Strong Alkalies: None.
Alcohols: None.
Ketones: Swells.
Esters: Soluble.
Aromatic and Chlorinated Hydrocarbons: Soluble.

*Strong oxidising acids cause some discolouration.

ETHOLEX POLYSTYRENE, which comes to you in crystal clear rods from $\frac{1}{4}$" diameter, in all sizes up to $2\frac{1}{2}$" and in sheets 20" square or 5" x 10" pieces from 1/16" thick up to 1" thick, is processed in special stainless steel equipment to avoid contamination with impurities.

THIS AMAZING MATERIAL may be easily sawn, drilled, turned and milled with standard tools—can be bent to complex shapes by heating to 212-240°F—special cements are available.

APPLICATIONS INCLUDE: Aerial Insulators and Spreaders; Condenser Insulators; Stand Offs; Coil Formers and Supports; Extension Shafts and a host of other applications.

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[illegible] Street, Windsor, Melbourne

CALLING CQ!

By Don Knock, VK2NO

International Band Differences

As plans are made in most countries to restore amateur radio to rightful ownership of frequencies, it becomes apparent that band allocation is at best the result of temporary decision by local authorities. Inevitably, a straightening-out of the mess will be necessary at an International Convention. Process of shifting from certain V.H.F. bands to others will cause inconvenience, which could be avoided if licensing authorities conferred beforehand. For example, U.S.A. puts amateurs on 28 to 29.7 Mc/s, 50-54 Mc/s. and 144-148 Mc/s. Australia is reasonably in step by allocation of 28-29 Mc/s. and 50-54 Mc/s, but instead of giving VK's the 144 Mc/s. region, deviates to 166-170 Mc/s.

The reason as yet is not evident. News comes from England that the G's get 28-29 Mc/s and instead of 50-54 Mc/s. portion of the old "five-meter" band—28.5-60 Mc/s.

There will always be some incentive for VK's to look for W signals during freak conditions between 50 and 54 Mc/s., but the G's will not be in the picture. Cynics may say, "Who wants DX on five?" but the seemingly impossible always attracts the radio amateur.

In Definition of the Radio Amateur

There are misconceptions among the uninformed about the radio amateur and his status quo. The word "amateur" may have been an unfortunate label from earlier days, but it has become something tangible and symbolic to many thousands of enthusiasts. To readers of these columns the description "radio amateur" applies to those who operate their own radio communication (transmitting) equipment for love of a scientific hobby, and not for personal gain. Radio science and industry owe a big debt to the "amateur," but it is doubtful if soulless commercialism will ever honour that debt. The radio industry grew up as a result of pioneer technical study made by radio amateurs who burned midnight oil trying to send signals "across the street."

From these men were developed technicians who became the "servicemen" of the new business. Because these self-trained men were readily available, radio in general advanced quickly. They didn't study radio because they planned to go into the business—they didn't know that it would ever become a business! The spirit of adventure drove them on, but they had no idea what to expect from such adventures. After having overcome all kinds of obstacles, the final detail was added and the public acquired the apparatus and service which was in speedy demand. Radio broadcasting as a public utility grew from the seeds planted by early-day radio amateurs.

W.I.A. N.S.W. Dinner

Owing to power and lighting restructions throughout N.S.W., first post-war annual "get together" of W.I.A. members planned for 20th December, 1945, at Sydney's "Dungowan" had to be deferred until February 5th.

Future "DX Band" Activities

Listening to two W's in occupied territory—on 14 Mc/s phone, one referred to "information from U.S.A. that official date for American amateur re-occupation of '20' and '40' is 1st January, 1946." Following the advent of ZL's on "80," idle speculation about the ever-useful "40" metre band prompted a run over that band, with the revelation of a ZL1 and ZL2 in telegraphic contact. Further speculation now is whether these stations are "dinkum" or "synthetic." So many B.C. and Service Stations are planted between 7 and 7.3 Mc/s. that it's hard to find a clear spot. Whilst listening to ZL phones on "80," a little C.W. DX was noted in the shape of XU8HCC working AK3MB. The usual "little bird" whispered to me that VK's may have their "DX bands" returned to them by the Services in "about three months' time."

Call-sign Jumble

One far-reaching effect of the war upon radio telegraphic com-

(Continued on next page)

ZL's Back on 80 Metres

Big surprise in amateur circles was the fact that idle curiosity on the evening of December 9th last revealed ZL's in occupancy of the "80-metre band." Whilst dial twisting with the receiver, a run was taken between 3.5 and 4 Mc/s, and attention instantly focussed on the medley of New Zealand amateur phones. Stations appeared to be on from all ZL districts with C.W. interspersed with phones. Effect was that the war had been merely an interlude or unpleasant dream.

The story goes around in Sydney that ZL's are permitted only on "80," not on other bands, and that overseas QSO's are forbidden. First restriction is understandable as a temporary state of affairs, but not the second. If such is the case, no doubt questions will be raised about the why and wherefore of such a ban.

Visualise the effect later, if others are using "80" and have to "ignore" the walloping phone signals from ZL's with a "Sorry, OM. I'm not allowed to talk to you" atmosphere!

Night after night ZL's are prolific on "80," but it is an unequal battle with static. "80" is mostly a wintertime band for VK's and those who used it in better times know how valuable it is. For contact between city and country stations, either by day or night, it is ideal. Chief snag for the VK in suburbia is that of "B.C.L. QRM," but that is a near an obstacle to be surmspace

HAM NOTES

(Continued)

munication was the necessity for secrecy of station identity, with the idea of keeping sources of information from the enemy. The Nazis during the first Libyan struggles initiated a system of "single call-sign procedure," whereby two or more stations worked on a common call-sign. The Allies adopted the scheme and the confusion of identity hit back upon the instigators.

Calls were altered daily, according to allocations determined almost "on the spot." Result after a few months of this kind of thing was that call-signs meant anything but their implication.

JNB, for example, instead of being recognisable as a Jap commercial station, **could** be an Australian Army Field Unit anywhere in the blue, and **that** callsign might be changed to GBR in an hour or two. GBR, of course, wouldn't mean Rugby! These were certain means for quick identification of service stations, so that the only confusion was the enemy's. But, as the writer sees it, the system also opened the way for illicit station operation within a country by enemy agents.

It was just as easy for such stations to choose any old call-sign—and to change it at intervals. An example of how easily confusion may be caused to the **originating** communication service instead of the enemy is contained in an incident early in 1941.

A signals officer conducting a training exercise at a service school originated a plain language practice message containing words to the effect "Convoy attacked by submarines," etc., and the call-sign happened to coincide with that of a very well-known Pacific telegraphy station. Nothing might have occurred, but it was coincidental that a super Cunarder "Queen" was a day or two out along the coast with a hefty contingent of A.I.F. reinforcements for a battle front. The "pip-squeak" signal from the little field transmitter batting out the training message on C.W. was at a frequency that dropped the signal down at an important monitoring centre hundreds of miles distant. Carrying the well-known commercial call-sign—it caused a furore and a speedy hunt for the source of origin. Result was a necessary tightening of methods of using radio for practice or training purposes.

OBSERVATIONS ON 28 MEGS

Since the VK gang got a start on the new bands, it goes without saying that "Ten" is the number one stamping ground. Some of the boys discovered sorrowfully that receivers of the 80-40-20 breed don't always tick over on "Ten," and that a little more attention to L/C ratios and aerials is worthwhile. Another surprise for many is the fact that, if the 28 Mc/s. super is a really sensitive job for DX, it will also be a recipient of unwelcome intrusions such as the nextdoor neighbour's sewing machine motor or the ignition din from sundry motor vehicles, perhaps streets distant. "Ten" can, in other words, be fascinating, intriguing, DX producing, and completely exasperating at the same time. The lad who lives at the end of the power line away in the bush has it all over his city-suburban colleage. He hears signals in the quiet gentle hiss of the receiver that wouldn't have a ghost of a chance around Sydney or Melbourne. Both have a lot of fun nevertheless. After the usual tortuous Spring-cleaning, born of 6 years' intervention, the writer's station made its post-war debut on the key, early in January.

A modulator took shape, after chasing out the usual bugs," etc., and QSO's now proceed as ordained. "Ten" is showing erratic and interesting behaviour in Sydney. For example, at 11.30 a.m. on January 27th, a T9 crystal signal was heard at R8/9 around 28,050 kc/s in the shape of HB9CX in with land. He was "chased" by K2NO and others, but with no known success. Interesting point is that, to my knowledge, this is the first case of a European amateur being heard in Eastern Australia on "Ten" in daylight hours at this end.

In 1935-36 the G's, etc., were workable between 6 and 10 p.m., E.A.T., from September to November only. During the late afternoon of January 28th, VK2RA was heard QSO G6UC/ZC2, indicating that a G Ham was located in Cocos Islands. The mainland Americans are spasmodic in the mornings and not easy to "raise," but those in the Japanese area: Tokyo, Okinawa, Iwo Jima, Iie Shima, etc., frequently lay a strong signal down. Likewise with K6's. There is a tendency, as of yore, to congregate at the L.F. end of the band—a region I prefer to avoid. There's more chance of one's signal being in the clear, at least, from 28.5 to 29 Mc/s. Incidentally, during a QSO with W6MVL/China in Shanghai, he told me that he was working portable—at 400 watts! He seemed dubious about the 90 watts **input** at this end. One unexpected type of QSO was at 4 p.m. on January 27th with a W9 F.M. station—not identified for obvious reasons, but, when peaking at R9 plus, was understood to be using an F.M. outfit in Southern Kyushu, Japan. F.M. for Americans is in order on "Ten," portion of the band being allocated by F.C.C. for the purpose. Weird mushy sounding transmissions, therefore, may be the result of such signals as heard on an A.M. receiver—a most unpleasant sound. Interstate QSO's are possible at odd periods, but there is no semblance of reliability about such contacts. One moment the signals are there on the dial—[illegible] next—gone with the wind or som[illegible]!

NEXT ISSUE—

Full constructional details, including coil data, for a

Special Ham Superhet

to tune from 5 to 80 metres

By

Don B. Knock

ORDER YOUR COPY NOW

THE LID COMES OFF

Experimental Transmitters Back on the Air

So far, it is but a gently steaming pot, but as the temperature rises it begins to bubble and boil in intensity. Which is one way of picturising the fact that for VK Hams —the wartime ban is OFF. With Christmas upon them, RI's had little or no time to deal with a "snowing under" situation, but a few of the early birds were O.K.'s for the air. As the new year got a hold, licences began to go out in increasing numbers. In one's and two's they appeared on "Ten"—the older hands with pre-war confidence—and the more questing attitude of equally old hands at the Ham game—but who had not previously radiated a cycle above 14,400 kc/s. In other words, the band revealed desultory occupation by VK's around early January, but by the end of the month that picture had changed. Spasmodic interstate QSO's between VK2's and 3's, 4's, 5's and 7's have been fairly frequent, but as yet no 6's have been heard in Sydney.

The band is filling up and in another month the QRM situation between locals may become acute. But that's all in the game. Main thing is—the ban on amateurs in Australia is OFF, and a new era dawns in the history of VK signals.

May it not be too long before the Services disgorge some of our sorely-needed lower frequencies.

G's on 28 Mc/s.

As this is written, news arrives from England about the issue of licences there. Operation is authorised on 28-29 Mc/s, corresponding to the VK allocation, and holders of pre-war licences get 100 watts. On the "5" metre band G's are permitted to use only 25 watts, so that VK's are better off. An interesting point about the new G licences is that no longer are G's **experimental** stations but are "licensed **amateur** stations," a status obtained by R.S.G.B. request. VK licences are, as in pre-war days—**experimental**, a definition which appears to be somewhat contradictory, for the reason that VK's are not permitted to use F.M. at any **frequency**!

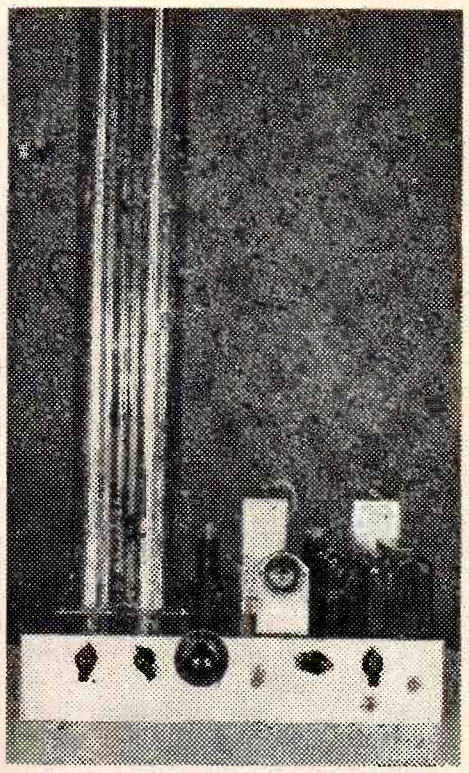
So far, I have not heard any G signals (from England) on "Ten" and have a feeling that we have missed the seasonal bus for European QSO's. But one never can tell on this temperamental band! If any VK reader of these notes raises or hears G's—the writer would appreciate word thereof.

So much has been heard over the air about receivers that behave unresponsively on "Ten" that the writer has decided to describe fully for "A.R.W." readers his own post-war amateur band receiver. It's a relatively simply job to construct—and is designed specially for the amateur bands alone. It is **not** a general coverage receiver. It will appear just as soon as time and space will permit.

Marker Station for 50 Mc/s Band

During considerable pre-war activity on the old "five-metre" band, the writer used automatic keying of a 100-watt crystal controlled transmitter to facilitate DX observations.

The keyed signal, "CQ DX 56 MC de VK2NO," was left running for scheduled periods, resulting in a collection of useful reports from New Zealand and other DX points. Realising that a marker station for the new 50-54 Mc/s band will be useful to assist many who will be starting up on VHF's for the first time, the writer will establish a transmission, on the crystal controlled frequency of 50,400 kc/s. This will commence some time during the month of February and will run nightly from 1930 to 2030 hrs. The carrier will be keyed, repeating "CQ, CQ, de VK2NO, 50.4 M.C." and a small percentage of tone modulation may be included in order to facilitate identification by most types of receivers. Power input will be 100 watts and directional vertically polarised aerials will be used, with directivity changed at intervals. As the band becomes occupied (in the Sydney area), speech will be radiated and the automatic transmissions interrupted for QSO's.



This example is of a modern coaxial-tuned V.H.F. Receiver. High frequency is obtained in the input circuit by the use of the concentric line.

Answer to the Mast Problem

Among the many renovation jobs around the shacks is that all-important job of aerial suspension. If, during the war years, the "Ham" was one of those who marched away to the big brawl, his aerial masts back home were likely to have fallen into disrepair, if not fallen down. With the opening on 28 Mc/s, several phone and C.W. men can be heard. Referring to the time—"when I get my new poles." It's quite a job, especially if heavy arrays are to be supported, and not all can enlist the aid of big hefty people for a pole-raising bee.

The Americans have an answer, as they have so effectively for most problems. "QST" carried detailed ads for "tubular plastic plywood sectional masts." These are a war development and run from 12 to 125 feet lengths, with stays every 25 feet. Australian timber people should be able to produce similar constructions of alternate layers of wood veneer and fabric, bonded with waterproof phenolresin. There is plenty of room in amateur (and commercial) radio for such lightweight masts.

—D.B.K.

HAM NOTES
(Continued)

Recently out of R.A.A.F. blue, ex-Flight/Lt. Phil Weston (VK2-AJH) tells of experience in North Borneo in connection with an effort to secure officical sanction for a group of "Hams" in that area to get back on the air—on DX bands. It seems that so many of the VK gang were kicking their heels around the place, and so many "Okinawa W's" had been heard on "20," the North Borneo boys decided to do it the morally correct way and, instead of pirating under "buckshee" call-signs, to ask officialdom for consideration. All went well up to a point. The British Administrator of the area gave his consent for the North Borneans to make a start on "20," but they reckoned with the local A.I.F. C.S.O., who ruthlessly "scrubbed" the proposition.

However, the gang did get an O.K. for 224 Mc/s, and most of them brought their gear to Civvy Street for conversion to 166-170 Mc/s.

—D.B.K.

THE NEW 6 METRE BAND

50 to 54 Mc/s, the post-war allocation to supersede the old 56-60 Mc/s band, seems certain to become an established international band. Television and F.M. interests grabbed off the old band, which was harmonically related to "Ten" and the other DX bands. Harmonic operation had obvious advantages, but it had disadvantages also. Unwanted signals from locals on "20," etc., had a habit of appearing on "five"—quite an obstacle during DX hunting periods. The new band will not exhibit this characteristic—unless there are powerful commercial locals around on 6.5 or 13 Mc/s or thereabouts. It is a high enough frequency allocation to have all the characteristics of 56 Mc/s and yet may exhibit a borderline tendency to lower frequency performance. With "ten" behaving at times like "20," there are likely to be DX experiences on "6." "DX," of course, applying to anything outside the local line of sight radius. One thing should be obvious to all planning to use the band. It is no place for modulated oscillators and "squeggers." These were headaches enough, pre-war, on "five" before the R.I.'s Department ordained C.C. technique on that band, and commonsense should prevail on 50-54 Mc/s.

If super-regen. receivers are used they should obviously include a T.R.F. amplifier ahead of the detector.

Better to start off in correct fashion instead of rushing on with antiquated gear. Even a broad I.F. channel superhet may not be able to identify a wildly dithering splutter from the signal put out by a heavily-modulated S.E. oscillator, and QSO's may be lost thereby. 50-54 Mc/s as allocated in Australia corresponds to the American band, but for the time being the G's are on 58 to 60 Mc/s. According to R.S.G.B. Bulletin, that arrangement is temporary, and in the near future English amateurs will use 50-54 Mc/s.

PERTINENT PONDERINGS—By D.B.K.

IT'S refreshing to find old-timers back on the air, and when one hears voices long familiar prior to September, '39, on 28 Mc/s phone, the effect is almost as if there hasn't been the big "Shut Down" in between times. Colin Galbraith (VK2ABD), one-time 14 Mc/s phone DX man, didn't take long to unearth his gear from cupboards, etc., and has appeared on the present "top" band with nice quality phone. Only thing that didn't perk from the start was his A.M.C. system (automatic modulation control), but a valve replacement soon put things right.

* * *

Back with his familiar swing and rhythmic call is Fred Stirk (VK-2ABC), essentially a telegraphy man to make a "bug" perform. He was heard trying a little R/T with a somewhat P.M.G.-ish mike! There was a time when VK2 three letter calls were first issued, when Americans doubted the authenticity of Fred's call. He had a tough time convincing them that VK2ABC wasn't any pirate!

D'ye Ken John Peel (VK2WJ) is back with us! VK2WJ was one of the old 56 Mc/s "reliables," and, although like most of us, he broke the ice on the "temperamental band" this time—he won't be long before migrating to higher frequencies.

* * *

A recent W.I.A. meeting in Sydney was graced by the presence of two or three of the fair sex—one an Army lass. Which proves a wartime contention of your scribe that in the not so far distant future there will be lots of VK calls issuing from gear handled with excellent telegraphic proficiency by ex-Wrans, Awas and Waaafs. If the girls get Ham radio really into their blood, just watch "'em burn up the air—and a few Ham-handed young squirts!

* * *

Bad luck was the order of things for "Bill" Moore (VK2HZ), R.A.A.F., who, after surviving the ordeal of life as a P.O.W. in J hands for nearly five years, broke his ankle whilst playing tennis. Safest place for you, Bill—is the shack!

* * *

They tell me that a few lads over on one side of a capital city are having a great time "duplexing" on "five," and are asking for the gang to come in and join them—the water's fine. Which would be nice and dandy—but the early birds are in the wrong water—in the old 56-60 Mc/s region!

It won't do, OM's—better get busy with lecher lines or something, but operation within the correct limits is vitally important. Remember that 50-54 Mc/s, our new band, is **not** related to the old harmonic family. Establishment of a marker station in **each** metropolitan area is a service worth rendering by a station or stations fitted for such work.

* * *

Old-timers are like the proverbial old soldiers—they mostly do a fade for a while—and don't seem to die off. I found myself in QSO on 28 Mc/s C.W. with VK7CW, after a spell of at least 12 years. A7CW was a busy signal on the old "32-metre" band in 1927-28. He's lost none of his good fist or interest in the game.

—Don VK2NO.

Shortwave Review

CONDUCTED BY
L. J. KEAST

NOTES FROM MY DIARY

SHADES OF THE PAST

Dx-ers will welcome the return of some of the old overseas stations, and the news that quite a number of the Scandinavians are being heard well, the fact that Albania is on the job again, and several weak sisters trying hard to get through, makes listening at present really worth while.

No doubt as these still unidentified stations "find their bearings," we will, during one of the sessions, definitely log them.

Just as aviation has reduced long distance travel, so have modern transmitters reached out far beyond what we thought possible a few years ago.

Not so long ago we thrilled at landing a Canadian, and if we held him for 15 minutes it was wonderful. If we heard a foreign language at very good volume we said, "Just another BBC outlet," but today we wait and make sure who the stranger is, and there is not one corner of the world that would surprise us "as being on the air." Yes, if you want new stations they are there to be had, but do not forget altogether those stations that have given us such grand entertainment. Out of sheer decency we must remember the BBC, the Crosley Corporation, the WRU's, the NBC., the CBS, the almost continuous service of the 'Frisco stations with their delightful entertainment, and the many who "were always there" when we couldn't find a new one.

MOONSTRUCK

Not in the sense that usually applies to this remark, but I heard a most interesting session from 'Frisco over KWID, 9.85 mc., 30.44 m, at 8.40 p.m. on February 2, when the moon was struck by radio signals.

Actually the item I refer to was a record of the experiments carried out at the Evans Signal Laboratory, Belmar, New Jersey.

With special equipment and using very high frequencies, I think it was 111 mc, pulses shot into space at the speed of light (186,325 miles per second) and echoes were detected at about 2½ seconds later. We were warned to listen carefully for the signal and the echo and despite the heavy background noise they could be heard. My Pitman is not too good, but I believe the commentator said the round trip was about480,-000 miles.

SUNSPOTS

As if to show resentment for the radio signals sent to the moon, old Sol put on a turn on February 4, and thoroughly upset signals endeavouring to reach South Africa. The largest sunspots for 20 years even prevented the BBC from being audible. I'll bet Arthur Cushen and Rex Gillett were doing some "real cussin'" if on their usual midnight vigil.

SAYS WHO ?

YV5RM, Caracas, Venezuela, is now received very well on new frequency of 4.97 mc—Cushen.

(This would make their wave length 60.36 m as against 60.97 m when, until recently, on 4.92 mc—L.J.K.)

Dr. Gaden says: "Veries are a bunch from Crosley and KNBX for 7.8 and 21.61 mc, the 13 m one being long overdue.

TAQ, Ankara, 15.195 mc, 19.74 m, has been heard well at night with nice music as well as "good" stuff, closing at 10.30.

The Free Indonesian fades some on 15.23 mc, but is easily followed at 10 p.m. He closes also at 10.30.

SEAC on 15.12 mc, 19.84 m is a very fine show, especially about 11 p.m.; still can be heard on 3.4 mc in parallel.

Radio Macassar, on about 32 m seems to be a very low powered station. Reception is noisy at 8 p.m.

Very few notes from Wally Young this month, and a good reason for them not coming over. Two of his boys are home from the war and lots of work is being done in making room for them and their families to settle in. Well, Wally is a good listener and I guess the lads have many stories to tell to an admiring and justifiably proud father. —L.J.K.

Rex Gillett has been entertaining Mr. Frank Inglis of Shanghai. This gentleman, who was associated with XCDN, Shanghai, later known as XGDN, and waged a war with the German owned transmitter, XGRS. He was eventually interned by the Japanese for 4 years. His visit to Adelaide was to pick up his wife and seven-year-old son who, when their ship was torpedoed just after Pearl Harbour, they eventually landed in Perth, W.A. and finally settled in Adelaide. They are all returning to Shanghai at once.

(I remember the old XCDN who, later, in order to comply with international sign allocations, changed to XGDN. My report of August 8, 1941, came as a welcome surprise to the engineers, and as they said it was most encouraging to receive a report so soon after they had commenced to broadcast on shortwave. Until then they had, for a year or more, been on 1440 kc. The 1 kw shortwave transmitter operated on 11.76 mc, 25.53 m.—L.J.K.)

Arthur Cushen, of Invercargill, N.Z., sends some very useful notes:

"A letter from Armed Forces Network, London, states they closed on December 15 and frequencies and schedule now taken by transmitter in Munich, Germany, using this revised schedule: 6.08 mc, 49.34 m, 2.55—7.45 p.m.; 4.30 a.m.—Noon, and on 8.565 mc, 35.02 m, from 8 p.m. till 4.15 a.m."

"Z.J., Colombo, was discontinued from November 30, all transmissions now carried on SEAC, which will soon use 100,000 watts."

"XUPA is call on 9.695 mc, 30.94 m, according to American report. Heard with XGOY news relay at midnight. Also on 6.015 mc; may be Tokyo or Formosa outlet." (9.695 before VJ-Day was JXAK. Then in November we were told call was XUZE, Taihoku (Formosa), and that on 6.011 mc, Home and Empire Service was being transmitted. Mr. Cushen does not say if he had heard XUPA and noise, or sun spots or

(Continued on page 32, col. 1)

NEW STATIONS

CKLO, Sackville, 9.63 mc, 31.15 m: This station, referred to in January issue, has been heard by Mr. Leo Edel testing to Australia from 7.30—8 33 p.m. Signal is very good and much better than CHOL 11.72 mc, 25.60 m, which is in parallel. Chimes are used as identification signals, together with announcement, "This is Canada testing to Australia." Signs off with Canadian National Anthem and "God Save the King."

——, Paris, 9.815 mc, 30.56 m: Mr. Edel also reports this new frequency for Paris, heard in the evenings with fair signal.

Radio Singapore, 6.19 mc, 48.47 m: Being heard nightly around 11.30 in parallel with 4.78 mc, 62.76 m.—L.J.K.

Radio Singapore, 6.09 mc, 49.26m: This new outlet for Malay is reported by Rex Gilett. Recorded music is played at 9 p.m.

Radio Singapore, 7.185 mc, 41.75 m: Ern Suffolk sends along particulars of this further frequency. It is at good strength around 1.30 a.m., when announcement is: "You are listening to The British Military Administration Station in Malaya."
(This station is now heard around 9 p.m. with good signals in parallel with 6.09 mc.—L.J.K.)

Radio Singapore, 4.78 mc, 62.76 m: Heard at very fine strength in Forces programme at 11 p.m. News in English at midnight. Is in relay with 6.09 at 10.30, but much better signal than 6.09 which is spoilt by morse. This report is from Mr. Edel. Arthur Cushen and Ern Suffolk are also hearing it.

Radio KIEV, Ukraine, 6.20 mc. 48.39 m: Another reported by Mr. Edel. Announces in Ukranian after chimes at 1 a.m., "This is The Voice of Kiev." Signal is quite good.

——, Berlin, 6.04 mc, 49.66m.: An after midnight heard by Mr. Edel. Signal at 1.15 a.m. was R6 and a splendid concert being broadcast.

"The Voice of Indonesia," (Location ?) 6.70 mc, 44.77 m: Fair signal if noise permits.

PHI-2, Huizen, 17.77 mc, 16.90 m: This old-timer is being heard again around midnight in special programme to Netherlands Forces in Far East. Reported by Leo Edel.

DHTC, Munich, 15.105 mc, 19.86 m.: Rex Gillett announces this German point-to-point broadcast wih "The Voice of America" in New York at 1 a.m.

(Continued from page 31)

both, have prevented me from forming any definite call, so reports will be welcomed.—L.J.K.)

Athens is reported to be testing on 7.295 mc, 41.13 m, from 6—7.30 a.m. Rex Gillett suggests this may be the station thought to be ZOY, Accra. He says the bugle effect interval signal is familiar to him, but he couldn't place it. He asks me what I think. The bugle effect sounds more like an Austrian, and, as as some time ago in these columns I referred to the BBC returning the Athens Bell, I should imagine it would be used, considering it was so highly prized that it was sent to the BBC, London, for safe keeping. Will try and have a "look" for that station.

OLR2A, Prague, 6.01 mc, 49.92 m: This Czechoslovakian, operated during the war by the Germans, under the call DHE2A, is being heard at 7.30 a.m. with news in English.—L.J.K.

OZH, Copenhagen, 15.32 mc, 19.58 m: Here is one to try for. Said to be on the air from 2.45—6 a.m.

OZF, Copenhagen, 9.52, 31.51 m.: In parallel with above.

OZU, Copenhagen, 7.26 mc, 41.32 m: Also in parallel with OZH.

SEAC, Rangoon, 6.045 mc, 49.62 m.: "Rangoon Calling, Burma Broadcasting Service c/o CAS(B) 12th Army SEAC, Rangoon Burma." That is the announcement heard by Arthur Cushen. He now has a verification from them stating power is 7500 watts and that they opened officially on November 15, 1945. English broadcasts are: 10.45—11.30 am.; 3.15—4 p.m.
(Rangoon is also heard on 11.855 mc, 25.31 m in English at follows: Noon—12.30 p.m.; 4.15—4.45 p.m. Other programmes are in Burmese and Hindustani —L.J.K.)

OIX-2, Lahti, 9.495 mc, 31.60 m.: Here is another nice catch by Mr. Leo Edel. This Finnish station, well known before the war, is now heard nightly from about 10 o'clock. At 10.17 has nine minutes of news in English. From 10.30 is interfered with by XEWW.

OIX-4, Lahti, 15.19 mc, 19.75 m: And still another old outlet of Lahti heard again by Mr. Edel. This one is in Finnish all the time, and is generally audible from about 10.30 p.m.

LKJ, Oslo, 9.54 mc, 31.45 m: A further Scandinavian back again and reported by the same gentleman. A good signal comes in from 9.50 till 10.30 p.m., but no English is heard.

Radio National Belge, Brussels, 17.845 mc, 16.81 m: Dr. Gaden is hearing at night a weak signal on this frequency. Language is French, and he thinks station is a Belgian. I presume, therefore, it is RNB, Brussels, as the time coincides with the latest schedule I have, viz., 8—9 p.m. They are also again from 2—3 a.m.—L.J.K.

Radio Tetuan, Tetuan (Spanish Morocco) 6.067 mc, 49.43 m: This 1000 watter is reported by Arthur Cushen as coming in well between 5.30 and 6 p.m. News in Spanish is followed by typical Spanish music. Stations signs with a march.
(This is not actually a new station, but I cannot find where it has been logged in this part of the world before —L.J.K.)

CS2WI, Parade (Portugal) 12.40 mc 24.19 m: Arthur Cushen has received a verification by air mail for his report on this station. He hears them at 6 a.m. and mentions that the Director, Victor Santos, who signed his verie, would like further reports.
(This station was shown in the American Club sheets as CS2ZA, but as Mr. Cushen's letter was dated January 12 when leaving Portugal, call is CS2WI—L.J.K.).

ZAA, Tirana, 7.85 mc, 38.22 m: This Albanian sation which, if I remember correctly, was first reported by Ray Simpson way back in May, 1940, and which, of course, went out of business during the war, has been recently heard by Ern Suffolk of Lobethal, South Australia.
Mr. Suffolk says: "Using the Italian language this station closes down at 6.15 a.m. Signals were weak, which prevented me from making positive identification." Rex Gillett, also of S.A., says: "I am positive it is Tirana as signals were good when I listened after being tipped off by Ern. Male and female announcers."
Well that's good business boys, and for those who want to send reports, maybe the old address will do, which was: Direction Generale des Postes, Telegraphs et Telephones, Direction de la Presse, Posts St. Tirana, Albania. As you can see the old ZAA was Government-owned. Incidentally, they were using 3 kw in the antenna and had several frequencies allotted, viz., 6.085, 7.85, 9.96 and 15.63 mc, but as far as I know only 7.85 and 6.08 were heard in this country. Station used to sign with Albanian National Hymn, followed by Italian Royal March and Giovinezza.—L.J.K.

WLWS-2, Cincinnati 21.65 mc, 13.85 m: Directed to North Africa from 10.30 p.m. to 3.45 a.m. this new frequency of The Crosley Corporation is in parallel with WLWS-1, 15.13 mc, 19.83 m. —L.J.K.

ZBW, Hongkong, 9.57 mc, 31.35 m: At last the elusive Riviera of the Orient has been run to earth by Mr. Edel. He says they are on nightly and can sometimes be heard quite well, but on others are badly heterodyned by KWIX and Khabarovsk is also to be reckoned with. However he says they relay the BBC news at 9 p.m. and quite frequently refer to "Here is ZBW, Hongkong." These people seem to have an unfortunate habit of selecting a frequency unsuitable for this country and doubtless, by now, Ern Suffolk has again recommended them trying one of the several he suggested. (See A.R.W. January isue, page 31). If they find these unsuitable, why not try 9.47 mc, where the Japs used to get through O.K. until the cessation of hosilities.

——, Berlin, 9.695 mc, 30.94 m: And I have to thank Mr. Edel for putting me on to this one. A phone ring on Sunday, February 17, at 5.15 p.m. All talk from this station was in German and as we listened on our respective sets, he did the translating. It was not the usual AFRS programme, but definitely a German broadcast. "Here is Berlin relaying Central German Shortwave Station, Country transmitter Weimar." At time of our listening weather reports were given. Signal was very strong and clear.

XGOL, Foochow, 9.995 mc, 30.1 m.: Here is a station Mr. Edel and I have been hearing for many moons, but have not been able to catch the call sign, even when it was given; although Mr. Edel thought he heard —OL. According to the latest "Universalite" to hand, this is XGOL, Foochow. It is on around 8.30 p.m. but is subject to bad QRN.

LATEST SCHEDULE FOR CROSLEY STATIONS

Taken from February programme list, which arrived 15.2.46—L.J.K.

For Latin-America

WLWK, 15.25 mc, 19.67 m: 8 a.m.—10.15 a.m.
WLWK, 6.08 mc, 49.34: 10.30 a.m.—3.15 p.m.
WLWO, 17.80 mc, 16.85 m: 8 a.m.—8.45 a.m.
WLWO, 9.59 mc, 31.30m: 9 a.m.—3.15 p.m.
WLWS, 15.20 mc, 19.73: 7.45 a.m.—10.15 a.m.
WLWS, 11.71 mc, 25.62 m: 7.45 a.m. —10.15 a.m.; 10.30 a.m. — 3.15 p.m.

For Europe and North Africa

WLWK, 11.71 mc, 25.62 m: 10.30 p.m.—7.30 a.m., Europe.
WLWO, 17.80 mc, 16.85 m: 10.30 p.m. —6 a.m., Europe.
WLWO, 9.59 mc, 31.30 m: 6.15 a.m. —7.45 a.m., Europe.
WLWR, 15.25 mc, 19.67 m: 10.30 p.m.—8 a.m. N. Africa.
WLWS, 15.13 mc, 19.83 m: 10.30 p.m.—3.45 a.m., Europe.
WLWS, 21.65 mc. 13.85 m: 10.30 p.m.—3.45 a.m., N. Africa.
WLWS, 15.13 mc, 19.38 m: 4 a.m. —7.30 am., Europe
WLWL, 17.955 mc, 16.70 m: 10.10 p.m.—3.45 a.m., Europe.
WLWL, 15.23 mc, 19.70 m: 10.30 p.m.—3.45 a.m., N. Africa.
WLWL, 9.70 mc, 30.93 m: 4 a.m.—9 a.m., Europe.
WLWL. 15.23 mc, 19.70: 4 a.m.—9 a.m. N. Africa.

This Months Loggings

OCEANIA

Australia

VLH-4, Lyndhurst, 11.88mc, 25.25 m: Good, but not better than VLR-3, (Cushen.) (VLH-4 has replaced VLR-3,—L.J.K.).

VLA-3, Shepparton, 9.68 mc, 30.99 m: Transmitting with VLC-8, 7.28 mc, 41.21 m, to Britain at 1.45 a.m.—good signal (NZ-DXtra)
(Also in parallel with VLG 9.58 mc, 31.32 m.—L.J.K.)

VLK-3, Sydney, 8.095 mc, 37.06 m: Heard calling KWV at 9 p.m. (Fluck).

VLR-2, Melbourne, 6.15 mc, 48.78 m: Good on opening, but fading after 7 a.m. (Cushen).

New Zealand

ZLT-7, Wellington, 6.715 mc, 44.68 m: Opens at 7.30 p.m for just over 10 minutes.—L.J.K.

New Caledonia

"The Voice of France," Noumea, 6.208 mc, 48.39 m: Call sign of FK8AA dropped. Station taken over by Government (Cushen). (Heard well between 5 and 7 p.m.—L.J.K.)

Philippines

WVLC, Manila, 9.06 mc, 31.11 m: R8 Q5 at 11 p.m. when calling JVS and JVT Tokyo, and KEB 'Frisco (Fluck).

Algeria

——, Algiers, 6.04 mc, 49.67 m: Heard quite well at 7.15 a.m. (Gillett).

——, Algiers, 6.02 mc, 49.83 m: Also good at 7.15 a.m. (Gillett).

Belgian Congo

OTC, Leopoldville, 17.77 mc, 16.88m: Good some nights but bad on others (Gaden) Fairly good signals when classical music given at 8.45 p.m. (Gillett).

OTC, Leopoldville, 9.748 mc, 30.77 m: God signal at 6 a.m.

RNB, Leopoldville, 9.38 mc, 31.98 m: Good signals at 3 a.m. (Gillett).

British Somaliland

Radio Somali, Hargeisha, 7.126 mc, 42.10 m: Signals now poor at midnight (Gillett).

French Equatorial Africa

FZI, Brazzaville, 15.595 mc, 19.25 m: Left the air at 10.45 p.m. after playing of "Marseillaise" (Gillett). (Heard with American transcriptions in early evening—L.J.K.))

FZI, Brazzaville. 11.97 mc, 25.06 m: English at 6.45 and 8.15 a.m.—L.J.K.

FZI, Brazzaville, 9.44 mc, 31.78 m: Same remarks apply as above.

Gold Coast

ZOY, Accra, 7.295 mc, 41.13 m: Heard at 7.30 a.m. (Suffolk).

Kenya Colony

VQ7LO, Nairobi, 6.114 mc, 49.07 m: Good signal at 1.45 a.m. (Gillett).

VQ7LO, Nairobi, 4.95 mc, 60.60 m: R7 Q5 at 4.30 a.m. (Fluck).

Mozambique

CR7BE, Lourenco Marques, 9.705 mc, 30.90 m: Appears to leave the air at any time between 6.30 and 6.45 a.m. after playing Portuguese National Anthem (Gillett).
(News at 5.55 a.m.—L.J.K.)

CR7AA, Lourenco Marques, 5.86 mc, 51.19 m: R7, Q5, with same programme as CR7BO at 4.30 a.m. (Fluck).

CR7BO, Lourenco Marques, 4.92 mc, 60.97 m: Good in recorded music at 4.30 a.m. (Fluck).

THE EAST

Burma

Radio Rangoon, 11.85 mc, 25.31 m: Heard with news in English at 11.45 p.m. (Cushen).

Celebes

Radio Macassar. Macassar, 9.37 mc, 32.02 m: Heard nightly with programme of native type music and good band selections (Miss Sanderson).

Ceylon

Radio SEAC, Colombo, 15.15 mc, 19.81 m: Musical programme from 8 p.m.; News at 10.30—L.J.K.

Radio SEAC, Colombo. 15.12 mc, 19.84 m: Good signals nightly (Gillett).

Radio SEAC, Colombo, 11.765 mc, 25.50 m: Excellent from midnight—L.J.K.

VUC, Colombo, 4.90 mc, 61.22 m: Has some very nice music till 10.15 p.m.—then native (Gaden).

Radio SEAC, Colombo, 3.395 mc, 88.36 m: Heard at good strength around midnight Cushen).

China

XMEW, Kunming, 16.54 mc, 18.14 m: Good at 6 p.m. (NZ-DXtra).

XMHA, Shanghai, 11.86 mc, 25.29 m: "Your Armed Forces Radio in Shanghai" News at 8.45 p.m. (Cushen).

XORA, Shanghai, 11.71 mc, 25.62 m.: Good at 9 p.m. (Young). News in English at 9 p.m. at fairly good volume. (Gillett).

French Indo China

Radio Saigon, Saigon, 11.78 mc, 25.47 m: Good from 7.30 p.m. till 12.15 a.m.; English 8.15—8.45 and 11.30—12.15 a.m. Balance Indo-Chinese.—L.J.K.

India

BFN, Delhi, 7.21 mc, 41.61 m: Heard till 3.30 a.m. (Cushen).

VUD, Delhi, 6.01 mc, 49.93 m: Good signal at 1 a.m. (Gillett).

Japan

AFRN, Tokyo, 7.55 mc, 39.72 m: Gives Home Service programme (Cushen). (Closes at mignight—L.J.K.)

AFRN, Tokyo, 5.76 mc, 52.15 m: Comes in well till sign off at midnight (Cushen).

AFRN, Tokyo, 3.08 mc, 97.40 m: Heard signing at midnight (Cushen).

Java

"The Voice of Indonesia", ? Bandoeng, 15.22 mc, 19.71 m: Heard reading news in English at 10 p.m. (Gillett). (This station reported under "New Stations" in January issue is believed to be located in Bandoeng; I understand the transmitter in Djokarta was blown up — L.J.K.)

Malaya

Radio Singapore. 11.86 mc, 25.29 m: News at 11.30 p.m. (Cushen).

Radio Singapore, 11.73 mc, 25.58 m.: News till 6.45 p.m. then Dutch. Badly heterodyned by 'Frisco on same frequency (Edel).

Radio Singapore, 6.09 mc, 49.26 m: In parellel with 7.22 mc, 41.55 m. Programmes mainly in Malay. News at 11.30 p.m. — signs at 1.30 a.m.
Several new Malayan frequencies are shown under "New Stations."

Great Britain

BBC London

GSK, 26.10 mc, 11.49 m: Has improved in strength when opening at 9.15 p.m. in General Forces programme. R6-7, Q5, (Fluck). Reception spoilt by harmonic of 13.05 Yank (Gaden).

GSJ, 21. 53 mc, 13.93m: Now heard opening one hour later, viz., 8 p.m. in General Forces programme. Signal R8, Q5. (Fluck). (They are scheduled to open at 7 p.m.—L.J.K.) Very good at 9.30 (Gaden).

GSH, 21.47 mc, 13.97 m: Now scheduled to open at 12.15 a.m.—L.J.K.

GSV. 17.81 mc. 16.84 m: Very good at 11.15 p.m. (Young).

GVQ. 17.73 mc, 16.92 m.: Good at 11.15 p.m. (Young)

GRA. 17.715 mc, 16.93 m: O.K. at 11.15 p.m. (Young).

GWC. 15.07 mc, 19.91 m: Good at 9.45 p.m. (Young).

GWO. 9.625 mc, 31.17 m: Good signal at 3 a.m. (Young).

GSW. 7.23 mc, 41.49 m: Very good at 7.15 a.m.

GWL. 7.205 mc, 41.64 m: Very good at 7.15 am.

GRK. 7.185 mc. 41.75 m: Good at 7.15 a.m. and again at 11.30 p.m.

U.S.A.

San Francisco unless otherwise mentioned.

KGEX, 15.21 mc, 19.72 m: Very good signal at 4 p.m. with news. Conference Period is given at 4.05. Closes at 4.45 —L.J.K.

KGEX, 11.73 mc, 25.58 m: Opens at 5 p.m. — good signal — L.J.K.

KGEI, 9.55 mc, 31.41 m: Excellent signal at night. News at 10 followed by Sports News at 10.05 at dictation speed — L.J.K.

KNBX, 9.49 mc, 31.61 m: Closes at 9.45 after giving Report from America. Reopens at 10 o'clock with news for 5 minutes then into Standard Chinese news—L.J.K.

KGEX, 7.25 mc, 41.38 m: At 9.50 p.m. "Washington Commentary."

KWID, 7.23 mc, 41.49 m: News at 10 p.m. — good signal — L.J.K.

KNBX, 6.06 mc, 49.50 m: AFRS and Japanese programmes to 9.45 p.m. (N.Z. DXtra).

U.S.A.

Other than 'Frisco

WLWL, C'cinnati, 17.955 mc, 16.70 m: News at 1 a.m. (Fluck).

WCBN, New York, 17.83 mc, 16.83 m: R8, Q5 at 1.15 a.m. with news (Fluck).

WRUL, Boston, 17.75 mc, 16.90 m: Foreign languages at 1.30 a.m. (Fluck).

WRUL, Boston, 15.29 mc, 19.62 m: Fair in mornings (Cushen).

WRNE, New York, 15.28 mc, 19.63 m: Good in mornings (Cushen).

WBOS, Boston, 15.21 mc, 19.72 m: Nice signal at night and clear of PCJ (Gaden).

WOOC, New York, 15.20 mc, 19.73 m: Very close to CKCX, but could copy him O.K. (Gaden). Note slight change in frequency—L.J.K.

WNRI, New York, 13.05 mc, 22.98 m: News in German 7.45 a.m. Closed at 9 o'clock (Miss Sanderson).

WCBN, New York, 9.65 mc, 31.09 m: Broadcasts AFRS programme at 6 a.m. —L.J.K. Signals only fair at 9.30 p.m. (Gillett).

WCBN, New York, 7.82 mc, 38.36 m: Very good in the morning (Gaden).

WOOC. New York, 7.82 mc, 38.36 m: AFRS, News and Sports Roundup, 5.45 p.m. (Miss Sanderson).

WNRX, New York, 7.25 mc, 41.38 m: Far behind the 38 metre Yank in morning (Gaden).

SOUTH AMERICA

Chile

CE-970, Valparaiso, 9.728 mc, 30.83 m: At times good strength at night (Cushen).

CE-1227, Punta Arenas, 12.27 mc, 24.45 m: Is being heard again in the mornings. (Howe, "Universalite"). Note: time mentioned is Sydney.

Ecuador

HCJB, Quito, 12.455 mc, 24.08 m: Signal is very good at 9.45 p.m. (Gillett).

HCJB, Quito, 15.115 mc, 19.84 m: Said to be on at 10.30 p.m. but not a chance against GWG on 15.10 mc, 19.85 at my little burg—L.J.K.

HCJB, Quito, 4.105 mc, 73.08 m: Asking for reports. Not sure of schedule, but think from 6—9 p.m.

Paraguay

ZPA, Encarnacion. 11.95 mc, 25.10 m: Relays "Radio Belgrano", 8.45 — midnight —(N.Z.-DXtra).

Venezuela

YV5RM, Caracas, 4.97 mc, 60.36 m: Now received very well on this new frequency (Cushen). (Note: Has moved up here from 4.89 mc.—L.J.K.)

U.S.S.R.

Moscow unless otherwise mentioned

——, 12.11 mc. 24.77 m: Very good from 10.45—11.15 p.m. Plenty of English—L.J.K.

——, 11.83 mc, 25.36 m: News at 4.30 p.m.—L.J.K.

——, 9.60 mc, 31.25 m: Heard with news in English at 10.30 p.m. then on in foreign languages (Edel). English at 9.45 p.m. but signal mushy (Gillett).
(This is a new spot for Moscow, although some time ago Leningrad was on this frequency.—L.J.K.)

——, 9.566 mc, 31.36 m: News at 10.45 p.m. (Edel).

——, 9.48 mc, 31.61 m: News at 4.30 p.m.—L.J.K.

——, 6.77 mc, 44.32 m: Good at 1.45 a.m. (Gillett).

Speedy Query Service

Conducted under the personal supervision of A. G. Hull)

F.C. (Mitchelton, Q.) expresses appreciation of the "Little Companion" kitset article, but wants one for a seven or eight valve set using 6V6G valves in push-pull in the output.

A.—Patience, my good man; patience is a virtue. Doubtless in the not too distant future we will eventually get back into our stride and give circuits for all sorts of sets, both big and small, but so far we have had many disappointments. There are still many shortages in the good things of life: beer, smokes, petrol and radio parts! Keep hoping for the best.

* * *

B.S.S. (Perth) wants to know if "QST" is still published.

A.—Yes, "QST" is still going strong, and, if we were asked to offer comment, wed say that the latest issue to hand (December, 1945) is the most interesting we've seen. Subscription rate is 3 dollars a year and you can get a money order for this amount from the local post office on filling out the required from which they will give you. The simplest way to place a subscription, however, is through one of the agencies, such as the Technical Book and Magazine Co., of 297 Swanston Street, Melbourne. Placing you subscription this way costs 21/- per year. The address of "QST" publishing offices is 38 La Salle Road, West Hartford, Conn., U.S.A.

* * *

W.A.B. (Leichhardt) is interested in magnetic wire recorders and wants to get books on the subject, instructions for making and using and also advice about the patent position in regard to manufacture.

A.—Sorry, but we have no data on hand which would enable us to run a full article and instructions for building gand operating. We are unable to give any decision on the patent situation either. Under the circumstances we can only appeal to any readers who are able to offer help and if they write in to us we will put them in touch with you.

* * *

C.J.C. (Styx, N.C. Line, Q.) wants diagrams and kitsets for 3, 4, 5, 6 and 7 valve superheterodynes.

A.—Sorry, but at the moment we are still in trouble with the procurement of supplies. In the November issue we started off with an article covering a 5-valve kit, but already the demand has exceeded supply. Many hundreds of kits were made available, but these were quite unable to satisfy the thousands of orders received. Production of vital components, especially gang condensers and speakers, has not come up to expectations, partly due to strikes and power restrictions. At the moment it seems that it may be two or three months yet before components will be available in sufficient quantities to warrant the publication of further articles on set building. Needless to add, we hope, we have both eyes wide open and watching for every chance to help our readers.

* * *

A.H. (Brisbane) has in mind to build the Champion amplifier from the December, 1944, issue, but using a "Pep-punch" transformer.

A.—It would not be worthwhile going to the trouble of building up a hot-stuff amplifier if you are going to use a cheap and nasty transformer, as it would completely spoil results. The transformer you mention was decidedly a "popular-priced" transformer and no better than could be expected from the price. Unless you can get a good transformer, we feel sure you will do better with a phase changer and resistance-capacity coupling.

* * *

P.E.P. (Hobart) enquires about post-war battery plans.

A.—At the moment of writing there does not appear to be any improvement in the battery position, but doubtless things will look up soon. If the battery people make the most of the technique they developed during the war we should have some fine batteries for portable and "personal" sets. As soon as any announcement is available in this direction we will publish it.

SPECIAL NOTICE!

All queries should be addressed to:

AUSTRALASIAN RADIO WORLD

336 Waverley Road

East Malvern

Victoria

P.B.L. (Mosman) has been trying to buy a Ferrotune unit, but his dealer is not able to supply.

A.—We understand that there has been a little extra delay at the factory, due to unavoidable incidentals, but it won't be long now before they hit the market. So far as we know, the unit will not come on the market in the style shown in the photographs you have seen, but as a complete unit with a dial attached. We have actually played around with a set fitted with one of these units and we can tell you quite surely that it really does work and plays the stations without a gang condenser.

* * *

G.N. (Brunswick) talks of a t.r.f. set with iron-covered coi's.

A.—Yes, you can use the iron cores for adjustment, but the best plan of all is to use the trimmers on the gang as well, peaking the trimmers for the high frequency (low wavelength) end of the dial and and using the iron slug adjustment for the top of the dial (the lower frequency, higher wavelengths). You may need to go over the adjustments several times, but working along these lines you should be able to get much better alignment than normal with t.r.f. coils.

COMMERCIAL RADIO IN AFRICA

According to a recent report it seems probable that British exporters will be able to use a new commercial broadcasting station to push their goods in South Africa. A new company, African Broadcasting Services, has been formed and the use of a radio station at Lourenco Marques, capital of Portuguese East Africa, secured.

The service is for the exclusive use of British advertisers, and its programmes, though intended for the South African listener, will also be heard on sets in Britain on the 51-metre band. African Broadcasting Services is an all-British com-

Tests Prove Eimac Vacuum Condensers Far Superior in Operating Efficiency

Ability to handle high current at high frequencies is the true measure of the performance of a capacitor. A high peak voltage rating based on low frequency measurements does not tell the whole story.

The chart on this page shows the results of tests at 50 Mc. conducted on a standard Eimac VC50-32 Vacuum Capacitor and three other 50 mmfd. vacuum capacitors, designated on the chart by "A," "B" and "C." At just over 17 amps. (approximately 1525 peak volts across the capacitor) Unit "A" (rated at many times the applied voltage) became sufficiently heated to melt the solder on the end caps. Under this same test, the Eimac VC50-32 operates at less than 70°.

Eimac introduced the vacuum capacitor in 1938. It is interesting to note that the original Eimac capacitor design is still outperforming all comers. Such outstanding performance is typical of all Eimac products, which is one of the reasons why they are first choice of leading electronic engineers throughout the world.

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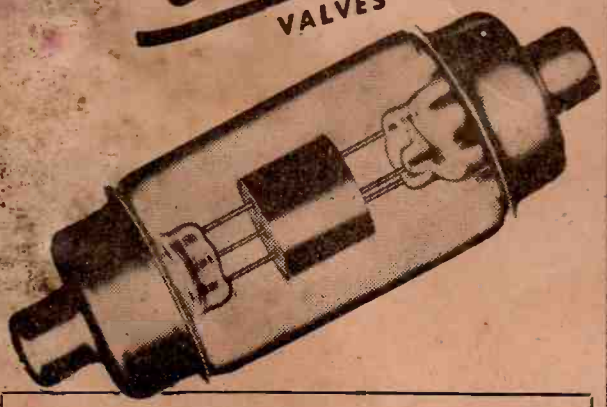

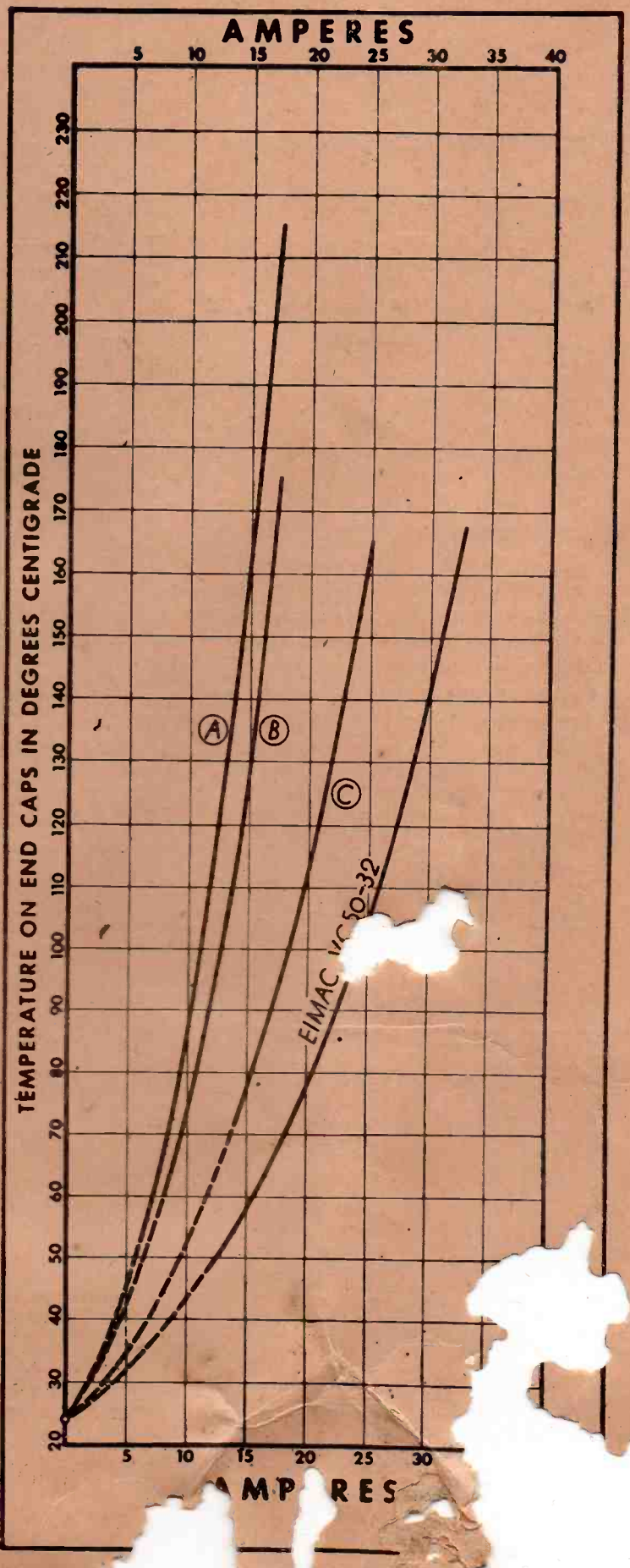

EIMAC VACUUM CAPACITOR TYPE VC50-32

General Characteristics

MECHANICAL:

Maximum Overall Dimensions

Length	6.531 inches
Diameter	2.281 inches

ELECTRICAL:

Maximum Peak Voltage	32,000 volts
Maximum RMS Current	28 amps.

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—H.B., Western Australia.

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—D.H., Home Hill, Q'ld.

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