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EDITORIAL

Whether the war is over or not seems to be a matter of legislation, but so far as "Radio World" is concerned we are a long way from being back to where we started.

Owing to a chain of unavoidable circumstances we find that the only roof under which the "Radio World" typewriter can find shelter is located in Melbourne, whilst the printing press is still in Sydney. To obtain office or personal accommodation in Sydney seems to be well beyond the limit of possibility at the moment and so we are making the best of things as cheerfully as possible.

As is often the case, when you have high expectations you may feel disappointment more acutely. Conversely, when you are not over-expecting you can be happily surprised. So it happens in this case. We conjured up many visions of the problems which would arise with such an arrangement, but now that we are settling down to it there appears much to be happy about.

The Melbourne radio trade is giving splendid co-operation and as a result our readers can look forward to many new components designed especially to suit their requirements and embodying new lines of thought. The Sydney trade has its own particular problems, but is also concentrating on new products to suit the changing times.

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THE "VK2NO — V6"

Designed and described by a practical "ham"

THE receiver described here is at present in use at the writer's amateur station. It is an effective answer to the problem of building a relatively simple but efficient amateur band superhet with more than average sensitivity on the 28 Mc/s (ten-metre) band. Full details are given for coverage of the usual amateur bands.

In choosing a title for this post-war successor to my pre-1939 "Ideal Amateur Superhet," the "V" was prompted by the "V for Victory" motive, not because of any semblance to a road vehicle! The idea of the receiver was uppermost in my mind for at least a year before the guns and other lethal weapons ceased bellowing — for where is the dyed-in-the-wool Ham who even in the midst of war's turmoil doesn't nurse private ideas about that post-war station? Be it said at the beginning, this receiver is no haphazard journalistic "plug" —or an example of editorial "padding," but materialised after contemplation of definite ideas about what kind of a receiver will suit the **average** post-war Ham, new **and** old. Points outstanding were:

1. Ample sensitivity.
2. **Enough** selectivity.
3. Peak efficiency on amateur bands **only.**
4. Ease of operation.
5. Construction must not be difficult.
6. **Where possible** — standard parts to be used.

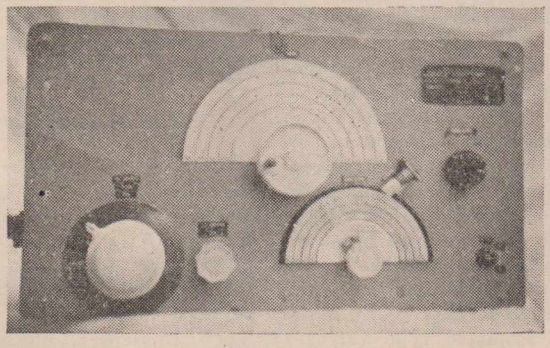
By

DON. B. KNOCK (VK2NO)

M.I.R.E. (Aust.), M.W.I.A.

Engineering Staff, Philips Electrical Industries of Australia Pty. Ltd.

The superheterodyne has now been employed for almost two decades as the world's standard basic principle for receiver design and the days of "will it or won't it work" are long past. Like the motor vehicle—Mr. Everyman (in normal times) pays out cash for a vehicle of a particular make and/or design. He knows that in so doing he gets a vehicle which will do all the manufacturer claims—and a bit more. The point is—that the products of other manufacturers do the same —under other names. In other words, experimental days for automobiles for general utility are no more. So it is with radio. One modern commercially-produced receiver is as good as another. Both pull the wanted stations in and faults are practically insignificant. But for purely amateur application, the type of receiver remains quite experimental, particularly in Australia. There is not, at the moment, a series of commercial productions designed especially (and exclusively) for the amateur bands. Also, the Ham is essentially of a constructive nature. He revels in "building his own." Here then is a design which is basically simple and lacks nothing that the average Ham requires. It sports no noise silencer, S meter, or crystal filter. Such useful accessories have their place, but not in this receiver, designed for the shallow pocket.



The "VK2NO-V6," showing the band-spread dial at top centre. The lower scale is for the band setter. The large white knob is for the r.f. and mixer controls. The small white knob is the I.F. gain control. Panel is of masonite lacquered french grey.

General Details

Reference to the circuit diagram shows the essentials and I want to emphasise that it is not imperative that the valves indicated be used. It is obviously in order to employ several valve substitutes in the various stages, but a high efficiency frequency changer must be used if comparable results are expected on 28 Mc/s. This receiver is a 6-valve arrangement comprising RF amplifier, mixer-oscillator, I.F. amplifier (at 1600 Kc/s), detector, audio output, and B.F.O. No power supply is shown in the diagram—that may be conventional or may be of an unusual type as referred to later. Pre-war constructors will remember my description of a simple amateur-band superhet in 1934 as the "Ideal Amateur Superhet."

In that design advantage was taken of a simple device to boost input gain by using an R.F. pentode mixer (a 6J7, 6C6, 6L7, or 57) with a separate oscillator, and the introduction of regeneration in the mixer. Potentiometer control of screen voltage on the mixer varied the amount of regeneration. The "boosted" mixer input took the

(Continued on next page)

VK2NO-V6

(Continued)

place of an R.F. stage but the idea had snags. Likewise the second detector. This was controllable for regeneration and oscillation, thus dispensing with a separate B.F.O., but tended to "pull" the I.F. somewhat. It was, nevertheless, a useful type of strictly "Ham-band" receiver, but could be a little "finicky" when used by unskilled hands. The "VK2NO V-Six" embodies no trick circuits, and is a sure-fire job for peak performance on amateur bands from 3.5 to 50 Mc/s.

Valves

R.F. amplifier valve specified according to the circuit diagram is a Phillips EBF2G. This versatile valve is now well enough known to appreciate for general use. It is a duo-diode R.F. pentode (vari-mu) and in this case the diodes are unused. In order to keep them out of the picture completely, they are returned to cathode. Other valves can be used in this position, but it is desirable that a high-gain type be applied for best results. EBF2G has an amplification factor of 2350 and a slope of 1800. If the reader has available a 954 or 955 type "acorn," it goes almost without saying that such valves will show up to maximum advantage in the front end of a receiver of this kind. The mixer-oscillator as used in the writer's receiver is of a type not readily available — the Philips ECH4G, a triode-heptode converter, but at the time of writing I am informed that supplies of type ECH-35 are expected. The latter is a triode-hexode converter and the difference in performance between the two is so small as to be unnoticeable. It amounts to a conversion gain of 650 for ECH35 as against 750 for ECH4G. Although valves of the 6J8G type can be applied here, the difference in conversion gain at the higher frequencies is quite marked. Other ways of tackling the high gain problem include the use of "acorns" with separate mixer-oscillator coupling, but the practice gets away from the use of standard type valves—one of the objectives. An unusual valve for the average reader is that used in the I.F. stage—the Philips EF50. Although this valve was developed before the war, it did not reach the constructional-press stage, and its uses have been in war-time applications in Radar and the like. This is a single-ended all-glass R.F. pentode of very high slope and amplification.

Heater voltage is 6.3V. at 0.3 ampere.

Anode voltage is 250V. at 10 mA.

Screen voltage is 250V. at 3 mA.

Grid voltage 2V.

Slope, 6500.

Omplification factor, 6,500.

It has a glass-seal form of construction calling for a special type of 9-pin socket. Both valve and sockets are available in limited quantity. An alternative valve to use here would be the 6AC7/1852 in the single-ended octal series with much the same performance. High gain in the I.F. is desirable, but if really good I.F.T.'s are used, an average valve of the 6U7G type may give all the gain necessary to make the most of things on 28 Mc/s. The 2nd detector is a conventional R.F. pentode used as a triode. Almost anything can be put to use here—6C6, 6D6, 77, 78, 6K7, 6J7, EBC3—all are suitable. No A.V.C. is included but its inclusion would be a good thing where overstrong local (and DX) 'phones on 28 Mc/s are concerned. Audio output to permag speaker is via a 6V6GT. Similar flexibility of valves can be applied here. Other suitable valves are 41, 42, 6K6G, 6G6G.

The valve used in the B.F.O. is another where choice of quite a few exists. The one used in the original happens to be a 6U7G. Shown in dotted lines to the oscillator anode feed is a VR150/30 voltage regulator — an optical but useful inclusion.

Tuning Considerations

Note that in the circuit diagram the modern service manner of indicating "thousands" is adopted by the use of the symbol "K." Instead of "mmfd" for micro-microfarads, the compact symbol "PF" (Picofarads) is applied. "1," for example, by a condenser, means .1 microfarad and "200" near a resistor indicates 200 ohms. The grid of the R.F. amplifier and mixer are tuned by 40 PF midget variable conden-

sers and these two sections are ganged for manual control from the front panel. Because coverage in each case is intended only for the limits of each amateur band, it is hardly necessary to touch this control after peaking for the centre of the band. Tuning is done solely on the band-spread control, which is the large dial on the panel. This operates a 40 PF variable tapped down across the oscillator grid coil for requisite "spread." Oscillator band-setter is a midget variable with maximum capacity around 140 to 160 PF.

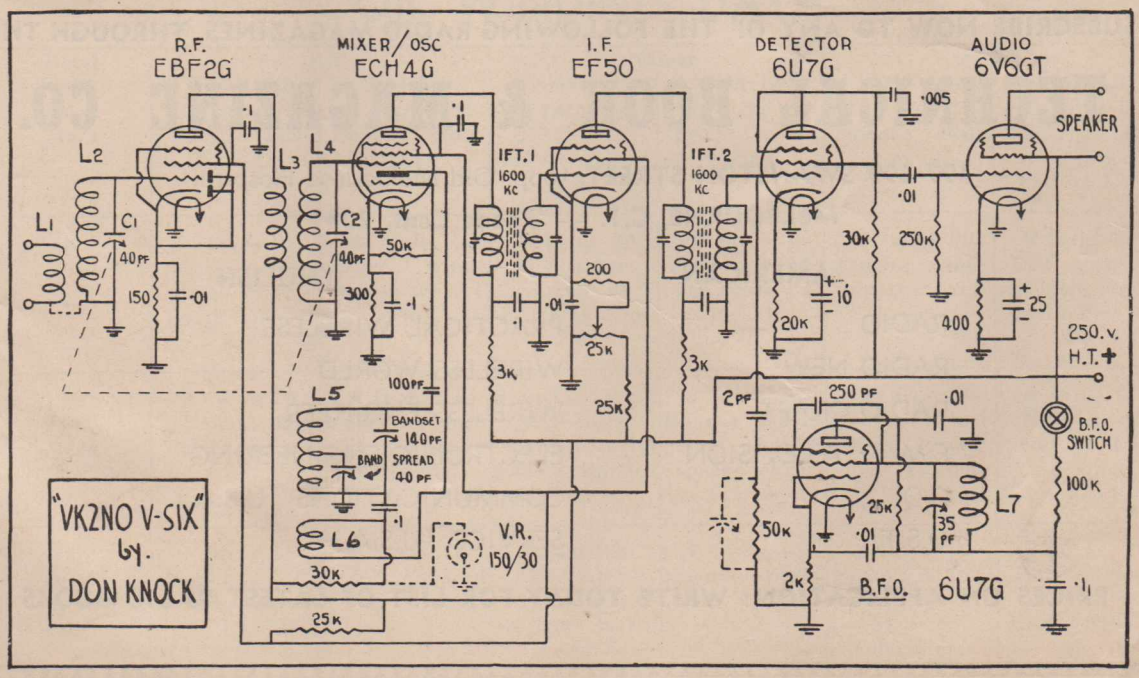
Independent Oscillator Tuning

The idea of a separately tuned oscillator in a superhet may appear at first as a handicap, but such is not the case here. Wide frequency coverage is not a consideration and tuning on each band is confined to the limits. Ratio of inductance to capacity is chosen so that whilst a high value of C is present in the oscillator section—low C and high L predominate in R.F. and mixer circuits.

C1 and C2 as used in the original are pre-war "Raymart" types and if such condensers are not easily obtainable now, the keen amateur will no doubt exercise ingenuity in remodelling suitable types. Old "moulded-mud" midgets of the single bearing variety can often be reconstructed with "Perspex" or "loaded ebonite" insulation to make really good condensers. Same applies to the oscillator 140 PF variable, which in the original, is an old English "Formo"—reconstructed in like manner. C1 and C2, ganged, are mounted underneath the chassis at the left and the plug-in coil sockets are directly over the sections, above the chassis top, on short stand-off pillars.

A calibrated dial is obviously superfluous for this combined control. 0 to 100 deg. semi-circular plate is provided to set things off, and also as reference guide. A plain pointer knob serves the purpose; no vernier is needed here. With the oscillator band-setter condenser—a vernier control is desirable, although once the calibration settings have been noted, a plain knob suffices to position the condenser for each band. The condenser is also mounted underneath the chassis and in the original is driven by a planetary drive—a pre-war "Eddystone." The panel carries an inked card scale with arcs in different colours corresponding to the indicating colours of the sets of coils. A thin "Perspex" pointer is affixed to the drive with an inked hair line scratched thereon, and small holes drilled through, corresponding to the position of the coloured semi-circles on the scale. An ideal arrangement here would be the use of an ex-service "Flick tuning" dial whereby band-setting would be positively effected by the feel of the catches snicking into pre-arranged settings. The oscillator band-spread is the important operational control for this receiver. The condenser in the original happens to be a doctored old-time "Gecophone" with integral vernier drive—to give 40 PF capacity. It is mounted on the top of the chassis so that a large semi-circular card indicator occupies most of the centre of the front panel. One with a 6-inch radius is used in the original, with coloured arcs to indicate the 80, 40, 20 and 10 metre ranges. At approximately 2 o'clock on the dial a black radius line is

(Continued on page 8)



(Continued)

drawn from centre to circumference of the scale and this has marked upon it: "Reference band set." Use of this will be obvious. A little lower frequency leeway is necessary over the L.F. band limit in each range, to permit re-setting the band-setter control. All calibrations are made with the Perspex pointer of the band-spreader on the reference line.

Coil Data

Whilst it would be quite easy to design the receiver around band-switching, it was decided that a lot is in favour of "plug-in coil efficiency." Much shorter leads between coil mounts and variable condensers can be obtained where layout does not suffer at the dictates of band-switches. Also, lots of Hams undoubtedly have, even through war years, 4 or 5 pin plug-in coils of earlier days on hand. My scheme is to use 4-pin coils for R.F. and mixer, and 5-pin for oscillator. Remember, too, that old valve bases are still quite useful for the foundation upon which to make up coils. Except where started, the coils are wound upon 1½-inch diameter forms. If you haven't any, what is wrong with fitting 1½-inch diameter "Paxolin" tubing or the like to 4 and 5 pin valve bases? Or did you ditch your old valves as junk? Moral: there is no such thing as junk to the 100 per cent. experimenter—Ham! If you can lay hands on pre-war "Marquis" or "Rayway" 1½ forms, much constructional time may be obviated. Note, also, from the coil chart that the coils for the 28 Mc/s range are 1-inch diameter and wound on air. Forms are superfluous here, and 14 enamelled copper is self-supporting as a coil when soldered directly to the pins of a cut-down valve base.

I wish to stress the importance of using really good insulating material for the coil mountings and to warn particularly about using dubious moulded composition valve bases for the foundation carrying the 28 and 50 Mc/s coils. As mentioned previously, old valve bases, etc., are useful, and average material will be in order for "80," "40" and possibly "20," but for the others, try to get hold of bases made of micanol or similar modern valve base material. Air supported coils of 16 enamelled copper are easy enough to make up, and to solder into valve base pins for mounting, but once the calibrations have been made, don't leave the coils without a measure of protection against movement of turns. The writer's method of doing this is to cement a few strips of celluloid over the turns, parallel to the axis. "Glyptol" or similar cement will ensure rigidity. Varnishing of coils is recommended for close-wound 1½-former assemblies, but be sure that a really good R.F. insulation varnish, such as "Amphenol 912" is used. Unknown brands of bottled "coil dope" can be disastrous, as I found to my annoyance in pre-war days. With plug-in coils, a good solid type of valve socket is needed for mounting, and here let me warn again. Rubbishy sockets will mean future sorrows, and it is worth while using positive contact ceramic body valve sockets for this work.

There were many early type 4 and 5 pin sockets made with excellent contacts, but the moulding was invariably an afterthought. The handyman-amateur can do worse than to reconstruct totally such sockets by making up a new body of loaded ebonite, Perspex, or one of the many low-loss materials using the original body as a template. Mount the coil sockets about 1 inch above the chassis top to reduce capacity to earth. In this connection I advise mounting variable condensers such as C1-C2 with the stators turned away—not toward the surface of the chassis.

I.F. Amplifier

Notions about I.F. amplifiers vary and for the signal frequencies to be covered by this receiver, one stage of high gain I.F. amplification is ample, especially if a valve of the EF50 or 1852 is applied as suggested. Reasons for the choice of I.F. at 1600 Kc/s are that:

(1) Images fall outside the range of each amateur band.

(2) Tuning on 28 (and 50) Mc/s is done with more ease than with 465 Kc/s I.F.

(3) With well designed 1600 Kc/s I.F.T.'s, selectivity should be ample. It is certainly better than the inherently inselective T.R.F. type receiver.

I realise that at this stage of post-war constructional radio it is one thing to say "use 1600 Kc/s I.F.T.'s," and another thing to get them. The ones used in the writer's receiver were made in pre-war days by Tasma Radio, Sydney, especially for Ham consumption and they are a particularly excellent job. High gain iron cores are used and it is possible that some would-be builders of this receiver may have such I.F.T.'s in the "old oak chest." I imagine, however, that, because of popular demand on the part of Hams, enterprising coil kit manufacturers will soon make I.F.T.'s of other frequencies than the 450 Kc/s region available. There is need for I.F.T.'s as high as 20 Mc/s for V.H.F. superhets. A word of constructional advice about "rolling your own." Frequently one encounters types of 450-65 Kc/s I.F.T.'s that can be "doctored" for higher frequency resonance around 1600 Kc/s. Those with iron cores and slotted formers, either with slug or trimmer capacity adjustment usually have lumped capacity of 250 PF across primaries and secondaries. Replace the 250 PF mica condensers by 15 PF types, and you will be somewhere near the mark. Make sure that the 15PF replacement condensers are each of the same capacity, no matter if plus or minus 15 PF. Get them checked on a capacity bridge if in doubt. If they are not within close capacity peak with each other, difficulty may be experienced in getting resonance at the new I.F., particularly with tuning.

Lining Up

Some variation is permissible where windings are peaked by air or pressure 0-50 PF trimmers. The thing is to avoid necessity for alteration to windings. Finally, a modulated oscillator or signal generator is needed to line up for the new I.F., but even this may be fluked in the usual Ham way. Only gain control in this receiver is the 25K potentiometer in the cathode return of the I.F. valve. The second detector following I.F.T. 2 calls for no comment—it is a simple triode-connected pentode anode-bend detector, and incidentally, there is no reason why triodes proper, such as 6C5's, 6J5's or 76's should not be used. No A.V.C. is provided. That is left to the discretion of the Ham constructor, and is easily included. Resistance coupling in the usual manner to a 6V6GT provides audio output.

(Continued on page 11)

COIL WINDING DATA

Band	R.F.		Mixer		Oscillator	
	Aerial L2	**Grid L1**	**Primary 13**	**Grid L4**	**Grid L5**	**Anode L6**
"80" 3.5-4 Mc/s	10 turns 30 DSC; ⅛ inch from L1.	45 turns 20 Enam.; close wound.	8 turns 36 DSC over lower end of L4.	45 turns 20 Enam.; close wound.	20 turns 20 Enam.; close wound.	10 turns 30 DSC., ⅛ inch from lower end of L5.
"40" 7-7.3 Mc/s	7 turns 20 Enam.; close wound at Earth end of L1	22 turns 20 Enam; winding space 1½ inches.	8 turns 30 DSC interwound at Earth end of L4.	22 turns 20 Enam.; winding space 1½ inches.	10 turns 20 Enam.; winding space 1¼ inches.	8 turns 30 DSC located ¼ inch from Earth end of L5.
"10" 28-29 Mc/s	3 turns 16 Enam.; at Earth end of L1.	6 turns 16 Enam.; 1 inch diam., air-wound.	3 turns wiring flex inter wound with L4 from Earth end.	6 turns 16 Enam.; 1 inch diam., turns spaced over 1 inch.	3 turns 16 Enam.; 1 inch diam. spaced over 1 inch.	3 turns 22 Enam.; at end of L1.
"6" 50-54 Mc/s	2 turns 16 Enam.; at Earth end of L1.	7 turns 16 Enam.; spaced over 1 inch.	4 turns 30 DSC interwound with L4 from Earth end.	7 turns 16 Enam.; spaced over 1 inch.	5 turns 16 Enam.; ½ inch diam. spaced by wire diameter.	3 turns 16 Enam.; close wound, at Earth end of L.

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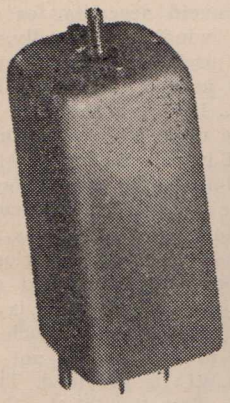

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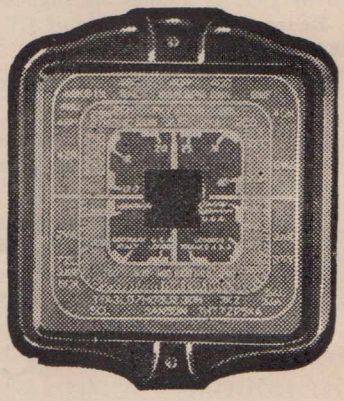
IE 75 — Permeability tuned: 175 K.C.



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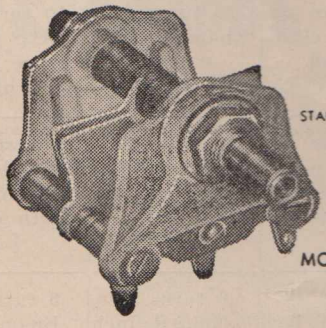

		Max. Cap. MMFD.	Min. Cap. MMFD.	Plates
STAR	CV34	10	3	2
	CV35	15	3	3
	CV36	25	3.5	4
	CV37	35	4	5
	CV38	50	4	7
	CV39	70	5	9
	CV40	100	6	14
MC	CV41	10	3	2
	CV42	15	3	3
	CV43	25	3.5	4
	CV44	35	4	5
	CV45	50	4	7
	CV46	70	5	9
	CV47	100	6	14

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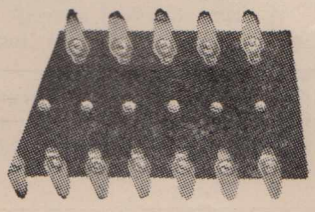
Type MS8 ½in. wide.



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174 CANTERBURY ROAD, CANTERBURY

VK2NO-V6

(Continued)

The B.F.O.

Instead of taking the line of least resistance and making the 2nd detector controllably regenerative for C.W. reception, a separate B.F.O. is used. There's nothing out of the ordinary about that, but there is in the actual B.F.O. design. It is a transitron type oscillator—a variation of the earlier Dynatron—having negative resistance characteristics. Its main advantages are stability, and low harmonic content, both being highly desirable features at VHF's in particular.

The usual cathode-tap triode B.F.O. is a prolific generator of harmonics and these can be a nuisance when falling inside the range of an amateur band. Reference to the circuit diagram shows the arrangement of the B.F.O. L7 is a coil consisting of 25 turns of 22 D.S.C. scramble-wound on a ½-inch diameter insulating former. The variable condenser in dotted lines across the 50K resistor is a 2 or 3 plate midget with control shaft brought to the front panel of the receiver for B.F.O. note control. The 35 PF midget variable is the trimmer across L7 and, once set, need not be altered normally. Coupling to detector grid is through a 2 PF capacity consisting simply of short lengths of flex twisted together. Experimentation is needed here for the correct amount of B.F.O. injection. When finalised the flex wires can be cemented together with clear lacquer. It is necessary to shield L7 and the B.F.O. valve for best results and the whole assembly can be built compactly into a metal box on the chassis top in the usual manner. A battery switch is included in the H.T. feed line through the 100K resistor to switch the B.F.O. On or Off as required. This will get a lot of use and so should be a really well-made type of toggle switch.

Power Supply and Voltage Regulation

No H.T. supply unit is indicated in the diagram and that normally will be conventional. The usual standardised broadcast power pack will do, but a suggestion is the addition of .01 mfd. mica buffer condensers between rectifier plates and filament in order to remove any trace of "tunable hum." H.T. supply used by the writer consists of two earlier day Philips "B" eliminators applied in series to give the 250 volts needed under load. The units were used because they happened to be on hand, and as a quiet, hum-free H.T. supply they are excellent; a 6-volt 4-amp transformer takes care of heater supply for the 6 valves. Use of a VR 150/30 gaseous voltage regulator tube is suggested for control of oscillator potentials. If connected as indicated in the diagram, it will hold the oscillator plate voltage at a steady 150 volts and in the case of the two "B" eliminators used in series, it was found that a good degree of control can be obtained by connecting the VR 150/30 across 150 volts of the supply from negative H.T.

The eliminators referred to use series-feed of voltages and do not employ a tapped bleeder type potential divider. There is little more to be said. Constructional details and layout I leave to the commonsense of the amateur versed in the ways of receiver construction. Parts necessary for basic construction can be ascertained from the circuit diagram and size of chassis, panel, etc., is a matter for individual decision.

With a separate cable-connected power-pack, the size of the receiver can be kept to reasonably compact dimensions. Any further details the reader may require the writer will be pleased to supply if application is made through "Australasian Radio World."

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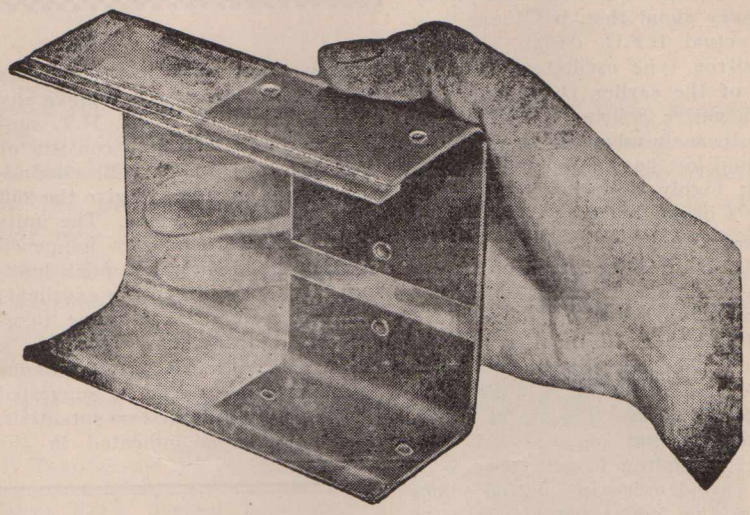

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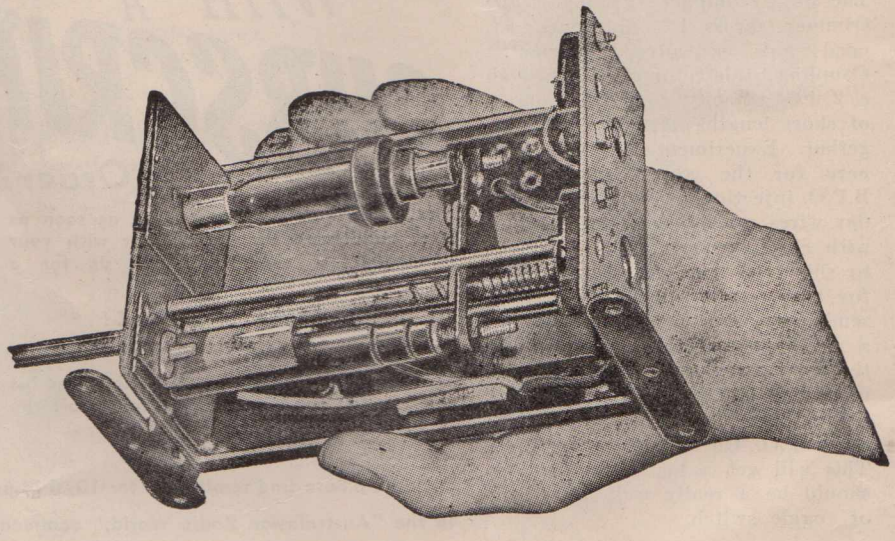

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FROM AUSTRALIA'S LEADING DISTRIBUTORS

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USING THE "1852"

By T. G. DuFaur B. E., A.M.I.E (Aust.) etc.

Those who have heard of the high-gain valves produced for radar work during the war want to know how to use them to best advantage. Here is the answer, set out clearly and in full by one of Australia's leading radar scientists.

THE 1852, otherwise known as the 6AC7, is a receiving type pentode designed for use in television receivers. The tube is relatively new to Australia and is of considerable interest to radio amateurs and enthusiasts, owing to its high gain when used as a short-wave or U.H.F. amplifier or mixer.

Quantities of these tubes first arrived in Australia in bulk during the war for use mainly in the construction of Australian-built Radar equipment.

Substitution for 6U7G

This article has been written for those who have acquired one o these tubes and are desirous of using it in their receivers. Owing to its extremely high mutual conductance, some have the impression that it can be used to replace ordinary pentodes such as the 6J7G and improve the overall gain of a receiver by an enormous amount. Some desire to replace the intermediate frequency valve in their radio with an 1852 to obtain additional punch, and others intend to use the tube as a radio frequency amplifier to increase the gain and signal to noise ratio of their receivers. The business of substituting the 1852 in such cases is not as simple as it might appear, and the details given hereafter are an attempt to clarify where the tube may be used to advantage.

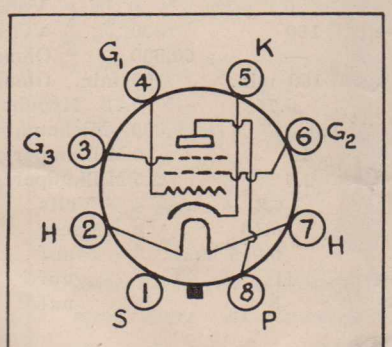


FIG. 1.

BASE CONNECTIONS FOR 1852.

BOTTOM VIEW.

The 1852 is of single-ended metal type construction and is recommended by the manufacturers for use in the radio frequency and intermediate frequency stages of picture amplifiers in television receivers as well as for the initial stages in television video amplifiers. It comes from a family of three, known as the 1851, the 1852 and the 1853. The first of these tubes has the same electrode assembly as the 1852 but has the grid terminal coming out on the top. Apart from minor differences in inter-electrode capacities, the 1851 and 1852 have identical characteristics. The 1852 has a special shielded lead construction to permit bringing the control grid lead to a base pin rather than to a pin cap without increasing the grid to plate electrode capacity. The proximity of the grid pin to the cathode pin simplifies wiring and enables shorter leads to be used, which is important at high frequencies, as it provides decreased feed back and improves circuit stability. Both the 1851 and 1852 are sharp cut-off pentodes; the 1853 is a variable mu tube of the same type having a lower transconductance, i.e., 5,000 micromhos. The 1853 cuts off with a grid bias of minus 15 volts, while the 1852 cuts off at minus 6 volts. The superior characteristic of the latter is its very high mutual conductance of 9,000 micromhos, which is over seven times that of the 6J7G.

The 1852 fits a standard octal socket, the connections being as shown in Fig. 1.

Transconductance

The high transconductance in the 1852 is obtained by decreasing the space between the grid and cathode. This increases the grid to cathode electrode capacity, but if the spacing between the control grid and cathode is halved, the transconductance will be increased four times for the same cathode current. Thus, the improvement is slightly better than twice that of the original tube provided the output capacitance is small in regard to the input capacitance. The actual distance between the cathode surface and grid wire

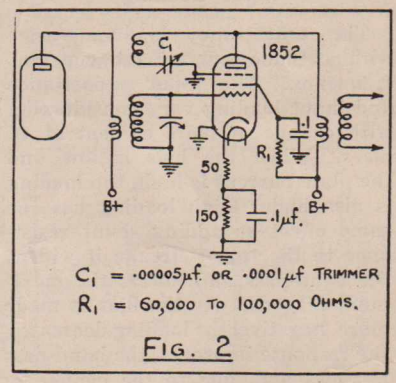


FIG. 2

in this tube is approximately 0.005 inch.

Where uniformity of tube characteristic is unimportant, the transconductance of the 1852 can be increased about 25 per cent. by connecting the No. 3 grid as an accelerator instead of as a suppressor. This grid should have a voltage about 50 per cent. more positive than the normal screen grid voltage. Under these circumstances the secondary emission from the screen grid adds to the normal plate current. This secondary emission is

(Continued on page 14)

(Continued)

large enough to cause negative screen current, whilst the sum of the No. 2 and No. 3 grid currents is almost zero; thus, the tube plate current will be 12.5 ma., instead of 10 ma., and the mutual conductance will be about 11,250 micromhos instead of 9,000.

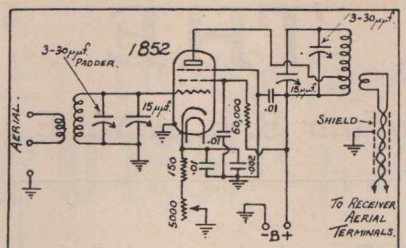
Grid Resistance

With screen voltage obtained from a fixed supply and with a 160 ohm cathode resistor, the tube can tolerate a maximum value of grid resistance of 250,000 ohms. With screen voltage obtained through a 60,000 ohm dropping resistor from a 300 V. supply, a maximum of 550,000 ohms can be used. If a larger cathode bias resistor is employed and is tied back to a positive voltage point on the supply bleeder, the regulating action is so improved that the input series resistance can be increased to several megohms.

Input Loading

The tube input loading varies with cathode current at constant frequency. The input capacitance and input loading vary considerably with change of plate current at 40 mc/s. When the bias is low and the plate current is high, the loading is also high. High loading has the same effect as adding shunt resistance to the tuned circuit; it widens the band-pass and lowers the maximum response. As the bias is made more negative, the loading decreases, the response improves, the band-pass narrows and, due to the change in input capacitance, the peak of the band shifts to a higher frequency.

The input impedances of the tube are such that they can seriously hamper its performance, particularly at high frequencies, such as 50 mc/s. The input impedance consists of the resistive component which varies with the square of frequency and the reactive capacitive component which varies inversely with frequency. The effect of this input loading is not serious at 10 mc/s but is very serious at 50 mc/s. The deleterious effects obtained are frequency shift, widening of the tuned circuit band-pass and added shunt resistance across the tuned circuit. These troubles



PRESELECTOR USING 1852.
FIG 4

can generally be overcome by using a small unbipassed resistor in the cathode. An unbipassed resistor, however, produces degenerative amplification and reduces the gain to

$$\frac{1}{1 + g_K R_K}$$

of its value when $R_K = 0$; therefore as low a value of R_K as possible should be used.

Generally, screen and suppressor grids should be grounded and not tied to the cathode, or else feed back may result. The plate to cathode capacitance, therefore, and the wiring layout become important, since the cathode is not at ground potential.

For use at high frequencies, the inductance in the cathode lead of the 1852 is important. The cathode return connections should therefore be made as close to the cathode pin as possible and non-inductive resistors must be used in the cathode circuit.

Signal To Noise Ratio

Due to its high transconductance, the 1852 gives an extremely high signal to noise ratio. As a frequency converter, it provides very high conversion gain and an excellent signal to noise ratio, comparable to that obtainable with r.f. amplifiers, and in these respects it is superior to other tubes used as mixers. However, the 1852 loads the circuit more and thus decreases the selectivity.

Below 10 mc/s the signal to noise ratio, gain and selectivity of the conventional r.f. amplifier stage

1852 CHARACTERISTICS

As Class A Amplifier

Plate Voltage	300 max.		Volts
Screen Voltage	150 max.		Volts
Screen Supply Voltage	300 max.		Volts
Plate and Screen Dissipation (total)	3.4 max.		Watts
Screen Dissipation	0.38 max.		Watts
Typical Operation:	**Condition I***	**Condition II****	
Plate Voltage	300	300	Volts
Suppressor Voltage	0	0	Volts
Screen Supply Voltage	150	300‡	Volts
Screen Series Resistor	—	60,000	Ohms
Cathode-Bias Resistor	160 min.	160 min.	Ohms
Plate Resistance (Approx.)	0.75	0.75	Megohm
Transconductance	9,000	9,000	Michomhos
Plate Current	10	10	Milliamperes
Screen Current	2.5	2.5	Milliamperes
Heater Voltage (A.C. or D.C.)	6.3		Volts
Heater Current	0.45		Ampere
Grid-Plate Capacitance°	0.015 max.		uuf
Input Capacitance°	11		uuf
Output Capacitance°	5		uuf

°With shell connected to cathode.

As Class A Amplifier

*With fixed screen supply. **With series screen resistor.

‡Screen supply voltages in excess of 150 volts require use of a series dropping resistor to limit the voltage at the screen to 150 volts when the plate current is at its normal value of 10 milliamperes.

using tubes such as the 6U7G are sufficiently high. At higher frequencies, however, this is no longer true. With practical r.f. and i.f. amplifier circuits the gain per stage using an 1852 is 3.5 to 7 at 50 mc/s, with a band width of 2.5 mc/s. As an intermediate frequency of 11 mc/s and a band width of 2.5 mc/s, the gain per stage is 20 to 45.

Comparison With Other Tubes

Relatively high gain may be obtained with the 1852 above 10 mc/s, and this tube also develops less noise than other types. Owing to its high input loading effect, however, the selectivity is decreased and the tuned circuit gain is lowered. Pentodes, such as the 6J7G, have lesser input loading effects at the higher frequencies, moderate gain and relatively high inherent noise. Acorn tubes are excellent from the input loading viewpoint and the gain obtained from them is similar to that with the standard types. Inherent noise in acorn and similar miniature tubes is lower. Where selectivity is important, the choice of tube for an r.f. amplifier at high frequencies can be determined as follows: Acorns give the best results, standard pentodes next and high mutual conductance tubes such as the 1852 come last. From signal to noise ratio and an overall gain viewpoint, however, the 1852 is superior, followed by the acorn and the standard pentode last.

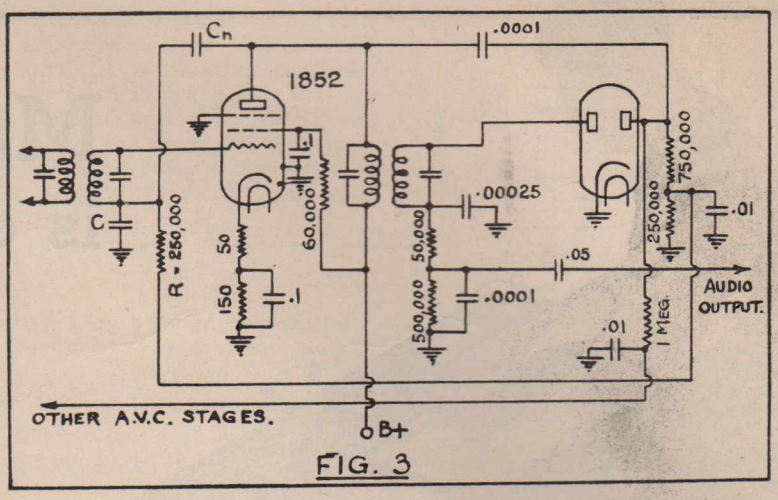
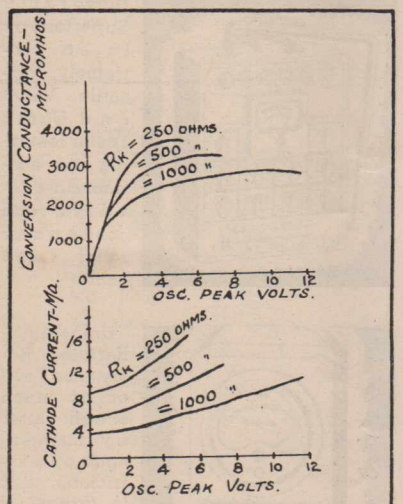


FIG. 3



TYPE :- 1851, 1852

E_f = 6.3 VOLTS

E_b = 300 "

E_d = 150 "

SUPPRESSOR TO CATHODE

GRID VOLTS : AS INDICATED

OSC. & SIG VOLTAGES TO No1. GRID.

CURVES TERMINATE AT GRID CURRENT POINT.

FIG. 6

Use In Broadcast Receivers

The idea of replacing existing pentodes in a broadcast receiver with 1852's to obtain higher stage gain is rather a fallacy. Firstly, as the 1852 is a sharp cut-off pentode, it cannot easily replace r.f. and i.f. amplifying valves in commercial receivers because the latter are invariably of the variable mu type in order that automatic volume control can be applied to them.

Whilst the high frequency tuned r.f. stages in television receivers have impedances of only a few hundred ohms owing to shunting capacitances being unfavourably high, the output impedance of a high quality broadcast i.f. stage is 100,000-200,000 ohms. If an 1852 has an impedance of this magnitude in its plate and grid circuits, oscillation must result and cannot be controlled unless neutralisation is used. Examination of the tube characteristics reveals that the grid to plate capacitance of the 1852 is 0.015 uuf., which is double that of the 6U7G or 6J7G tube type, and the gain of the 1852 is, theoretically, approximately seven times that of these tubes. It is easy to see that instability must occur if the 1852 is used as a normal i.f. amplifier, because the feed back from plate to grid, through the grid-plate interelectrode capacitance, is larger than the input signal to the stage unless low Q coils are used. It is not proposed here to discuss in detail the maximum input and output impedances which can be tolerated before oscillation occurs, as this subject is mathematically complicated, the frequency of the oscillatoin differing slightly from the input frequency to the stage. Readers who wish to follow this matter further are referred to "The Technique of Radio Design," by Zeppler, page 219.

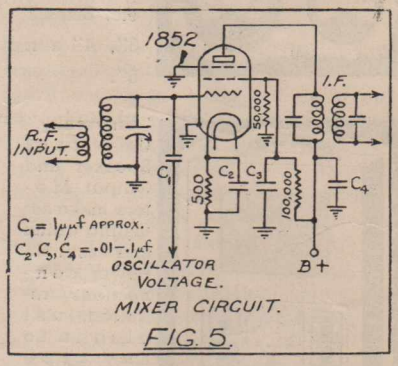
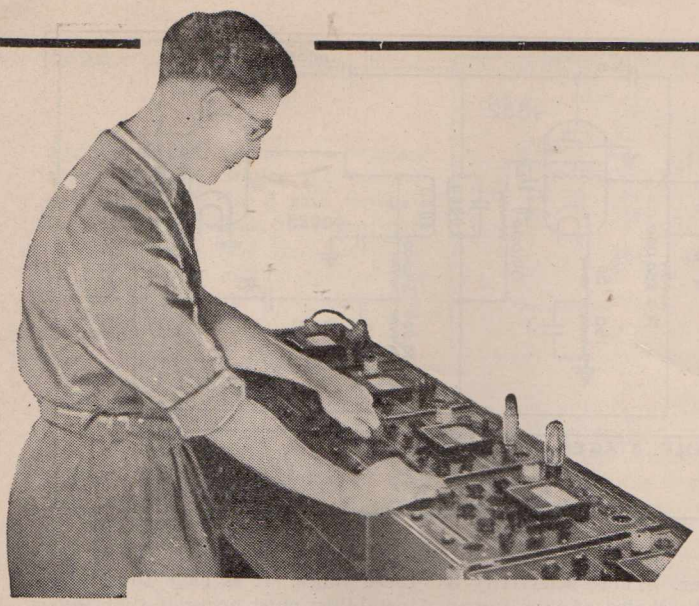


FIG. 5.

The 1852 can be used as a broadcast band i.f. or r.f. amplifier by applying degeneration as shown in Fig. 2. Degeneration may be effected by winding a small coil adjacent to the secondary tuned circuit and connecting it as shown be-

(Continued on page 17)



Mr. White
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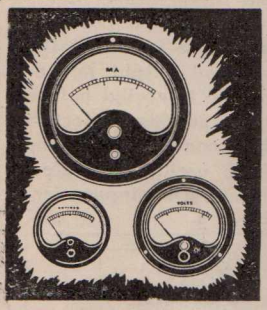

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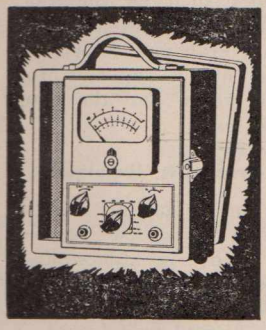
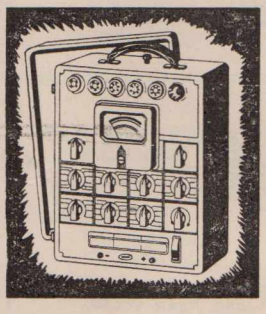


University M.V.A. all-purpose Multimeter (bench or portable) giving complete AC/DC measurements together with output meter ranges.



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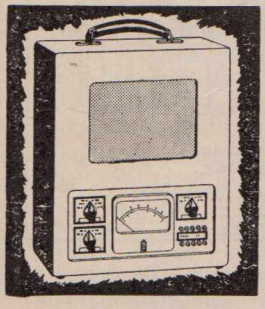

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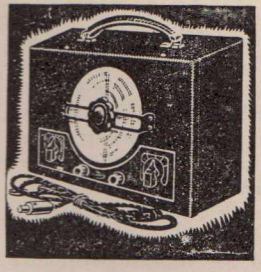
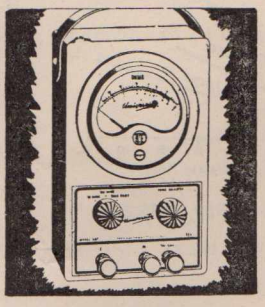


A new "University" five band oscillator for the alignment of all types of radio receivers. A 'must' for every serviceman.



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(Continued)

tween the plate and earth, in series with a small adjustable trimming condenser. The circuit is actually similar to that of the well-known regenerative circuit, except that the additional coil is connected round the other way to give a degenerative instead of a regenerative effect. Stability can also be obtained by heavily loading the tuned circuits with resistors and, thus, reducing their "Q" and the stage gain. This practice, however, ruins the selectivity of the circuit, although it does produce quite a nice wide band i.f. stage if such is required to limit side band cutting. However, to gain satisfactory results, considerable care must be exercised in the layout of the stage; generally speaking, a tube such as the 6U7G will produce results comparable with that of the 1852 under such conditions.

Another method of neutralising a high gain i.f. stage is shown in Fig. 3. This method is interesting, as it is ideal for a stage where A.V.C. is used. A neutralising condenser Cn is fitted in the circuit between the tube plate and the earthy end of the i.f. coil connected to the grid circuit of the tube. Examination of the circuit will show that balance is obtained when

$$\frac{Cn}{C} = \frac{Cgp}{Cgk}$$

where Cgp = tube interelectrode capacity between grid and plate.

Cgk = tube interelectrode capacity between grid and cathode.

The resistance R should be very large compared to the reactance of the condenser C. If an 1852 is used in the circuit of Fig. 3, the value of Cn may be calculated as follows:

From the tube characteristics we find that Cgp is 0.015 uuf, and Cgk = 11 uuf. If C has a typical value of 0.02 uuf, we have

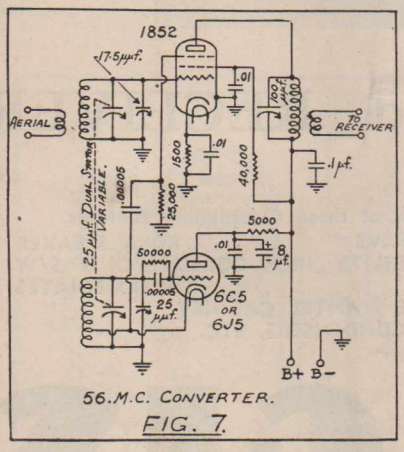
$$\frac{Cn}{.02 \times 10^6} = \frac{0.015}{11}$$

therefore Cn = 27.2 uuf.

In practice, we must also take into account stray wiring capacities between the grid and plate and between grid and cathode, and therefore Cn must be adjusted accordingly. In the above example, a high-grade mica condenser of 25 uuf or 30 uuf will be found satisfactory, if stray capacities are minimised.

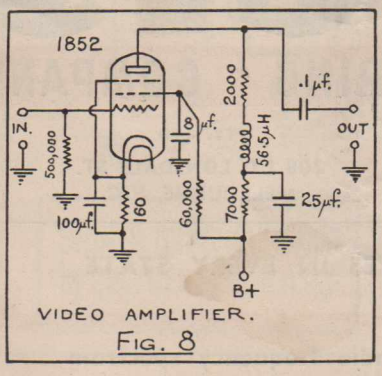
It must be remembered that Cn is in parallel with the resonant circuit in the plate circuit of the amplifier, i.e., the primary of the following i.f. stage. Therefore the value of C must be such that Cn will not be so large as to make it impossible to align the following i.f. primary.

Except in special applications, it is not recommended that the 1852 be fitted in receivers used for broadcast reception alone.



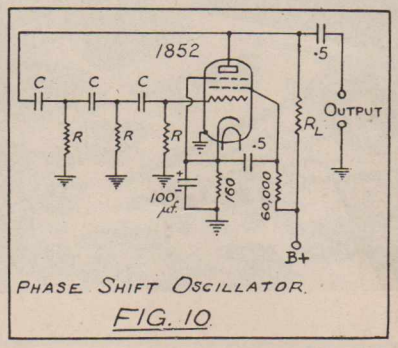
56.M.C. CONVERTER.

FIG. 7.



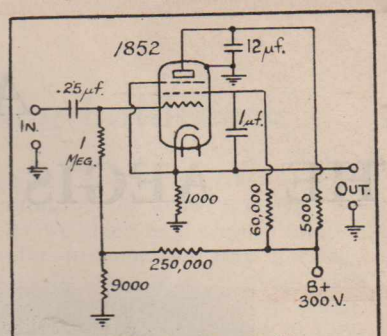
VIDEO AMPLIFIER.

FIG. 8



PHASE SHIFT OSCILLATOR.

FIG. 10.



CATHODE FOLLOWER.
EFFECTIVE OUTPUT IMPEDANCE = 100 OHMS.

FIG 9.

Use As Radio Frequency Amplifier At High Frequencies

The 1852 used as a U.H.F. amplifier produces good results owing to its high transconductance, and since the tuned circuits at these frequencies are relatively small impedances, little or no trouble is experienced with instability. As mentioned previously, however, the loading effect caused by this tube is considerable, and if high selectivity is desired, it is advisable to tap the grid down on the tuned circuit. This also improves stability. To overcome feed back troubles at medium short-wave frequencies, it may be necessary to top down on the plate circuit of an r.f. amplifier using this tube to reduce gain to a stage where instability is not bothersome. A circuit diagram of a pre-selector extracted from "The Radio Amateur's Handbook," 1942, as shown in Fig. 4, illustrates this point. The unit is not meant for operation below 14 mc/s, and has been designed as a regenerative pre-selector for use on and above 14 mc/s, where the gain of most receivers decreases.

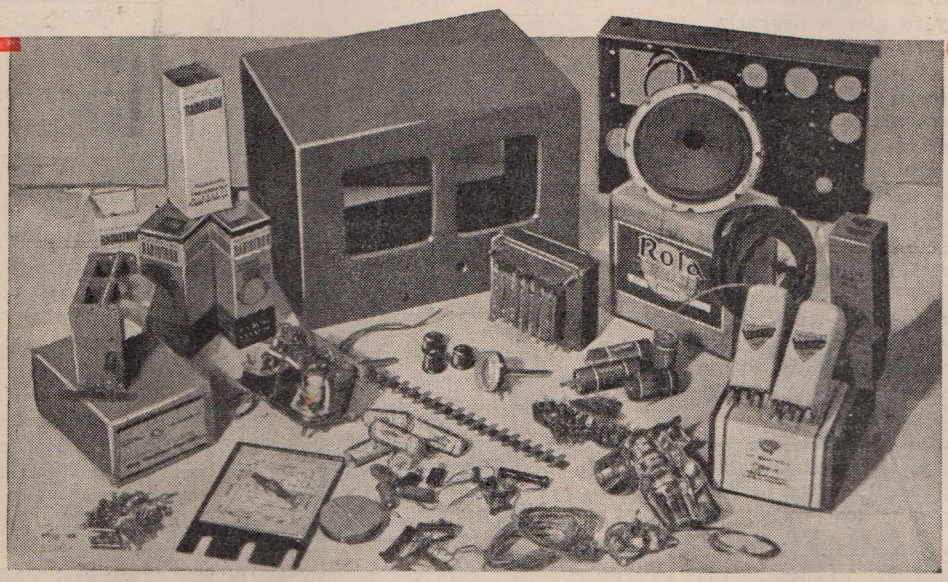
Automatic Volume Control

The 1852, being a sharp cut-off pentode, is not designed for use with A.V.C. However, A.V.C. may be used with fairly satisfactory results by applying the control voltage to the suppressor grid instead of to the control grid. If it is desired to employ A.V.C. on the con-

(Continued on page 22)

Available at Last

THE AEGIS "LITTLE COMPANION"



Build this 5 Valve 2 Band RECEIVER

The ideal kit for the radio enthusiast—the Aegis "Little Companion" kit assembly (cat. No. KS5/D) is a 5-valve 2-band receiver, A.C. operated. It is now available in easy-to-build kit form, careful'y engineered down to the last nut and bolt, including a modern cabinet. Each set is supplied with step-by-step directions which can be easily understood by anyone, for pictorial and schematic diagrams illustrate where each part belongs and where each connection is made. Also included is the lining procedure for the Aegis Permeability Dual Wave kit and I.F.'s type numbers K1, J1 and 2.

Look at these Outstanding Features

DUAL WAVE PERMEABILITY — ROLA SPEAKER
" " — IRON-CORED B/C & S/W INTERMEDIATES
DURABLE MANTEL CABINET
DUCON CONDENSERS, ETC.

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USING AVAILABLE GANGS

Some suggestions to avoid the two-gang bottleneck

TWO major shortages are causing the most trouble in the radio business at the moment: speakers and two-gang tuning condensers. The speaker situation is definitely tough, but at least the Rola people are awake to the position and they are going

By

A. G. HULL

ahead with big production plans for speakers, which are expected to come off the assembly line at a terrific rate of speed when they really get moving. By the time these lines appear in print we expect the speaker problem to be easing.

Toughest of all the minor supply shortages seems to be the two-gang condenser, which is practically a standard fitting for every commercial set which is produced these days. Every factory in the business has its orders placed with the makers of two-gangs, there being only two major sources of supply. Eventually the production will catch up with orders, but in the meantime there are two solutions.

Inductance Tuning

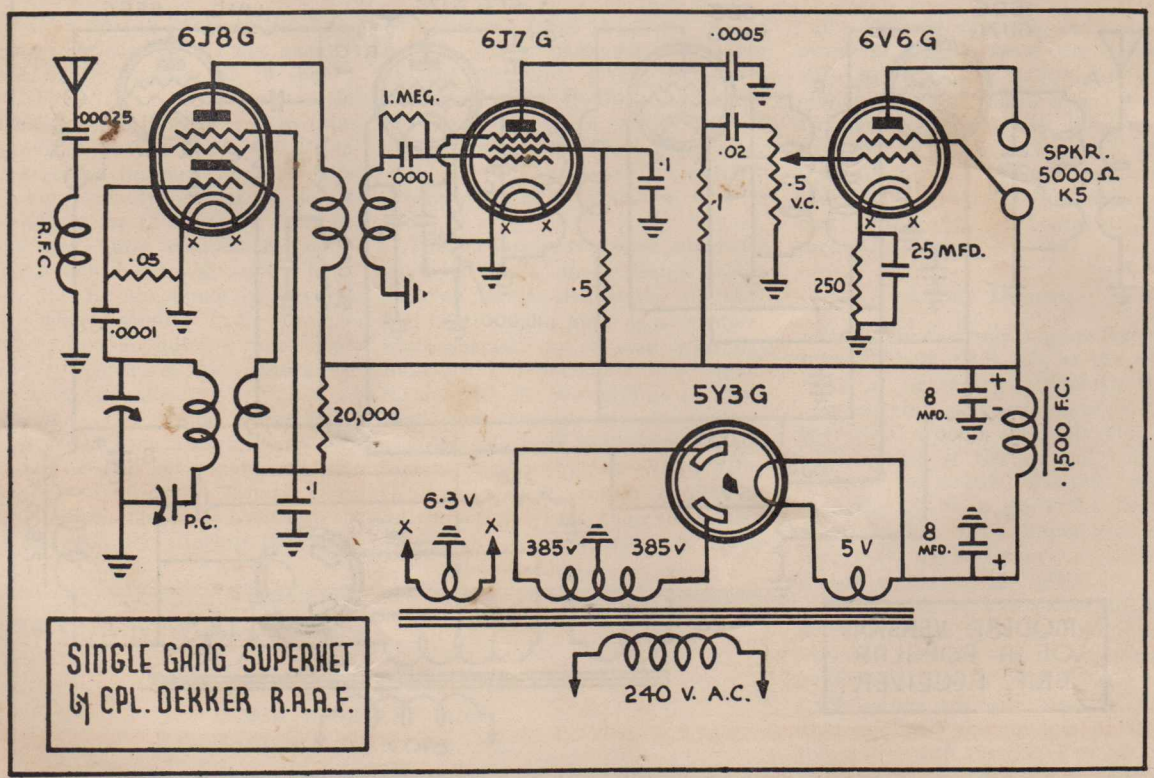
One is to use resonant circuits tuned by the movement of an iron core through the inductance, as with the new Kingsley "Ferrotune" unit. These units are an established fact, insofar as we have actually played around with a receiver using one of the Kingsley units in it. It works well, bring in all the stations sweetly and appears to be satisfactory in every way, but one. At the moment they haven't actually hit the retail market. Due to just one thing after another and the worst possible luck, the Kingsley unit is (at the moment of writing) still a step or two away from actually waiting on the dealer's shelves.

So we come to the other solution to the problem, dodging the issue by using other types of gangs, such as single gangs and triple gangs. Apparently due to the lack of commercial demand for these types they are much more readily available than the two-gangs. In fact, as we strolled down Lonsdale Street, Melbourne, the other day, we noticed a big window display of single and triple gangs in Homecraft's window.

Reaction Sets

The single gang can be put to good use in a set with a single tuning circuit and with modern coils it only requires to have an intelligent person operating the reaction control and it is possible to separate all the local stations in 90 per cent. of suburban locations in any of the capital cities of the vari-

(Continued on page 20)



GANGS

(Continued)

ous States. By using an EL3NG in the output stage and a screen-grid detector, the overall gain is ample to give full loudspeaker results from even a short aerial.

Untuned Supers

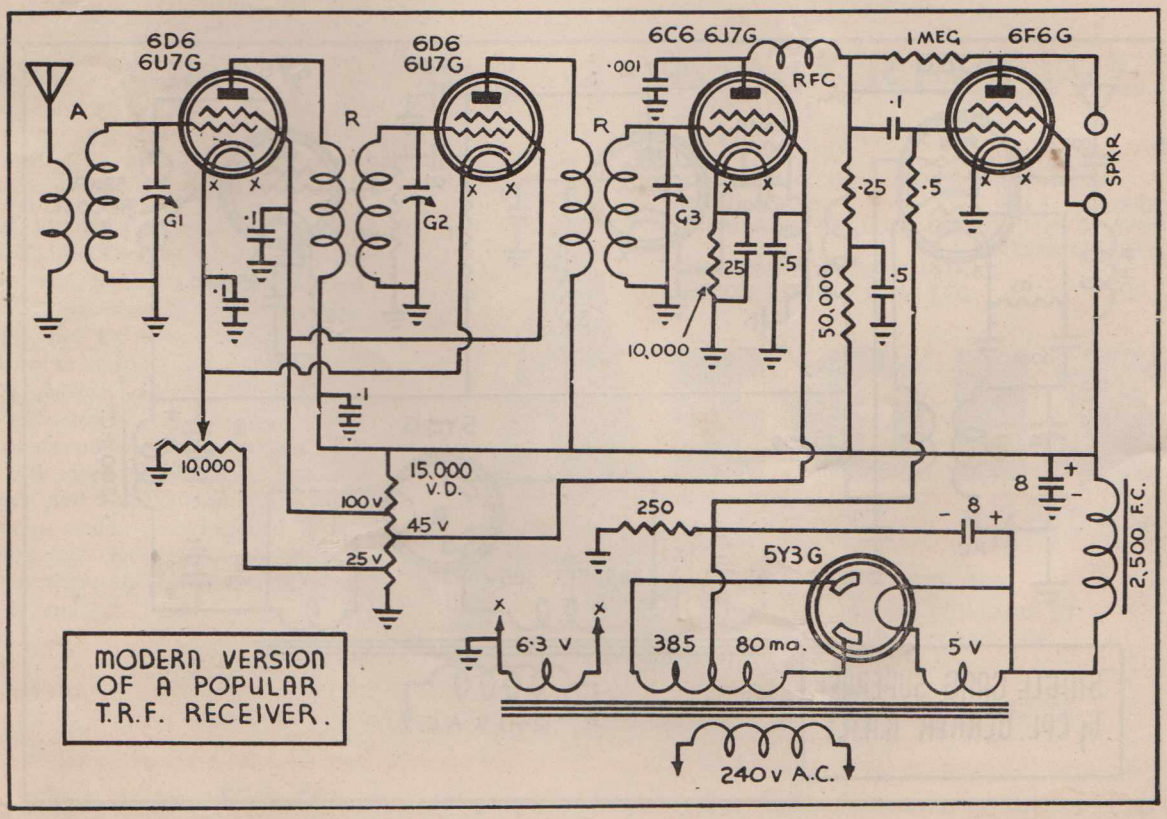
Another possibility is to use a single gang for a superhet with an untuned aerial circuit. The idea is to tune only the oscillator circuit and this idea worked out quite well in several shortwave converter circuits which I brought out in "Wireless Weekly" back about 1935. A recent letter from one of our subscribers, Corporal Dekker, of the R.A.A.F., Townsville, tells of a small superhet which this reader built up for his own personal use and proved completely satisfactory in practice. We have reproduced the circuit supplied by Corporal Dekker, and on looking at this you will notice that there is no actual intermediate amplification, just an i.f. transformer to couple the converter into the leaky grid detector. Apparently Corporal Dekker used just an ordinary 465 K/c intermediate transformer, but the actual frequency will not matter from a tuning point of view as the aerial circuit is untuned. But from an image rejection point of view it might be worthwhile trying a much higher i.f. frequency, such as 1,600 or 2,000 K/c. Suitable transformers of this frequency are readily available and might give still better results. In Corporal Dekker's circuit he takes one or two short-cuts which we hesitate to endorse as being good practice. For example, we would like to see a little bias arranged for the converter valve, but doubtless the majority of our readers will want to embody their own ideas anyway, and the suggestion by Corporal Dekker will be a good foundation on which to do a little experimenting.

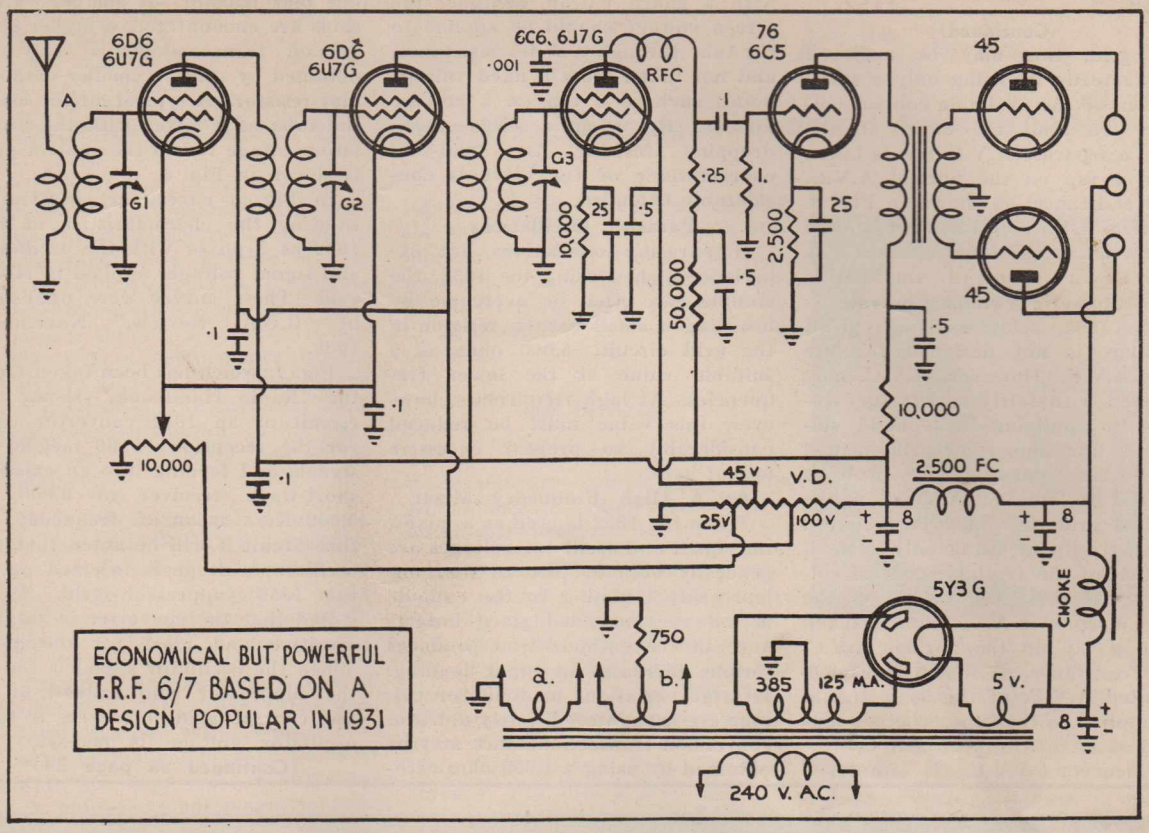
Tuned Radio Frequency

The three-gang condensers can be put to good use with both t.r.f. and superhets. Nothing is nicer than a big superhet with an r.f. stage ahead of the converter valve. It gives lowest noise level for any given degree of sensitivity and also better effective selectivity than the conventional commercial circuit as used with the two-gang. Cost, however, comes into the problem, especially if the set is to be a dual-waver, as the dual-wave coil boxes with the r.f. stage often run as high as £6 to £8, and by the time you take into account the extra valve and its associated components the cost is practically double that of the ordinary set. As a result, superhets with r.f. stages are only appreciated by those who want some DX results.

T.R.F. Advantages

The availability of the three-gangs, however, revives the age-old question as to whether the t.r.f. set should really have been so completely superseded by the superhets. The t.r.f. set has a fascination of its own and, if we neglect the matter of acute selectivity, the t.r.f. set can do everything that the superhet can do. In fact, in most cases the average t.r.f. set will give far better tonal quality than the superhet, especially when you con-





sider than 90 per cent. of the time the average superhet is not exactly tuned to the station as it should be. Especially with automatic volume control, it is so easy to tune a superhet just a shade off from the station, thereby marring the tone considerably. The t.r.f. set is definitely nicer to tune. It must be years since any established radio factory turned out a set of the t.r.f. type, yet we do know of several cases where smaller radio dealers have worked up quite a nice clientele for themselves by making up t.r.f. sets for sale.

We show two circuit suggestions for t.r.f. sets, one a very cheap job to assemble and yet capable of giving splendid all-round results. The output stage can be a 6V6G, or a 2A3 or 6A3, by altering the bias. The resistor from the plate of the output valve back to the plate of the detector gives feed-back. to improve the quality. It should be used for sure with a 6V6 in the output, is hardly necessary with the 6F6 and can be entirely disregarded if a 2A3 or 6A3 is used.

The second t.r.f. circuit which we show is based on a design which enjoyed great popularity in 1931 and is still being built as a "custom-built special" by a man who has built up a remarkable local reputation with it. We happen to know that often enough his clients have visitors who hear their sets and are instantly wanting to know why they can't have similar quality of reproduction from their own sets. Even with a comparatively cheap audio transformer this set gives a powerful output from the speaker with a very low amount of harmonic distortion, and even if the frequency response is limited, it still sounds much better than even the widest range type of reproduction if that reproduction also carries a fair bit of harmonic distortion.

A.V.C. Difficult

Probably the only unpopular feature of these t.r.f. sets is the difficulty of arranging automatic volume control, and, as a result, the operation of the set calls for intelligent use of the manual volume control to avoid blasting when swinging on to a powerful station after having been tuned to one which is not putting in such a strong signal to the aerial.

To emphasise the moral of this story: don't sit down and mope just because you can't get a two-gang condenser, because single gangs and triple gangs are more readily available and you can do lots of effective work with them if you get out of the rut.

(Continued)

trol grid, this may be achieved satisfactorily by using only a small portion of the available control voltage. To limit the effect on the tube, a separate A.V.C. line is taken from a tap on the normal A.V.C. load resistance, as shown in Fig. 3. Limited A.V.C. of this type should be applied to the tube, whether it is used as an r.f. or i.f. amplifier.

Automatic Volume Control

The 1852, being a sharp cut-off pentode, is not designed for use with A.V.C. However, A.V.C. may be used with fairly satisfactory results by appilying the control voltage to the suppressor grid instead of to the control grid. If it is desired to employ A.V.C. on the control grid, this may be achieved satisfactorily by using only a small portion of the available control voltage. To limit the effect on the tube, a separate A.V.C. line is taken from a tap on the normal A.V.C. load resistance, as shown in Fig. 3. Limited A.V.C. of this type should be applied to the tube, whether it is used as an r.f. or i.f. amplifier.

Whenever A.V.C. is employed with a sharp cut-off pentode, the screen voltage should be applied to the tube through a series resistance, and not taken from a fixed voltage point, such as a tap on a voltage divider. By using a series screen dropping resistor, the "cut-off" characteristic of the valve is considerably extended.

Parasitic Oscillations

If parasitic oscillations are experienced when using the 1852, the trouble can often be overcome by inserting a small carbon resistor in the grid circuit. 5,000 ohms is a suitable value at the lower frequencies. At high frequencies, however, this value must be reduced considerably to prevent excessive loss of gain.

As A High Frequency Mixer

When the 1852 is used as a mixer, the signal and oscillator voltages are generally both coupled to the control grid. Coupling to the cathode is not recommended since inductance in the cathode lead produces serious increases in input loading. If large variations in oscillator voltage are encountered, fairly uniform conversion transconductance may be obtained by using a 1,000 ohm cathode bias resistor. If smaller variations are encountered, a higher conversion transconductance may be obtained by using a smaller cathode bias resistor. A typical circuit using the tube as a mixer with the oscillator voltage fed to the control grid is shown in Fig. 5.

In Fig. 6 curves are illustrated showing the characteristics of the 1852 as a mixer with the oscillator and signal voltages applied to No. 1 grid. These curves were published in "R.C.A. Review," November, 1939.

Fig. 7, which has been taken from the "Radio Handbook," shows the circuit of an 1852 converter used for the reception of 56 megacycle signals and feeding into an existing short-wave receiver at 3,000 to 3,500 Kc/s as an i.f. frequency. In this circuit it will be noted that the oscillator voltage is injected on to the 1852 suppressor grid. It is stated that the converter is "highly sensitive and ideal for the job." When the oscillator signal is fed to the suppressor grid instead of to the control grid, however, a high oscillator voltage is necessary to

(Continued on page 24)

NEW PERMAG SPEAKERS

Further details of the new-style lightweight models now in production

RECENTLY manufacturers and users of electrical equipment have been hearing a new term applied to magnets—"Anisotropic Alnico"—a term which is being applied to a magnet material with a performance far superior to all previous known alloys.

A product of war, this alloy made a marked contribution to the efficiency and portability of service equipment.

Now, it is being applied to peacetime products—notably loudspeakers, and its effect on speaker and radio receiver design will be as far reaching as its effects on war equipment.

The story of this alloy started in England in July, 1938, when two English research workers discovered that if permanent magnet alloys of the Alnico type were heat-treated in a uni-directional magnetic field, the remanent flux and, consequently, the potential energy content could be increased. The effect of the heat treatment process was to bunch the magnetic properties in one direction at the expense of the properties in the other directions, hence the name "Anisotropic Alnico."

Unexpected Results

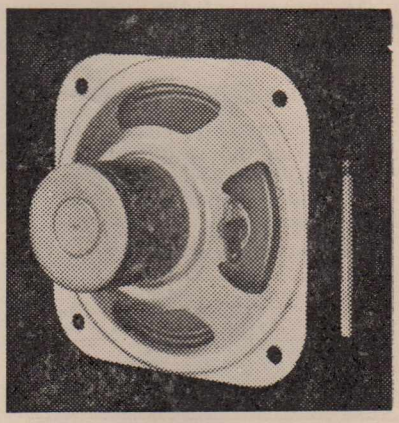
Learning of the discovery, a foreign radio and electrical manufacturer worked on the method and found that heat treatment in a magnetic field yielded unexpected results when applied to different alloys.

By selection of these alloys it was found that it was possible to secure an improved alloy with a maximum energy (BHmax) several times greater than that produced in known alloys. The quality made it ideal for military purposes. It is unfortunate, therefore, that the details of this British discovery reached Germany in the early stages of the war. The British first became aware of the German knowledge of this development when enemy signal apparatus fell into British hands. Fortunately, the shortage in Germany of cobalt, aluminium and nickel tended to restrict production, and, although these materials were not plentifully available in England, there was no real shortage.

Use In Radar

Very shortly afterwards, British manufacturers were able to produce Alnico magnets better than any produced elsewhere.

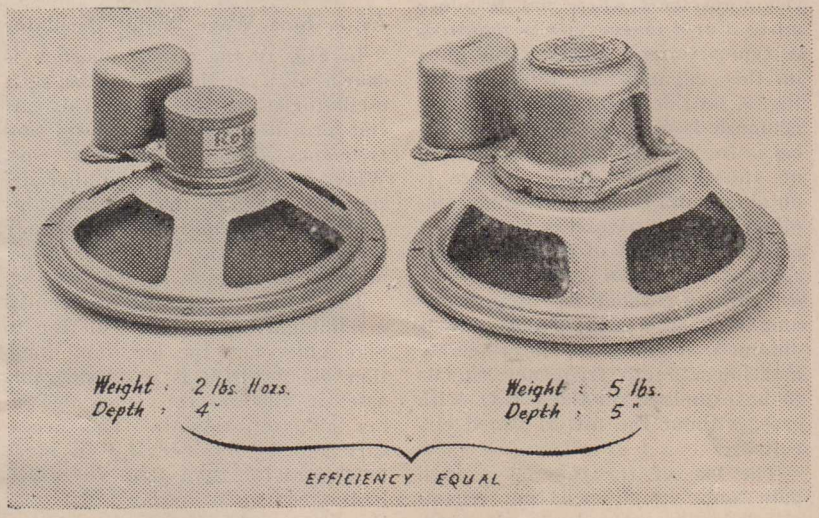
Australia's special needs for compact magnet equipment of extremely high efficiency made itself felt when this country became involved in war with Japan and was threatened by invasion. The need for improved radar apparatus and other signal equipment was particularly urgent and Rola Company (Aust.) Pty. Ltd., who had for some time been manufacturing magnets of the earlier types of Alnico immediately set out to develop an improved alloy. They were soon in production with an alloy whose maximum energy content (BHmax) was equal to three



The Rola 3C, a real "baby" speaker.

times that of the most widely used of the generally-known Alnico group. With a BMmax of approximately 4 x 10^6, this material enabled vastly improved apparatus to be made available to the defence authorities. This effect on radar

(Continued on page 24)



A comparison between the new 5C and the old K5 speakers, which have equal efficiency.

SPEAKERS

(Continued)

development was particularly noticeable and no country in the world was more advanced in its radar technique and manufacture than Australia.

At the end of the war, manufacture of this alloy had reached an all-time high.

Technical Properties

The technical properties of the material are interesting.

The most important qualities are a considerably improved remanent flux (Brem) and coercive force as the following figures show:

	Brem gauss	Coercive Force oersted	Energy Product
Alnico 3	700	475	1.4×10^6
Alnico 2	720	530	1.6×10^6
Anisotropic Alnico	12,300	575	4.3×10^6

The effect of Anisotropic Alnico compared with earlier alloys is best illustrated by the following table, which sets out the weights of various magnets required to produce the same flux density in the airgap as one ounce of Alnico 3, assuming that the magnets are of the correct design.

Tungsten Steel: 4.1 oz.
Alnico 3 (or Alni): 1.0 oz.
Alnico 2: .78 oz.
Anisotropic Alnico: .37 oz.

Because of the uni-directional properties some care must necessarily be observed in the design of apparatus in which the magnets are to be used.

Although these improved permanent magnets can be manufactured without any serious change in manufacturing procedure, a certain amount of special equipment is necessary. In the mass production of magnets of a given type, the cost of such apparatus is quickly absorbed, which makes the improved material ideal where large quantities of magnets are required.

Application to Loudspeakers

The special qualities of this material recommend its use in loudspeaker manufacture where compactness, lightness and high efficiency and economy in the use of materials are of prime importance. An interesting example of the use of Anisotropic Alnico is the newly-released Rola 3C, a 3½in. speaker, which epitomises the special quality of Anisotropic Alnico.

Weighing only 6½ ounces, this speaker makes possible for the first time the introduction into Australia of the personal portable receivers. What country could offer a better market for this type of receiver than Australia?

NO BOUNCE CONTACTS

Discovery of the fact that a hollow steel ball half filled with metallic powder will not bounce has led to the use of similarly filled hollow contacts in electrical relays to prevent poor connections by eliminating bouncing and chattering. The same results are accomplished by attaching hollow powder containers to solid contact points.

1852

(Continued from page 22)

give satisfactory conversion gain.

Use As A Video Amplifier

The 1852 was primarily designed for use as a video amplifier, i.e., an amplifier in the video stage of television receivers where flat response up to 3 or 4 megacycles is required. A typical circuit showing the tube in this capacity is illustrated in Fig. 8. In this circuit, the frequency response is relatively flat from 10 c.p.s. to 3 Mc/s. An overall gain of approximately 10 per stage is obtained and, thus, a two stage amplifier of this nature is capable of producing a gain of 320. A circuit such as this is of great use when designing a cathode ray oscilloscope amplifier, as a wide band unit is obtained, enabling any intermediate and lower radio frequency signals to be examined on the C.R.O. with ease, without the use of tuned circuits.

The use of the tube as a high gain audio amplifier is not recommended unless the heater is operated from a battery source, as otherwise, objectionable hum may result.

As A Cathode Follower

A circuit extracted from "R.C.A. Review," January, 1939, illustrates the use of the 1852 as a cathode follower in Fig. 9. In this case, the effective output impedance obtained is approximately 100 ohms, which is a fairly satisfactory match into standard coaxial cable.

As A Sine Wave Audio Oscillator

In Fig. 10 the circuit diagram is shown of a single tube phase-shift oscillator using the 1852. This circuit provides good wave form and frequency stability at a low cost. When followed by an amplifier designed to furnish the required output voltage, it can be used to supply power for A.C. bridge measurements insulation tests, etc.

The gain in the circuit must equal a minimum of 29 for oscillation to take place and the high amplification of the 1852 is a considerable asset in this respect, when designing a practical unit. The necessary gain is obtained if R is made much greater than RL, where RL is the equivalent parallel value of the plate resistor and the grid resistor of the following amplifier tube. In practice, satisfactory results are obtained if R is about 10 times greater than RL. For best waveform, the smallest value of RL which will produce satisfactory oscillation should be used.

The three condensers marked C in the phase-shift network must be of equal value, and the three resistances R must also be equal. The frequency of the oscillator is obtained from the formula:

$$f = \frac{1}{2\pi\sqrt{6}\ .R.C.}$$

$$= \frac{1}{15.42\ R.C.}$$

where f = cycles per second
R = ohms
C = farads.

Acknowledgments

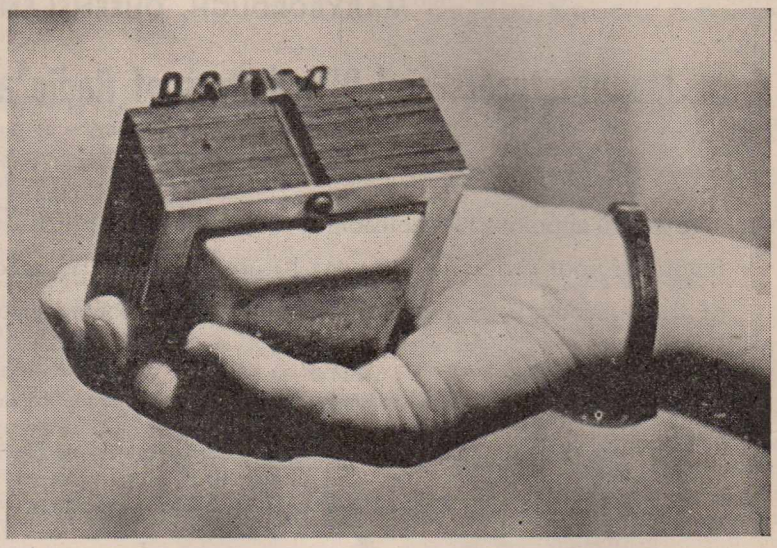
The writer wishes to acknowledge that much of the above information has been extracted from the following sources:

"R.C.A. Receiving Tube Manual."
"Radiotronics."
"New Television Amplifier Receiving Tubes," by A. P. Kauzmann ("R.C.A. Review," January, 1939).
"The Radio Amateurs' Handbook," nineteenth edition, 1942.
"The Radio Handbook," ninth edition, 1942.
"Electronics," November, 1943.

NEW MELBOURNE PRODUCTS

Baby Power Transformer

Now coming off the production line in quantity is the Baby Trimax power transformer. This is a dandy little handful of power, with a secondary able to supply high tension of up to 40 milliamps, and with ample filament windings. Yet by the use of high-quality core material the size has been kept to a minimum. Actual overall dimensions are 2½ inches by 3, with about 1¾ inches above the base and ¾ of an inch below when flush mounted.



The lightweight TRIMAX transformer, which is ideal for small receivers.

Instrument Dial

Those enthusiasts who build up their own modulated oscillators, short-wave converters, communications receivers and all that sort of gear will be delighted to find that there is now available a really classy type of instrument dial.

Offered by the Aegis Manufacturing Co., of 208 Little Lonsdale Street, Melbourne, this dial has a large knob, as well as the small vernier knob with rubber-cushioned drive. The main dial, about six inches in diameter, is calibrated and the calibrations are read off through a hair-line engraved on a perspex panel which overhangs the dial scale. The whole unit is similar to the dial used on the most expensive of American signal generators, and equally well made in every way. Price of the complete unit, fitted up in a neat box as shown in our photograph is 25/-.

The instrument dial which has just been released by the Aegis Co. It should be popular with "hams" and other radio enthusiasts.

Calling N.Z.

The Aegis Manufacturing Co. Pty. Ltd., of 208 Little Lonsdale Street, Melbourne, is making rapid progress and expansion. Their coils, kits and other components are finding a ready market and in every way this firm is leaping ahead. They already have representation in all Australian capital cities, but so far they have not made an appointment in New Zealand. If there is an En-Zedder firm looking for some nice lines to fill up the holes on the shelves they should get in touch immediately with the Aegis Company.

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INTERNATIONAL RADIO CO PTY. LTD., Radon cables, Amphenol products, etc.

DUCON CONDENSER PTY LTD.—Ducon and Chanex products.

STROMBERG-CARLSON—Gang condensers.

PATON ELECTRICAL PTY. LTD—Palec Test Equipment and meters.

LANGCO ELECTRIC JUG CO.—Irons, toasters, jugs, grillers, heaters, etc.

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COMMONWEALTH MOULDING CO.—Marquis products.

W. S. TAIT & CO.—W.S.T. potentiometers, trimmers, padders, etc.

ZENITH RADIO PTY. LTD.—Calstan Test Equipment and radio receivers.

MASTERADIO LTD. (England)—Loudspeakers from 2" to 18".

TAYLOR ELECTRICAL INSTRUMENTS (England)—Test equipment and meters.

KRIESLER RADIO (Section of Queensland only).

WINGROVE & ROGERS (England)—Polar Gang condensers.

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HAM NOTES

CALLING CQ!

By Don Knock. VK2NO

THAT rash on the face of "Old Sol" certainly resulted in a spate of unpleasant hissing noises during February. Instinctively blaming the X-ray plant in the nearby hospital, I remembered suddenly the outpouring of sub-editors of our "Great Dailies," faced since Mars sheathed his sword with a dearth of news and frantic for "copy." There's nothing new about sun spots—and every Ham with DX experience of a decade or more behind him knows of their influence, but this time the old chap has boils instead of pimples, and he's making a big fuss about it.

During peak hours of sunlight, the overpowering hiss, like a giant feline, swamps all frequencies from around 2 Mc/s up into heaven knows what S.H.F.'s (the S means SUPER!). So much so that ground waves of locals are about all that can be picked up out of the din. An engineer at a large coastal radio receiving centre (also a Ham) tells me that 80-odd receivers at that QTH went about as useless as blocks of wood! During the peak of the din—28 Mc/s is just a nasty noise, but in between, when the solar radiation drops, the band behaves amazingly. On the 6th February it went wide open for the whole Pacific, North America, Canada and parts of Australia, at the same time. VE4RO, in Winnipeg, Canada, had a colossal signal and said the same of VK signals. Strongest interstate signal I have ever heard was from VK3WD in Ballarat, with whom I had a yarn for 30 minutes with more signal kick than would be the case on 80 or 40.

Good Aftermath

The sun spot activity seems to leave an aftermath of good ionospheric conditions around the time of sunset. To the Ham, with radio as a hobby, the vagaries of communication induced by old Sol don't matter very much, but spare a thought for the harassed commercial operator, trying to keep up schedules against long odds.

New Band Opened

VK2WJ and VK2NO opened the first known Sydney QSO on the new 50 Mc/s band on the night of February 6th. VK2WJ went to 52.8 Mc/s and put a nice C.W. and phone signal into VK2NO's big V.H.F. Super, using a short indoor aerial. A cross-band duplex QSO was conducted and now your scribe has the urge more than ever to get the proposed 50 Mc/s gear into action.

VK2AZ (Kogarah) appeared on 28 Mc/s C.W. and said that he was testing the exciter portion of his new 50 Mc/s TX. The new band will have a growing population ere long.

With VK2NO Around "Ten"

As the weeks slide by and more and more of the gang secure their licences, the population on "Ten" shows signs of increasing rapidly. Most dealt with the matter leisurely, but others succumbed to the urge to get going, and launch a signal on the air regardless. Result is a few signals that should be relegated to the limbo of the past. Another point is that some actually seem to have forgotten all about procedure. One, a ham of long standing in the VK2 community, was heard batting out CQ's interminably, and winding the whole boring business up with two insignificant "signs." I doubt very much if this futile telegraphic DX quest met with success, but it certainly didn't deserve to. My own reaction to a station, DX or otherwise, gumming up the air in such fashion, is that I haven't the pati-

(Continued on page 28)

W.I.A. (N.S.W.) DINNER

In years previous to 1939, annual functions of N.S.W. Division, W.I.A., were popular and well attended. Now with war receding into the background, revival is the order of things. Tuesday, 5th February, 1946, was the occasion of the first get-together of its kind since the gang marched away in uniform. Present, were quite a few old-timers and the occasion was one to welcome back to repatriation ex-P.O.W.'s W. M. Moore (VK2HZ), G. Brigden (VK2ACJ) and J. Edwards (VK2AKE). Like most who were detained by the enemy, they had little to say about experiences. The dinner, which had been delayed two months because of strikes, etc., was also a function to farewell retiring N.S.W. Superintendent of Wireless, W. T. S. Crawford, who was the recipient of a gift from the Division.

Toasts were proposed by Chairman W. G. Ryan (VK2TI), "The King"; H. F. Peterson (VK2HP), "The Repatriates"; J. Howes (VK-2ABC), "Silent Keys"; F. P. Dickson (VK2FB), "P.M.G.'s Department"; W. G. Ryan (VK2TI), "The Guest of Honour"; Col. Lorenzo, D.S.O., "Wireless Institute of Australia"; Don B. Knock (VK2NO), "The Old-timers"; C. Higgins (VK-2LO), "The Press"; and W. Dukes (VK2WD), "The Visitors."

The toasts and many responses resulted in a full programme from 1900 to 2315 hrs. An overseas visitor was Arthur Middleton (VQ-2MI) from Rhodesia, who is on his way home to erect rhombie antennae to QSO VK's.

—D.B.K.

HAM NOTES

(Continued)

ence to await the end of the lengthy CQ cals, and to tune off the offender in search of more palatable operating. And if I feel like that, others must do likewise! Three times three in calling, just as laid down in the book of regs., pays dividends. One thing that sticks in my gills about this "rotten operating," for such it is, is the poor example to the genus "new ham," a few hundreds—maybe thousands of whom—are probably doing a lot of CW copying prior to facing the A.O.C.P. ordeal. It behoves every ham, old and new, to spend 1/6 on the recently-published handbook for the guidance of operators of experimental wireless stations, and to digest the contents fully. Future strife with authority may be avoided by keeping simply within the clauses laid down and that is not hard to do. I am told that already some Sydney lads have been rapped over the knuckles for contravention of the "second op" ruling. Remember that the Advisory Committee is comprised of hams mainly, and the very necessity for such a committee is distasteful but obviously necessary. Remember also that an adverse report on operation of a station may come, not from a ham member of the committee in the first place, but from one of the several P.M.G. listening posts. Staff there is numerous and **always** on the job.

Unlicensed operation by "second ops" is not likely to be condoned. In the Sydney area, "ten" shows an influx of old-timers almost daily, and, with all the fervour of DX days on "twenty," they join in the quest for overseas QSO's. There is no lack of such contacts either.

Aftermath of old Sol's facial rash brought interesting conditions. The lads on Okinawa, Iwo Jima, Johnstone Island, Hawaii, etc., can often be working South Africans shortly after the time the band folds for VK contacts, but nary a sign of the Springboks can I hear at my location. G6CU/ZC2 on Cocos Island roared in at R9 on phone for a few minutes around 1800 hrs (6 p.m. to non-exservicemen!) on 13 February, 1946, during a QSO with a VK4. He is, as the callsign implies, a G on cable service duties and said that he has lots of contacts with the Old Country. My luck was out for a QSO with him on that occasion as he QRT and went into the surf. Can't say I blamed him either.

DX on "10"

The only G I have yet heard on post-war "ten" was G2TA, who was observed QSO VK3KX around 1930 hrs E.A.T. His sig was around the R3 level and didn't last long. If seasonal behaviour recurs as in pre-war years, it will be next September or October before we start working the G's. That is, of course, unless the Service Big Wigs disgorge our DX frequencies in betweentimes! Despite normally adverse DX conditions for Europe, H. E. Cox, of the world famous VK2GU seems to knock a few off at intervals. He certainly reaches across the Pacific with a big voice, for often the band between 28 and 29 Mc/s reveals plenty of W's calling him. One or two of the "occupation" W's have flattered me by comparing my own signal with VK-2GU's, but I don't succumb to such plaudits for the reason that there can be no comparison between a simple vertically polarised co-ax fed dipole and a string of curtain arrays around the countryside. Or can there? There is no doubt that friend Cox works "miscellaneous DX" whilst others burn up the air even trying to attract attention!

Among the parade of old-timers on "ten" around Sydney I notice such calls as 2DA, 2NG, 2HO, 2VN, 2SA, 2IQ, 2AZ, and 2ZH. Cross-Pacific boys can be heard frequently QSO such country stalwarts as 2ADT, 2NY, 2PN and 2ZC. There is obviously much activity in VK4, judging by the manner 4JP and 4AB secure the DX, to say nothing of Victorians 3WD and 3KX. In S.A. old hand, Frank Miller, at Murray Bridge can be heard with

PERTINENT PONDERINGS

Whilst the amateur world in general digests and makes the most of the frequency crumbs from the tables of the great Service Signals Chieftains, one can be forgiven if occasionally one switches on a receiver capable of covering "20," "40" and "80," and after a spell of listening there, gets a bit hot under the collar at things in general. The story has gone, in "QST," "RSGB Bulletin" and other mediums, that the Service people are "making great efforts" to clear these channels so that amateurs may reoccupy them. My experience as a soldier taught me that an order from up above is usually obeyed, if not to the letter, then as nearly as possible. But the point is that something must be done to implement that order. This "applesauce" about "making great efforts" doesn't ring correctly to me when I examine the regions referred to. If anything, **new** Service stations seem to be appearing on the scene, and if any order **has** been given to clear these channels, then it does not appear to be taking effect. Somebody has their tongue in the cheek about it. It is many months since amateur organisations the world over were "appeased" by the statement of "great efforts" and today . . . well, witness the number of stations of all Services, including teleplex outfits, blandly in occupation. The writer is not the only scribe with criticism to make of the manner in which uniformed samplers of temporary powers have treated the amateur, as those who read "RSGB Bulletin" will know.

I heard a ZL talking (on 80-metre phone) to another, and noted a reference to "ZL's not getting on ten for at least a year." Maoriland affairs have nothing to do with VK's, but one can be permitted to opine that there doesn't seem to be any sense for such a ruling, if such should be the case. It cuts both ways. If VK's don't get "80" for a year or so, one won't be able to talk to t'other, which, for next-door neighbours, is the very antithesis of the spirit of international amateur radio.

Meanwhile, the South Americas have removed completely the ban upon frequency allocations and have restored everything that existed prior to the outbreak. South Americans can often be heard wedged in between Service stations on "twenty."

VK5BF making a DX stir in the air, and in the Apple Isle 7LJ is well in evidence. Westralians are showing no lack of DX contacts either, with VK's 6FL and 6LW heard on this side at intervals.

DX At a Consistent R9

Immediately following upon the appearance and disappearance of that large sunspot, a most amazing set of conditions appeared on "ten" over the Pacific area. For several days, from around 9 a.m., E.A.T., it was possible to hold non-fading R9 plus phone contacts with many W's (in America), K6's, Philippines, etc., for hours on end. So remarkably strong have been signals at both ends that never in the last 24 years of DX working can I recall comparative results on any other band. "Twenty" had its bright moments, but when "ten" really opens up, it can produce ultra-DX conditions. One reason for the super-excellence of strong signals lies in the undoubted fact that static is of a very low order at 28 Mc/s in comparison to 14 Mc/s and lower frequencies. But against this virtue is the oft-times irritating display of man-made QRN in the form of car ignition, refrigerator motors and the like. I have discovered that to go on a DX quest on "ten" around 8 a.m. at my location is asking for it. My neighbours decide that then is the time to get busy with electric razors, of which aids to daily life the motor-driven type are the very soul of PRM!

About 50 Mc/s

Some of the pre-war "five-metre" gang around Sydney have wasted no time in making a start on the new band, and those in evidence so far are VK's 2WJ, 2ABZ, 2LS and 2ZN. Con Bischoff (VK2LZ) has returned to Civvy Street from the R.A.A.F., and is established back at Wentworth Falls in the Blue Mountains, where he is again on the engineering staff of BC station 2KA. He has an R7 CW signal in Sydney over the 60-mile path on 52.8 Mc/s with a little outfit using no more than about 4 watts of RF. It is an 1852 Tritet quadrupling in the output side and feeding a simple dipole. Which shows what can be done without pretentious gear. Many of those interested in 56 Mc/s before September, 1939, are making steady progress toward making a start on the new band, and among these are your scribe, also VK2AZ and VK2EM. As emphasised in previous notes, I wish once again to plead with those who intend to use this promising band to put on one side all thoughts of modulated oscillators and super-regen. receivers, whether "long lines" or other allegedly stable varieties. The super-regen. receiver is passable if it embodies a tuned RF stage ahead of the detector, and is of the separately quenched type. "Squeggers" are definitely "out." In other words, the technique applied to 28 Mc/s and lower frequencies **must** apply to 50-54 Mc/s. There can be no argument about it, the regulations state this fact quite clearly in Clause 56. There is plenty of room for the simple gear on 166-170 Mc/s.

"ROLLING YOUR OWN"

The genus modern "Ham" doesn't really know what it meant to be a keen member of the fraternity in the pioneer days. There were no radio stores with stocks of components and if one wanted a variable condenser, one set to and laboriously cut out the plates, etc., and revelled in the construction thereof. Thus it is refreshing to run across a Ham with a love of such work in these days of lashings of Disposals goods, etc. VK2CE, Alf Barnes, is, as this is written, almost ready to start up again after the Big Silence. He would have been ready sooner but for the fact that he set to and wound **all his transformers,** power **and** audio himself. If anybody doesn't think that is quite a job for even an experienced Ham, they should try it some time! VK2CE is, in addition to being a Ham, a keen hobbyist in other directions, and, to boot, a mechanical engineer. I believe Alf would rather make up his own screws and nuts for a rack and panel assembly than use ready-made items. There's something in the "built like a British battleship" idea, anyway. I noticed an ad in an American trade magazine for a wonder adhesive that will bond almost anything together. For example, two strips of aluminium overlapping by about an inch, and about the same width, will, after being put together with that adhesive, need a pull of thousands of pounds per square inch to part them. What couldn't the Ham use a cement like that for?

New Knobs For Old

The moulded black or brown "bakelite" knob with ¼in. spindle is always on hand for a multiplicity of controls, but there is a sameness about that humble but important accessory that renders it unattractive when plastered in quantity over a front panel. Here's a tip for the constructor who likes something different to grace the eye. White (ivorine) type knobs are not around in profusion but some manufacturers have used knobs of coloured mouldings for B.C. and D.W. receivers. Black or brown knobs can be transformed into smart-looking white controls by the judicious use of white lacquer (not enamel). The kind I find most suitable is "industrial white" Duco. First roughen the surface of the moulding where possible with smooth sandpaper, and then brush on a coat of lacquer. Allow this to set hard for an hour or so and then repeat the process. Three brushings usually suffice, and the effect can be quite pleasing. Have a look at my "VK2NO V Six" receiver and you will see what I mean. The white controls set off the battleship-grey panel. There is scope for variation in colour in the idea, but don't overdo it or the final result might look better in a beauty salon than a Ham shack!

Shortwave Review

CONDUCTED BY
L. J. KEAST

NOTES FROM MY DIARY

Were You Listening?

Strolled into a newsreel theatre the other day and had the pleasure of **seeing** and hearing the man who, not like our politicians, talks **of** millions, but the man who had spoken to the biggest audience in history. Yes, sir, none other than Derek Prentice, who is probably better known to the readers of these pages than many of the comperes of our commercial broadcasting stations. Mr. Prentice is believed to have spoken to well over 100,000,000 listeners on the occasion of his broadcast of the momentous news on D-Day.

He is in Australia under contract to 3DB-LK for broadcasts and producing. On the screen his face reminded me of another clever Englishman, Charles Laughton. Prentice said "he liked the Melbourne beer . . . when you can get it." I wonder if the wait in Sydney for the amber fluid would increase his desire for this kind of refreshment.

"Fibber McGee and Molly"

I'll bet there are very few listeners to the 'Frisco stations who have not heard "Fibber McGee and Molly." This team, who in real life are Jim and Marian Jordan, husband and wife, have been heard under this title for 11 years. Featured on the United Network programme, they are on the air every Wednesday at 1.05 p.m. 'Frisco list elsewhere in this issue for choice of station.

Commentators' Digest: Facts Behind the News

"Bringing the world to your door, 'Commentators' Digest' presents the trend in America's thinking. From leading newspapers in the United States come the opinions of editors and columnists; from the nation's most informed radio commentators come the thoughts of the people that will fashion the vast coming chronicle of post-war events. Peace has finally come to the world. And with the peace comes the shift in emphasis from tactics and logistics to political and economic developments." Well, that is the claim or rather portion of the claim made by the United Network for this portion of their programme heard on Tuesdays till Saturdays at 12.05 p.m. And makes good listening, too.

SAYS WHO ?

"Thanks for information on LKJ, Oslo, 9.54mc, 31.45m. Have searched for this one many times without success. There are two stations on this frequency in the mornings but have not definitely identified either, although I believe one to be SBU." —Gillett. (Mr. Edel tells me he is still hearing LKJ late at night.—L.J.K.)

"Am afraid listening has been a bit scrappy of late; have been bringing in the Hams. The 10-metre band has been a great success . . . very patchy . . . and the best times do not suit me."—Gaden. (Am hoping that the Dr. will revert to the lower frequencies and that we will once again receive some more of his always interesting loggings.—L.J.K.)

"Was lucky to catch PCJ in its special . . . quite an accident, too; it appears that the call is now PCJ on both frequencies. The 16 metre is now at a very slightly lower w/l than Paris, whereas some time ago it was a tick higher w/l and was badly interfered with. Is in the clear now, say on 16.87½m, if Paris is on 16.88m."—Gaden. (Yes, PCJ has moved to 17.775mc and Paris is on 17.77mc.—L.J.K.)

Radio Milan, 9.635mc, 31.14m, is heard in many languages when giving Prisoners of War session at 11 p.m.—Edel.

GWG, London, 15.11mc, 19.85m, is an excellent station at night . . . pity it closes at 11.15 but by moving to GSF, 15.14mc, 19.82m, you will find programme continues at very good strength and clarity.—L.J.K.

OTM2 is call listed for Leopoldville on 9.38mc, 31.98m, and OTC5 is correct call for 17.77mc, 16.88m. —"Universalite."

"An unidenified station heard in Chinese on 7.18mc, 41.78m, around 11 p.m. No English at this hour, so do not think it can be Chungking." —"Universalite." (This is probably the new transmitter in Singapore on 7.185mc.—L.J.K.)

Moscow is broadcasting on 11.715 mc, 25.61m., as "Espana Independiente" from 2.30-2.55 a.m. My Spanish is not so good, but I figure the remarks are anything but complimentary to Franco.—L.J.K.

And, whilst on Moscow, here is a list of transmitters in that city all more or less audible from 8 p.m. till midnight and from which a good percentage of English is heard: 15.75mc, 19.05m; 15.34mc, 19.56m; 15.32mc, 19.58m; 12.17mc, 24.65m; 12.11mc, 24.77m; 11.78mc, 25.47m; 9.71mc, 30.89m; 9.60mc, 31.25m; 7.27mc, 41.27m; 7.195mc, 41.69m.

That woodenhead, Charlie McCarthy, can be heard on Sundays from 6.15 p.m. over KWID, 9.855 mc, 30.44m. Charlie can always hand me a laugh and now with his college pal, Mortimer, aided also by Anita Gordon and Ray Noble's orchestra, there certainly is a grand 30 minutes' show.—L.J.K.

As from March 5th, AFRS programmes will be heard over KWIX, 9.57mc, 31.35m, from 6.45 p.m. till 2 a.m., according to an announcement heard on KWID at 6.45 p.m. on Sunday, March 3rd.

At 10.30 p.m. "The Voice of Free Indonesia" on 15.22mc, 19.71m appears to give a call-sign. Has anyone deciphered it? If so, please let me know.—L.J.K.

Rex Gillett writes: "CBFX, Montreal, has been on 9.61mc, 31.22m, until after midnight with good signals. Change possibly due to CKLO, Sackville, using 9.63mc, 31.15m, for tests to Australia. The latter was being heard between about 7.45 p.m. till closing at 9.30. Lately has been closing at 8.30 with very fine

signals. CHOL carries same programme."

Further to my reference to Athens under this column in February issue: Ern Suffolk writing in "Radio Call" says: "Some weeks ago I reported that ZOY, Accra, was conducting test programmes from 6-7.30 a.m. on 7.30mc, 41.10m. Although at the time I did not think the call sign sounded quite like Radio Accra's, the signals were being heard on the operating length of Radio Accra. The arrival of mail from U.S.A. advises that the station is Radio Athens, Greece. A further check-up on my receiver reveals that this is so. After practically every musical recording some flute-like notes are played as an identification signal. The test broadcasts appear to have concluded, and regular transmissions are now on the air."

Mr. Edel advises HCJB, Quito, on 12.445mc, 24.08m, at 9.30 p.m., is in relay with 9.958mc, 30.12m, and the latter is the better signal. At 11.45 12.445mc is in relay with 15.095mc, 19.87m.

"Addis Ababa, 9.62mc, 31.19m, at 1.30 a.m. presents news in English . . . lady announcer. At 1.45 programme continues with light music. —Edel.

If any listeners would like to join the British Shortwave League they should get in touch with the Australian representative, Mr. Gordon I. S. Hepburn, 10 McGregor Street, Croydon, Sydney. He is most anxious to meet keen Dx-ers and will provide them with all the information they need.

Keith E. Jones, of Box 104, P.O., Forbes, writes that he has so far received 84 verifications for reports sent overseas, his latest being from FK8AA, Noumea; KRHO, Honolulu; and KSAI, Saipan.

Dr. Gaden was quite correct when saying he thought he heard the call WARSAW on 6.10mc. They are now heard there from 5-7.30 a.m. with news in English at 7.—L.J.K.

Arthur Cushen sends an air-mail advising PCJ, Hilversum, have been using 11.73mc in the morning as well as on 9.59mc (which is mixed with Delhi) and 15.22mc and 17.765 mc. Heard from 5-6 a.m. to South Africa. The 11.73mc outlet is good on opening, but mixed with WRUL later in the session . Arthur goes on to say: "I expect you have seen the nice new card the CBC are using for verifying reports . . . it's a very nice job. WRUL, etc., are also verifying reports with a new card, though they have not mentioned frequencies on the card."

NEW STATIONS

"The Voice of America in North Africa,"

Algiers, 6.02mc, 49.83m: Now heard here at about 7.30 a.m. in different programme to 6.04mc, says Rex Gillett. (This is getting pretty close o FZI, Brazzaville, 6.025mc, who can be heard most mornings around 8.15.—L.J.K.)

PCJ. Hilversum, 17.775mc, 16.88m: This is the correct call and frequency for station shown as PHI-2 under "New Stations" in February issue. I understand that this station, previously conduced by Philips, is now under Government jurisdiction.L.J.K.

WLXJ, Shanghai, 13.115mc, 22.88m: Rex Gillett reports this new Easterner calling PY-11, Manila, and KGT-7, Los Angeles, about 11 p.m.

SEAC, Singapore, 6.77mc, 44.31m: Mr. Edel rang me re this new outlet for Singapore. The schedule appears to be 6 p.m. till 11.30. When signing they announce, "This is the Far Eastern Service of South East Asia Command signing off from Singapore on 11.735 mc and 6.77mc. Our next transmission is at 9.15 G.M.T., corresponding to 1655 Malayan time.' Signal is very good, as also on 11.735mc.

Changes in AFRS Programmes from 'Frisco: As from March 5th programmes to China and Japan will not commence on KWIX until 6.45 p.m. but as usual they will open at 5 p.m. on KCBR, 9.70 mc, 30.93m, and KNBI, 9.49mc, 31.61m.

Radio Luxembourg, 6.09mc, 49.26m: Rex Gillett advises hearing Luxembourg on this new frequency at good strength when opening at 7.15 a.m. The usual male and female announcers are heard in English when giving titles of records played.

AFN, Frankfurt, 6.078mc, 49.35m: The American Forces Network are heard on this channel giving the usual popular American sessions such as "Bob Hope," "Mail Call," etc., around 6 a.m. Signals are only fair.

——, Paris, 17.845mc, 16.81m: This seems like a new frequency for the Parisian. Ern Suffolk says he hears them in relay with two 19-metre transmitters from 1-1.30 a.m. Signal strengh is good. However, earlier in the evening, 9-10.30, he thinks this station is on but signals are very poor, probably due to a different beam. Mr. Edel reports Paris here at midnight in relay with 15.24mc, and says sig. is excellent.

——, Paris, 11.705mc, 25.63m: Mr. Suffolk has also heard Paris on this spot, closing at 9 p.m. and re-opening at 9.30, but signals are very poor. (Well, they have been doing some jumping around. Firstly on 11.71mc, then a trial on 11.73 and now 11.705. Who could keep still in Paris, anyway?)

Radio Vienna, 12.21mc, 24.57m: Mr. Edel advises hearing this Austrian at 1 a.m. A metronome is used as an interval signal. Announcements are all in German. Signal is fair.

Radio Kuala Lumpur, 6.16mc, 48.70m: This is the spot where Mr. Edel is now hearing this Malayan from 9 p.m. They relay Singapore quite often and signals are good. Mr. Edel first heard them on 6.09mc, 49.21m, as mentioned in Jan.-Feb. issue. They then moved to 6.18mc, 48.54m, according to Ern Suffolk, and have now apparently settled down on 6.16mc. At 12.30 a.m. English is given.

PCJ, Hilversum, 11.73mc, 25.58met: Trust Arthur Cushen and Rex Gillett to hop on to this new outlet for Holland. Signal is O.K. when opening at 5 a.m., but is badly spoilt by WRUL before closing at 6 o'clock.

SEAC, Malacca, 17.76mc, 16.89m: Heard after midnight when PCJ signs. Announces "Far Eastern Services of SEAC from Malacca." Reported by Arthur Cushen.

WLXJ, Shanghai, 5.51mc, 54.44m: This U.S. Signal Corps station, Racecourse Road, Shanghai, heard contacting Manila and San Francisco.

ALTERATIONS TO D.O.I. OVERSEAS SERVICE

"Radio Australia" as from 1-2-46

VLA-6, Shepparton, 15.20mc, 19.74m: Now opens at 9 a.m. and continues in Japanese to Asia till 9.20. Reopens as usual at noon with VLC-4, 15.315mc, 10.59m, and VLG-6, 15.23mc, 19.69m, to North Pacific till 2 p.m. On Saturdays only, a special ABC sporting programme for the Forces is given from 1.45-5.25 p.m. Opens again at 6.35, transmitting to North Pacific till 10.15 p.m.

VLG-10, Melbourne, 11.76mc, 25.51m: To New Caledonia, now from 6.10 p.m. French news and talk till 6.55.

VLC-8, Shepparton, 7.28mc, 41.21m: To British Isles from 6.20-6.55 p.m.

VLA, Shepparton, 7.28mc, 41.21m: General Pacific News Service from 10.45 p.m. till 12.30 a.m.; Forces programme (South East Asia) from 12.35 till 12.45 a.m.

VLG, Melbourne, 9.58mc, 31.32m: Replaces VLG-5, 11.88mc, 25.25m, in programme to British Isles, 1.15-1.45 a.m.

(Through pressure on space, the above was carried over from February issue.)

Rex Gillet writes: "A station announcing as 'Radio National Espana or Espanol' has been logged at 7.15 a.m. on 7.035mc, 42.63m; this may be EAJ-3, Valencia, listed on this spot. Shouts of 'Viva Franco,' bugle calls and gongs were also heard."

The MONTH'S LOGGINGS

OCEANIA

Australia

VLC-6, Shepparton 9.615mc, 31.2m
Good at 9 p.m.; fair at 2 a.m. (Byard).

VLW-7, Perth 9.52mc, 31.51m
Excellent with news at 11 p.m. (Byard).

VLR-2, Melbourne 6.15mc, 48.78m
Very good at 6 p.m. (Byard).

Java

"The Voice of Free Indonesia,"
Bandoeng 15.22mc, 19.71m
Have heard this new frequency (mentioned in Jan.-Feb. issue of ARW) with English prior to closing at 10.30 a.m. Four-letter call given but not copied (Gillett).

New Caledonia

Radio Noumea 6.208mc, 48.39m
Good until closing at 8 p.m. (Byard).

New Zealand

ZLT-7, Wellington 6.715mc, 44.68m
Very good with news at 7.30 p.m. (Byard).

THE EAST

Celebes

Radio Macassar 9.37mc, 32.02m
Heard at fair strength. Closes at 11 p.m. with "Good-night Melody" (Byard).

Ceylon

SEAC, Colombo 4.90mc, 61.22m
Very good at midnight (Edel).

China

XGOY, Chungking 11.91mc, 25.18m
Good from 7.55-9.30 p.m. News in English at 8 o'clock.—L.J.K.

XORA, Shanghai 11.695mc, 25.65m
Gives call sign at 8.20 p.m. (Edel).

XGOY, Chungking 7.153mc, 41.96m
Fairly good when giving news at midnight (Byard).

XGOY, Chungking 6.14mc, 48.80m
Slightly better signal than 7.15mc when in parallel at midnight (Byard).

French Indo-China

Radio Saigon 11.78mc, 25.47m
News in English at 8 p.m.—L.J.K.

Radio Saigon 4.81mc, 62.37m
Heard closing at 12.40 a.m. (Edel).

Hong Kong

ZBW, Victoria 9.57mc, 31.35m
Very good when signing off at 9.20 p.m. Are heard again at midnight, but badly QRM'd at KWIX (Edel).

India

VUD, Delhi 15.35mc, 19.54m
News at 1.30 p.m.—very good signal.—L.J.K.

VUD, Delhi 15.16mc, 19.79m
News at 9.30 p.m.; good signal.—L.J.K.

VUD-8, Delhi 11.87mc, 25.27m
Very good at 9.30 p.m. with news (Byard).

VUM, Madras 7.26mc, 41.32m
English heard for about an hour before closing at 3 a.m. Very good signals.—L.J.K.

Malaya

Radio Kuala Lumpur 6.16mc, 48.70m
See "New Stations."

Radio Singapore 4.78mc, 62.76m
R7 at 12.30 a.m. (Edel).

Portuguese China

Radio Macao 7.525mc, 39.85m
Weak at 11 p.m. (Byard).

SOUTH AMERICA

Ecuador

HCJB, Quito 15.095mc, 19.87m
Heard around 11.45 p.m. (Edel).

HCJB, Quito 12.445mc, 24.08m
Good from 9.30 p.m. (Byard).

HCJB, Quito 9.958mc, 30.12m
Very good from 9.30 p.m.

MISCELLANEOUS

Items marked with an asterisk are carried over from February issue.

Albania

ZAA, Tirana 7.85mc, 38.22m
Signals some days good, others poor. Male and female announcers. All speech in Italian. Close with anthem at 6.15 a.m. Interval signal is about 12 notes on a flute-like instrument (Gillett). Signs at 6.15 a.m., later at times; good signal (Cushen).

Andorra

***Radio Andorra** 5.997mc, 50.02m
Still heard around 7 a.m. at fair strength (Cushen).

Austria

Radio Vienna 12.21mc, 24.57m
See "New Stations."

Azores

Emisora National, Ponta Delgada 7.018mc, 42.74m
Have moved from 11.09mc and heard here again with good signals and closing at 7 a.m. with 7 double chimes (Gillett).

Canada

***CKNC,** Sackville 17.82mc, 16.84m
Think a shade lower wave-length would be better. Some music could be followed before 11.30 p.m. (Gaden).

***CKCX,** Sackville 15.19mc, 19.75m
Good at 7.15 a.m. (Miss Sanderson). Excellent at 10.45 p.m. one night (Gaden).

CKCX, Sackville 15.19mc, 19.75m
Signs off at 6 a.m.; CHOL continues (Gillett). (CHOL is on 11.72mc, 25.62 m and gives news at 7.45.—L.J.K.)

***CHOL,** Sackville 11.72mc, 25.60m
Good in morning in news and music (Miss Sanderson, Byard). Bad interference at 8 p.m. (Gillett).

CBFY, Montreal 11.705mc, 25.63m
This is the Home Service for the C.B.C. and news is given at 10.30 and 11 p.m. —L.J.K.

CKLO, Sackville 9.63mc, 31.15m
Good level on opening at 6.15 a.m. Blots out Milan on same spot (Gillett). Good at night (Byard).

CBFX, Montreal 9.61mc, 31.22m
Heard on this new frequency until after midnight.

CFRX, Toronto 6.07mc, 49.42m
Appears to be heard more regularly now, only fair signals nevertheless at 9 p.m. (Gillett).

Czechoslovakia

***OLR4A,** Prague 11.84mc, 25.35m
Now operating 6.45-7 p.m.; 8-8.30 p.m. (Cushen).

OLR3A, Prague 9.55mc, 31.41m
Schedule is 12.30-1 a.m.; 3.45-4.55 a.m. (Cushen).

OLR2A, Prague 6.01mc, 49.92m
This new station operates from 5-10.15 a.m. (Cushen). Fair signal at 7.30 a.m. in English (Gillett).

Ethiopia

Radio Addis Ababa 9.62mc, 31.19m
News in English at 1.30 a.m.

Finland

OIX4, Lahti 15.19mc, 19.75m
Have heard this Finnish station opening at 10.15 p.m., with a 5-mintue survey of news in English, followed by Finnish until leaving the air about 10.30-10.35 p.m. Rather bad interference from CKCX on same spot.

France

***Radio Paris** 17.77mc, 16.88m
Often louder than GSV or GSG at night and that says something (Gaden). Very good at 10.30 p.m. (Gillett, Edel).

***Radio Paris** 15.24mc, 19.69m
Splendid at night (Gaden, Edel, Gillett).

***Radio Paris** 9.50mc, 31.58m
At 3 p.m. programme of music was heard (Gillett).

Germany

DHTC, Munich 15.105mc, 19.86m
Heard on this announced frequency in contact with New York, one night at 1 a.m. with srong signal (Gillet).

——, Berlin 9.695mc, 30.94m
Strong QRM at midnight but things ease a little when news in German is read a 1 a.m. (Edel).

Holland

***PCJ,** Hilversum 17.77mc, 16.88m
Heard in Dutch and English at 2.30 a.m. (Fluck). (Call before the war was PHI-2 and location Huizen, but I think all transmissions are now by the Dutch Government.—L.J.K.)

PCJ, Hilversum 17.765mc, 16.90m
Heard strongly at 11 p.m. . . . reports are requested (Gillett). Fades badly at 9.30 p.m. (Byard). (Note slight change in frequency.—L.J.K.)

PCJ, Hilversum 15.22mc, 19.71m
Fairly good at 9.30 p.m. (Byard).

Italy

***Radio Milan** 9.635mc, 31.14m
Good signals at 5.30 a.m. with programme of music (Gillett). (Bad heterodyne from CKLO on 9.63mc at 6.15 a.m.—L.J.K.)

Radio Milan 9.635mc, 31.14m
From 1-2 a.m. is heard in English, French, Russian and Italian (Edel).

Iraq

Radio Baghdad 7.09mc, 42.32m
Often good at 11.30 p.m. with native type programme (Gillett).

Madagascar

Radio Tananarive 12.125mc, 24.73m
Breaks through the heavy morse on occasions. Closes at 11.30 p.m. with "Marseillaise" (Gillett).

Mexico

XEQQ, Mexico City 9.68mc, 30.99m
Believe I am hearing this station at 12.15 a.m. (Gillett).

***XERQ,** Mexico City 9.615mc, 31.21m
"Radio Continental," the best Mexican here, heard till after 5 p.m. at very good strength . . . slogan given often (Cushen).

*XEWW, Mexico City 9.50mc, 31.58m
The best 31-metre band station in the afternoon. Heard closing at 4.45 a few times. Up to its old form (Gaden). C.B.S. relay "Hit Parade" at 3.45 p.m. (Miss Sanderson). (Very good also at 12.45 a.m.—LJ.K.)

Poland

Radio Warsaw 6.10mc, 49.18m
Heard from 5-7.30 a.m. News in English at 7 a.m.—L.J.K. (Note slight change in frequency.)

Portugal

CSW-6, Lisbon 11.04mc, 27.17m
Good from 7-9 a.m.—L.J.K.

Spain

Radio National Espana, Madrid 9.32mc, 32.20m
Good in English 6-6.30 a.m. (Byard). (News at 6.15 except Mondays when it is on at 6.45.—L.J.K.)

Sweden

SBT, Stockholm 15.155mc, 19.80m
Very fair signals have been heard with classical music about 11 p.m. The customary 11-note chime was used between programmes (Gillett). Good from 9-10 p.m. (Edel).

SBP, Motala 11.705mc, 25.63m
Heard late at night . . . fair signal.—L.J.K

Switzerland

HEI-5, Berne 11.715mc, 25.61m
Tuesdays and Saturdays from 6-7.30 p.m. for Australia and New Zealand. English on Tuesdays.—L.J.K.

Turkey

TAQ, Ankara 15.195mc, 19.74m
Heard strongly one night closing at 10.30 (Gillett).

WEST INDIES

Cuba

COCX, Havana 9.275mc, 32.36m
Weak at 10.15 p.m. (Byard).

COKG, Havana 8.955mc, 33.50m
Weak and suffering from interference at 10.45 p.m. (Byard). (Sometimes Moscow is on this spot or nearby.—L.J.K.)

COCQ, Havana 8.83mc, 33.98m
Poor at 10.45 p.m. (Byard).

Speedy Query Service

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

S.S.D. (Toorak) asks about the sawing of polystyrene sheet.

A.—We suggest you use a hack-saw and keep the polystyrene wet when cutting. If you have a lot of bits to cut it would be worth while to rig up a jam tin with a nail hole in the bottom so that a fine jet of water is kept running on to the saw blade at about the spot where it is cutting the poly.

* * *

R.A.P. (Bondi) can't understand why we avoid describing remote-control gramo outfits.

A.—It is simple enough technically, to make an oscillator which will operate at a frequency up at one end of the dial or the other, modulate it with a pick-up and thereby "broadcast" from one room to another. Our policy is to avoid these affairs, as they are getting too close to contravening the regulations governing the operation of illegal transmitters. Actually if they are properly made and kept within certain power limitations they are quite legal, but we have trouble enough without thinking about what some enthusiasts might do if they start experimenting along those lines and then started to use big power. The whole stunt is more of a novelty than a useful arrangement, too, and you can run wires over any of the distances at which the stunt is likely to be effective.

* * *

G.H. (Paradise, S.A.) enquires about a VTVM circuit.

A.—This circuit appeared in the April, 1945, issue, but unfortunately this issue is out of stock and out of print; in a nutshell, it is unobtainable.

* * *

L.A.G. (Gunning) enquires about back numbers.

A.—Of the 1945 issues we have all of them except April and December, and there is a chance that we will get some December issues back later from interstate distributors. All back numbers are 1/- each, post free. If remitting money by means of stamps, we would prefer 1½d or 2½d stamps, as these are used mostly.

* * *

S.D. (Curragena) wants to see more battery sets featured.

A.Yes, we don't seem to be doing much about battery sets at the moment, but that is mainly because we are waiting on the battery manufacturers to do something about bringing out new minimax types and we are also waiting on the valve people to bring out their new ranges of battery valves. We expect that in a few months' time there will be a rush of battery circuits. We haven't any actual figures to prove it, but we'd feel inclined to think that battery-operated sets are only a very small percentage of the total sets in use in Australia. In the first place, there are so many millions congregating close to the capital cities, and secondly, a great many country towns are now supplied with electric power. All-electric sets are so much more economical and generally satisfactory that no one would think of using a battery set if there is any chance of getting power for an a.c.-operated set.

* * *

W.K.L. (Wollongong) has a set with a continuous high-pitched whistle.

A.—Since the trouble has only started since the set was re-installed, we feel sure that the trouble is nothing more serious than the aerial and speaker leads being too close together. If you run them parallel for any considerable length there is always a chance of feedback, portion of the signal in the speaker leads "leaking" back into the aerial and being re-amplified until it builds up to a squeal. The remedy is to keep speaker leads well away from the aerial lead-in.

* * *

D.S.B. (Coogee) is a ham who finds that he can't get used to sending c.w. without hearing the note, as he has done all his practice with an oscillator.

A.—It is a comparatively simple matter to arrange to have the key coupled up to an oscillator with a plate supply which is also used to operate a relay for keying the primary of the power supply for the transmitter. We recently noticed an installation of this kind at VK2CE. Being able to hear your own signals whilst sending morse tends to give you a far better "fist" than normally. The ordinary type of practice oscillator with an audio transformer for coupling and a plate supply of 4 or 6 volts can be used.

* * *

F.A. (Kyneton) is interested in making a big noise.

A.—The 807 type valves will deliver plenty of audio power for your purpose, but there are plenty of minor pitfalls to be avoided in using them the way you suggest. Parasitic oscillation is the main problem and the most careful layout and attention to detail is necessary to avoid high frequency parasitics which waste your power in unheard output, even developing high voltages which overload the tubes and curtail their lives. In audio work the troubles are not clearly noticeable at first, except that full power output is not obtained and tonal quality is not up to expectations. In ham radio work, however, the parasitics make an awful mess of things when they occur in a modulator, and on this account it is often found that hams avoid the use of the 807 in the modulator and use a pair of 809 triodes in class B, even if they run them down on 400 volts to get a power output of 25 watts of audio. The triodes in Class B are much easier to get into clean operation.

* * *

W.R.T. (New Farm) is trying to use a metal filament lamp as a resistance and is running into trouble.

A.—The resistance of the lamp can be calculated from the power it draws at a rated voltage, but this is the resistance of the lamp when it is hot. When the filament is cold, before the voltage is applied, the actual resistance of the lamp may be almost anything at all, usually about one-tenth of the expected resistance. In your particular application the above characteristic makes the lamp quite useless.

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.

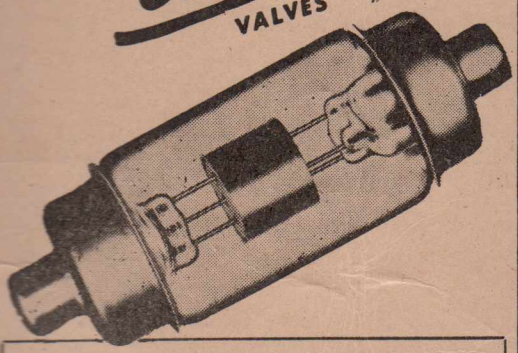
The chart on this page shows the results of tests at 50 Mc. conducted on a standard Eimac VC50-32 Vacuum Capacitor and three other 50 mmfd. vacuum capacitors, designated on the chart by "A," "B" and "C." At just over 17 amps. (approximately 1525 peak volts across the capacitor) Unit "A" (rated at many 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.

1113

Follow the leaders to

Eimac REG. U.S. PAT. OFF. VALVES



EIMAC VACUUM CAPACITOR TYPE VC50-32

General Characteristics

MECHANICAL:

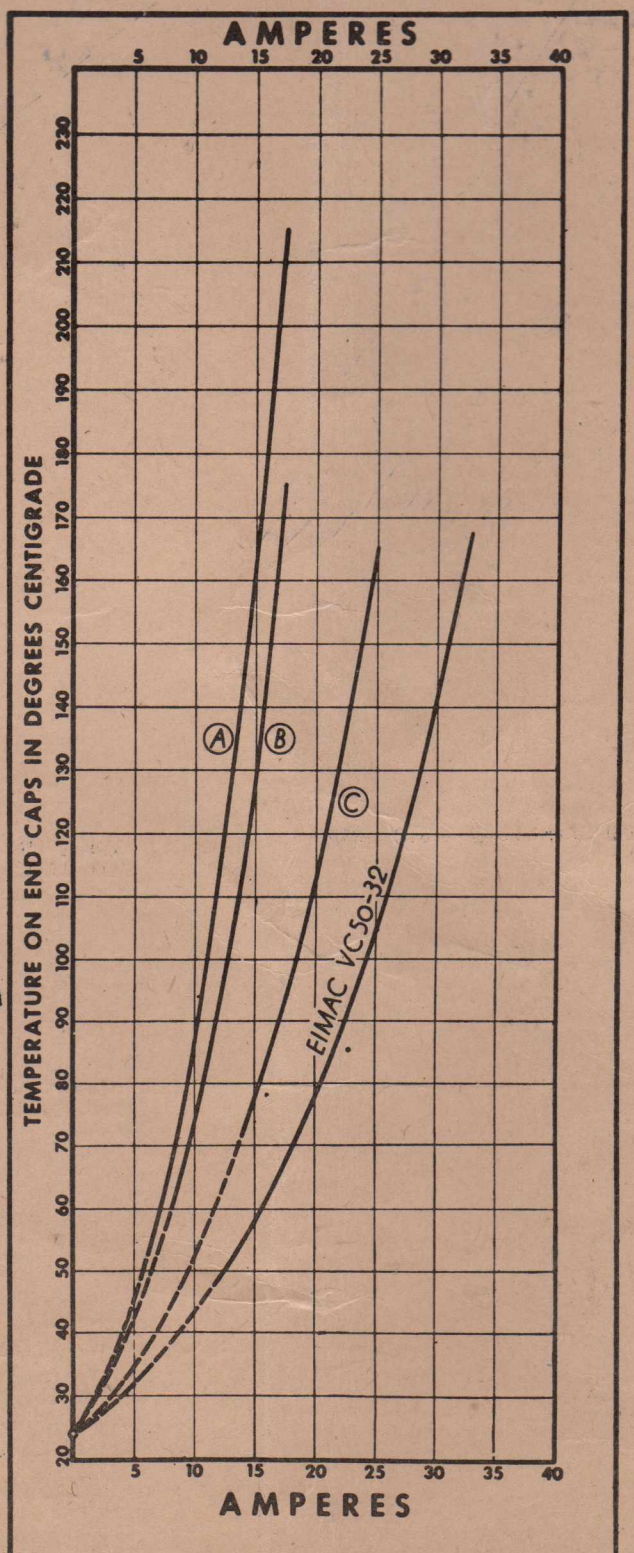
Maximum Overall Dimensions

Length	6.531 inches
Diameter	2.281 inches

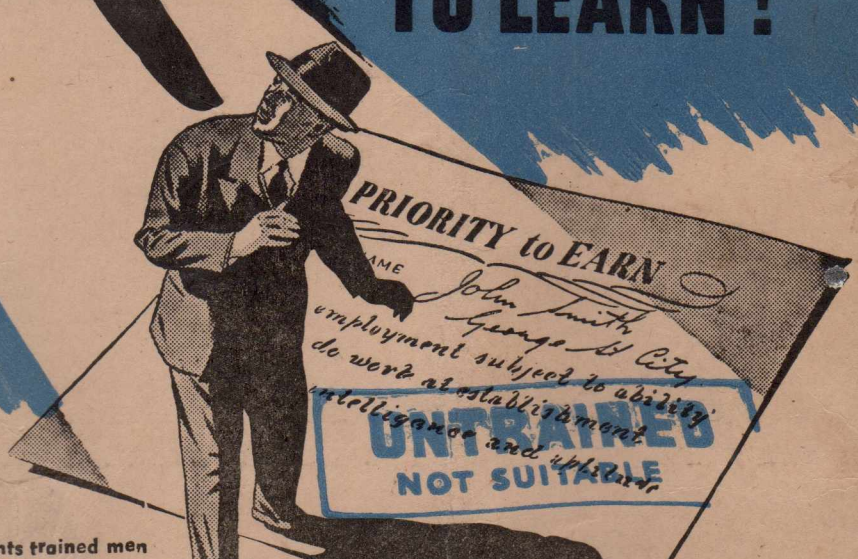
ELECTRICAL:

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

EITEL-McCULLOUGH, INC., 1113 San Mateo Avenue, San Bruno, Calif.
Plants located at: San Bruno, California and Salt Lake City, Utah
Export Agents: Frazar & Hansen, 301 Clay St., San Francisco 11, Calif., U. S. A.



THERE IS NO PRIORITY TO LEARN!



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. . . and in conjunction with your will-power must direct the whole course of your life.

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Radio is a young industry which has made remarkable progress in the past few years. If you want security, prosperity and a recognised status in the community start training right away.

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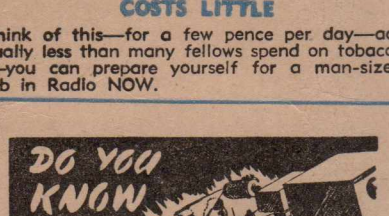
Think of this—for a few pence per day—actually less than many fellows spend on tobacco—you can prepare yourself for a man-sized job in Radio NOW.



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The spraying process of radio valves is now controlled by a new Radio device The conveyor belt carries unpainted valves in front of two special spray guns, and then into the baking oven. A control, in the form of an electronic switch makes certain that the guns spray each valve completely, but withhold the spray if certain valves as missing from their sockets on the conveyor belt. Truly a marvellous device brought about by Radio.

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D.H., Home Hill, Q'land.

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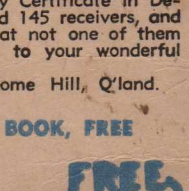

To Mr. L. B. GRAHAM, Principal,
Australian Radio College Pty. Ltd.,
Broadway, Sydney. 'Phone M6391-2

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