THE AUSTRALASIAN

Radio World

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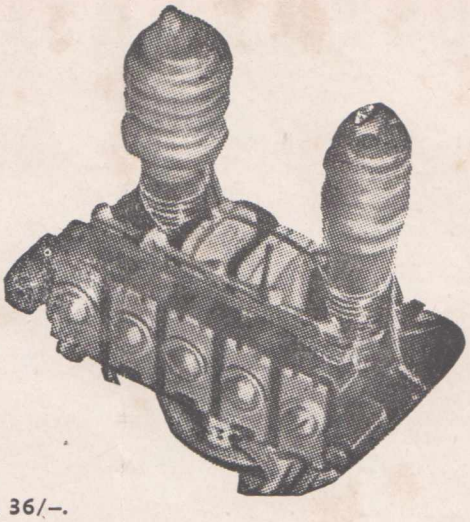
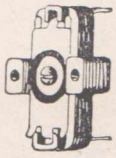
VOL. 13 ..... NO. 3

AUGUST 18, 1948

CROWN
COMPONENTS





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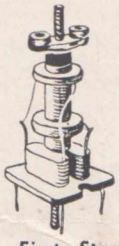

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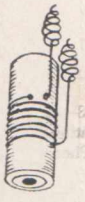

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RADIO WORLD

Devoted entirely to Technical Radio

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EDITORIAL

The next issue will be the special Radio Handbook and Data issue, which will be something quite out of the ordinary, with a great collection of tables, tabulations and lists which you will find useful as a handy reference for many months to come. A large number of extra copies are being printed and circulated but if you are not a regular reader I would strongly recommend you to make a point of placing a definite order for this issue with your local newsagent.

Whereas some of our issues have been a few days late in the past, the big September issue is due to come out on time, in fact it is scheduled to reach every part of the Commonwealth by the 15th of the month, which is the date on the cover. Subscribers' copies should be in their hands about a week earlier.

The special issue marks the start of a series of improved issues and we have some fine technical articles lined up to follow on in the October and November issues. Among these might be mentioned the mantel model to outdo all mantel models, designed by Paul Stevens and described in detail with full photographs and diagrams, the 1948 World Standard, which gives terrific power with exceptional fidelity, yet costs only a few shillings more than an ordinary set, a new 45-watt super-quality amplifier, and last, but not least, the sweetest of low-powered amplifiers. This last item is a modest affair but has the following performance when laboratory checked; frequency response flat with half a decibel from 10 c.p.s. to 18,000 c.p.s., and total distortion less than .15 per cent. when delivering an actual 2.7 watts to the voice coil! This is the answer to those who deplore the use of high-powered amplifiers for home use.

—A. G. HULL.

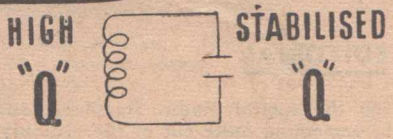
Only R.C.S. I.F.'s could pass this test!

This is an actual photograph of the three R.C.S. I.F.'s undergoing their continuous three day and night water test from which they emerged with "Q" value unchanged. Recently, during the course of normal research in our chemical laboratory on the effects of the extremes of humidity upon radio apparatus, our chemists made these two tests:

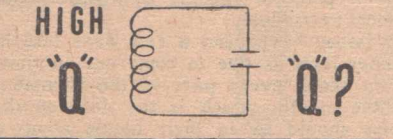
ONLY R.C.S. UNAFFECTED BY EXTREME HUMIDITY TESTS.

1. Three heavily-waxed condensers were immersed in water and after six hours, the "Q" factor had dropped to a very low level.
2. Three of the same type of condensers were immersed in water after being moulded into a Polystyrene coil former under an R.C.S. patented process. These were tested every two hours over a period of three full days and nights, and their "Q" factor remained unchanged. This proves conclusively that in extreme climatic conditions only R.C.S. moulded-in condensers can maintain a stable "Q" factor.

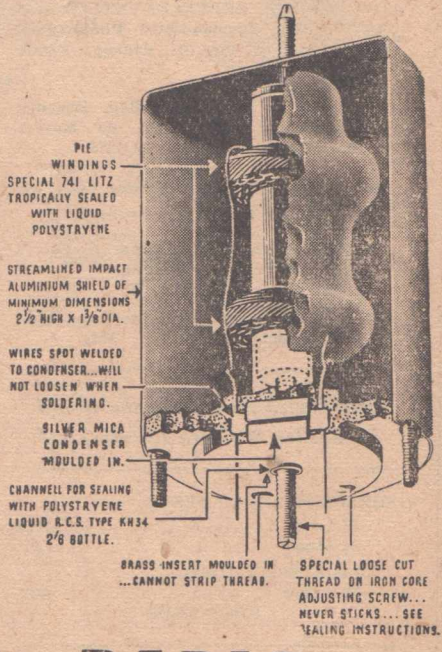
RIGHT



WRONG



The illustration at left shows right and wrong I.F. circuits. Whilst you may have a coil of very high "Q," this is useless if unstable condensers are used in conjunction as the variation in atmospheric conditions lowers the "Q" of the condenser and consequently the I.F.



The patented R.C.S. feature—condensers moulded-in to a Polystyrene former—is a development of over twenty years' leadership in radio component design and development. Remember, R.C.S. components have been used in "Radio and Hobbies" (previously the "Wireless Weekly") and "Australasian Radio World" circuits during that period.

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Converter For Amateur Bands

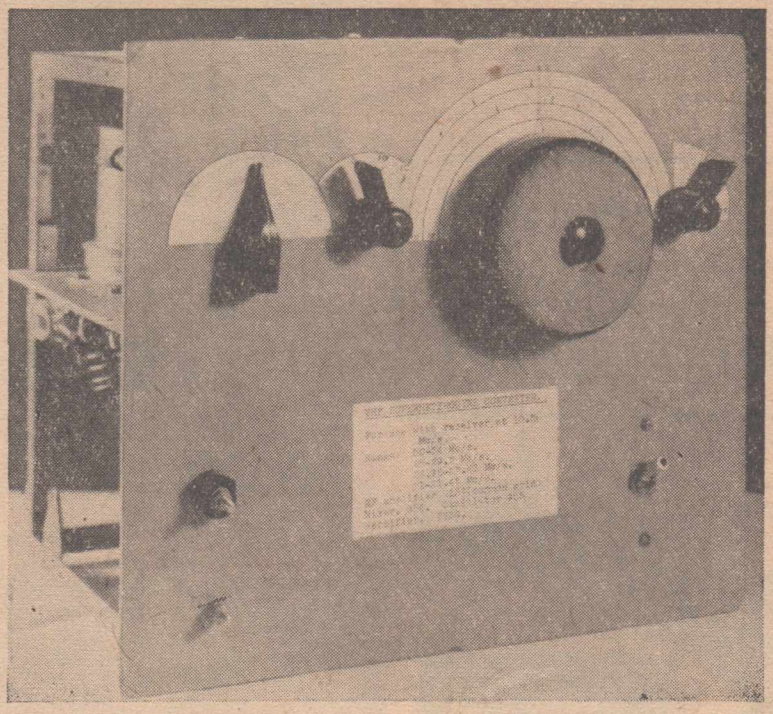
Featuring multi-band operation with grounded-grid r.f. stage.

THE advantages of a high signal-to-noise ratio have been apparent from the time when the standard practice in broadcast receiver design was to use neutralised or otherwise stabilised triodes in r.f. amplifier stages. For the reason mainly that valves had not progressed far from

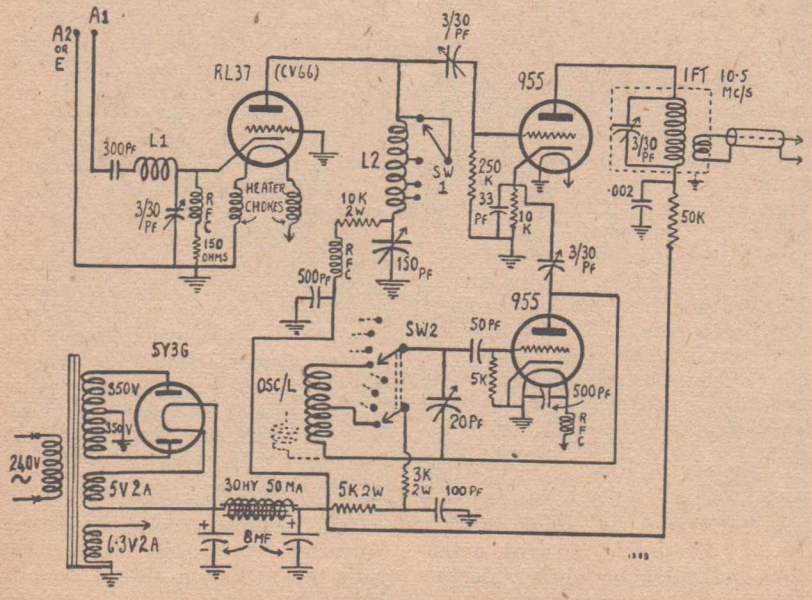
By

DON B. KNOCK

the "general purpose" stage, and had in themselves relatively low gain, the main impression was that of particularly "quiet" functioning. Sufficient amplification before detection was obtained by cascading successive signal frequency stages, with the result that receivers included three or four such stages. Nevertheless, measured in terms of signal to noise, the inherently low background noise accompanying reception was undoubtedly emphasised by use of triode stages. No advantage is to be gained now by such practice at medium frequencies; modern valves and circuitry deal amply with all requirements, but attention is directed to the use of special triode valves for r.f. amplification at the higher h.f's. and v.h.f's.



Panel view of the converter. On each side of the dial are band switch levers. Pointer on left is r.f. tuning.



Schematic circuit of the converter.

Despite the fact that valves of the RL37 type are intended primarily for operation in the region of 150 m/Cs and somewhat higher, it is found in practice that they may be applied with advantage in equipment covering ranges including frequencies as low as 22 megacycles. Modification of the original model converter (described in Technical Communication No. 9, October 1947,) was decided upon

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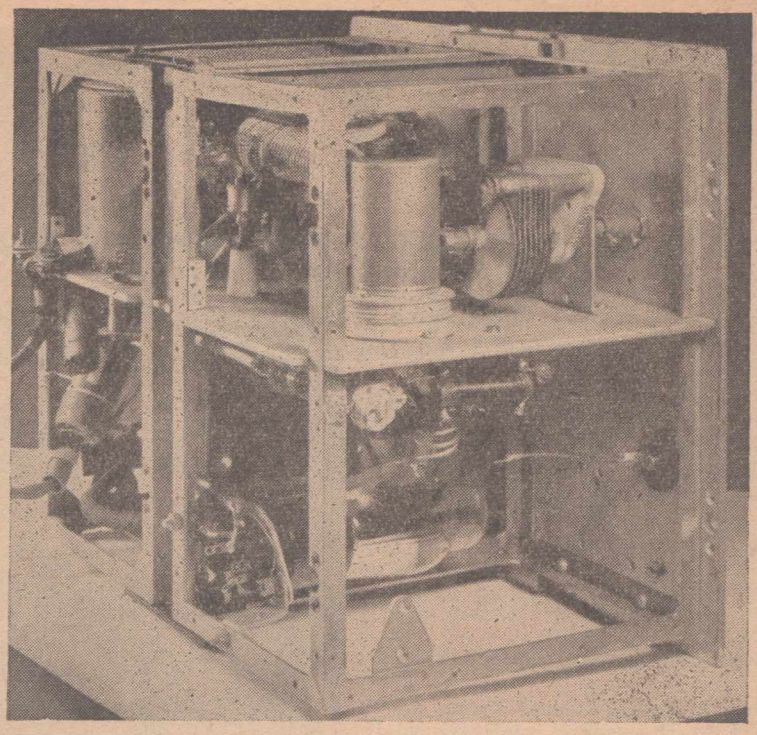


View from r.f. end. The RL37 and plate tuning condenser are above the platform; cathode input components below.

CONVERTER

(Continued)

mainly in order to take the next available amateur frequency channel higher than 50-54 mC/s. This channel is, for Australian amateurs, the range from 144-148 mC/s. Also at the lower frequency limit of the v.h.f. allocations, a new band will eventually come into use for international amateurs between 21 and 21.45 mC/s. To be of interest to the progressive amateur thereof, it is desirable to design any v.h.f. tuner or converter to include the bands between 148 and 21 mC/s. Such practice does not mean inclusion of all frequencies between those bands with overlapping coverage. In the first instance, the amateur is not interested in the intervening territory and secondly, mechanical and electrical considerations put such design beyond the scope of the average home constructor. It is possible however to make up a v.h.f. tuner utilising an earth grid r.f. stage to take in only the bands required, extended to the higher v.h.f. region by the use of appropriate valves.

Bands 144, 50, 28-27 and 21 Megacycles

At first glance a v.h.f. tuner covering these bands may be considered ambitious, but the project becomes relatively simple for the reason that the RL37 cathode input circuit may remain unchanged. No alteration in tuning is necessary here, although the overall gain would be raised somewhat by varying resonance, particularly at the higher frequency limit. In practice it is sufficient for more than average purposes to vary the L/C ratio of the anode (output) circuit alone. Amateurs interested mainly in the higher frequency range of 144-148 mC/s will find it a simple matter to peak the r.f. stage for maximum value gain by substituting a smaller value of inductance for the cathode (input) circuit in place of the inductance specified. The value is not critical and a coil having 3 turns of 16 gauge wire ¼ inch in length will be suitable.

R.F. Stage

This remains exactly as in the converter previously described, with the exception that a tapped inductance is used in the anode

circuit. The converter illustrated makes use of two separate switches for rf. and oscillator switching, but there is no reason why a common lever control cannot be used to actuate both switch sections. Layout was the deciding factor for dual switches in this instance. The RL37 valve is arranged with the anode tuning components above and the cathode input circuit below the sub-chassis, which, as indicated in the socket connections for the RL37 valve, there are four leads to the grid. It is advisable to tie all of these directly to earth adjacent to the socket. Connection to one point only, by way of even a length of wire one inch long, will result in instability and oscillation. At the frequencies involved, even a short piece of wire in series with the grid has appreciable inductance. The input circuit is applicable to either balanced line or aerial against earth connection, although in the latter case it would be preferable to couple through a shunt-tuned coil, link-coupled to the cathode circuit and with the aerial tapped down the extra coil as with h.f. practice. I series with the ca- a Windom type aerial in normal thode inductance L1, is a 300 pF mica condenser. L1 has four turns of 16 gauge copper wire ½ inch in diameter and is soldered directly to the cathode connection at the valve socket. Also at this point the 3/30 pF concentric trimmer condenser is connected to earth and also the v.h.f. choke via the 150 ohm bias resistor. The low resistance r.f. chokes in series with each heater lead are constructed on ¼ inch diameter glass tubing. They consist of 50 turns of 24 gauge enamelled copper wire wound in three sections, single layer. These chokes are essential to keep the input capacitance at a suitable value. They are wired as close to the valve socket as possible.

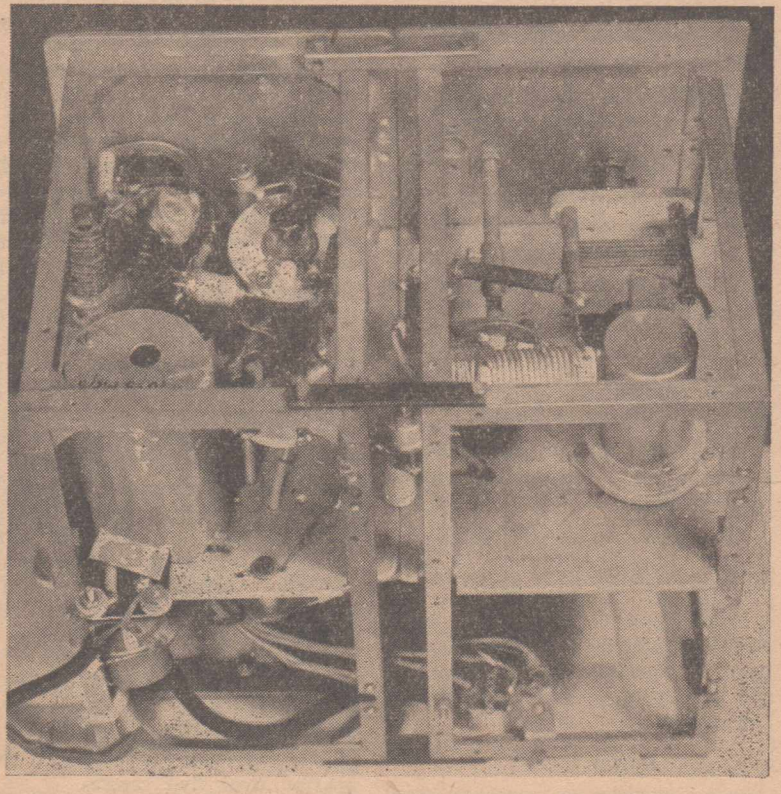
SOUND RECORDING INSTITUTE

In Melbourne there is now active a keen group of enthusiasts who have formed the Sound Recording Institute of Australia, with club rooms on the lower ground floor of "Tasma," 4 Parliament Place, Melbourne. The honorary secretary is Mr. L. T. Garrioch.

The Institute is holding an Instantaneous Disc Recording Competition at the Reception Room of the Assembly Hall, Collins Street, Melbourne, on Wednesday evening, August 25, at 8 p.m. All interested in recording and reproduction are cordially invited to attend, and should find much to interest them at this contest.

The contest is divided into Open and Amateur Sections, with judging being carried out partly by audience ballot and partly by a panel of technical judges.

Among those interested in the Institute is our old friend, Charlie Mutton, so if any of our readers would like to go along to the contest, they should ring Charlie at JW4540 any evening and he will send out invitation cards and make the necessary arrangements to roll out a strip of red carpet to welcome you to the Assembly Hall.



Top view with r.f. stage on right. Section of left contains the acorns, oscillator switching and i.f. coupling transformer.

In the converter previously described, plug-in inductances were used in the anode of the r.f. stage to provide series-resonance for the 28 and 50 mC/s bands only. In the switched version, a coil having 25 turns of 16 gauge copper wire space-wound by the wire diameter on a ¾ inch polystyrene form covers the various bands by tapping at 1½, 3 and 6 turns respectively from the low potential end. The fourth position of the switch includes the whole coil for use at the 21 mC/s position. It is imperative that losses be kept to a minimum in the anode circuit of the RL37 valve and a switch with ceramic insulation is used in preference to the usual wafer composition kind. Some adjustment of tapping positions for L2 will be necessary depending upon stray capacity in wiring and lay-out, the placing of components etc., but the specifications as given will serve as a guide. The taped coil L2 is series-tuned as shown in the circuit diagram by the 150 pF variable condenser and here again, ceramic or polystyrene insulation is preferable. No vernier control is needed

(Continued on next page)

CONVERTER

(Continued)

for this condenser, the tuning action being flat enough to need only a plain pointer knob. Because of the wide variation in frequency afforded by the series-tuned circuit, the relatively large capacity of 150 pF is needed for effective coverage.

Mixer-Oscillator Combination

In place of the ECH35 Frequency Changer valve applied previously, two 955 "acorn" triodes are used as mixer and oscillator respectively. Many combinations of VHF triodes could be applied similarly for this function and valves of the 7193 type (CV6) with grid and anode caps on the glass envelope will be quite suitable for operation at 148 mC/s in this arrangement. Miniature valves such as the 9002 and 6C4 are equally applicable. With the tuned anode circuit in the r.f. stage, aperiodic coupling to the mixer control grid is provided through a Philips 3/30 pF concentric trimmer condenser and 250,000 ohm grid resistor. A most convenient frequency for receiver coupling is found to be 10.5 mC/s and a small i.f. transformer is provided at that frequency in the mixer anode. Twenty turns of 20 gauge enamelled copper wire close-wound on a § inch diameter former will cover this frequency range when tuned by a 3/30 pF trimmer condenser, and with a link coil of 2 or 3 turns of wire about ¼ inch below this winding, coupling is provided to the receiver. The i.f. assembly is completely screened in a metal box and for connection to the receiver a short length of coaxial cable may be used. It is desirable to provide adequate screening between converter and receiver to avoid pick-up of unwanted signals in the i.f. channel. Mixer injection of oscillator voltage is obtained by cathode coupling, through a 3/30 pF trimmer condenser from oscillator anode to mixer cathode as shown in the circuit diagram. This method provides high conversion gain with no noticeable "pulling" of the oscillator frequency when the anode tuning control of the r.f. stage is adjusted for signal peak. In arranging the physical placement of mixer and oscillator stage, the shortest possible connection should be provided for the cathode-coupling.

In the converter illustrated, the 955 sockets are so positioned that the 3/30 pF condenser alone provides the actual connecting link between oscillator anode and mixer cathode. The only tuning control proper is the 20 pF variable condenser in the grid-anode circuit of the oscillator and this, by reason of the Hartley circuit used, must be insulated from earth. In series with the unearthed leg of the oscillator heater connection is a small r.f. choke, consisting of about twenty-four turns of 20 gauge enamelled copper wound over a ¼ inch diameter form such as a pencil and allowed to spring off. It is self-supporting and may be made rigid by the use of polystyrene lacquer. The r.f. chokes in series with the RL37 cathode resistor and the anode voltage feed, are constructed similarly. The oscillator heater is by-passed by a 500 pF mica condenser. Note that the oscillator cathode is earthed and in some instances, depending upon the valves used, it may be necessary to include a small r.f. choke in series with cathode to earth.

For oscillator switching a four-point two-deck ceramic insulation switch is applied; the anode end of the coils being common and the grid and centre-tap switched in each instance. Coil details are, for the respective ranges:—

144 mC/s band—3 turns 16 gauge enamelled copper ¼ inch diameter ⅝ ins. in length.

50-54 mC/s band—7 turns 18 gauge enamelled copper ½ inch diameter, 1 inch in length.

28-30 and 27 mC/s band—13 turns 20 gauge enamelled copper ½ inch diameter, 1 inch in length.

21 mC/s band—18 turns 20 gauge enamelled copper ½ inch diameter, 1 inh in length.

These specifications will vary with individual construction, but may be accepted as a guide for the ranges. Each coil is tapped at the centre.

Power Supply

The converter is provided with power supply unit so that it may be used with any receiver at 10.5 mC/s without the need for tapping for heater and high tension supplies. Current requirements are modest so that a small wattage power transformer and filter choke are sufficient. A type 6X5G rectifier may be used alternatively to the 5Y3G where a transformer is available without a 5 volt winding but the latter rectifier is recommended in preference.

Operation

Results obtainable with a tuner covering the bands for which this model is designed, depend to some extent on the type of aerial system and the effectiveness of coupling thereto. At 28 and 27 mC/s amateur practice is mainly the use of horizontal polarised aerial systems and it may be assumed that such will be the case when the 21 mC/s band becomes available. At 50 mC/s most active amateur stations use alternative aerials for specialised application, so that either vertical or horizontal types may be thrown into action quickly. At the higher frequencies, vertically polarised transmission is the accepted practice and this may apply to 144 mC/s, although in U.S.A. amateurs make extensive use of both vertical and horizontal polarisation in that band. If it is desired to use an intermediate frequency different to the 10.5 mC/s, it is a simple enough matter to design a frequency changing and coupling unit to suit individual needs, or the aperiodic output arrangement for the converter described in "Technical Communication" No. 9, October, 1947, may be applied to the model described here with equal effectiveness. With constructional work done correctly, and with voltages checked for appropriate values, there should be no difficulty encountered in putting this wide range converter into action. An additional feature worth inclusion would be the control of oscillator voltage by the use of a type VR150/30 valve but such regulation does not appear to be necessary in the model illustrated. An appropriate dial for operation of a v.h.f. tuner of this type is the Philips "Log-Dial," which makes provision for individual calibration over five ranges.

(From Philips Technical Communication)

History Of The "1933 Standard"

By

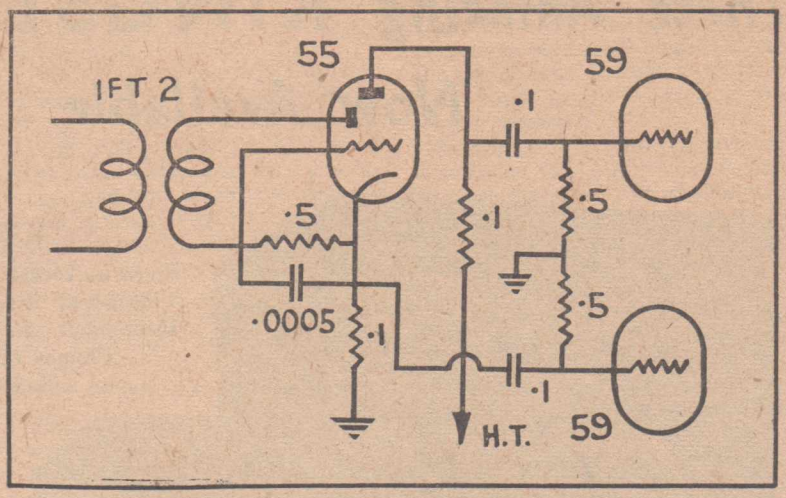
A. G. HULL

THE years roll by so fast that I just can't realise that it is fifteen years since I wrote the story of the 1933 Standard. It seems more like a year or two. I can recall quite vividly the excitement that went on behind the scenes when that set was being exploited.

At the time I was technical editor of the "Wireless Weekly." The old weekly was at its prime, with a circulation of about 60,000 copies each week, but technical radio seemed to be slipping a bit. We had enjoyed a series of booms with the various stages of radio development but the introduction of the superheterodynes in 1931 and 1932 had rather frightened a number of our old supporters. A great many who had stuck with us right through from crystals to valves and from battery to A.C. operation were scared off when they read about the difficulties of intermediate transformer alignment and so on. Few of even the best-equipped service laboratories could claim to have a modulated oscillator. Total number of signal generators in this country at the time would not have amounted to a dozen.

I put a terrific amount of work into the introduction of the superhet to Australia in 1931 and 1932 and a lot of it was uphill battling. One prominent executive of a large Sydney factory made a statement (after due deliberation) that he thought the superheterodyne circuit was unsuitable for Australian conditions and that, in his opinion, the Australian workmen were too rough and ready to ever master the critical adjustment of superhets!

So it was that there was some doubt about the success of superhets for home-built receivers and I was scratching my head a lot trying to get a circuit which would put the amateur set-builder back into prominence.



Basic circuit of detector and output stages of the original Standard

Searching for an inspiration, I was going through some American magazines and noticed a few circuits featuring cathode-coupling, with the normal plate load resistor transferred to the cathode circuit. The thought came to mind that it offered possibilities for a quick and easy way of getting push-pull and so I tried it out and found that it worked. At that time the diode-triodes had just been introduced and a popular method of using them was to employ what was known as diode biassing, no bias resistor being required.

Using this scheme made it even simpler to get the desired push-pull operation. So it came about that the circuit was evolved which gave much better tone than a single pentode, twice the power, yet was extremely simple.

The first sample which I built up gave grand performance. One of the first people to hear it was Mr. Scott, the millionaire American radio manufacturer who was visiting Sydney at the time. Mr. Scott came out to my place at Northbridge and was greatly impressed with its performance and gave me the necessary encouragement to go ahead with it in a big way.

My enthusiasm for the set was so great that the trade readily agreed to get the necessary bits organised, special bases, special coil kits, and so on. Complete kits of parts were available for about £10 to £12 and when the story was released there were a great many advertisements to back it up.

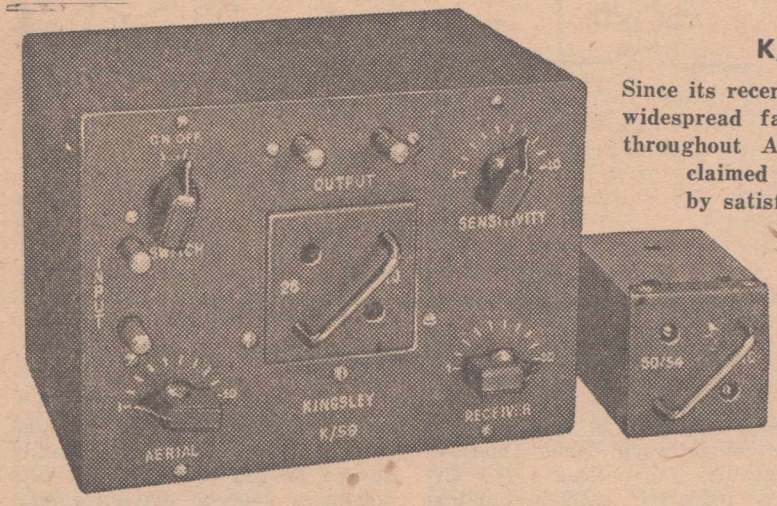
The success of the Standard was phenomenal. Those dealers who were a little sceptical about the future of home set-building were soon optimistic when they found themselves flooded with orders for kits. As I found out later when checking back with the manufacturers of bases and coils the Standard kits sold in thousands.

There was one major mistake which I made when bringing out the Standard. Instead of working out the wattage in the field coil I just gave the matter one poor moment's consideration and thought that since there were two output valves and twice the usual current drain the speaker field would need to be half the normal resistance, say, about 1,250 ohms, instead of the 2,500 which was more or less normal at the time.

(Continued on next page)

These Amazing KINGSLEY UNITS

Now Available . . .



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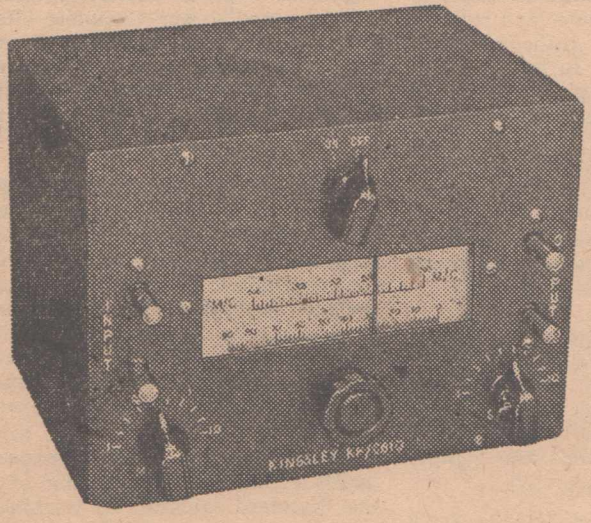
Since its recent introduction the K/S9'er has met with widespread favour, many hundreds now being used throughout Australia. The K/S9'er does everything claimed for it, and is being acclaimed everywhere by satisfied users. It operates on 10 metres, and additional plug-in coil boxes to operate on the 6 and 20 metre bands are now available at little extra cost.

Completely assembled, less valve.
£5/5/- plus Tax.

Plug-in Coil Boxes, 6-20 metres, each 15/- plus Tax.



KINGSLEY
SHORT WAVE CONVERTER

Ready for immediate use on 50/54 megacycles (6 metres) band, the KF/C6 is completely assembled, aligned, and adjusted.

No amateur operator can afford to be without this amazing unit. Acclaimed throughout the Commonwealth as an outstanding success.

Completely assembled, less valves £6/18/6 plus Tax.

Available all authorised Kingsley radio distributors.

— — — —

Complete installation and circuit details of both units are obtainable on application.

If your regular supplier is unable to supply your requirements of Kingsley products, drop us a line mentioning his name and address.

Ask for—Insist on DEMAND Genuine Kingsley Parts from your supplier

KINGSLEY QUALITY RADIO PRODUCTS

KINGSLEY RADIO

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STANDARD

(Continued)

So, 1250 ohms was specified, but this gave the field twice its normal wattage of excitation. The result was the most excellent low note response and the set sounded extra fine, but after a few weeks of service the overheating caused the voice coil housing to warp and foul the pole piece!

There were several factors which worked together to give the Standard a quick reputation for tone. The I.F. stage was at 175 kC/s and so selective that the highs were lopped, likewise the speakers did not have a strong high note response. So although the actual amplifier itself had a good high note response and a certain amount of screechiness due to third harmonic distortion in the output valves, it sounded good when belting out solid lows, balanced off with just enough highs.

There were quite a few drawbacks to the Standard but it held its place for a couple of years. Even today it is quite a problem to answer the letters from those who still have a Standard in operation and ask if I can recommend a circuit to give better value.

The drawbacks to the Standard started to reveal themselves when the speaker fields started to overheat. It was easy enough to change the specification to 750 ohms, but with these lower-resistance fields the hum filtering was not quite as effective as with the 1,250 fields, and in some cases it was found necessary to add a filter choke.

The output valves which were originally specified also failed in service. They were the type 59, an output valve with a multitude of internal elements, many of them brought out to the socket pins. By connecting certain elements you could use it as a triode, by connecting others it was a triode for class B operation; still another way and it behaved like a normal pentode output valve. But as we found out later in practice, it behaved almost any way at all if the internal elements got shaken up a bit and started to short circuit on to one another. The type 2A5 was substituted, but they never seemed to have quite such good tone or power output as a pair of 59's in proper operating condition.

Another drawback which I never quite understood was that in some examples the diode-biassing didn't seem to work out properly and the set would distort at low volume levels, yet perform perfectly at loud volume.

There were also some inherent difficulties. It was difficult to arrange for a.v.c., which was just coming into favour at that time. It was also difficult to fit a gramophone pick-up, since the cathode of the detector was so high above ground potential. With a crystal pick-up and a fair bit of rearrangement of the biassing, it was possible to use it with both sides "floating" above earth, but it could not be considered completely satisfactory.

The converter employed in the superhet end of the set was the old autodyne, which was a great performer from a noise-to-signal-ratio point of view, but every now and then it would stop functioning, sometimes due to dampness in the oscillator coil winding, sometimes due to the most elusive reasons. On the other hand, the use of the R.F. stage was both a help as well as a problem. The overall gain was so terrific that there was ample sensitivity even if the I.F. stages were out of alignment, or if the gang sections weren't accurately matched. On the other hand it gave such selectivity that proper alignment was seldom achieved.

Reading this tale about the drawbacks you might find it hard to understand why it should have been such a grand success, but I can assure you that it was the most popular set ever described in Australia.

There are lots of ways of bringing the old Standard up to date. You could use a modern type of converter valve, intermediate at 465 with the a.v.c. circuit in the I.F. stage, and then have the old original Standard detector circuit with a pair of beam power valves. You could easily fit inverse feedback, but it is doubtful whether it would be a successful proposition like the original Standard.

Design for quality

- Within the familiar glass bulb of every radio valve, cleanliness and purity of materials rank above all other considerations — a condition achieved only through the application of stringent processes designed to safeguard ultimate performance.

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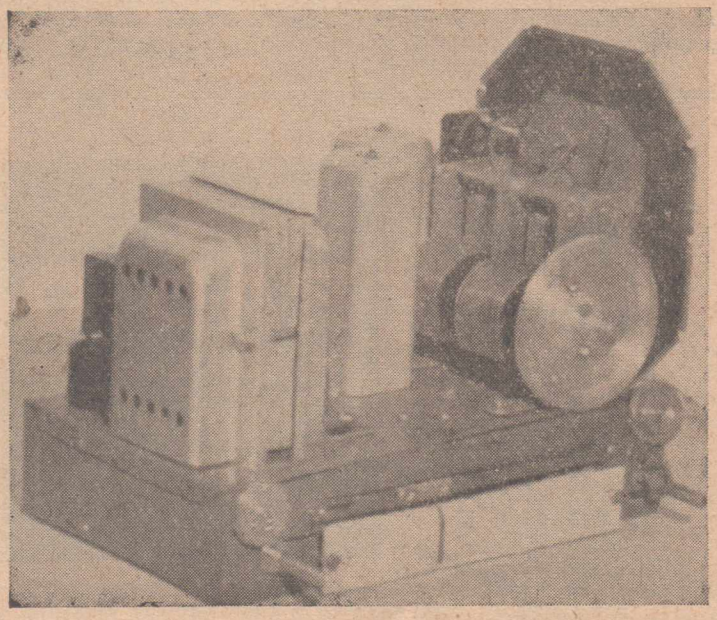
"THE BEDSIDE 5"

Here is a fine article on building a powerful mantel model, featuring a home-wound aerial coil and a home-made dial assembly, written by one of our readers who actually built and tested the receiver.

By
W. S. LONDEY
8a Barkly Street
Sale, Vic.

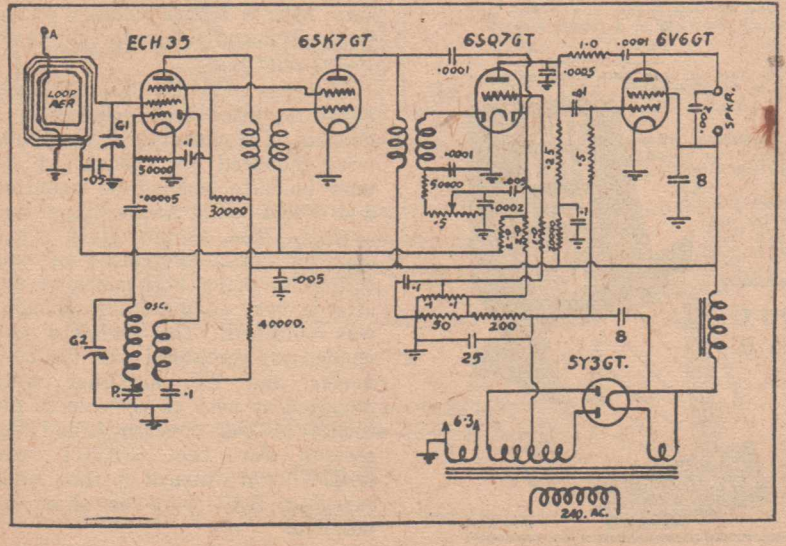
ABOUT the time the article featuring the "SNUG 5" was printed, a friend asked me if I could build her a small set for her bedroom. It was decided to build a five-valve set and, as I have always disliked sets with inaccessible valves, I decided to follow up the idea.

There is, however, one other point I do not like in most small sets, the use of 5-inch speakers. Although a 6-inch speaker requires a larger cabinet, I consider the larger speaker preferable. Firstly, it has better power handling ability than the smaller unit, and this becomes important when the output tube is a 6V6 with a maximum output of 4½ watts. Secondly, the larger speaker will reproduce more of the lower frequencies, having about double the cone area.



Finally, the 6-inch speaker is more sensitive than the 5-inch type.

To avoid untidy indoor aerial wires I decided to use a loop aerial. This would be ample to receive any local stations and a few other stations at reasonable strength and eliminates all wires except the power lead.



With these points in mind I set out to design the set. The best size for the chassis was found to be 9½ in. x 5½in. x 2 in. high, the cabinet being 10 in. x 6¼ in. x 8 in. high, inside dimensions. The extra half-inch in length is at one end and is to accommodate the loop aerial, and ⅝ in. in front of the chassis accommodates the dial mechanism and clears the lower edge of the speaker.

The chassis was made from sheet aluminium, the ends being riveted in place. To make it as rigid as possible all bottom edges were turned under ⅛ in. The front right-hand top corner was cut and bent back so that the dial drive

(Continued on next page)

"BEDSIDE 5"

(Continued)

pulley at this point could be inclined.

The tuning condenser was a standard-size Stromberg-Carlson two-gang unit and this was mounted ¼ in. from the right-hand end of the chassis. Trimmers were mounted on the gang on bakelite strips in such a position that they could be adjusted with the receiver in its cabinet.

The Circuit

The circuit used was fairly standard having single-ended GT tubes in all positions except the converter. A converter having a grid cap was preferable to a single-ended type, as it allowed all aerial and grid leads to be kept above the chassis away from the oscillator connections. An ECH35 was chosen as converter as it is smaller than the 6A8 or 6J8 and has higher conversion gain. The valve line-up was then—ECH35, 6SK7GT, 6SQ7GT, 6V6GT, 5Y3GT.

All cathodes were earthed, and bias for all valves was obtained from a resistance network in the transformer centre-tap lead. It was found necessary to filter the H.T. and bias for the 6SQ7GT to reduce the hum to inaudibility. This would probably be unnecessary with a 5-inch speaker owing to the reduced frequency range of the smaller unit.

The bias network, 6SQ7GT plate resistors, filter and coupling condensers, and power line terminals were mounted on a sheet of $\frac{1}{16}$-inch bakelite, drilled as required and fitted with solder lugs and eyelets. The sketch gives some idea of the arrangement of this strip. By using both sides of the strip a very compact arrangement was obtained. The resistors and condensers connected with the converter and I.F. amplifier were mounted as near as possible to the socket or coil concerned and the sockets for the 6SK7GT and 6SQ7GT were turned so that leads carrying H.F. were as short as possible.

PARTS LIST

1—Chassis 9½" x 5½" x 2".
1—RCS Oscillator Coil, E347.
1—I.F.Ts. (Iron-cored.).
1—Power Trans. 50 MA, 285V.

CONDENSERS

1—2 gang.
1—Padder RCS P21.
2—Trimmers.
1—.00005 Mfd. Mica.
3—.0001 " "
1—.0002 " "
1—.0005 " "
1—.005 " "
1—.01 " "
1—.002 " Paper 400v
3—.1 " " "
1—.05 " " 200v
1—.1 " " "
2—8 mfd 525PV Electrolytic
1—25 mfd 40 PV "

RESISTORS:

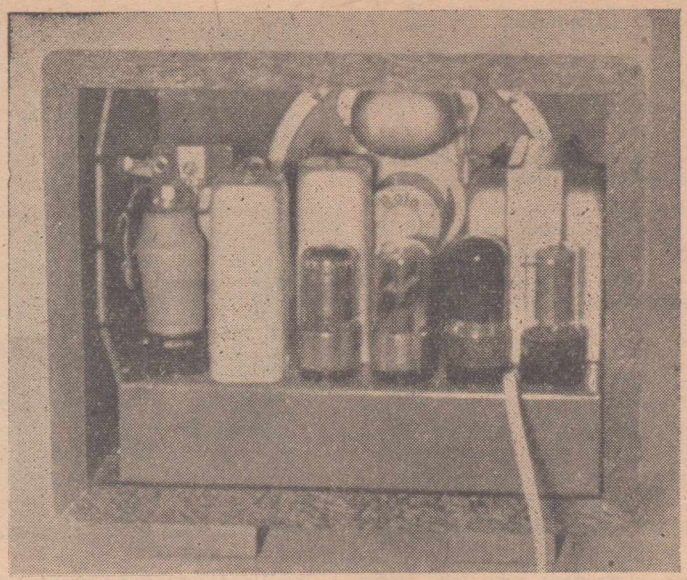
2—2 meg. ½w.
2—1 meg. ½w.
1—½ meg. ½w.
1—¼ meg. 1w.
2—100T ½w.
2—50T ½w.
1—40T 1w.
1—30T 1w.
1—20T ½w.
1—200w ww.
1—50w ww.
1—½ meg. v.c.
6" permag. speaker.
ECH35, 6SQ7GT, 6SK7GT, 6V6GT, 5Y3GT.
5 sockets, wire, dial, lamp and holder, sundries.

Inverse feedback was applied to the 6V6GT by connecting a 1 meg. resistor and a 100 mmfd. condenser in series from the 6V6 plate to the 6SQ7 plate. This gave a well-balanced tone but different values could be tried if desired.

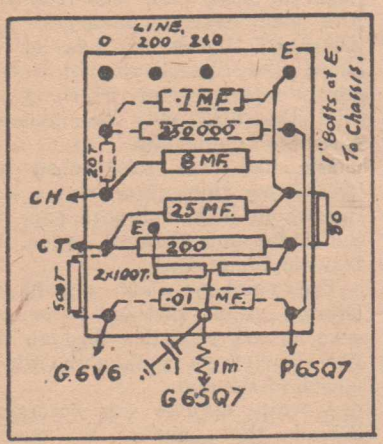
The Coils

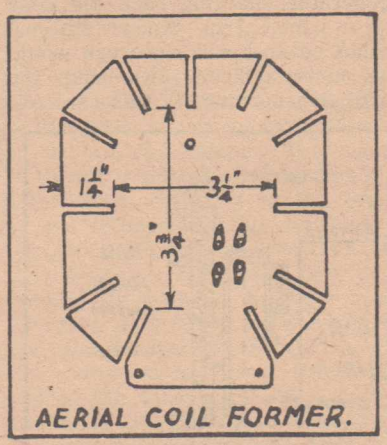
As most commercial loop aerials are designed for portable receivers they are rather small, so I usually wind my own to a larger pattern. The aerial coil for this receiver was wound on a 3/32-inch thick lacquered card cut as shown in the sketch. Using 27 S.W.G. D.C.C. wire, 34 turns were required for the grid coil. A 6-turn aerial coil was wound on the former first to allow the use of an external aerial if desired. The finished size of the coil was 5½ in. wide and 6 in. high, and the card was extended below the coil to allow it to be bolted to the chassis. A stay was fitted from the top of the gang to the upper part of the coil to steady it. The exact number of turns required may vary slightly and it is best to check the coil using a grid-leak detector and service oscillator to see that it tunes over the whole band.

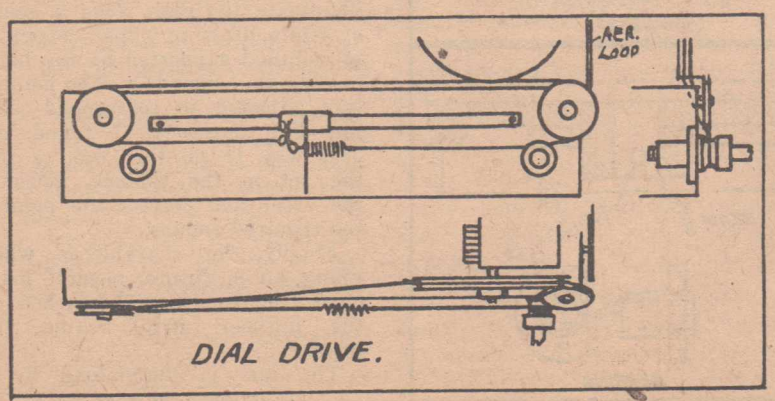
This should finally be done with the coil and condenser mounted in position on the chassis as the adjacent metal will reduce the effective inductance slightly. The completed winding should be lacquered to make it rigid.



Rear view of the chassis tucked into its cabinet.







The oscillator coil was an R.C.S. iron-cored unit (any other coil having an adjustable iron core would be suitable) and was mounted horizontally under the chassis—bolt the can in place first and insert the coil after. The adjustable core is necessary to allow the coil to be matched to the aerial coil.

The intermediate transformers were standard iron-cored units.

Alignment

The procedure for lining up the intermediate transformers is probably familiar to all but a word about the procedure for adjusting the tuning and oscillator sections may not be amiss. I have found the following procedure the simplest—

(1) Set the adjustable padder about one turn out from maximum capacity.
(2) Set signal generator to 1000 kC/s and adjust the oscillator iron core until maximum signal is obtained. (Rock gang slightly to keep the signal in tune.)
(3) Adjust aerial and oscillator trimmers at 1400 kC/s.
(4) Set signal generator to 600

(Continued on next page)

(Continued)

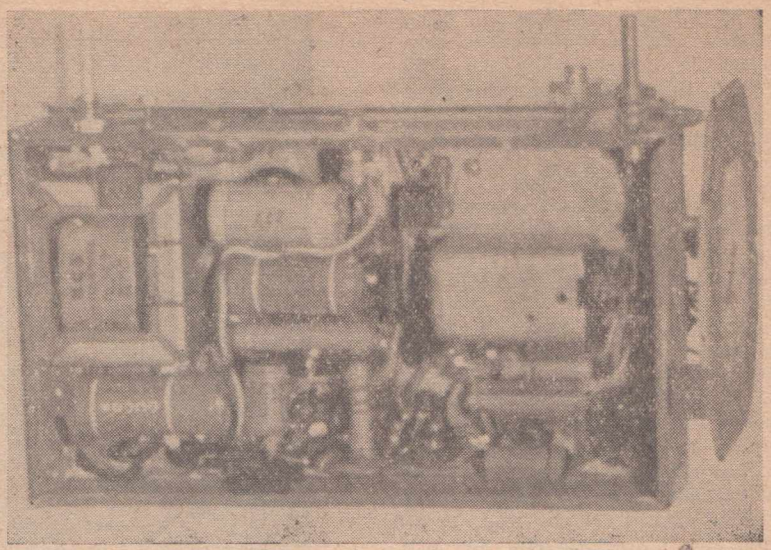
kC/s and adjust for maximum signal at this frequency by adjusting the padder and rocking the gang.

(5) Repeat 2, 3 and 4 at least once more (preferably twice).

If this procedure is carried out correctly the aerial and oscillator will be correctly aligned at 1400, 1000 and 600 kC/s and the errors between these points will be very small.

The Dial

The dial movement was of my own design as there is nothing suitable available. The drum and pulleys were as shown in the sketches, the slider bar was a piece of ¼ in. x $\frac{1}{16}$ in. steel, and the slider was a piece of tinplate bent to slide smoothly along the bar. A wire bent into two loops as shown and a pointer were soldered in place to complete this part. By placing the loops slightly out of line any slack between the bar and slider is taken up without excessive friction. The main drum being 2⅞ in. diam. at the bottom of the grooves gives a pointer travel of about 4½ inches. The sketch shows the method of threading the dial drive cord which is taken one complete turn round the knob spindle pulley.



Underneath view of the wiring, showing the snug assembly of the components.

The dial scale was made by calibrating the set using a signal generator, marking each 100 kC/s on a paper strip. Known stations could be used but the work would be more difficult. Knowing the available opening, in this case 5½ ins. x 1½ ins., the dial was drawn, principal stations lettered in, and the whole traced, using Indian ink. Next a thin contact print was made on sheet film. The resulting film was nearly opaque, except where the Indian ink has left it clear. The film should not be too dark, or the pointer, which is behind the film, may be invisible when the lamp is out.

The film was sandwiched between two thin glass plates and the whole is bound with tape at the edges and clamped inside the front of the cabinet.

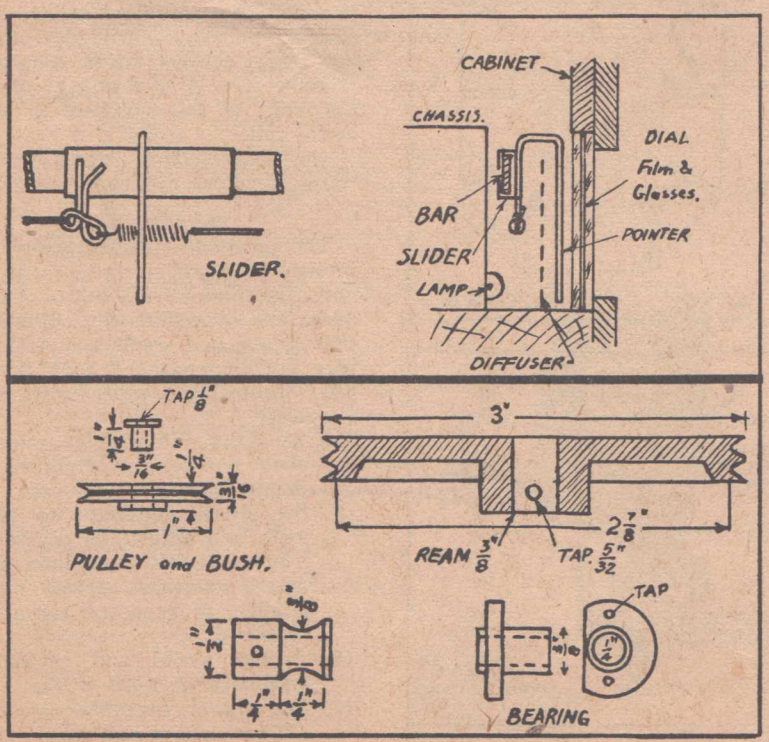
The pointer, which should be painted some distinctive colour, such as red, is visible through the two clear strips running the whole length of the dial.

A white diffuser was necessary behind the pointer to evenly illuminate the dial. This is made of white drawing paper cemented to celluloid supported by the bolts holding the slider bar. The pointer was adjusted to correspond with the dial markings. I found the best way to do this was to put the set in the cabinet, measure the error and correct the pointer the required amount.

Finally, for convenience when lining up in future, several principal frequencies were marked on the diffuser strip behind the pointer.

The dial is illuminated by a

(Continued on page 28)



LOUDSPEAKER BAFFLING

IN a speaker system, the baffle or housing plays a part as important as the speaker itself. In order to understand the function of a baffle, first assume a speaker operating without a baffle. At low frequencies as the cone moves back and forth, there is ample time for the air to move around the edge of the speaker to equalise the pressure without radiating sound. To avoid this effect, the speaker may be mounted on a baffle, which in its simplest form is a plane flat surface increasing the length of the acoustic path from the front to the back of the cone. This path should be not less than ½ wavelength of the lowest frequency it is desired to radiate. In some applications a speaker may be set into a wall, thus making a whole wall a baffle but, in this case, the back of the speaker must open into a large volume of air or the enclosure becomes a closed-back housing.

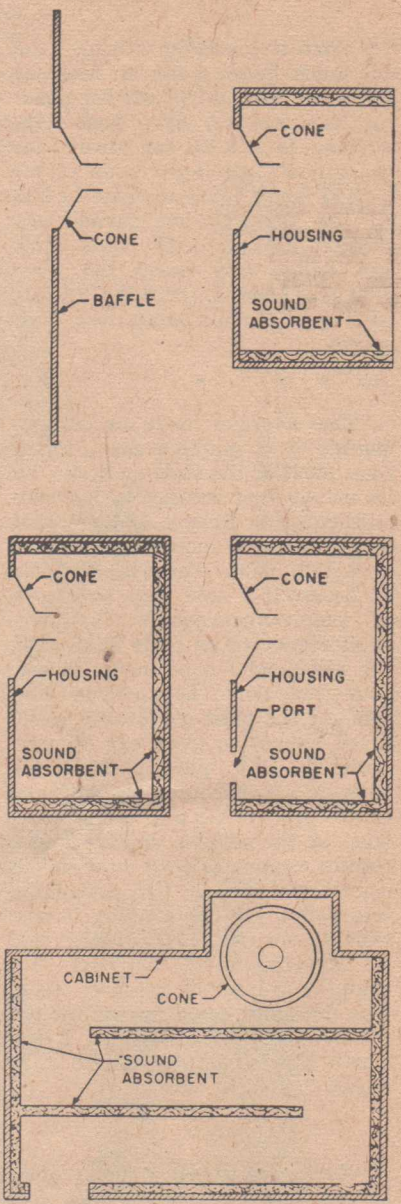
A flat baffle may be folded into an open-back housing, effecting a considerable reduction in space at small sacrifice in the length of the acoustic path from the front to the back of the cone. Here reflections between parallel interior surfaces may cause resonances in the low-frequency region that seem at first to enhance the bass in music. After a while, the listener becomes conscious that only a narrow band of frequencies are thus enhanced and every bass note seems to "touch off" the resonant frequency. Such resonance in the speech band makes speech "boomy." Resonance may be avoided by using non-parallel surfaces or by placing sound-absorbent material on at least one of each pair of parallel surfaces.

The closed-back housing is different from both the flat baffle and the open-back housing in that there is no acoustic path from the front to the back of the cone. In this case, low-frequency cut-off is determined by the volume of the housing taken together with the mass of the cone assembly and the compliance of the cone suspension for the speaker used. Considerable economy of space over the open-back housing may be effected. But, here again, parallel surfaces may require treatment to prevent resonance.

The acoustic phase inverter or "bass reflex" housing is a variation of the closed-back housing, employing a pipe or hole coupling the enclosed cavity to the exterior. The sound issuing from the "port" will be in phase with the sound radiating from the front of the cone at some low-frequency, thus producing a peak in the response. With a given speaker and volume of housing, the frequency and magnitude of this resonance increases as the size of the port is increased. It is, therefore, possible to adjust the resonance frequency to compensate for speaker deficiencies occurring above the fundamental resonance of the speaker. In this case, as in other types of speaker housings, parallel surfaces may require treatment to prevent resonance.

The acoustical labyrinth is an absorbent-walled, open-ended tube, one end of which is coupled tightly to the back of the speaker, folded to fit into the cabinet. The mass of the air in the tube acts as though attached to the back of the cone at low frequencies, thereby lowering the fundamental resonance of the speaker system, and thus extending its response to lower frequencies. At a frequency for which the tube is a half-wavelength long, the sound issuing from the open end of the tube is in phase with, and adds to, the sound radiating from the front of the cone. Adjustment of these values permits compensation for deficiencies in the low-frequency response. Note that this is the only system of those described that lowers the fundamental resonance of the speaker.

The housings described above may be modified by the use of distorted shapes or the addition of elements to produce special effects. Many of these effects depend upon the use of resonance to make up for deficiencies in bass response and, in the hands of skilled designers, this attack may result in improved performance for a given space.



—Extracted from an article on speakers by Angeirne and Anderson in "Audio Engineering," (U.S.A.).

AMONG OUR READERS

Further news and views from subscribers.

"When it comes to writing I am not much good. I am an amateur and have been on the air for about eighteen months, have been subscribing to A.R.W. for about four years now, and hope to do so for a good many years to come. I like all the features but favour any subject dealing with ham radio and enjoy very much the Ham Notes."—Leon J. Durkin, VK7JP, 55 Regent Street, Sandy Bay, Tasmania.

* * *

"The average ham or experimenter is a married man, therefore, most of the time, is broke. Or let us say that because of his commitments his finance is such that he is unable to experiment beyond a certain field. Perhaps it would be better if I said that the scope of most experimenters is somewhat restricted by their finance. In the past, and I hope in the future, your magazine has shown how some of the most useful and sometimes expensive gear can be constructed with parts which the average experimenter has on hand or can procure for a small expense. Most of the articles described give results comparable to high-priced commercial gear. By continuing this policy you are making it possible to not only broaden the field of experimenting activity, but bringing it into the reach of many who normally could not afford it." —Vic. Reeves, VK5KR, 72 Kenilworth Road, Parkside, South Australia.

* * *

"Radio has been my hobby since before I left school. I have just passed the A.O.C.P. exam and hope before long to have a signal on the air from my own rig. Your magazine is very helpful and a constant source of reference. Don Knock's notes are read with interest and are a guide to newcomers to maintain clean amateur operating. The editorial and all articles are appreciated. It is not often that VK6's are mentioned in Ham Notes, or the part played by some VK6 hams when telephone lines around Mt. Magnet and Meekathara were washed away by floods."—A. D. Hawksworth, Bruce Rock, West Australia. (Always pleased to make room available for news about VK6's if there is anyone keen enough to send it along. —Ed.)

* * *

"Cannot more manufacturers be persuaded to publish full lists of their products from time to time, as did R.C.S. in a recent issue? Manufacturers sometimes have full lists printed for their own distribution, but these only circulate through their own wholesale channels and seldom get to where they are appreciated, that is, the home of the ham, the amateur set builder and to the servicemen in firms not handling that particular brand of components. Almost everyone selling radio, making radio, or, like myself, servicing radios, reads your paper. Believe me these full lists are invaluable. I could quote hundreds of instances where my filed lists taken from papers such as yours have helped my workmates, customers and myself."—W. R. Gilson, 134 Campbell Street, Rockhampton, Queensland.

* * *

"I am a horticulturist. I like your publication because your articles are good and the schematic diagrams are clear and well drawn. I have been reading Radio World for many years. In fact, I was a contributor to Wireless Weekly and built many of its circuits. I think the best one was Peter Adams' £50 prizewinner."—James H. Power, The Shack, Birdwoodtown, Victoria.

* * *

"I think you are really trying to please most of us, but falling down in one or two issues by making full feature articles of manufactured kit-sets. No doubt these kit-sets are good in their particular field but please don't devote almost the whole of any one issue to them. In the main your publication is a good one, but please remember the man who may be aiming a little higher in the line of high-fidelity, give us more really constructional items and, lastly, more reprinted items from overseas magazines, notably American, because our practice seems to closely follow that line." —E. Coleman, 2 Gregory Street, Granville, N.S.W.

* * *

"Radio with me is a hobby. The programmes, generally, leave me cold. I don't like a box of somebody's Crispy Crunchies rammed down my neck in return for a couple of records of modern (so-called) music. Hence when I listen it is mainly to symphony concerts from the A.B.C., so I like good reproduction. Some time ago I used to live at Campbelltown, about forty miles from Sydney. My mouth still waters when I think of reception up there. I used a 1J6 one-valve and Mr. Keast could not print a call-sign that I couldn't get. Now, with a five-valve set I can't hear as much, because I can't get all the pedal wireless sets from Charleville to Hall's Creek, but I can get vacuum cleaners, electric motors and loose lamps in street lights very distinctly. I do wish I were A. G. Hull, able to look up from his bench on to gum trees and salt water. I get a beautiful view of the tarmac at Mascot, and the screech of the circular saw when I can hear it above the din of the aircraft motors, for I am A.N.A.'s leading hand in the carpenter's section. I like the ham stuff from good old Don 2NO. What a good old scout he is, always the gentleman. Then comes Paul Stevens, DuFaur and all the others. I have enjoyed all the articles on amplifiers, especially the last one.—'In Search of Fidelity.' Makes one think a lot."—C. A. Rose, 178 Old Kent Road, East Bankstown, N.S.W.

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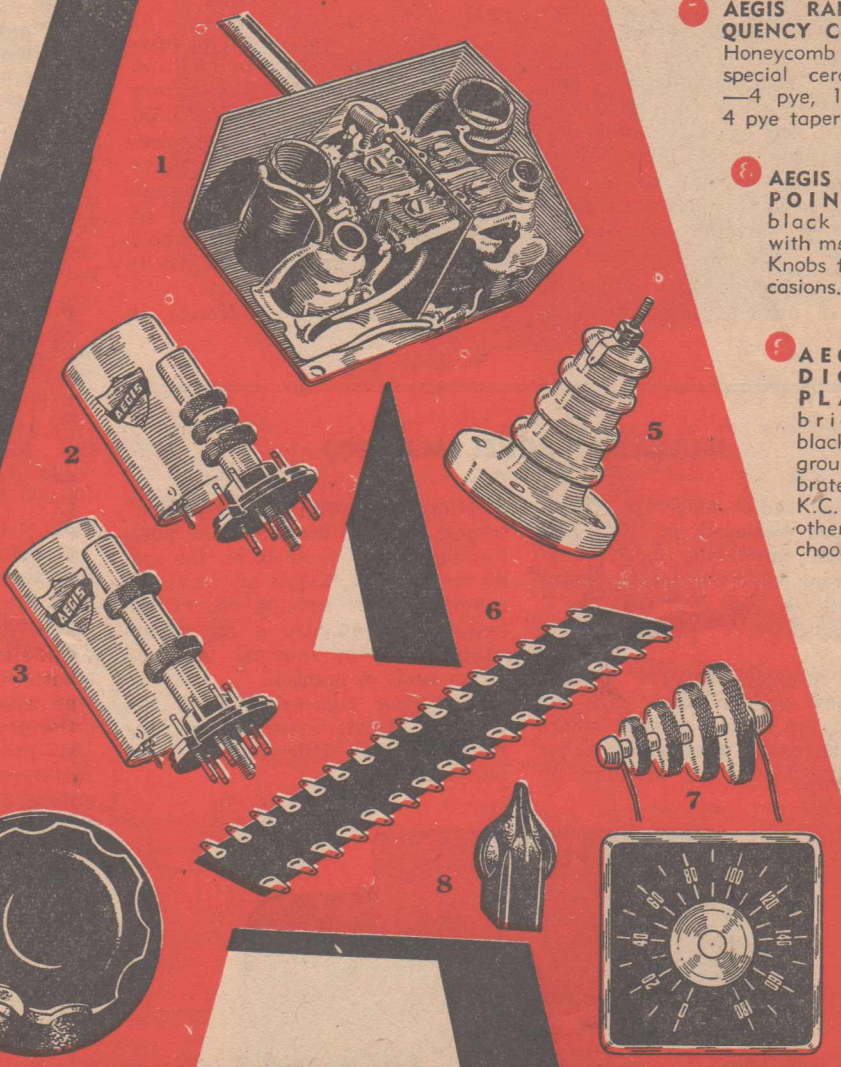
Capital "A" is appropriate for Aegis components—for their quality is second to none! Here are some typical examples from the comprehensive Aegis range, each one designed and made to exacting standards from first-grade materials.



5 **AEGIS CERAMIC INSULATORS.** Full range of stand-off and feed-through types for all needs.

6 **AEGIS RESISTOR STRIPS** 48 lug, 24 lug and 6 lug (with upright mounting lugs).

7 **AEGIS RADIO FREQUENCY CHOKES.** Honeycomb wound on special ceramic rods —4 pye, 1 pye and 4 pye tapered.

8 **AEGIS TUNING POINTER** in black bakelite with metal insert. Knobs for all occasions.

9 **AEGIS INDICATOR PLATE** — bright on black background, calibrated 0-180 K.C. — many other types to choose from.

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The American Radio Industry

Some interesting facts and figures.

MR. Bond Geddes, Vice-President and General Manager of the American Radio Manufacturers' Association, recently gave evidence before a House of Representatives' Committee on the state of the American radio industry. The figures given show the rapid expansion of the American radio industry in the years immediately following the war, and will be interesting news to many engaged in the corresponding industry in Australia.

The American R.M.A. comprises about 325 principal manufactuers of all types of radio and electronic equipment, including 193 set makers (as compared with 57 prewar), and of these about 65 are major firms.

The factory employment is estimated at 300,000, and in addition there are 1,500 radio distributors and wholesalers and 35,000-50,000 dealers. With 40,000-50,000 servicemen, the total industry employs about half a million. The average hourly wage for all types of labour, skilled and unskilled is now $1.19 (4/6), against $0.68 (2/8) prewar.

Radio business in America is composed mainly of scores of small parts suppliers and set makers on a modest scale. It is highly competitive, to the point of being "cut-throat," and only about 50 of the 290 manufacturers have survived. Conditions today are at their competitive peak, owing to the entrance of many new firms into the business.

Radio set ownership among the American people is estimated (according to the F.C.C. Report) at 73,000,000. There is at least one radio in 91 per cent. of homes, and the average home ownership is two sets.

In 1947 the industry had a record production of 18 million sets of all types compared with the previous record of 16 million in 1946, the first post-war year of full production. The estimated value of this production is $1,271,400,000 or about £254,300,000.

F.M.

A year ago the F.C.C. predicted that there would be more than 700 F.M. stations on the air by the end of 1947. Actually there are 379 sations in operation. Largely as a result of the inability to secure network music on F.M. broadcast programmes, the industry's 1947 production was only 1,150,000 receivers, or less than half the anticipated figure.

Television

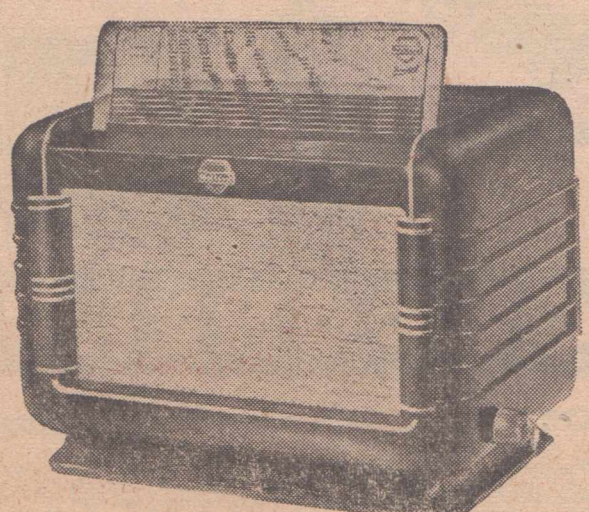
The production of television receivers in the last five years has totalled 183,000, but nearly all this quantity has been produced in 1947. Estimates give a total of 500,000 receivers to be made in 1948, with a value of nearly $250,000,000.

MULLARD MODEL MAS1000

Of the radio receivers which have been released in 1948 the one which shows the most interesting and effective improvement in detail is the Mullard model MAS1000.

This receiver features an entirely new style of dial, with the scale on top of the cabinet where it can be easily seen from either a sitting-down or standing-up position. Known as "Eye-line" tuning, the dial scale and the positioning of the controls on the end of the cabinet makes an ideal arrangement for bedside use of the receiver. It is also a handy arrangement for normal use on either table or mantel.

Featuring high-gain valves and efficient circuit arrangement, the receiver is a splendid all-round performer.



The Mullard MAS1000.

The Inter-Com.

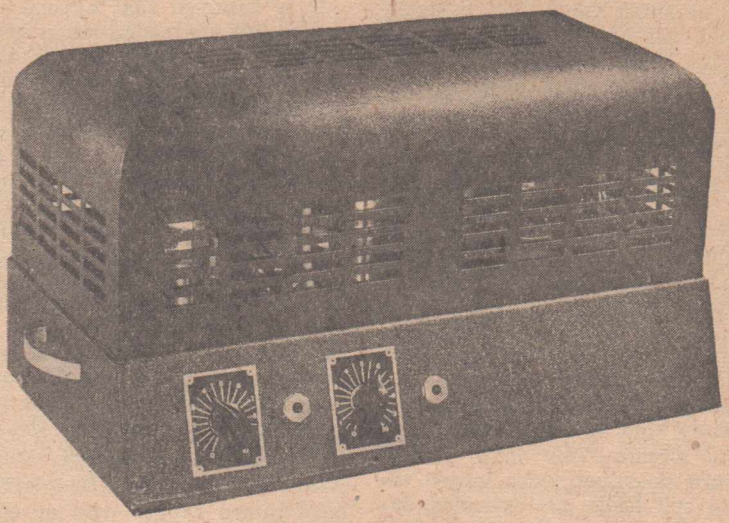
In the Inter-Com circuit in the June issue there were two minor errors in the drawing. The 1 meg grid-leak of the 6SJ7 ran too far and connected up with the suppressor.

Down at the bottom of the circuit a line did not run far enough, so that the buzzers and bezels appear to be connected in series. They should be connected in parallel to the six-volt supply.

Exceptional 20-watt Amplifier

Described by Technical Staff, Australian Radio College.

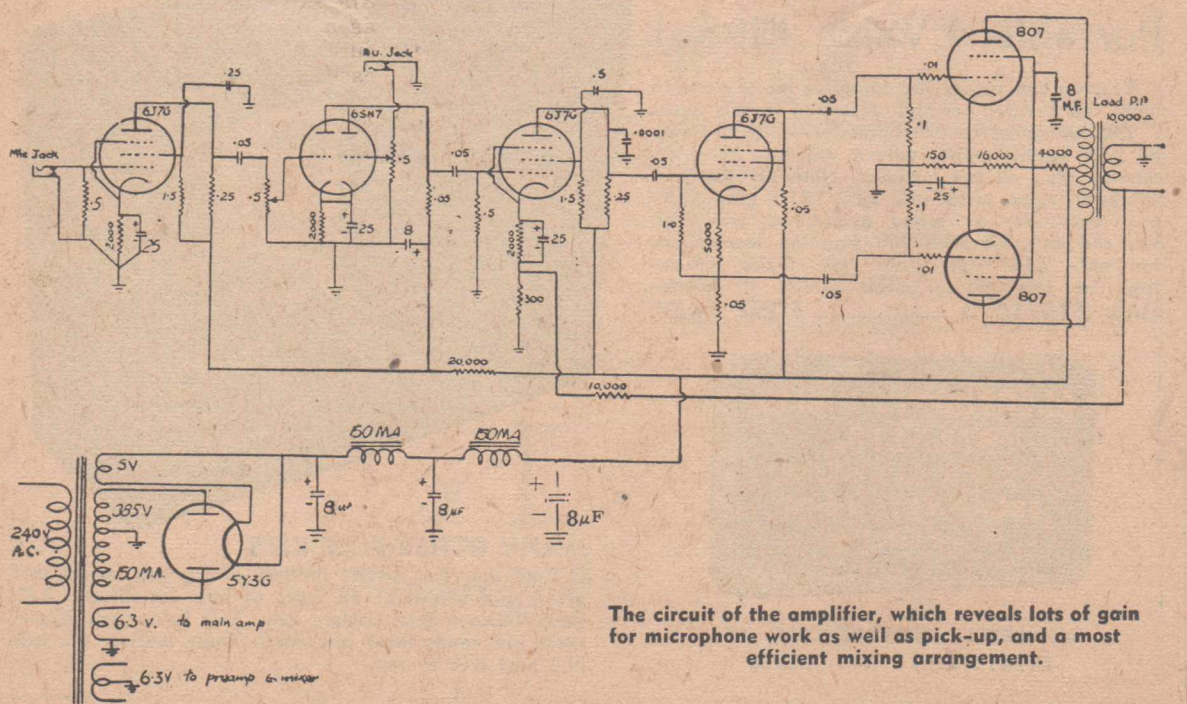
THE following is a description of a 20 watt, high fidelity type of amplifier, as used by Mr. J. Lawler, of our technical staff, for his own personal use. Mr. Lawler is an enthusiast on sound reproduction, and you may be assured that this amplifier is really something "out of the box." Furthermore, all parts necessary to build it, together with special chassis and cover, are available if required.



Technical Details

This amplifier may be recommended to anyone requiring an instrument which is capable of providing ample power output for average uses, combined with excellent tonal quality, and providing ample gain to allow it to be used with any type of microphone or pick-up. The amplifier has the following line-up of valves. Push-pull 807's are employed in the output stages, supplying an output of approximately 20 watts. A 6J7 is used as a phase inverter to supply the out of phase signal to the output valves. This is preceded by another 6J7 voltage amplifier. The next valve is a twin-triode 6SN7. If you refer to the circuit diagram you will notice that both plates are fed through a common load resistor which is coupled to the grid of the 6J7. One section of the 6SN7 is used as an input channel for the pick-up, while the other section receives its input signal from the plate circuit of the 6J7 used as a preamplifier stage for microphone work. By using the 6SN7 in this manner it will operate as a mixer stage, and so, will allow the fading of music in over the voice and vice-versa. Inverse feedback is used in the amplifier, the feedback volt-

(**Continued on next page**)



The circuit of the amplifier, which reveals lots of gain for microphone work as well as pick-up, and a most efficient mixing arrangement.

20-WATTS

(Continued)

age being taken from the voice coil of the speaker, and applied back to the cathode circuit of the first amplifier valve. This feedback circuit was found to give excellent results, and contributes a great deal to the excellent frequency response of the amplifier. The input jacks used are of the shorting type which close the grid circuit when the plug is removed, thus preventing any instability due to open grid circuits. This unit is ideally suited for both horn and cone speakers of the permag. type. The output transformers of which should be mounted on the chassis, the voice coil leads being extended. This method is preferable to extending the plate leads, as extremely high voltages exist in the plate circuit. This high voltage hazard does not exist where the voice coil leads are extended, because the voltages in this part of the circuit are of a low value. The complete amplifier is housed in a black crackle finished case, equipped with nickel plated handles to facilitate lifting. Altogether it presents a most pleasing appearance.

Hints on Building

It is assumed that anyone who undertakes the construction of an amplifier of this nature, will have had previous experience in building receivers and amplifiers, as it is necessary that certain precautions be taken in the wiring and placement of parts. If these precautions are not observed it is quite possible that the amplifier will hum and be unstable in operation. When deciding on the layout of filter chokes and power transformer it is advisable to mount the chokes at right angles to each other, and in relation to the power transformer, and at the same time keep them well away from the amplifying stages. In wiring the amplifier, it is advisable to run some bare tinned copper wire of about 16 or 18 gauge around the chassis to form earthing points.

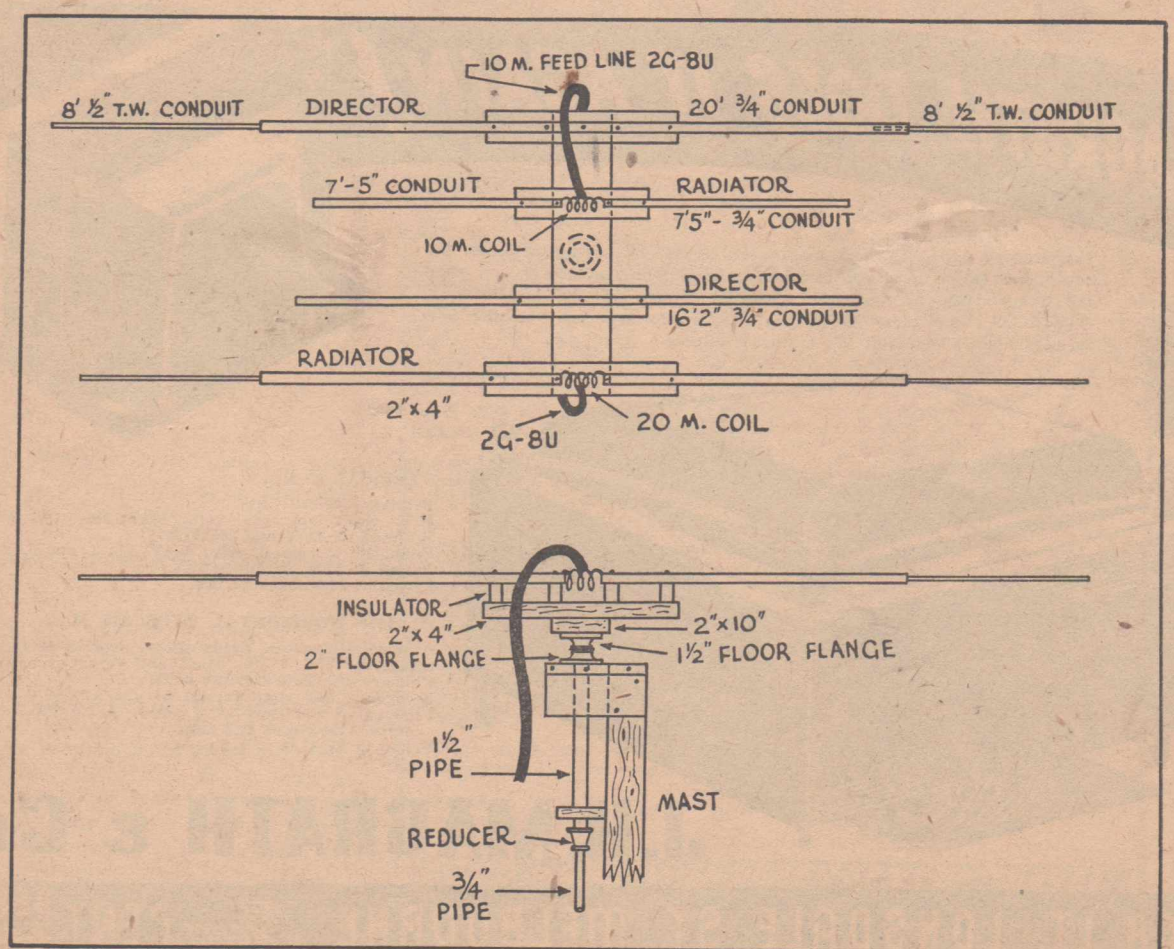
Under no circumstances should lugs for earthing purposes be placed under transformer bolts, as this may cause hum. Any wires carrying A.C. should be tightly twisted, and kept well away from any grid or plate leads. In the original amplifier, no trouble was experienced with instability in the 807's, if instability does occur, a cure may be effected by placing 100 ohm non-inductive resistors in the screen circuits of the 807's the junction of the two resistors being by-passed to earth with a 0.01 mica condenser. If hum trouble is experienced in the preamplifier stage it may be due to the valve. Changing the valve often cures the trouble. Some individual valves appear to be more prone to cause hum when used as preamplifiers. If the above points are borne in mind when constructing the amplifier no trouble should be experienced in getting the equipment to operate satisfactorily.

"Long Shot" Economy Beam

THIS beam has been used successfully since 1937, and owing to its low cost and results, warrants passing on. Starting with tower construction: The main feature of this antenna is that you can bring it down to you—you don't have to go up to it. First pick a spot close to transmitter location. Then get a railroad tie (one of the 9 ft. type that they use at a switch); use a post hold digger to dig a five or six foot hole; insert railroad tie, leaving about 3 or 4 feet out of ground. Then get four 2 x 6's and splice them together, making two 2 x 6's, 32 feet long; bolt them together at top. Then start fanning them out, using spacers every 3 or 4 feet so that at bottom 2 x 6's will straddle railroad tie. At top of mast put a 2 x 10 shelf that protrudes about 10 inches to one side (see sketch); drill a 2-inch hole in shelf so that 1½ inch pipe is about 2 inches out from pole; place a 2 inch pipe flange over hole; fasten it with screws; then about four feet down pole place another shelf and drill same type hole to match top hole and cover with flange, same as above, on bottom of header "exactly centre" place a 1½ inch flange into which you screw a five foot length of 1½ inch pipe tightly; run pipe through holes in shelfs, then use a 1½ to ¾ inch reducing coupling. Continue down pole with ¾ inch pipe to a spot just above head high. There put another shelf to hold an awning gear box with which you make right angle turn. (These gear boxes are small and are self-locking at about 8 to 1 ratio.) From gear box run a ⅜ rod or pipe through shack wall, inside put a wheel with a handle on it (similar to old coffee grinder); leave enough space between wheel and wall to put about 15 turns of

Since W9NLP described in "QST" a year ago his "inductively coupled" method of feeding a compact rotary array for 14 and 28 mC/s, the scheme has become very popular with amateurs everywhere. This description is from "Rolly" himself.—D.B.K.

(Continued on next page)



BEAM

(Continued)

string around rod, to which you tie a plum bob which acts as a direction indicator.

If you can't go direct into shack from tower, you can make any number of turns using awning gear boxes to get there, but keep ratio small. Pin all connections when tower is ready. To raise, fasten guy wires about 4 feet from top of mast, also eyebolt for block and tackle. Then straddle railroad tie with 2 x 6's and drill bottom hole about one foot above ground, drill through 2 x 6's and railroad tie, using ½-inch bolt or larger. Hook block and tackle as high on house as possible and pull array into vertical position, using guy wires to steady it; when all centred, drill top hole in railroad tie for top bolt. After this is done, all you have to do to lower it is remove top bolt and lower to ground to work on it. Don't worry about tuning it, as it is at its peak for half wave off ground operation. You will be amazed at the low noise level for receiving; it can also be tuned against ground to work on 80 metre band; it is flexible and versatile.

If either antenna does not load, put a small variable condenser in series with the centre conductor of the RG8U coaxial cable at the transmitter end. A more efficient primary coil can be made by stripping the outer braid from coaxial cable and by using the polythene-insulated inner conductor between the turns of the antenna coil.

The most important feature of the close-spaced 2 element (antenna-director) rotary beam antenna to be described is its total low cost of only approximately 50 dollars.

The electrical details are as follows:

(a) Twenty metre antenna, 31 feet long or 15 feet 6 inches per side with space at centre for the loading coil to be described.

(b) Twenty metre director, 33 feet long or 16 feet 6 inches per side spliced or bolted together at centre.

(c) Spacing between twenty metre elements is 7 ft. 3 ins.

(d) Twenty metre loading coil consists of eight turns of ¼ in. copper tubing 2 ins. in diameter spaced $\frac{3}{16}$ of an inch between turns. Over the centre of this coil and in the grooves between the turns is tightly wound five turns of spark plug wire which connects to RG-8/U coaxial cable feed line.

(e) Ten meter antenna 14 ft. 11

ins. long or 7 ft. 5½ ins. per side with space at centre for loading coil to be described.

(f) Ten metre director 16 ft. 2 ins. long or 8 ft. 1in. per side spliced or bolted together at centre.

(g) Spacing between ten metre elements 3 ft. 4 ins.

(h) Ten metre loading coil same as twenty metre coil except has five turns of copper tubing and three turns of spark plug wire. Feed line is also RG-8/U cable.

Material required for header assembly is as follows:

(a) Header, 2 ins. x 10 ins. or 2 ins. x 12 ins.—7 ft. 6 ins.—1 required.

(b) Twenty metre crossarms, 2 ins. x 4 ins—6 ft. long—2 required.

(c) Ten metre crossarms, 2 ins. x 4 ins.—4 ft. long—2 required.

(d) Twenty metre elements, ¾ in. and ½ in. thin wall conduit—2 10 ft. lengths of each required.

(e) Ten metre elements, ¾ in. thin wall conduit—4 10 ft. lengths required.

(f) Copper tubing sufficient for loading coils described above.

(g) Spark plugs wire sufficient for loading coils.

(h) Stand-off insulators—16 required.

(i) Miscellaneous sizes and lengths of carriage bolts and lag screws for assembly.

Header construction details are as follows:

Twenty metre elements are made from thin wall conduit; first length is ¾ in. 10 ft. long; second length is ½ in. 8 ft. long. The connection between the ¾ in. and the ½ in. conduit is made by splitting the end of the ¾ in. with a hacksaw fitted with two blades to give a wide slot 5 in. long. Put a brass garden hose clamp over the split and squeeze to fit tightly around ½ in. conduit. Ten metre elements are just ¾ in. thin wall conduit cut to length.

THE EFFECTS OF SUPERSONICS

AT a recent meeting of the Royal Society of Arts in England, Sir Ernest Fisk announced that E.M.I. had been successful in recording frequencies up to 20,000 C/s on wax discs. In view of the fact that even the lissom ears of the human young can respond to nothing above about 16,000 C/s, whilst those of aged dodderers like myself have normally a cut-off in the neighbourhood of 10,000-12,000 C/s, your comment on this statement might be a ribald "So What?" But when Sir Malcolm Sargent and others who know both their musical and their acoustic onions maintain, as maintain they did, that even higher frequencies may have to be recorded in order to obtain complete realism in reproduction you begin to do some thinking. At first blush the idea seems utter nonsense: how can what we hear be affected by the presence or absence of frequencies that we can't hear? And then something at the back of your mind whispers that $f^1 - f^2 = f^3$; in other words, two supersonic frequencies may produce an audible beat frequency. It seems quite possible that when an orchestra is in action the supersonic upper harmonics of certain instruments do produce such beats. If they are absent from an electro-mechanical reproduction, it doesn't sound quite real.

If the original supersonic frequencies are, say 19,000 and 21,000 C/s the beat will be at the audible frequency of 2,000 C/s. Assuming that there is such a beat and that I record and reproduce up to, perhaps, 6,000 C/s, why should not the beat frequency of 2,000 C/s be adequately brought out, even though the generating frequencies are removed by the cut-off at 6,000 C/s?

The answer is that non-linearity is required somewhere in the system to produce the beats. If the recording microphones, amplifiers and cutting heads are free from non-linearity distortion the beat frequencies will not be generated as such in the record, nor will they be present in the reproducing equipment if it is similarly free from "amplitude distortion." Not until the original supersonic frequencies reach the non-linear device known as the ear will the audible beat frequency emerge.

So if you cut off at 16 kC/s in recording you must do your mixing and introduce some non-linearity before or in the cutter head if you want to record those beats. Which poses the question: If one records only the whole gamut of audible sounds how much non-linearity distortion should be introduced for realistic reproduction?

—"Diallist" in Wireless Wirld, (Eng.).

An Angle On High-Fidelity

IN an editorial in "Audio Engineering," (U.S.A.), there appears an interesting controversy about high-fidelity reproduction. We quote: "From England, a British engineer writes that we shouldn't call an amplifier "high-fidelity" unless the harmonic distortion is kept down to around one-tenth of one per cent and the frequency response flat to within one db from 20 to 20,000 cycles. Another writer maintained that his amplifier had to be designed to boost both lows and highs far above the middle register to give him satisfactory reception. Another has written that what we really want is pleasing reception, whether or not it is high fidelity, and cites the fact that even a pleasant voice might sound awful if the speaker got too close to the mike, especially if exactly reproduced.

All this has its parallel, of course, in other fields. A couple of decades ago, the same controversy arose in photgraphy. Portrait photographers didn't like high grade anastigmat lenses because they brought out every pore and blemish in the skin, details which were not normally noticed when directly viewed by the eye. A fad arose for partially corrected lenses, chiffon diffusers, and other means of softening the details. In some cases, these expedients did give more pleasing pictures, but these devices have largely disappeared with the advent of better photographic materials and improved techniques in lighting and finishing processes.

Because a reduction in sound power causes a far greater decrease in the loudness of the lower frequencies (and, to a lesser degree, the higher frequencies) than those in the middle register, due to the characteristics of the human ear, it has been argued that some compensation is necessary when reproducing sounds at a lower power level. This is not necessarily true. The sound power developed by a large orchestra, for example, is far greater than that produced by the average radio. But the orchestra would normally be spreading this acoustic power over a much greater area than that covered by a home radio when operating in a living room. Thus the radio could reproduce in the home orchestra music with much less sound power, yet give the same degree of loudness as would be experienced by the listener to the orchestra at some point in a large auditorium. Therefore no bass boost is necessary unless the listener operates the reproducing equipment so that the music is not as loud as it would be if he were listening to the orchestra directly in an auditorium.

Engineers who test loudspeakers are often somewhat amused at the efforts of designers of amplifiers to make the electrical response flat to within a fraction of a db over a wide frequency range, because the speakers to which the amplifiers connect have such jagged response curves. Actually, if uniform frequency response were the only consideration, the care would not be worth the trouble. But in making the frequency response flat, distortion is also reduced, so that a fine amplifier does enable better reproduction from the same speaker than could be secured from a mediocre design.

CALLING CQ!

By Don B. Knock, VK2NO

"CQ," U.S.A., tells of a case of particularly enthusiastic VHF operation. OK1MI in Czechoslovakia is Jira Jandova, an XYL. Recently she took her 56 mC/s phone rig to hospital when expecting the stork and kept skeds with her OM, OK1EJ. He first heard his little daughter's voice thus by 56 mC/s phone.

There's a catch in that method of tuning over the 144 mC/s band by crystal-locking the converter oscillator and tuning the I.F. between 14 and 16 mC/s. The receiver used for the I.F. function must be perfectly screened against signal pickup in the congested region between 14 and 16 mC/s.

There is limited chance nowadays on interstate QSO's on 6 metres because of waning activity on the band in favour of 2 metres. That is because of a natural inclination to give a new toy a workout. Result is that interstate contacts on 6 metres now look like being even more sporadic than the E medium which makes such contact possible.

28 mC/s diehards are leaving their happy hunting ground for pastures anew. VK2's who were "all for ten and wouldn't give you tuppence for twenty" have appeared in force on that band. They have appeared, too, replete with rotaries rebuilt from their previous ten-metre jobs. It is ample evidence, if such were needed, that 28 mC/s is slowly but surely on the wane as the sunspot maximum passes. A time will be reached in a year or so when desultory DX contacts only may be expected until around 1957. Whether you and I will then be interested in ten-metre DX is anybody's guess.

The 7 mC/s men who virtually live on that band are finding also that Old Sol is playing apparent tricks at night. In reality it is normal . . . merely 1938 conditions repeating themselves. At present the band is not productive nightly of those consistent S9 signals inside a range of about 400 miles. VK2's, for example, are heard wailing loss of familiar contacts and that "the old band folds up at night." All that is workable is interstate stuff. Examination of logs around 1938 will show clearly that this extended skip is far from being unusual. Of course, no doubt it IS a bit annoying to "Round Table Termites."

Westralia's "Radio Listening Post" refers in the amateur news section to 144 mC/s activity on the part of VK's 6KW, 6RU, 6DF, 6GB, 6RO and 6LW. Much fun is being had on the band in and around Perth. T'would indeed be a shattering event were one of the Westralians to hook up next summer with an Easterner on 144 mC/s. Less unlikely things could happen, considering 50 mC/s experiences; already VK's 2WJ and 2VW have been heard in Brisbane on 144 mC/s.

Those excellent B38 receivers, of which a few were sold ex Navy in Sydney a year or two ago, and snapped up at £25. Known as the R208, they are advertised in Brit-

(Continued on next page)

WIRELESS INSTITUTE — BALCOMBE MEETING

The monthly meeting of the Peninsular sub-branch of the Eastern Zone was held at Balcombe on July 12, 1948. Those present were V3RR, VK3GE, VK3KT, VK3ML, VK3ABO, VK3UG and seven associates.

The President (3RR) spoke of the excellent work done by the Eastern Zone on the emrgency network recently in co-operating with D24 in a search for a lost child.

A Technical sub-committeee was formed consisting of VK3RR, VK3KT, and Lieut. Roberts.

The secretary reported that a class conducted for those studying for their amateur station licence was progressing and it is expected that six members will sit for the October examination.

Through the activities of the President, several city business houses had donated trophies for the first annual meeting. These trophies would be awarded to those members producing handy pieces of equipment of their own construction.

Copies of a circuit of a Field strength meter-modulation indicator etc., were distributed to those present, and constructional and operational details were discussed at length.

The next meeting will be held at the Signals School on Monday, August 9. Arrangements are in hand for an inspection of VHF aerial arrays in operation at the School.

H. K. LOVE

His many friends in the radio trade and amateur radio circles were deeply shocked by the sudden passing of Howard Kingsley Love on July 29. As managing director of Kingsley Radio Pty. Ltd. and as VK3KU, Howard was known to a wide circle as one of the very best.

I am sure all my readers join me in expressing deepest sympathy to his widow and two daughters.

—A.G.H.

HAM NOTES

(Continued)

ain's "Short Wave Magazine" at £12/10/- and a complete set of spare valves is offered for another £2. What a bargain! Other attractions for G's are BC348's at £18/10/- and HRO's at similar gift prices. Some things may be in short supply in the little Island but certainly not war surplus radio goods. The ads in the American radio magazine, however, really are breath-taking and it isn't good for a VK's peace of mind to read some of them with this and that offered for a few cents or a dollar or two.

—D.B.K.

* * *

If you are planning to use a Foldipole aerial constructed of that excellent Telcon 300 ohm twin-lead, make an engineering job at the centre section, or you can expect trouble after a few weeks of wind etc. Best way is to make a T-shaped splint of perspex or similar material and to bind this, first with poly-tape behind the joint. Then bind over that with strong twine, and dope the lot with Amphenol 912 or similar liquid poly solution. A T-joint made without any strengthening will break somewhere or other after the feedline has been jittering around in the breezes for a while.

* * *

The answer to the selection problem is Number One priority in communication on the 7 and 14 Mc/s bands in particular. "QST" is tackling it from various angles, including single side band technique. One alternative is a receiver with dual conversion from say 3 Mc/s to 175 Kc/s . . . the Englishmen use 110 Kc/s. With the exception of the band-pass crystal filter, the usual crystal filter application is not altogether satisfactory. A good answer for phone is the conversion scheme to a reasonably low frequency (NOT 455Kc/s, but 175 Kc/s or lower) and for CW the inclusion of an audio band-pass filter of the "Heterofil" kind. Yes, those old 175 Kc/s IFT's of yesteryear still have their uses. Moral is never to scrap some things . . . you never know.

* * *

Writing in "RSGB Bulletin," G5KJ points out a few facts about "bandbusting" telephony transmissions. 1. A two-stage transmitter in which the first is a VFO and the second is amplitude modulated, almost invariably produces a considerable amount of frequency modulation. 2. Distortion in a modulator very often imposes high order harmonics on the carrier, giving a broad signal even when the modulation is less than 100 per cent. This is particularly true of over-driven or badly-designed Class B modulators. 3. For 100 per cent. anode modulation of 100 watts input, with a sine wave, 50 watts of audio are required, but with the peaked waveforms of speech, 100 per cent. peak modulation can often be reached with as little as 30 watts of audio. In any case 32 watts of audio will modulate 100 watts with a sine wave up to 80 per cent. 4. A modulated stage should be approximately linear in performance. 5. **Efficiency** modulation systems **cannot** be made to work at high average efficiency . . . all of which is ample food for thought.

It would be a kindly consideration on the part of officialdom if the PMG Dept. would refrain from re-issuing callsigns of deceased amateurs; at least until a decent interval of time has passed. When a familiar callsign goes silent because of the death of the licencee, it goes against the grain to hear it in use again, almost before the first grass shoots have appeared on the newly turned soil. One well-known amateur in this country died recently, and his callsign was in use again by the new recipient less than a month afterward.

CONVERSATION PIECE

Overheard between a recent amateur licencee and an old hand.

R.A.L. "What advantages would I get by joining the W.I.A.?"

O.H. "Well, for one thing you would have the privilege of paying a subscription to the oldest radio club in the world."

R.A.L. "Yes, I know, but what do I gain?"

O.H. "You would have opportunities of giving your views on amateur politics and technicalities at meetings—you might like to discuss crystal control and things like that."

R.A.L. "Crystal control? I'm well past that stage—I have an E.C.O. rig"!

"BEDSIDE 5"

(Continued from page 16)

single lamp, which is fitted in a socket so that it projects through the front of the chassis near the bottom, in the centre.

Performance

The performance of this receiver exceeded my expectations. The tone was excellent, possibly partly due to the cabinet being solid wood with a thickness of ⅜-in. in front (two thicknesses of 3/16-in. ply glued together) and the sides, top and bottom ⅝-in. thick.

At this location, 130 miles from Melbourne, and using the loop aerial only, Melbourne "A" and "B" class stations, and several Tasmanian stations are easily picked up in daylight, while at night the results are all anyone could desire.

PERTINENT PONDERINGS

THERE is a new kind of marathon in vogue—the "consecutive QSO" craze. Two stations, usually one in Europe and the other in this hemisphere, start off with a few daily contacts and discover that a small total has been reached of say 20 or so without missing a day. Some competitive urge prompts them to go on and make it100 contacts, and from there it may grow to 150 or 200. Supposing two such stations do make a couple of hundred "chain" QSO's—what of it? No doubt it is some form of record, albeit one in which mutual satisfaction only is the issue. There's something about it all that savours of the jitterbug contestant, with the difference that the spectators aren't there, or if they are, they are casual and somewhat bored.

* * *

The virus that is amateur radio is likely to remain in the blood through one's lifetime, even if dormant for a decade or so. Witness Australian Old Timer Chas Mclurcan, VK2CM. He, as he then thought, pulled the switches finally around 1927. In 1947 he decided to make use of ex-army gear on 7 mC/s during a Barrier Reef fishing holiday. Things went well, skeds with one or two Southern stations showed Chas just how easy it is to cover distance with a handful of watts, even on crowded bands. Back in Sydney, it was a logical step further to acquire more comprehensive ex-Service gear; offering as it was at more than attractive prices. An Ex RN transmitter was remodelled to take in crystal coverage of 80, 40, 20, and 10 metres, phone and CW . . . and then the bug emerged really from the partially awakened state . . . bit hard . . . so that now the delightfully uncertain stage of "antenna hatching" is the order of the day. The 138 feet Windom antenna was augmented by a coaxial fed dipole, and as VK2CM is known recently to have travelled homewards with lengths of one inch dural tube along the car running boards . . . something "is cooking." A guess that a rotary of some kind is contemplated seems to be in order.

* * *

United Nations Radio now has an amateur station signing K2UN in the 28, 14, 7, and 3.5 mC/s bands. "QST" features the lay-out on a recent issue cover, and the station certainly appears to be the last word in chromium plating and semi-circular operating console design. K2UN should be a useful instrument for promulgation of harmonious ideas making for effective world peace among present and future generations. But one lone station equipped with such motive isn't enough . . . it needs all the amateur stations of the world plus improved facility for International communication. That of course, would mean wider . . . not narrower bands. But what do bureaucrats care about that?

* * *

Chief feature about that "inductively coupled dipole" of W9NLP's is not in any magical properties, but in the shortening of the "overhang" of a beam this designed. It becomes also, a convenient method of coupling to a low impedance line such as 70 or 50 ohm coaxial cable. A 2 or 3 turn link to the line serves the purpose. With 300 ohm line, spaced or ribbon variety, the link coupling or direct tapping on the antenna inductance does not provide a good match. An idea, yet to be tried, seems to be a combination of the centre-loading inductance plus the delta-feed or T-Match method. A really compact radiator, even for 3.5 mC/s, with centre-lading, delta-feed, and end-folding, could be constructed in such a manner without loss of too much efficiency. Also, it should be a better proposition for countering BC1 than the usual long wire of the SWF or end-fed kind.

* * *

Television is about to make a start in Australia, experimentally at first and under PMG and ABC control. The DG of P and T stressed in his recommendations to the Federal Government that TV has valuable features in wartime. No doubt it has in the fighting service, but it is difficult to see where the public variety of TV would be of use in war. London scrapped her TV service throughout the recent war. Australian amateurs can reckon that the advent of TV here is the turning point between ordinary BCI problems, and really formidable obstacles. In time to come we blems that now beset American and British amateurs . . . it takes shall be faced with the same pro- a lot of doing to keep TVI out of the picture. TV receivers essentially have a very wide band-pass charcteristic among other things . . . . a different story to BC receivers. Amateurs transmission get into the latter often enough . . . . the TV aspect is not difficult to visualise. A sound suggestion would be to keep the article on the subject now running in overseas magazines such as "QST" "CQ" and short-wave Magazine on "How to live with TV". . . and to file them carefully away for future reference.

Price Comparison

It has been noticed that in New Zealand the Eddystone receiver model 504 lists at £108, whilst the model 640 lists at £95.

By comparison the Australian price of these receivers is most modest, being more than £20 less in each case.

NEW BANDS FOR AUSTRALIAN AMATEURS

Effective from June 1, 1948, the following frequency channels have been made available additionally by the P.M.G. Department, for occupancy by amateurs:

26.96—27.23 mC/s, for A1, A3 and FM.
288—296 mC/s.
576—585 mC/s.
2300—2450 mC/s.
5650—5850 mC/s.
21,000—22,000 mC/s.
And all above 30,000 mC/s.

Types of transmission permitted in all these foregoing VHF channels are: A zero, A1, A2, A3, FM and Pulse.

Most interesting from the viewpoint of VHF addicts is the 288—296 mC/s allocation. Many familiar valves are applicable at this frequency, but for 576—585 mC/s the technique will call for specialised VHF types. The two allocations in these ranges appear to be alternative to the 230 and 420 mC/s bands as used by American and other amateurs.

Amateur Transmitting Licences

The following alterations were issued by the P.M.G.'s Department, dated June 18, 1948:

Alterations

VK2ADF, J. T. Greenhalgh, now Flat 95, No. 1 Hostel, St. Mary's, N.S.W.

VK3ET, H. J. Asmus, postal address: Telegraphist, C.T.O., Melbourne, Vic.

VK3ACU (formerly VK5CU), C. G. Gurr, 40 Mathoura Road, Toorak, Vic.

VK7EB (formerly VK3ANL), E. L. Blackmore, now 17 Oswald Street, Invermay, Tas.

* * *

June 25, 1948.

Alterations

VK2UR, C. J. Henry, now 45 Military Road, Neutral Bay, N.S.W.

VK2MJ, A. J. T. Crisp, now 558 Homer Street, Earlwood, N.S.W.

VK2FW, J. N. Teehan, now c/- 66 Manning Road, Double Bay, N.S.W.

VK2UL, R. W. Syner-Lyons, now Post Office, Tabulam, N.S.W.

VK3XO, L. A. Paul, now 340 Rathmines Street, Fairfield, Vic.

VK3AJN, J. Hill, now 5 Marris Street, North Balwyn, Vic.

VK3GT, G. A. Scott, now 72 Carlisle Street, St. Kilda, Vic.

VK3AJI (formerly VK2AJI), V. T. Egan, now 345 Bourke Street, Melbourne, Vic.

VK4MP, Rev. M. C. Pay, now Lyndhurst Road, Boondal, Qld.

VK4KS, K. Schleicher, now Goskar Avenue, Alderley, Qld.

VK4HW, H. D. Walsh, now 12 Rice Street, Moorooka, Qld.

VK4CR, C. M. Carter, now 14 Beaconsfield Street, Gympie, Qld.

VK4AD, E. P. Black, now c/- 24 Princess Street, Bundaberg, Qld.

VK6AT, A. T. G. Hanson, now c/- Dept. Civil Aviation, Broome, W.A.

VK9QK (formerly VK2QK), E. C. Roberts, now c/- Govt. Aerodrome, Lae, T.N.G.

Issues

VK2ZY, W. Campbell, P.O. Box 57, Murwillumbah, N.S.W.

VK2UC, H. T. Webb, 37 Parkes Street, Lismore, N.S.W.

VK2AJP, J. Weaver, 17 Coromandel Street, Goulburn, N.S.W.

VK2AL, E. J. Porritt, Box 29, P.O., West Maitland, N.S.W.

VK3CM, H. G. Selman, 55 Bourke Crescent, Geelong, Vic.

VK3IM, O. N. Porter, 51 Pakington Street, Kew, Vic.

VK4DK, R. Kerr, Congress Street, Tingalpa, Qld.

VK4CI, A. J. Forbes, "Hastings," Mallon Street, Bowen Hills, Qld.

VK4CE, C. D. Milne, 19 Dalby Street, Kelvin Grove, Qld.

VK4AI, A. H. Kearney, Flat 1, Shorncliffe Flats, Shorncliffe Parade, Shorncliffe, Qld.

VK6DW, A. D. Hawkesworth, Lot 149, Butcher Street, Bruce Rock, W.A.

VK6HR, L. H. Roeger, 59 Lansdowne Road, South Perth, W.A.

VK6CD, D. H. Dawson, 124 Forrest Street, East Fremantle, W.A.

Cancellations

VK2AL, A. W. Stewart, 3 Marshall Street, Petersham, N.S.W.

VK2EP, A. J. Myers, 22 John Street, Leichhardt, N.S.W.

VK3CM, W. G. Clements, Lloyd Street, Dimboola, Vic.

VK3IM, K. E. Pole, 71 Downshire Road, Elsternwick, Vic.

VK4PL, W. C. F. Proposch, Fitzroy Street, Nanango, Qld.

* * *

July 2, 1948.

Alterations

VK3AMB (formerly VK2NB), L. Banter, 31 Murdoch Street, Cremorne, N.S.W.

VK2AET, A. Havyatt, now 23 Archbold Road, Roseville, N.S.W.

VK3UY, J. M. Breen, 30 Clarence Street, Elsternwick, Vic.

VK3QY, C. W. Richardson, 298 Charman Road, Cheltenham, Vic.

VK4DY, E. J. Wright, Martin Street, Buranda, Qld.

VK4NQ (formerly VK2NQ), N. S. Piermont, c/- Station 4LG, Longreach, Qld.

VK9HI, L. C. Raebel, now Murray Barracks, Port Moresby.

Issues

VK2XH, H. A. Perkins, 21 Stratford Street, Cammeray, N.S.W.

VK2QK, R. B. McPhee, Lord Howe Island.

Cancellations

VK2ZO, F. H. Bridgewater, 8 Albion Street, Sydney, N.S.W.

VK6CX, C. Quin, now 67 Challand Street, Wembley, W.A.

Should QSL Cards Peter Out?

SOME years back, I sat in Burnham Military Camp, on a wet, cold night, listening to the radio. Mr. Churchill was speaking about the Atlantic Charter. The casual visitor to our mess would have thought that Mr. Churchill was suffering from a bad attack of adenoids—judging by his voice. But it was the radio which had adenoids; not Mr. Churchill.

As he spoke of the brave new world which was to be made possible by the Atlantic Charter, I found myself inspired. When Mr. Churchill signed off, I was one of the ones who made a vow to do something special after the war. In fact, I made two vows—to have a T9 note and the other to ALWAYS send QSL cards. But now the war has been over for quite a while. My T9 note occasionally slips a bit; but the QSL cards have slipped completely.

There must have been a very large number of amateurs who never heard Mr. Churchill and who, therefore, missed the inspiration which was given me. All I can say is this—from the moment we were permitted back on the air, I honestly tried to do the right thing with my cards, but, after 18 months, I have given up trying. From the moment I resumed operations on the air I sent QSL cards out within 24 hours of communications. In many cases I was promised cards in return. In the great majority of cases I'm still waiting!

However, I kept on trying, and, until December 31st, 1947, I kept on sending cards. From midnight on that date I closed the post office. Nowadays I do not send a card unless I receive one. When a card arrives I immediately send off one in return; but under no circumstances would I send one "on the off chance." The reason is simple. Here are the percentages of amateurs who have been kind enough to send cards in return for mine:—New Zealand 30%, Australia 25%, U.S.A. 60%, all other countries 60%.

Others may have had greater returns. I am merely speaking of my own case. I use C.W., and the C.W. man does not make the same

(Continued on page 34)

Shortwave Review

CONDUCTED BY
L. J. KEAST

NOTES FROM MY DIARY

As I am in this issue giving a long list of schedules, this portion of my pages must of necessity be brief. But I must thank those who have so regularly sent me a list of their loggings and thus make it possible to present such a formidable list as appears in this issue.

VERIFICATIONS

It seems as though he will never stop. I am of course referring to Arthur Cushen, who I feared may give up twisting the dial when he got married but he is as keen as ever and here is a man who most surely has the world at his finger tips. In his latest air-mail letter he tells me he has verifications totalling almost 1,400 and represent 107 countries. He has written to 2,500 stations and is still looking for new ones. His latest series are from:

XGOY, 15.17mc; Rome, 6.085 mc; Tabriz, 11.96mc; CNR3, 16.-666mc; VLW-5, Manila, 11.89mc; 15.33mc; WOOW, 9.70mc; WCRC, 21.57mc, and WLKS.

New Stations

VLT, Port Moresby, 9.63mc, 31.15m: This new station designed to cover those parts of the New Guinea Territory which cannot effectively hear the medium wave station 9PA is now on the air at the following times: Sundays: 7.45-11 a.m.; 12 noon-2 p.m. Mondays to Fridays: 6.45-10 a.m.; 12 noon-2 p.m. Saturdays: 6.45-8.30 a.m.

VLT, Port Moresby, 7.28mc, 41.21m: This frequency is used as follows: Sundays: 4-10 p.m. Mondays to Fridays: 3.30-10.30 p.m. Saturdays: 12 noon-11 p.m.

VLT has a power of two kilowatts and employs an omnidirectional aerial. It is expected it will give service to outlying districts such as New Britain, New Ireland, Manus, and other islands in the vicinity.

LLM, Friedrikstad, 15.175mc, 19.77m: This is a new outlet for Norway and can be heard in the afternoons opening at 4.30. First a choir, then musical numbers. The same programme is on LKQ, 11.735mc as is much clearer.

OLR4B, Prague, 11.76mc, 25.-51m: Czechoslovakia seems to be trying out more frequencies and has been heard testing here but it is at an awkward hour viz, around 2.30 a.m. However if after veries, this may be worth while as reports are asked for. Years before the war these people sent me some beautiful pictures of their country and used to send some most artistically prepared programme sheets well illustrated.

RADIO PARIS, 21.74mc, 13.81 m: I have not heard this one . . . yet, but according to "Sweden Calling" transmits from 1.45-2 a.m. to Brazzaville, French Equatorial Africa.

RADIO PARIS, 6.2mc 48.39m: This is reported by W.A. Shortwave League as being heard from 9.15 p.m.-12.15 a.m. (this is the frequency used by Voice of France, Noumea.—L.J.K.)

XGRS, Nanking, 17.765mc, 16.88m: Reported by "Radio Australia" as being hard testing at 12.15-12.35 a.m. to West Coast of North America.

RADIO DOUALA, French Cameroons, 9.16mc, 32.73m: This is another new frequency reported by "Sweden Calling." Said to be on the air from 4-6 a.m.

SAYS WHO?

I am listing hereunder a number of stations that should be heard on a reasonably good Dual-wave receiver providing care is exercised. It has been compiled from reports from Miss Dorothy Sanderson, Arthur Cushen, Rex Gillett, Dr. Keith Gaden, "Radio Australia," W.A. Short Wave League, "Universalite," DX Bulletin (N.Z.), The N.Z. Dxetra, "Radio News" and my own observations:

OCEANIA

Australia

VLB-5, Shepparton, 21.54mc, 13.93m: 1-2 p.m. Daily. (Sat. only 1.15-5.30 p.m. 2.30-8.45 p.m. (not Sat.)

VLC-9, Shepparton, 17.84mc, 16.82m: 1-2 p.m.; 2.30-3.45 p.m.

VLA-5, Shepparton, 15.32mc, 19.59m: 2.30-3.45 p.m.

VLG-11, Lyndhurst, 15.21mc, 19.72m: Noon-2 p.m.; (Sat. 1.15-5.30 p.m.)

VLH-5, Lyndhurst, 15.23mc, 19.70m: 9.30 a.m.-6.15 p.m.

VLG, Melbourne, 15.23mc, 19.70-m: 6-8 a.m. (Sundays 6.45-8 a.m.)

VLG-6, Lyndhurst, 15.23mc, 19.70m: 8.10-9.15 a.m.

VLC, Shepparton, 15.20mc, 19.74 m: 6-7.55 a.m.; 8.10-9.15 a.m.

VLG-11, Lyndhurst, 15.20mc, 19.74m: 2.30-8.45 p.m.; (Not Sat.)

VLA-6, Shepparton, 15.20mc, 19.70m: Noon-2 p.m.; 6.30-9.30 p.m.

VLB-11, Shepparton, 15.16mc, 19.79m: 7.43-9.15 a.m.

VLH-4, Lyndhurst, 11.88mc, 25.25m: 6-9.15 a.m. (Sun. from 6.45).

VLC-7, Shepparton, 11.81mc, 25.40m: 10-11.45 a.m.; 10-11.45 p.m.

VLA-8, Shepparton, 11.76mc, 25.51m: 6-9.15 a.m.

VLB-3, Shepparton, 11.76mc, 25.51m: 5-6.15 p.m.; 6.30-9.30 p.m.; M/n—1 a.m.

VLC-3, Shepparton, 11.76mc, 25.51m: 1-2.15 a.m.

VLG-3, Lyndhurst, 11.71mc, 25.62m: 6.30-9.30 p.m.; M/n-1 a.m.

VLB-9, Shepparton, 9.615mc, 31.20m: 1-2.15 a.m.

VLH-3, Lyndhurst, 9.58mc, 31.32m: 6.30 p.m.-M/n.

VLG, Lyndhurst, 9.58mc, 31.32m: 1.15-2.15 a.m.

VLR, Melbourne, 9.54mc, 31.45m: 8.30 a.m.-6.30 p.m. (Sun. till 5.15).

VLB, Shepparton, 9.54mc, 31.45m: 6-7.55 a.m.; 10-11.45 a.m.; 10-11.45 p.m.

VLR-2, Melbourne, 6.15mc, 48.78m: 6-8.15 a.m. (Sun. from 6.45); 6.45 p.m.-M/n (Sun. from 5.30).

Celebes

Radio Makassar 9.55mc, 31.41m: 8.30-10.30 a.m.; 1-4.30 p.m.; 7 p.m.-1 a.m.

Java

Radio Batavia, 11.78mc, 25.47m: Gives news at 8.30 p.m.

AFRICA

Belgian Congo

OTC, Leopoldville, 9.767mc, 30.70m: News in English and French and music from 9.45 a.m.

French Cameroons

Radio Douala, 9.16mc, 32.73m: 4-6 a.m.

French Equatorial Africa

FZL, Brazzaville, 11.97mc, 25.05m: Musical prog. and News in French at 3.45 p.m.

FZI, Brazzaville, 9.44mc, 31.8m: News in English at 3.30 p.m.

THE EAST

Ceylon

Radio SEAC, Colombo, 15.23mc, 19.69m: News in English at 10.30 p.m. also gives cricket relays from BBC.

Radio SEAC, Colombo, 11.77mc, 25.48m: Carries BBC cricket commentaries from 10.30 p.m.

China

XGOY, Chungking, 15.17mc, 19.17m: News at 7 p.m.

XTPA, Canton, 11.65mc, 25.73m: Good at 7.45 p.m. News at 11 p.m.

XGOA, Nanking, 9.73mc, 30.84m: Chinese news and Western Music from 7.30 p.m.

French Indo China

Radio Saigon, 11.78mc, 25.47m: Good from 8 p.m. News at M/n.

Radio Saigon, 6.165mc, 48.66m: Good from 8.30 p.m.

HONGKONG

ZBW, Victoria, 9.52mc, 31.51m: Good from 7.30 p.m.

Korea

HLKA, Seoul, 7.935mc, 37.53m: Noon-3 p.m.; 6.30-11.30 p.m.; 7.30-9.30 a.m.

Philippines

Voice of America, Manila, 15.33-mc, 19.54m: 5.30-6.45 p.m.; except Mondays.

Voice of America, Manila, 11.89-mc, 25.22m: 7 p.m.-1.05 a.m.

GREAT BRITAIN

BBC Pacific Service. 4-5.45 p.m. Special Regional programmes.

GWE, London, 15.435mc, 19.44 m; GSN, London, 11.82mc, 25.38m; GRX, London, 9.69mc, 30.96m: To Australia.

GRD, London, 15.45mc, 19.42m; GVZ, London, 9.64mc, 31.12m: To New Zealand and S.W. Pacific.

BBC General Overseas Service. Pacific Area.

GSG, London, 17.79mc, 16.86m, 4-6 p.m.; GST, London, 21.55-mc, 13.92m, 5-8 p.m.; GSV, London, 17.81mc, 16.84m, 8-10 p.m.; GSH, London, 21.47mc, 13.97m, 8-10 p.m. To Australia.

GRQ, London, 18.025mc, 16.64m, 6-8 p.m.; GSV, London, 17.81 mc, 16.84m, 8-10 p.m.; GSF, London, 15.14mc, 19.82m, 9-10 p.m. To New Zealand and S.W. Pacific.

CENTRAL AMERICA

Guatemala

TGWA, Guatemala, 9.78mc, 30.66 m: Heard till 3 p.m.

TG-2, Guatemala, 6.66mc, 44.76m: Fair till 2.30 p.m.

TGTA, Guatemala, 6.325mc, 47.39m: Heard at 2 p.m., but is mixed with COCW and OAX6A.

UNITED STATES OF AMERICA

East Coast

WNRX, New York, 21.73mc, 13.81m: 2-8 a.m.

WLWL-1, Cincinnati, 21.69mc, 13.83m: 2-7.30 a.m.

WLWS-2, Cincinnati, 21.65mc, 13.85m: 2.30-7 a.m.; 7.30-8 a.m.; 10-1.30 p.m.

WNRA, New York, 21.61mc, 13.88m: M/n-7.30 a.m.

WGEA, Schenectady, 21.59mc, 13.89m: 2.30-7.30 a.m.

WCRC, New York, 21.57mc, 13.90m: 1.15-7.30 a.m.; 7.45-8 a.m.
WOOW, New York, 21.50mc, 13.95m: 12.45-8.45 a.m.
WRUX, Boston, 21.46mc, 13.98m: 5-8.15 a.m.
WNRI, New York, 18.16mc, 16.55m: M/n-9.15 a.m.
WLWS-2, Cincinnati, 17.80mc, 16.85m: 7.30-8 a.m.
WNBI, New York, 17.78mc, 16.87m: 12.45-8.45 a.m.; 10 a.m.-1.30 p.m.
WRUW, Boston, 17.755mc, 16.88 m: 2-8.15 a.m. to Europe; 8.25-9 a.m. to Cent. America.
WBOS, Boston, 15.21mc, 19.72m: 4-8 a.m.; 11.30 a.m.-1.30 p.m.
WRUA, Boston, 15.20mc, 19.74m: 2.45-5 a.m.
WRCA, New York, 15.15mc, 19.81m: 5-8 a.m.; 9 a.m.-10 a.m.; 11 a.m.-Noon.
WOOC, New York, 15.13mc, 19.83m: M/n-9.15 a.m.
WLWO, Cincinnati, 11.79mc, 25.45m: News at 11.30 a.m.
WNRA, New York, 11.77mc, 25.478m: News in French at 8 a.m.
WNRX, New York, 9.67mc, 31.02m: Latin American Service at 10 a.m.
WCBN, New York, 9.65mc, 31.09m: 11 a.m.-Noon to South America.
WGEO, Schenactdy, 9.525mc, 31.51m: 10 a.m.-1.30 p.m.
WRUS, Boston, 6.04mc, 49.67m: 10.15 a.m.-1.30 p.m.

WEST COAST

KNBA, 'Frisco, 21.46mc, 13.98m: 10 a.m.-1.30 p.m.
KGEX, 'Frisco, 17.88mc, 16.78m: 10 a.m.-1.30 p.m.
KCBF, 'Frisco, 17.85mc, 16.81m: 1.15-6.30 p.m.
KHRO, Honolulu, 17.80mc, 16.85m: 5.30-6.45 p.m.
KGEX, 'Frisco, 17.78mc, 16.87m: 3.30-6.45 p.m.
KWID, 'Frisco, 17.76mc, 16.89m: 10 a.m.-1.30 p.m.
Manila-1, Manila, 15.33mc, 19.57m: 5.30-6.45 p.m.
KCBA, 'Frisco, 15.33mc, 19.57m: 7 p.m.-12.30 a.m.
KRHO, Honolulu, 15.25mc, 19.67m: 7 p.m.-1.05 a.m.
KNBX, 'Frisco, 15.25mc, 19.67m: 10 a.m.-1.30 p.m.; 3.30-6.45 p.m.
KGEI, 'Frisco, 15.21mc. 19.72m: 3.30-8.30 p.m.
KCBA, 'Frisco, 15.15mc, 19.80m: 1.15-6.30 p.m.
KCBR, 'Frisco, 15.13mc, 19.83m: 10 a.m.-1.30 p.m.; 7 p.m.-1.05 a.m.
KNBI, 'Frisco, 15.13mc, 19.83m: 5.30-6.45 p.m.
KWID, 'Frisco, 11.90mc, 25.21m: 3.30-9.30 p.m.
Manila-1, Manila, 11.89mc, 25.22m: 7 p.m.-1.05 a.m.
KWIX, 'Frisco, 11.86mc, 25.30m: 7 p.m.-12.30 a.m.
KNBX, 'Frisco, 11.79mc, 25.45m: 7 p.m.-1.05 a.m.
KNBI, 'Frisco, 11.77mc, 25.48m: 10 a.m.-1.30 p.m.
KGEX, 'Frisco, 11.77mc, 25.48m: 7 p.m.-1.05 a.m.
KNBI, 'Frisco. 9.70mc, 30.93m: 7 p.m.-1.05 a.m.
KNBA, 'Frisco, 9.65mc, 31.09m: 5.30-6.45 p.m.; 7 p.m.-1.05 a.m.
KWIX, 'Frisco, 9.57mc, 31.35m: 1.15-6.45 p.m.
KWID, 9.57mc, 31.35m: 10 p.m.-1.05 a.m.
KGEI, 'Frisco, 9.53mc, 31.48m: 8.45 p.m.-12.30 a.m.

Further Schedules will be shown in a later issue.

WINDOM AERIALS

Several readers have taken up the Windom controversy, but none of them agree as to how it works. We think the answer is this: That with a perfectly matched feeder (top and bottom) the Windom is just another dipole, and one that is very efficiently fed. Most of them, however, carry standing waves of varying ratios on their feeders, and therefore have characteristics quite different from the top alone. In some cases this can be turned to good effect. Those who swear that their Windom gives better coverage than a Zepp or a centre-fed aerial hanging in the same place are obviously in the latter category. Makes one think that a Windom with a controllable mismatch and the right kind of downlead might be quite a nice thing to have.
—"Short-wave Magazine" (Eng.).

Speedy Query Service

Conducted under the personal supervision of A. G. Hull

L. A. (Lewisham) is interested in the direct-coupled amplifier which was described in the September 1940 issue.

A.—There was an unfortunate error in the schematic. The main bias resistor of 750 ohms should have been between c.t. of the 2A3 filaments and earth, not between the c.t. of the high tension and earth. The picture diagram was correct. In this amplifier the 2A3's would be operating with 250 on the plates (between plates and c.t. of filaments) and with a plate current of about 90 above earth. This amplifier gave splendid performance but is not exactly the sort of thing we would recommend unless you are prepared to do a certain amount of experimenting, or to anyone who has not got a thorough grasp of the fundamentals of direct-coupling. It is highly desirable to have plate current meters in circuit all the time in both output plate circuits, and to keep the plate currents normal and balanced.

* * *

T.R.C. (Thornbury) is interested in home recording.

A.—Not having had sufficient practical experience in this field, which is really something apart from ordinary radio, we do not feel that we are in a position to make the recommendations you require. We feel sure that you would get better advice by going along and having a talk with prominent members of the Sound Recording Institute of Australia. The honorary secretary is Mr. L. T. Garrioch, and the club rooms are at "Tasma," 4 Parliament Place, Melbourne. Parliament Place is up behind the public office buildings beyond the Treasury Gardens.

* * *

F.S.N. (Launceston, Tas.) is in trouble with an amplifier.

A.—Unfortunately you have not given us much to go on. The circuit was O.K. and everything should be dandy if all components are right and no errors. Would suggest that your first step is to entirely remove the feed-back wires and components and get the job stabilised and working well without the feedback. Last case of a similar trouble we encountered was caused by a coupling condenser which was leaky, but the one before that was a dud 807, which, although brand new, drew grid current and twice normal plate current.

QSL

(Continued from page 30)

personal contact as the phone enthusiast. The phone men hear each other's voices, and, despite the spatter which they sometimes hand on to the C.W. operators, their contacts are more personal. Because of this they probably attain a greater QSL return.

Of course, there may be many who do not think that the QSL card has any useful function. Perhaps it hasn't; but, to me, it appears to be just a little courtesy which puts a nice finish to the contact. In the 18 years I have had a licence, I have always appreciated the other man's card. My experience of post-war radio, however, leads me to think that this pleasant habit is dying.

I'd hate to see it go. But, if that's the way people want it, then go it must. Fortunately, the traditional amateur spirit of helping the other man is as strong as ever before. If that went, it would be a real tragedy. But, I'd like to see the QSL habit revived, and, if I have struck a responsive chord in your heart, please look through your log and see if you owe me a card.

—ZL3DK in Break-In (N.Z.).

BARGAIN CORNER

Advertisements for insertion in this column are accepted free of charge from readers who are direct subscribers or who have a regular order placed with a newsagent. Only one advertisement per issue is allowed to any subscriber. Maximum 16 words. When sending in your advertisement be sure to mention the name of the agent with whom you have your order placed, or your receipt number if you are a direct subscriber.

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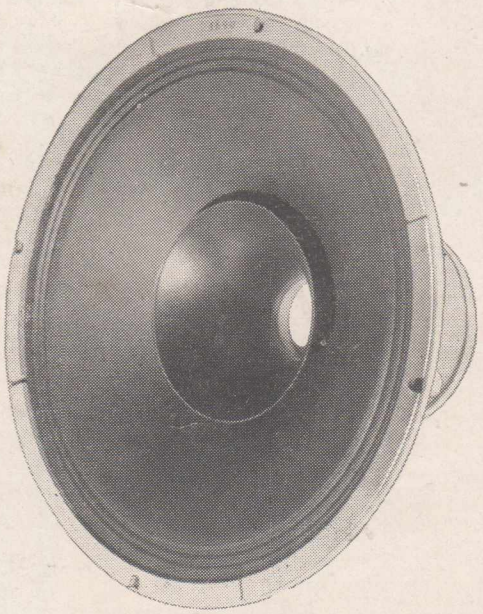

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Frequency Range 40 cps to 15,000 cps*

Peak power handling capacity 15 watts. Pole piece diameter 1¾". Flux density 13,000 gauss. Total flux: 145,000 Maxwells. Fundamental Resonance 55 cps. Voice Coil Impedance 15 ohms. Overall diameter 12-5/16in. Depth, 6-9/16in. Weight 12 lbs.

*These Speakers are not suitable for use with poorly-designed equipment as their extended frequency range will disclose distortion products if present in the input signal.

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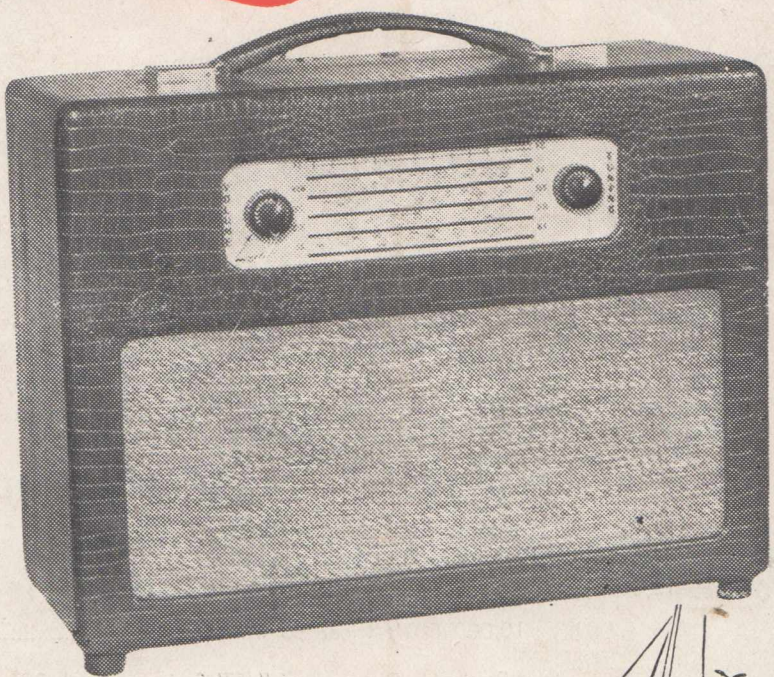
Back Again And Better Than Ever!

New University PK4X 4-valve Portable Kit Set offers endless pleasure

University's great portable kit set is back again—improved in sensitivity, tone, appearance and ease of construction.



ALL LATEST ADVANCES

The new PK4X Portable is a greatly improved radio and incorporates all the latest technical advances. Even the famous PK3, PK4 and PK5 of the 1940 range are superseded.

The new PK4X is a four-valve portable kit set employing the latest bantam-type valves and minimax-type batteries.

Housed in a genuine leather-covered carrying case, it includes all the parts necessary for the construction of a modern receiver. Carefully engineered and designed, the PK4X is simple to assemble with a few ordinary tools. A complete book of instructions specially written for the kit set is included in every package and the easy-to-read and easy-to-follow text is accompanied by clear photographs showing wiring diagrams, circuits and completed appearance.

INSTRUCTIONS ARE SIMPLE, EASY-TO-FOLLOW

The instrument is all assembled for you and wiring is simple and capable of being carried out by anyone who can use a soldering iron.

A clearly marked dial carries all the major stations in Australia and this portable PK4X is suitable for every State.

Get your PK4X now. It is available from all leading distributors throughout the Commonwealth and your satisfaction is guaranteed and backed by a name that is well-known in the radio industry.

TECHNICAL DETAILS

Attractive technical details of this popular kit are a well-designed cabinet covered in solid leather, 5" Alnico type speaker is used, four modern bantam series valves, modern straight line dial, Minimax batteries, special effectively designed loop aerial, provision for external aerial for use in country districts, good tonal quality and excellent sensitivity.

Retail price including sales tax is **£16/19/6**

IT'S A UNIVERSITY INSTRUMENT

MANUFACTURED BY RADIO EQUIPMENT PTY. LTD.

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