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INCORPORATING AUSTRALASIAN RADIO WORLD

Vol. 16. AUGUST, 1951. No. 1. 1'6

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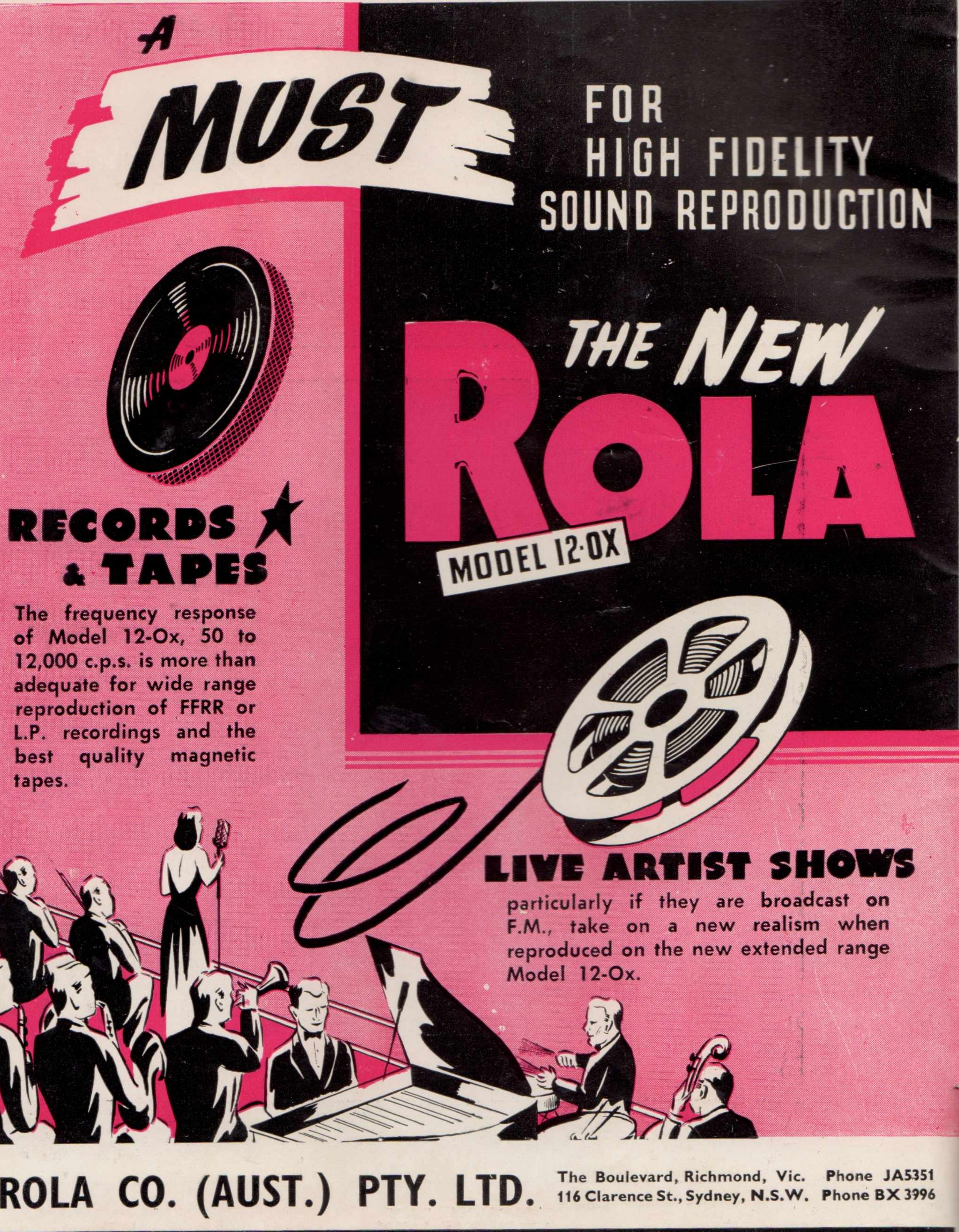
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Providing National Coverage for the Advancement of Radio and Electronic Knowledge.

Vol. 16. AUGUST, 1951. No. 1.

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OUR COVER

The design of suitable transformers to couple the relatively high output impedence of the audio power amplifier to the low impedence of the loudspeaker voice coil is a rather complicated job. Our Cover picture shows a corner of the Rola laboratory in which an audio oscillator, a bridge network and a vacuum tube voltmeter has been set up to make impedance measurements on a Rola C type transformer. Incidentally, each Rola output transformer has been specially designed to operate with a given valve or valves under a specified set of plate and screen voltage conditions.

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Editorial . . .

This issue commences our Volume 16 No. 1 and readers will note that, whilst retaining our usual Technical features, we have further improved the scope of "AUSTRALIAN RADIO AND ELECTRONICS" by the extension of our Shortwave Review to cover International Broadcasting generally.

Many of our readers are Shortwave listeners, who pursue the Hobby of logging stations from all over the world, thus improving their knowledge of other countries, quite apart from the entertainment derived therefrom.

We have also received endless enquiries from New Australians requesting information as to when and where they can receive transmissions from the country of their birth.

Research into their requirements has shown that it is not so much the stations of their former countries that they want to get, but to be able to listen to their MOTHER TONGUE, irrespective of what country or station transmits it.

This is quite understandable when one realises that most of our new brethren are struggling hard to get a working knowledge of English and no doubt, in a year or two, will be able to converse in English and use the famous Australian adjectives in the right place, just like any dinkum Aussie does.

However, we are of the opinion that all of us need relaxation when the day's work is done, and it is only natural that our New Australian friends should converse amongst themselves and want to listen to broadcasts in their own tongue.

Imagine yourself for instance, transferred to Italy (or some other country) and trying to cope with a new language day and night. Would you not endeavour to locate, per medium of your radio, some English speaking session, irrespective of what country transmitted it? We are sure you would, and it is for this reason that we have commenced the International Broadcasting section of our journal.

If we can assist our new countryman to settle down more quickly to our way of life, surely we should do so.

Therefore, A.R. & E. (Australian Radio and Electronics) have set up a special listening post, under the direction of Mr. L. J. Keast, our Shortwave Editor, to fully monitor foreign shortwave broadcasts and these, for the convenience of our readers, are listed under their appropriate language headings, so that "Old" and "New" Australians will derive maximum benefit from our service.

THIS TELEVISION BUSINESS.

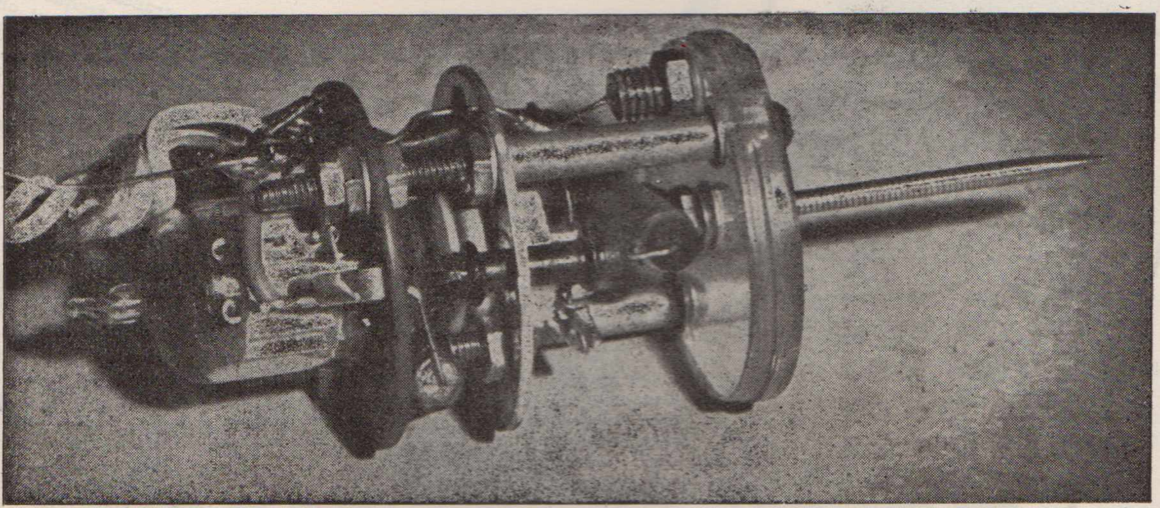
All the talk of recent months in radio circles has been largely centred about the possibility of television being introduced into Australia in the not–too-distant future.

That the entertainment value of television will be great is obvious and its impact upon the people will be far greater than radio ever was, since it will command a person's whole attention and become eventually a centre of family life. To those stout souls who are rearing a family in this troubled age and find it so difficult to get out in the evening for entertainment, this new art is going to come as a real boon. True, there are some pessimistic types who say it is not stimulating to thought and that it is the lazy man's method of entertainment, since he just has to "sit, look, and listen". This line of reasoning, however, seems dangerously like inviting an argument, for surely entertainment should provide relaxation. Most radio men will agree that they get all the thought stimulation they require during the course of a normal business day without carrying it over into the evening! Anyway, if we are to believe medical science, modern man is in no danger of becoming a moron, rather the reverse in fact, since his capacity for thought is increasing with every generation, and with all these distractions abounding!

Whichever way it goes, however, one thing is certain—while hundreds of people are obtaining considerable enjoyment from it the radio servicemen will be getting bags of thought stimulation while burning the midnight oil trying to fix Mrs. So-and-So's set in time for the cooking demonstration next morning!

A Simple and Inexpensive Vacuum-Tube Voltmeter

We have for some time been requested to publish the design for a V.T.V.M. that is reliable, accurate, easy to construct, and not too expensive. The instrument described here comes as close to fulfilling all these requirements as anything we have yet seen, and has advantages not possessed by many more costly and complex arrangements. It uses a diode probe for A.C. measurements, and can be employed at very high frequencies or at audio frequencies without any circuit changes.



This photograph shows the inside "works" of the probe built for the V.T.V.M. This probe is an integral part of the circuit, and drawings showing its construction will be featured in the second instalment of this article.

INTRODUCTION

The vacuum-tube voltmeter is such a useful instrument as to be almost universally desired at one time or another by experimenters and professional radio workers, but has always suffered from several disadvantages which between them, tend to neutralize its many theoretical advantages. Commercial instruments are expensive, are not always blessed by good accuracy, and suffer from miscellaneous defects which often make them extremely annoying to use. The instrument we are about to describe, however, is so designed that the inherent defects are negligibly small in magnitude, so that the instrument is quick and easy to use, without a great deal of fiddling with the zero adjustment, which remains remarkably steady after the initial warm-up period has passed. The circuit, moreover, has the great virtue of simplicity and ease of adjustment. It is not costly to build either as the most expensive part of it—the meter movement—is specified as 0-500 μamps, and can well be one of the inexpensive meters of this description that are available from war surplus sources. These meters, of course, have only a small scale, and a large meter would be an improvement, since it would be easier to read, but the accuracy of the small meters that are available is very good, making them very suitable except in this one respect.

BASIC REQUIREMENTS

What, then, are the basic requirements that must be fulfilled if we are to produce a satisfactory valve voltmeter?

First, perhaps, comes a satisfactorily large range of measurement. One of the difficulties of V.T.V.M. design is the production of a simple and reliable method of extending the useful measurements over a wide enough range. The present instrument has full-scale deflections of 0-3, 0-10, 0-100, and 0-300 volts, and the only requirement for including extra ranges, should they be needed, is one extra resistor (or possibly two) and an extra position on the simple single-pole range switch.

Next in order of importance is stability of zero-setting, or zero stability, as it is often called. All V.T.V.M.s have a panel control whose purpose is to set the pointer to zero on the scale before any measurements are taken. The instructions provided with the instrument usually specify that the input terminals should be short-circuited while the zero is set, after which it is ready for use. In a perfect instrument, once the zero had been set in this manner, it would remain so however long the instrument was in use, but in many meters, the zero setting exhibits appreciable drift, and in bad cases, requires re-setting before every reading is made. This severely limits the usefulness of the meter, on account of the time taken to remove the meter from the circuit and carry out the setting procedure.

A further important practical point is the existence of what is called zero error, as distinct from zero stability. Zero error may be defined as a change in the zero setting which occurs when the meter is switched from one measuring range to another. It often happens that the zero has to be re-set every time the range switch is shifted, but in the present instrument, not only is the zero stability very good, but zero error is non-existent and cannot possibly occur, because of the design of the circuit.

FEATURES OF THIS INSTRUMENT

Apart from the excellent coverage of voltages from about one volt to 300, with ample overlap between ranges, the meter to be described has the following features that will recommend it to many of our readers:

(1) Low Cost

Apart from the meter movement itself, it can be built for a very small expenditure of cash, the most expensive item being a midget instrument type power transformer. If a war surplus meter is used, the total cost is low, while even if a larger meter is purchased specially for the job it need not cost more than ten pounds all told.

(2) Stability

After a warm-up period of about ten minutes, the zero setting does not shift by more than one per cent. of full-scale deflection, however long it may be in use. The zero setting, and also the readings, are quite unaffected by variations in the supply voltage, as shown by the fact that a change of 100 per cent. in H.T. voltage produces no more than a barely discernible movement of the pointer—no more than a pointer's width. Nor do variations of heater voltage affect it, so that there is no need at all for a stabilized mains supply, or a regulated H.T. voltage.

(3) Zero Error

As explained above, zero error is completely absent.

(4) Frequency Range

No tests have as yet been undertaken to estimate the maximum usable frequency of the meter, but a 6AL5 diode is used, which should give accurate readings up to at least 100 mc/sec., and useful indications much higher than this, especially since an R.F. probe is used, with the diode mounted in it so as to reduce R.F. losses, and to make lead lengths carrying R.F. as short as possible.

(5) Range Overlap

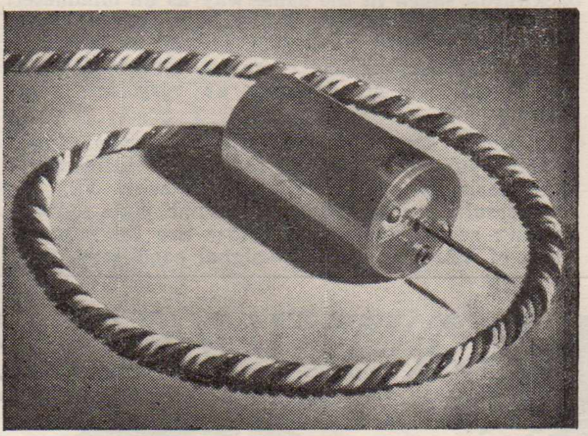
Generous overlapping of the ranges has been provided so that all readings can be taken on the upper half of the scale, and there is no necessity for reading any voltage, except on the lower part deflections. This increases the accuracy with which of the lowest range, at very small pointer measurements can be taken.

(6) Linearity

On all but the lowest range, the linearity of the indication is excellent. No observable departure from complete linearity is found on any range except the 0-3v. range. This non-linearity of the lowest voltage range is common to all V.T. voltmeters, and arises through the inherently non-linear rectification characteristic of all diodes at very small input voltages. However, even on the 0-3v. range, the indication is sensibly linear down to 1v., so that there is really no need for a separate scale calibration on the lowest range.

(7) Ease of Calibration

On account of the excellent linearity, calibration of the meter is very easily accomplished. This is due partly to the fact that the sensitivity is entirely determined, on each range, by the value of one adjustable resistor. In the prototype, all ranges were individually checked, but the overlap is so wide that it would be quite practicable to calibrate the meter solely at its maximum reading, viz., 300 volts, and then to calibrate all the lower ranges from the already fixed 300-volt range. In any case, calibration consists only of adjusting the calibrating resistor for the range in question so that the meter reads full scale when the appropriate input voltage is applied.



The photograph illustrates the completed probe of the V.T. voltmeter, the description of which is commenced in this issue. Although its circuit is simple and contains few parts, the stability and accuracy of the meter are excellent. The diode probe illustrated enables measurements to be made at very high radio frequencies.

THE CIRCUIT

The full circuit of the meter is shown in Fig. 1. As can be seen, the circuit proper uses only two valves, both of them readily obtainable and likely to remain so. The third is the rectifier, which is a 6X5. All the parts contained within the dotted line are housed inside the probe, a photograph of which appears on the front cover of this issue, and of which an inside view is given on the first page of this article. The principles of the instrument are, however, better illustrated by the skeleton diagram of Fig. 2. V1 is the rectifier diode, to which the A.C. input voltages are applied. It uses a peak rectifier circuit, so that a D.C. voltage is developed across the load resistor that is directly proportional to the peak value of the input voltage. This D.C. voltage is applied directly to the control grid of V2, which is a triode, operating with its sole load resistance in the cathode circuit, and thus with 100 per cent. negative feedback. It is because of this feedback that the linearity of the instrument is good. The application of a negative control voltage to the grid by the diode reduces the voltage drop across the cathode resistor of 47k. in strict proportion to the voltage input. It would, of course, be possible to obtain an indication simply by placing a D.C. meter in series with the cathode load resistor of V2, but this would have several disadvantages. The purpose of the remaining two tubes is to remove these obstacles, so that some explanation of what they are is necessary in order to describe the functions of V3 and V4.

In the first place, a meter in series with the cathode load resistor of V2 would read approximately 3 ma. when no signal was applied to the diode. When a voltage was applied, the meter would show less current, and so would make it necessary in the first place for the meter to be adjusted to full-scale reading, and then to be scaled backwards, much in the same way as an ohmmeter. A further disadvantage would be that the useful part of the scale would not extend to very low meter readings, because even the cathode follower circuit exhibits non-linearity at very low plate currents.

In order, then, to dispose of these disadvantages, a third tube, V3, is inserted. It is identical in characteristics and circuit values with V2, and as a result, passes exactly the same plate current, as long as its electrode voltages are the same as those of V2. Now under no-signal conditions, there

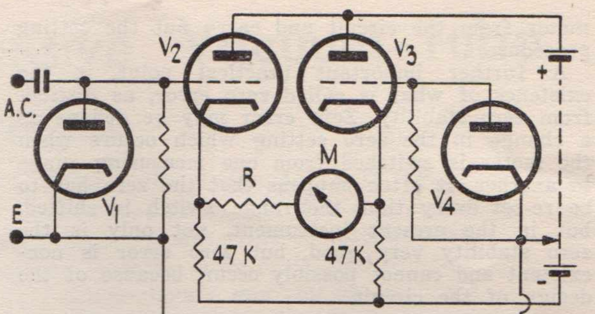


Fig. 2.—Basic circuit of the V.T.V.M. In practice, V1 and V4 are halves of a 6AL5, and V2 and V3 are halves of a 6SN7.

is a voltage drop of about 140 volts across the 47k. cathode resistors if the tubes are passing a plate current of 3 ma., so that if the grids were returned to the negative end of the power supply, the tubes would be very heavily biased by the large cathode resistors, and would not pass 3 ma. at all. For this reason, the grid return leads of both triodes are joined together and taken to a positive tap on the power supply. If this positive voltage is high enough, the tubes automatically adjust themselves until the correct operating conditions obtain, and they are passing the required plate current. Now the circuit is such that on receipt of a signal, this is applied to the grid of V1, but **not** to the grid of V2. For this reason, the only occasion on which the two triodes work under the same conditions is when there is no signal applied to the grid of V2 from V1. Now, since both tubes are then passing the same plate current, the voltage drops across the equal cathode resistors must be the same and there will be no difference between the voltages at the cathodes of the two tubes. It is thus possible to connect a voltmeter between the cathodes, without disturbing the operating conditions of either valve, and **without passing** any current through the meter, which therefore reads zero.

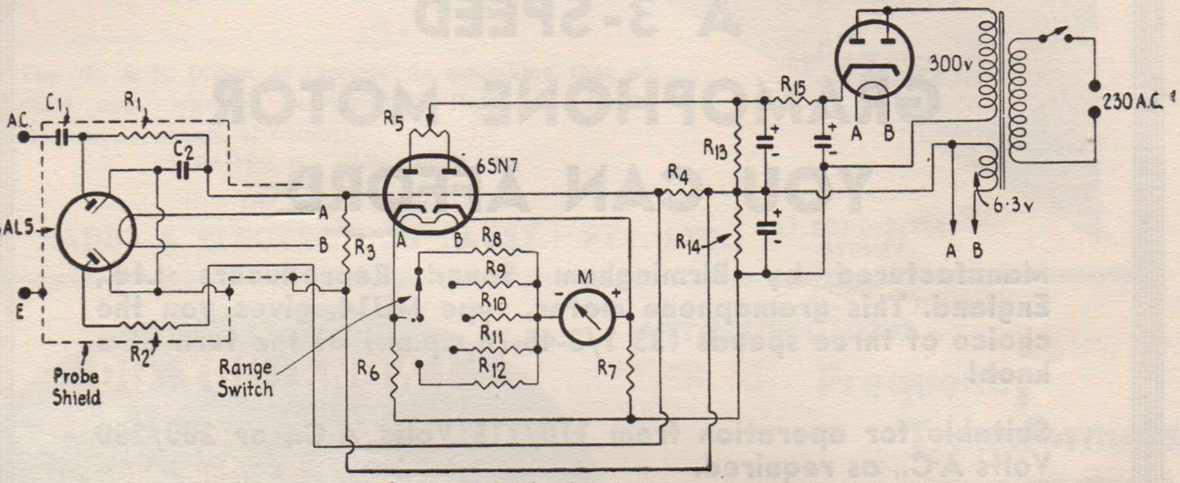


Fig. 1.—Full circuit of the instrument.

But when a signal is passed to the V2 grid, no corresponding signal is applied to the grid of V3, so that there is a difference of potential between the two cathodes, and current will flow in the meter circuit. It is now only a matter of connecting the meter in the correct polarity for it to read upwards in the proper manner when signal is applied. The fact that the circuit is inherently a balanced one accounts for the excellent zero stability, and also for the fact that the zero does not change appreciably with changes in plate supply voltage or of heater voltage. Because of the large negative feedback, quite large differences in the supply voltages, or in the characteristics of the valves themselves have very little effect on the cathode currents of V2 and V3, and because any changes in supply voltages affect both tubes to the same extent, no change in meter reading results.

The function of the second diode, V4, has not yet been explained. First of all, it is necessary to know that a diode rectifier circuit such as the one used here, produces a negative output of about one volt, even in the absence of a signal. This is called contact potential, and is due to the fact that some electrons reach the plate, because of the initial velocities with which they are ejected from the cathode, even when there is no positive D.C. voltage applied to the plate. In many V.T. voltmeters, this contact potential changes on the different measuring ranges. It is this, in fact, that causes a good deal of the zero error in many instruments. In addition, contact potential depends very much on the heater voltage of the tube, and so varies in amount quite considerably as mains voltage fluctuations occur. The contact potential therefore is a prominent cause of poor zero stability in instruments where regulation of the A.C. power input is not applied. But regulation of A.C. is expensive, and it is very desirable, if it can be done, to remove the need for the regulation. This is where V4 comes in. It is, in practice, the second diode of a double diode valve. It uses the same heater winding as does V1, and so is subject to identical voltage fluctuations. Its contact potential is applied to the grid of V3, so that the whole circuit is balanced, not only with respect to the triode stage, but also with respect to the diode contact potentials.

THE FULL CIRCUIT

We can now examine the full circuit of Fig. 1, and see what differences there are between this and the basic circuit of Fig. 2. The first thing to note is that instead of applying the whole D.C. output of the rectifier diode to the grid of V2, a voltage divider is employed, consisting of a 15 megohm resistor in series with 10 megohms. Thus only 0.4 of the diode output voltage is applied to the meter valve. This reduces somewhat the maximum sensitivity which it would be possible to obtain from the circuit, but this is unimportant, as it is still possible to make the low range read 0-3 volts, as indicated above. The main reason for it is that it enables the actual voltage applied to the meter tube grid to be less for a given meter reading than otherwise. If no voltage division were done, it would be necessary to apply a considerably higher H.T. voltage to the triode stages in order to preserve a linear scale at the high voltage end. The trouble is that the D.C. voltage applied to the grid of V2 must be less than the voltage drop across the cathode load resistor by a reasonable margin—preferably by at least 20 volts or so. There is thus an upper limit to the D.C. voltages that the meter tube will measure. In some instruments, this is overcome by making the range switching by means of a voltage divider chain,

(Continued on page 36)

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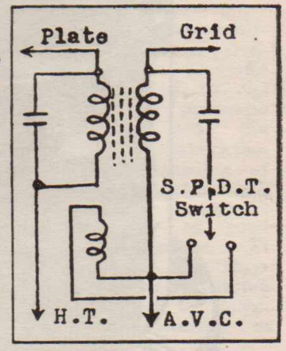

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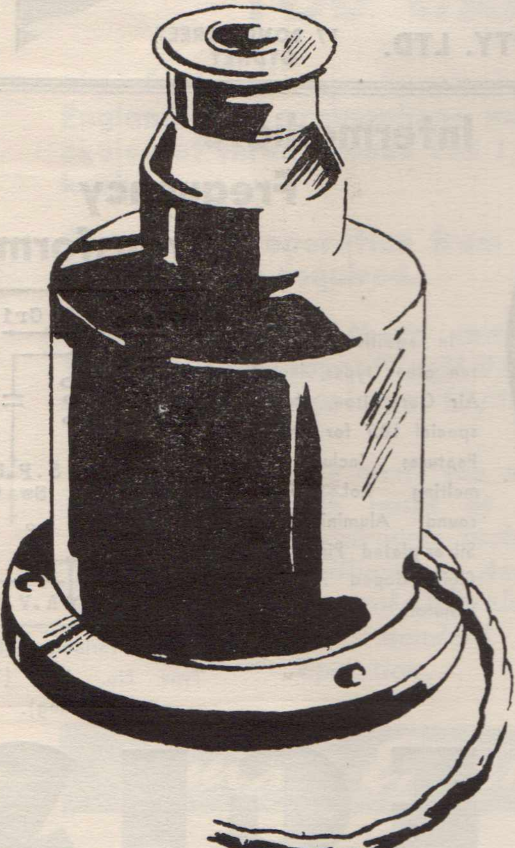

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IN TUNE WITH THE TRADE

RECORDING

A recent acquisition of Radio 3AK Melbourne is the Magnecorder tape recording equipment manufactured and supplied by Byer Industries Pty. Ltd., of South Melbourne.

Three basic methods of recording and reproducing sound are now in use — the mechanical or phonographic, the photographic or sound-on-film, and the magnetic. Of these the last has now come into general use and promises to outstrip the other two in fidelity.

The first tidings of the advent of successful magnetic recording were recorded in the patent office of Europe and America in 1899 when Valdemar Poulsen, a Danish inventor and engineer, applied for original patents on "methods of and apparatus effecting the storing up of speech or signals by magnetically influencing magnetizable bodies". Poulsen's unique machine attracted the attention of the scientific world at the Paris Exhibition in 1900. The Telegraphone, as his machine was called, could have many uses, but in his patent application Poulsen noted only three; as a substitute and improvement on the gramaphone, for recording and imparting messages over telephone wires with no human assistance, for telegraphic purposes, to record code messages at high speeds and play them back at much slower speeds so that the messages could easily be transcribed.

3AK announcer, John Hart, recording program material for "Voice of the Night in Victoria" broadcast.

Within a few years, several different types of Telegraphones had been developed, one using a solid steel disc, another steel tape, still another, wire. But no further development was noted for about two whole decades.

Further improvements in the art of magnetic recording were developed in 1924, this time by Dr. Kurt Stille, in Berlin. Influenced by Stille, the Ludwig Blattner Picture Corpn. of London, together with a Telegraphic Patent Syndikat, of Berlin, jointly announced a new system of magnetic recording on steel tape in 1929. Talking motion pictures, using steel tape for the accompanying sound, were exhibited, and the "Blattnerphone", it was hoped, would speedily supplant the gramaphone discs which were so difficult to synchronise with the pictures. The Blattner Corpn. also noted that its machine could be used to record telephone conversations, a purpose for which Poulsen had, almost expressly designed his "Telegraphone."

In 1930, Dr. Kurt Stille brought out his "Dailygraph", a dictating machine which could record either on steel tape or steel wire.

FIRST TAPE BROADCAST ON B.B.C.

That same year, 1930, the British Broadcasting Corpn. began using the "Blattnerphone" and its first broadcast using steel tape, occurred when King George V's New Year's Day address was re-broadcast from a Blattnerphone recording. This same year, a patent was issued to a Dr. Pfleumer covering the use of paper or plastic tape coated with iron dust. This innovation was immediately taken up by two German industrial concerns with the idea of producing a recorder for general use, less expensive to operate.

Radio broadcasting authorities both in Germany and in England were continuing to experiment with magnetic recording. By 1934, the B.B.C., in collaboration with a Dr. Heisling of Stille Laboratories, had developed a magnetic tape recorder of good broadcast quality. At this time also, the Marconi Company predicted a great future for magnetic tape recording in broadcasting.

By the end of 1936, one of the two German concerns had put on the market a recorder using a coated film tape and another Company was marketing a machine using a special steel tape. Both machines were being used by the German Broadcasting Company and several were manufactured for use in portable form.

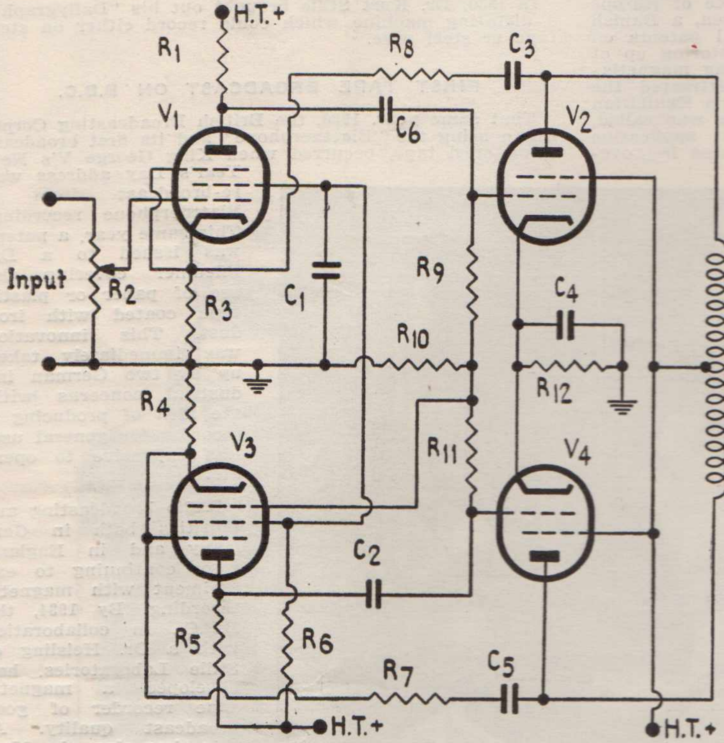
The war years and immediate post-war period brought about vast strides in magnetic recording due to extensive research carried out in America and Great Britain, but except for refinements in quality of reproduction, the basic principles laid down by Poulsen in the 1900's still govern magnetic recording.

Of the two countries, it is generally considered that the former holds a slight lead in progress, particularly where the medium is employed for broadcast use.

The Magnecorder equipment illustrated is wholly manufactured in Melbourne under exclusive rights granted by the American originators, Magnecord Inc. of Chicago, and promises to enjoy increasing popularity with Australian radio engineers and recordists, both professional and amateur.

The "R. and E." Beginners' Quality Amplifier

The amplifier described in this article has the virtues of excellent quality and extreme ease of construction. It also lends itself to the use of a wide variety of valves, making it an excellent one for those who wish to make use of equipment that is available in the workshop. There are no critical adjustments, and it has been designed to require no advanced instruments or special knowledge to get it going.



COMPONENT LIST

R1, R5, R9, R10, R11, 250k.

R2, 500k. pot.

R3, R4. 1500 ohms.

R6, 250k. (see note).

R7, R8. 500k.

R12, 125 ohms.

C1, 0.5 uf. (see note.)

C2, C3, C5, C6, 0.1 uf. 600 v.

C4, 25 uf. 25v. electro.

V1, V3, 6AU6.

V2, V4, 6AQ5 or 6V6.

Output Transformer, 10,000 ohms to voice-coil.

H.T. 250 volts.

INTRODUCTION

Once upon a time, before the development of all the super-high quality amplifiers that have been seen of recent years, amplifiers were almost always easy to build, and required no great technical knowledge or complex test equipment to get them going properly, as long as the circuit was followed faithfully, and provided the constructor took heed of a few simple tips given by the original designer. It was therefore possible for the veriest newcomer to valves and their circuits to build himself an audio amplifier that would be as good as the next man's, and which could be relied upon to stay that way, barring dry joints or other constructional imperfections. Nowadays, though, the situation is rather different. Circuits have been developed that enable hitherto undreamed of figures of distortion to be obtained—at a price. This price has to be paid if the builder of amplifiers is to be certain that his gear will work properly, and if it remains unpaid, then the reward is more than likely to be an amplifier which not only does not come near to fulfilling original expectations, but which actually performs a great deal worse than would a less pretentious design not so difficult to carry out.

The price we have been talking about includes increased complexity, increased cost of certain parts, a very high degree of negative feedback. It is in the latter two points that trouble s likely to be met, and, sad to say, is met by many who attempt these advanced designs. Distortion figures of less than 0.25 per cent. can readily be obtained with modern circuits, but it by no means follows that this performance will be obtained, and it is to ensure that it is, that causes all the difficulty.

BACK TO SIMPLICITY

What, then, if anything, can be done about it? The answer is simply this: that if a slight loss of performance can be put up with, quite a lot of difficulty can be overcome, In fact, we would almost go so far as to say all of it.

At this, there will no doubt be many murmurings from those who say that in an amplifier, nothing but the best is good enough, but here, as in many other places, there is room for argument. For

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Homecrafts
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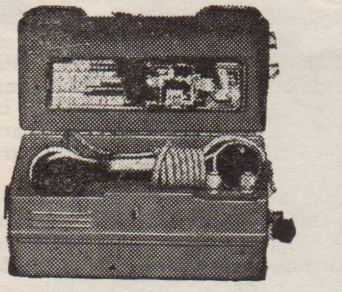
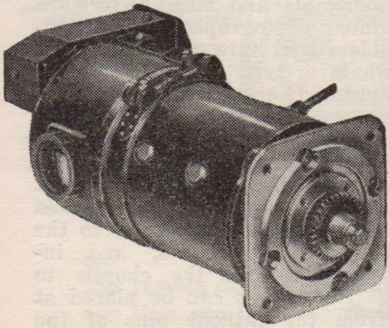
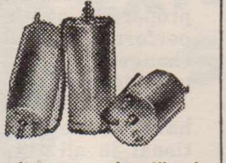


DISPOSAL BARGAIN.
English Army Telephones. Generator type with bell. No batteries required. Five mile range. As illustrated. Complete, only £4/7/6.

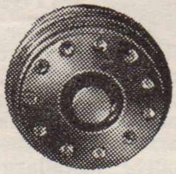


BRAND NEW.
R.A.A.F. 24 volt, 1,500 watt high charging rate Generators. Super Disposal bargain. Originally cost over £60. Our price, only 17 Gns.
Also 12 volt 500 watt generators. Completely reconditioned. Ideal for home lighting plants. Originally cost £50; price as illustrated 10 Gns.

NEW GOLDRING RECORD PLAYER
Incorporates the new No. 150 three-way pick-up and dual speed 78 and 33-1 r.p.m. motor in smart leatherette carrying case. Price complete, £19/10/-.



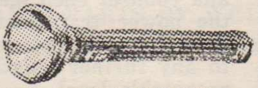
Brand new genuine Kingsley 455 Kc. I.F. Transformers. As illustrated, cut to only 7/11.



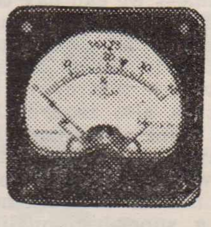
5BP1 CATHODE RAY TUBE SOCKETS.
Moulded 11-pin sockets with silver plated contacts. As illustrated, 9/6.

GOLDRING DUEL SPEED ELECTRIC GRAMOPHONE MOTORS.
Synchronous dual speed 78 and 33-1/3 r.p.m., 55/6.

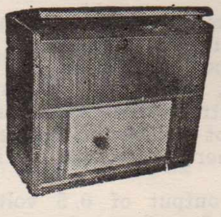
MICROPHONES
Again available English D104 high fidelity crystal microphones. As illustrated, only £5/19/6.



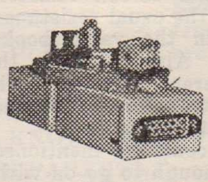
TORCH BARGAIN
Five Cell Focussing Torches. All chrome finish, as illustrated. Case with globe; 1,500 foot beam. Only 22/6. Batteries 4/9 extra.



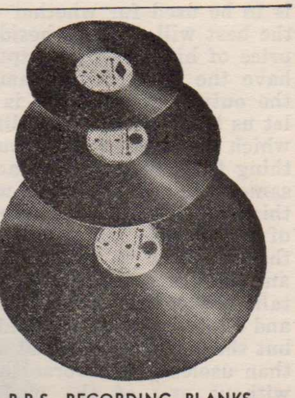
English Moving Coil Meters. 2in. scale 200 ohms per volt. Two models available —0-20 and 0-40 volt. Ideal for home lighting plants. Originally cost 70/-, cut to only 19/11. ALSO Thermo Coupled Ammeters, complete with Thermo Couple, 0-2.5 amp. or 3 amp. Only 19/11.



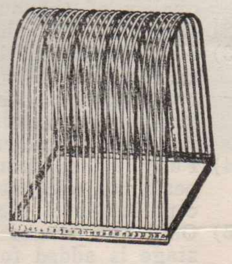
RADIOGRAM CABINETS
Beautiful walnut piano finish standard model, £13/19/6. Model with deep well for a Record Changer, £14/7/-. Also available in blonde finish. Standard model, £16/9/6; model with deep well for a Record Changer, £16/17/-. Please add 10 per cent. surcharge for increased Sales Tax. Country and interstate clients add 15/- packing charge.



"Radio and Hobbies" Car Radio Kit as described in May, 1949, issue of "Radio & Hobbies." Homecrafts offer this kit complete to the last nut and bolt. Price, as illustrated, 22 Gns., including Sales Tax.



B.R.S. RECORDING BLANKS
High grade Recording Discs with highest quality aluminium base. Available in three sizes, as illustrated. 8 inch, 5/2; 10 inch, 6/6; 12 inch, 8/6; 16 inch, 13/6.



The new improved Gramo. Record Rack. Holds 25 10in. or 12in. records. Complete with index card and gummed identificatoin numbers for records. Price, as illustrated, 22/6. Model to hold 50 records 33/-.

FERROCART SAPPHIRE GRAMO. NEEDLES
The lowest price quality sapphire needle on the market. The English "Ferrocart" with over 2,000 playings. Guaranteed. Trailer type, as illustrated, only 9/9.

COUNTRY AND INTERSTATE CLIENTS PLEASE ADD FREIGHT OR POSTAGE.

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example, few of us can afford to buy the best that is offering in, say, loud-speakers or gramophone pick-ups. We realise this, and with a sigh, go off and purchase the best our pocket will allow us to, saying to ourselves, "It may not be as good as old Tom's, down the street, but never mind, it will be pretty good for all that." What we want to point out here is that the same considerations as apply to speakers and pick-ups, which, in general, we do not make ourselves, can also apply to amplifiers which we do. It all depends what an amplifier is to be used for whether or not anything less than the best will do. And besides, unless we can pay the price of high-fidelity output transformer, we cannot have the best possible amplifier in any case, since the output transformer is part of it. By all means let us build the best amplifier we can afford, and of which we are capable, but let us also regard the thing from the purely practical point of view at the same time. This is what we have done in designing this amplifier, and we think it will give a great deal of pleasure to many who have neither the cash nor the facilities to ensure that a super-high-quality amplifier is really what it sets out to be. People may talk about frequency response up to 20,000 c/sec., and 30 db. of negative feedback as long as they like, but the fact remains that such an amplifier is worse than useless, and worse than the simplest amplifier without any of the modern "frills" if it is not working properly.

THE CIRCUIT

Before going into detail, let us see what this amplifier circuit has to recommend it. Here are a list of its features:

(1) Frequency response limited only by the quality of the output transformer.

(2) Distortion less than 2 per cent. total.

(3) Negative feedback used, but in such a way as to introduce no constructional difficulties, e.g., the amplifier cannot oscillate if a particular output transformer is not used, or if valves are replaced..

(4) Fully loaded from an output of 0. 5 volts peak, i.e., adequate gain for all purposes, except low-level pick-ups or microphones.

(5) Only two stages used, so that if an extra stage is added for working with a low-level microphone or pick-up, no difficulties will occur through motor-boating.

(6) Extreme flexibility. Any type of output pentode can be used simply by changing the cathode resistor to the recommended value for the tube used, and perhaps altering the output transformer ratio to suit. Different types of voltage amplifier pentode can also be used provided cathode and screen resistors are changed according to the usual resistance-coupled data available in the valve books, to suit the valve used. Also, altering the speaker to one of a different impedence will affect only the output transformer needed, and not any of the circuit values.

There are other points that could be mentioned, but the above list ought to be enough to go on with!

The circuit uses a phase inverter that is not used a great deal these days, but which has several points in its favour. If, as here, it employs high-gain pentodes, the balance is quite good enough for all ordinary purposes, and is obtained automatically, without any adjustments whatever. It also provides at the same time all the amplification that is needed ahead of the power valves, so that although two pentodes have been used, the total number of valves is still only four, and the sensitivity of the amplifier is such that 0.5 volts peak signal is enough to give full power output from the amplifier, and, of course, most of the time a considerably smaller input signal will actually be used. With ordinary resistors used in the phase-inverter circuit, and without any special attempt to choose exact values, the balance of the push–pull output provided by the phase inverter will be within 5 per cent. and this is a figure that is perfectly adequate for all but the most stringent requirements. A further advantage of the circuit is that, owing both to the negative feedback and to the self-balancing properties of the circuit, no noticeable change in performance will occur if any of the valves are changed, or if both valves of the same type are not identical.

Apart from the phase inverter circuit, all we have is the output stage, which is quite conventional in all respects. The power supply needs to give 250 volts at 100 ma., and with 6V6s or 6AQ5s in the circuit, the power output will be between 8 and 9 watts, with the low distortion and good frequency response mentioned above.

LAYOUT AND CONSTRUCTION

The amplifier is so simple and straight-forward that we have not printed photographs of the completed amplifier. Builders will have no difficulty in getting it to work, whatever type of parts layout is adopted. It is suggested that the valves be arranged at the corners of a square, that can be made just large enough to enable the coupling condensers to be wired directly from the plates of V1 and V3 to the grid terminals of the output tubes. The feedback condensers from the plates of the output tubes can be mounted directly to the plates of these valves at one end, and insulated solder tags mounted on the chassis to take the other ends. These tags can be placed at the right distance from the cathode pins of the voltage amplifier valves to enable the feedback resistors to be mounted directly from the tags to the cathodes.

Since building the original circuit, shown here, we have found only one source of possible trouble. It is in the use of a common dropping resistor for the two 6AU6s. With some valves, this connection was found to induce a very slow motorboat, or low-frequency oscillation, but it was found that this could be completely cured by using seperate 500k. screen resistors. When this is done, it is of course necessary to use a screen bypass condenser at each screen. This modification adds only one resistor and one condenser to the not very formidable list of parts.

Another point to watch is the way in which the heater winding is earthed. Very often it is possible to earth one side of the winding directly, but with this high-gain circuit it is best to wire two 50-ohm resistors in series, earth the centre point, and connect each end to one of the heater lugs on the power transformer. This effectively removes hum from this source, and there is no need to go to any further lengths than this to reduce it to an acceptable level.

As it stands, the amplifier will be found admirably suited to handling the output of a radio tuner or that of any ordinary gramohpone pick-up, such as a crystal or simple magnetic type. However, those pick-ups which require a bass commpensating network in order to give the output the necessary

(Continued on page 36)

NOVICE SET BUILDING

A SECTION FOR THE BEGINNER

THE ALL WAVE ONE — PART 1.

The receiver to be described is an old favourite—the regenerative detector, and for the beginner, valve for valve, there is nothing to surpass it for all-wave results. In referring to this set as a beginner's set, we are perhaps being a little ambitious for it is designed primarily for the enthusiast who has already had experience in constructing a small set. There is no reason why it should not be built by those who are new to radio however, so we will go into more detail as to its operation later on.

Briefly the All Wave one uses a 1D8–GT tube. The triode section is a regenerative detector and the pentode section is an audio frequency amplifier. The broadcast and short wave bands are covered by plug-in coils.

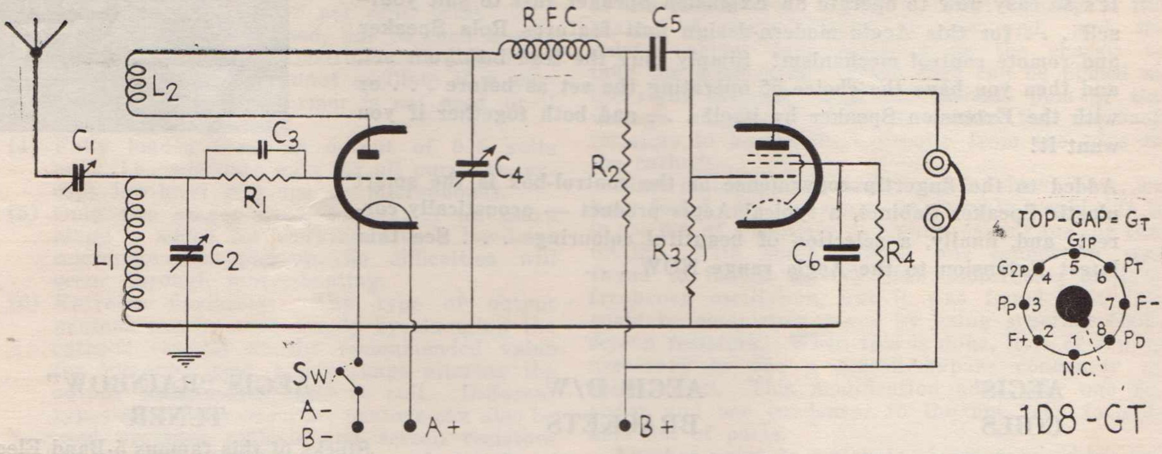
A study of the circuit will show that the antenna is connected directly to the input circuit of the detector by means of a small variable condenser and for this purpose we have used an ordinary trimmer condenser. The R.F. tuning circuit consist of the coil L1 and tuning condenser C2. Regeneration is obtained by the coil L2 and the reaction control is a .0003 uf. mica dielectric condenser C4. It is as well at this stage to issue a word of warning on making coil connections. The detector absolutely refuses to oscillate unless the reaction coil L2 is coupled to the grid coil in the correct manner. The grid end of the grid coil must be immediately adjacent to the plate end of the reaction coil and both coils wound in the same direction. While the component specifications given are accurate there is a possibility that due to differences in actual construction, difficulty may be experienced in getting the set to oscillate. Should this occur it is a good idea to try an extra turn or two on the reaction coil.

The components for the receiver were mounted on a wooden base board 5½ inches x 8 inches, and the panel used was a piece of steel sheet 8 inches x 6 inches. The use of a metal panel is very desirable for in an unshielded set hand capacity effect renders tuning, particularly on the short waves, very difficult and the extra trouble in constructing a metal panel is more than compensated for by the results achieved. The panel should be well earthed and care should be taken to ensure that the 'phone jack is well insulated as it carries H.T. The accompanying photographs serve to illustrate the chassis layout and it can be seen that the valve is mounted on the centre of the base board. This gives free access to the socket pins for both the detector and pentode sections of the valve.

In mounting the valve socket, spacing rods of approximately 1¼ inches should be used in order to firmly anchor the socket to the base board and at the same time make room for soldering the wires to the socket pins. This form of socket mounting should also apply to the coil socket, for the same reasons as outlined above. The coil is located immediately behind the tuning condenser and the aerial coupling condenser is mounted on the aerial terminal.

All the small components, such as the four resistors, the R.F. choke, the coupling condenser, and the pentode screen by-pass condenser are self-supporting. In the interests of both mechanical and electrical construction all leads should be as short as possible. It is important to note that the screen by-pass condenser should connect as close as possible to the screen terminal on the valve socket.

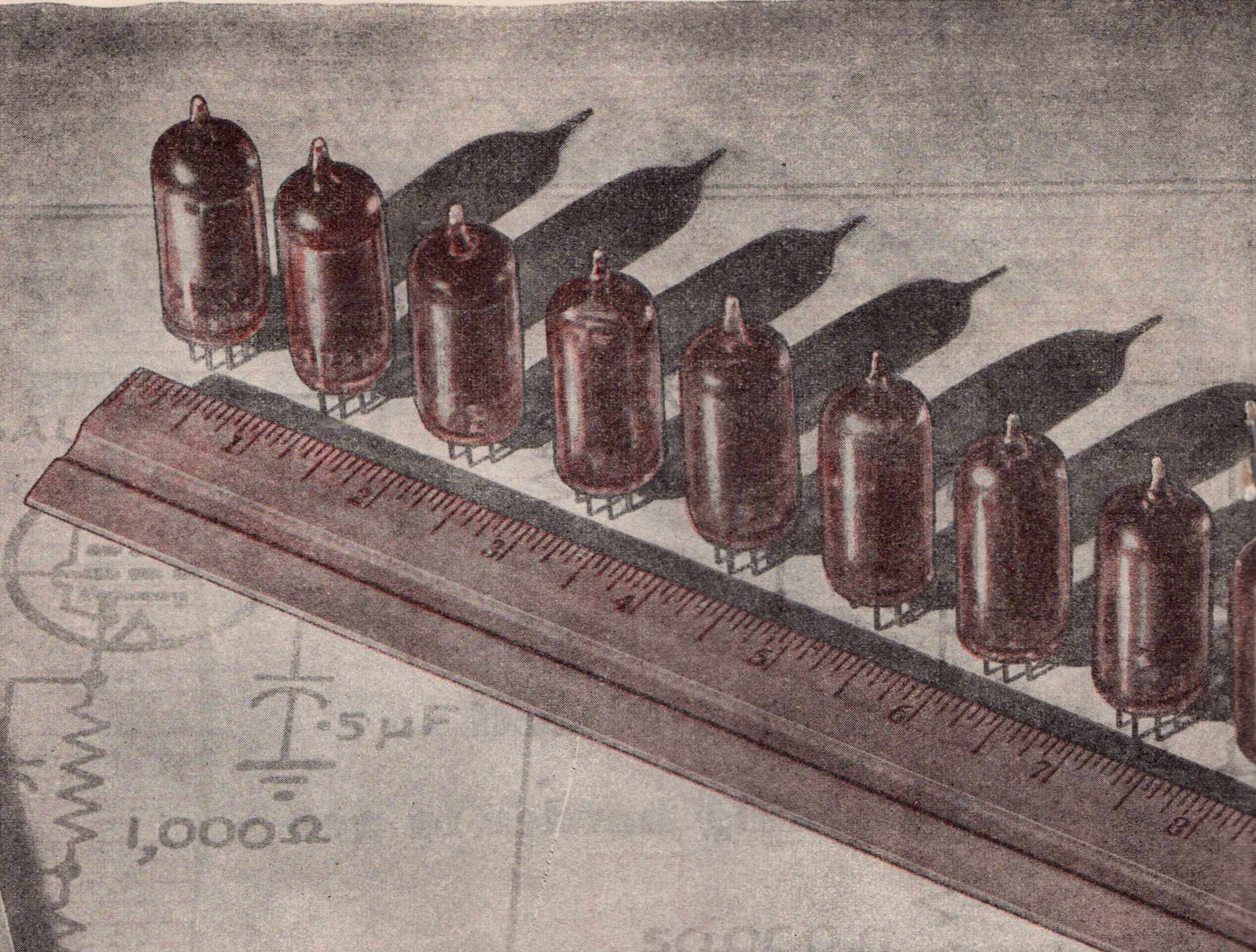
The grid condenser and resistor are connected to the top solder lug of the tuning condenser so that the shortest possible lead connects with the top–cap grid of the triode section of the 1D8.



C1 — 30 uuf. max. trimmer.			R1 — 2 Megs.
C2 — 0.00035 uf. max. variable.			R2 — 50,000 w.
C3 — 0.0001 uf. fixed.	C5,C6 — 0.1 uf.		R3 — 5 Megs.
C4 — 0.0003 uf. max. variable.			R4 — 20,000 w.

The coil specifications are given in the chart and it matters little which pins are used in the coil socket provided the choice of connections remains standardised throughout the set of coils. Some trouble may be experienced in obtaining coil former, but we used 1¼ inch former and ordinary six pin speaker plugs. It was found that the former fits perfectly over the end of the plug and a really good glue will firmly set the two together. This type of construction is only necessary for the broadcast and intermediate coils—the high frequency coil is wound on an old valve base. It may appear a little odd that six pin coil formers are specified, but we have in mind an R.F. stage which we will describe in the future and the two extra pins will provide the

CONTINUED ON PAGE 35


·5μF
1,000Ω


Measure quality!
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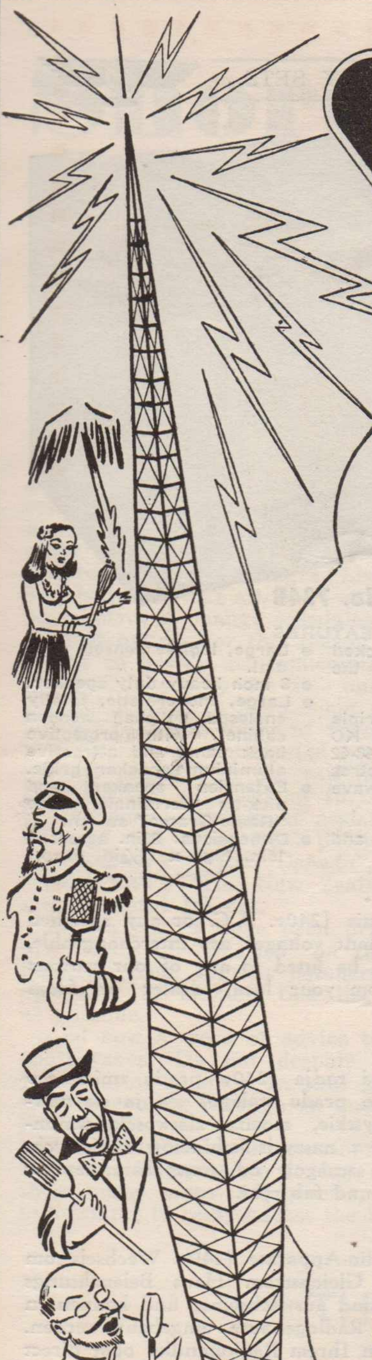
International Broadcasting and

SHORT-WAVE REVIEW



INTRODUCTION

When you switch on your receiver to short wave do you think about the abundance of power you have within your grasp? In actual fact, the whole wide world is at the tip of your fingers. Your short wave set can be an encyclopaedia apart from being the usual source of entertainment. Stories of far distant lands may be heard, as well as the latest news concerning the international situation. Music, both strange and familiar, is yet another feature which may be heard from every corner of the earth.

Your radio can also be a pleasant means of conveyance — it enables you to visit, without any trouble or personal effort, any country at any time and to stay as lon as you so desire.

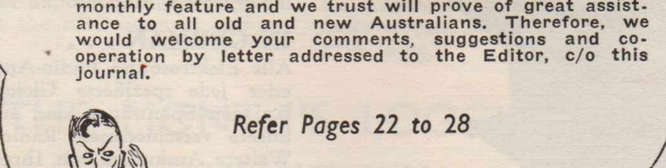
Listening to programmes from various lands one becomes accustomed to their different customs and in no time recognition of the station to which you are tuned is readily identified, before actually hearing it announced.

To tune in to a short wave station one does not require the assistance of a magician, but one fact must be remembered — accuracy in tuning short wave stations is essential. Do not despair or lose faith in your receiver should you not be able to obtain as good results on your second attempt as the first, or vice versa, because reception in many cases varies with climatic conditions and other factors, details of which will be published in future issues of this journal.

However, we are listing on the following pages numerous overseas stations set out in as much detail as space permits, and although we do not anticipate that you will hear every station listed, the schedules given will, at least, be a guide as to where and when these transmissions are actually taking place. Like any new venture we are bound to have minor setbacks at the start, but experience will overcome these difficulties.

Furthermore, our future issues will carry illustrations of stations and announcers so that as much interest as possible can be included. This new section of our journal, namely "INTERNATIONAL BROADCASTING AND SHORT WAVE REVIEW" will become a regular monthly feature and we trust will prove of great assistance to all old and new Australians. Therefore, we would welcome your comments, suggestions and cooperation by letter addressed to the Editor, c/o this journal.

Refer Pages 22 to 28



CRAFTSMAN-BUILT RADIOGRAMS AND SPECIALITY SETS.

Attention!

(IN ENGLISH)

NEW AUSTRALIANS

AND OTHER D.X.'s INTERESTED IN A RADIO SET TO GIVE FIRST-CLASS SHORT WAVE RECEPTION . . .

HERE IT IS

IMMEDIATE DELIVERY

★

UWAGA!

(IN POLISH)

Nowoprzybyli, zaintere — sowani w kopnie pierwszorzednego aparatu radjowego dla odbioru krotkofalowego. Natychmiastowa dostawa w niniejszym sklepie.

★

ACHTUNG

(IN GERMAN)

Neue Australier und andere neuankommlinge die interessiert sind in einen radio-apparat der erstklassigen kurzwellenempfang gibt.
Here ist er fur sofortige auslieferung.

★

FIGYELEM

(IN HUNGARIAN)

Uj Ausztralok es mas D.P.-K akik erdekelve vannak radio irant amelyen eisoranguan lehet rovid hullamot fogni.
Kaphato azonnali szalitassal.

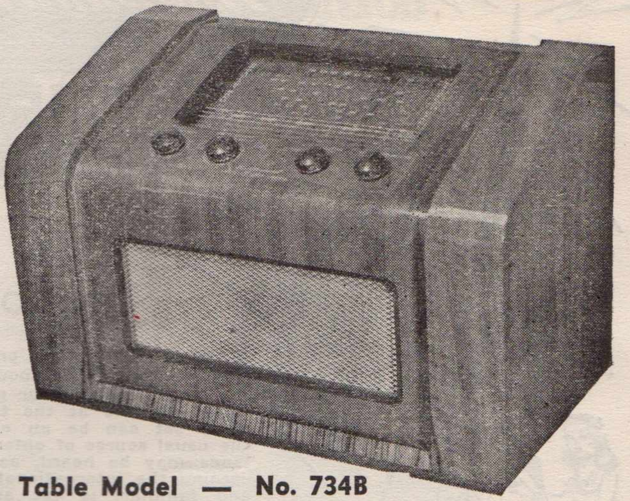


Table Model — No. 734B

FEATURES

- SEVEN power packed valves for spanning the world.
- Frequency coverage, triple wave, 500 KC - 1500 KC broadcast band; 13-42 metres and 40-120 metres on the TWO short wave bands.
- Tuned R.F. stage and push pull output.
- Large, legible console type dial.
- 8 inch heavy duty speaker.
- Large, modernistic, totally enclosed polished wooden cabinet, with protective back panel and attractive aluminium speaker grille.
- Extension speaker and pick-up terminals, also "Radio-Gramo" switch.
- Dimensions: 22in. across x 15in. high x 11½in. deep.

IN ENGLISH . . .

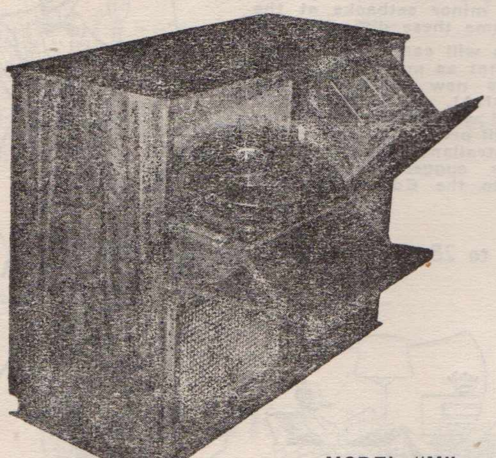
All Electrosound chassis (240v. A.C. or any specified D C. home lighting plant voltage) are interchangeable, and any of these can be fitted to any of our various cabinets. Enquire from your local dealer or from Electrosound direct.

IN POLISH . . .

Wszystkie Electrosound radja (240v. pradu zmienneco albo wyszczegolnionego pradu stalego) da ja sie nawzajem zamienic iwszystkie, mozna zlatwoscia wmontowac w ktorykolwiek z naszych kabinetow radjowych. Informacje i dalsze szczegoly od naszych zastepcow lub wprost z Electrosound fab ryki.

IN GERMAN . . .

Alle Elektrosound Radio-Apparate (240v. Wechselstrom oder jede spezifierte Gleichstrom Haus Beleuchtungs Anlagen Spannung) sind auswechselbar und konnen in unsere verschiedenen Radiogehause eingebaut werden. Weitere Auskunfte von Ihrem Radiohandler oder direct von der Firma Electrosound



MODEL "M"
RADIOGRAM

Electrosound

ELECTROSOUND PTY. LTD.
RADIO CRAFTSMEN
110 Salisbury Road, Camperdown, N.S.W.
Phones: LA4898 - LA4959.

CRAFTSMAN-BUILT RADIOGRAMS AND SPECIALITY SETS.

Short-Wave Review

Conducted by L. J. Keast

NOTES FROM MY DIARY. — LANGUAGE BROADCASTS

All times in these pages are Australian Eastern time.

In this issue we are making an ambitious attempt to prepare for the benefit of the "New Australians" a list of the principle broadcasts in foreign language.

Because of the peculiarities of short-wave I am giving (to the best of my present knowledge) the **complete times** that certain countries are on the air and in other instances the **known times** that other countries are giving special broadcasts in selected foreign languages. Listeners must remember, however, that all short-wave stations claim the prerogative to change schedules or alter frequencies without notice. For this reason I am asking all listeners to notify me immediately they notice any changes. I hope by the time our next issue is ready for publication to have some more particulars by airmail that will allow of further information and any alterations anticipated by changes in season.

I am grateful to the various Consuls who have provided and are seeking further information and I acknowledge the great assistance from "London Calling" and other BBC publications; "The Voice of America", "Radio Canada", "Sweden Calling", "Radio Call", "The New Zealand DX Times' and many helpful DX-ers.

In the past I have been principally anxious to give times of "English" on the air, so claim indulgence from regular listeners and ask their cooperation in making this list as comprehensible as possible.

And now a word of advice to newcomers to the short-waves. Do not despair if you cannot log your station at once. In your particular location it may be coming through on another frequency. Try them all.

Remember at various seasons of the year sometimes it is impossible to log even the BBC with their many many frequencies, as is often shewn in attempts to re-broadcast the BBC news at 11 p.m.

—L. J. KEAST.

STANDARD TIMES.

Times in Australia are based on what is known as Eastern Standard Time (E.S.T.), which is 10 hours ahead of Greenwich Mean Time. Throughout New South Wales, Victoria, Tasmania and Queensland E.S.T. is observed, whilst in South Australia, Northern Territory and Broken Hill time is half an hour behind E.S.T. In Western Australia time is two hours behind E.S.T.

STANDARD ZEITEN.

Die Australien-Zeit wird bestimmt nach der ostlichen Standard Zeit ("Eastern Standard Times"), die zehn Stunden fruher liegt als die mittlere Greenwich Zeit..

In ganz Neu Sud Wales, Victoria, Tasmanien und Queensland wird die ostliche Standard Zeit gebraucht, wahrend in Sud Australien, Northern Territory und Broken Hill die Zeit eine halbe Stunde spater als die ostliche Standard Zeit liegt.

In West-Australien liegt die Zeit zwei Stunden spater als die ostliche Standard Zeit.

CZAS SREDNI.

Czas w Australii jest oparty na tak zwanym Srednim Czasie Wschodnim (E.S.T.), ktory jest o 10 godzin wczesniejszy od czasu ustalonego w Greenwich. Takie oznaczenie czasu stosowane jest w New South Wales, Victorii, Tasminii oraz Queensland zas w South Australia, Northern Territory i Broken Hill czas jest opozniony o ½ godziny w stosunku do E.S.T. W Western Australii czas jest opozniony o 2 godziny w stosunku do E.S.T.

STANDARTA LAIKS.

Laiku Australija izteic pec t.s. austrumu standarta laika/E.S.T./, kas ir 10 stundas prieksa videjam Grinvicas laikam. Pie austrumu standarta laika turas New South Wales, Victoria, Tasmania un Queensland, kamer South Australia, Northern Territory un Broken Hill laiks ir ½ stundu velaks ka austrumu standarta laiks. Western Australia laiks ir par 2 stundam velaks ka austrumu standarta laiks.

THE MONTH'S LOGGINGS

"RADIO AUSTRALIA"

Overseas Service—Australian Broadcasting Commission

RADIO AUSTRALIA

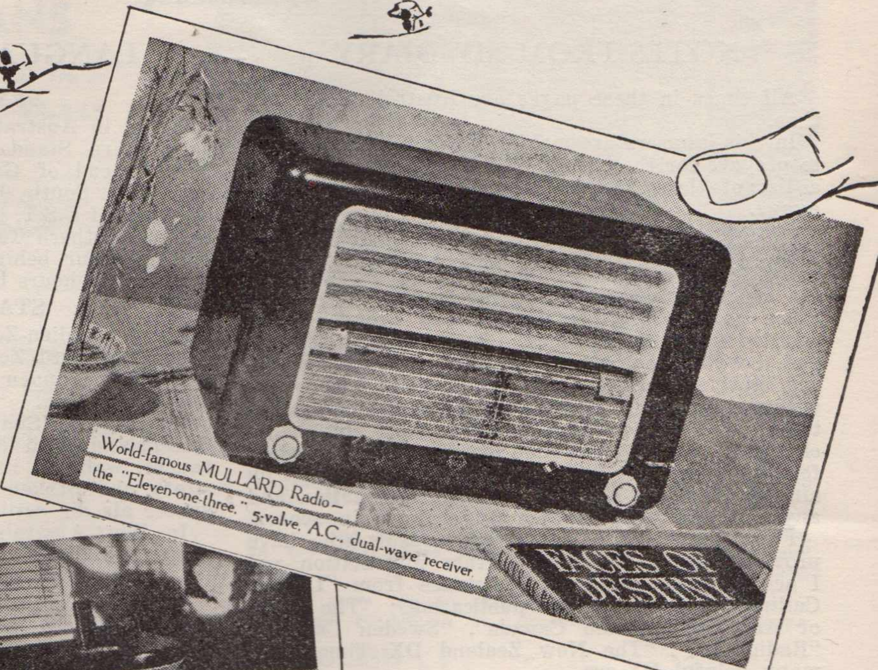
Schedule Alteration Effective June 1st.

6.28 — 7.50 p.m.	VLB11 — to Forces in Japan.	11.85 m.c., 25.32 metres.
6.28 — 9.45 p.m.	VLC15 — to S.E. and S. Asia.	15.32 m.c., 19.59 metres.
6.28 — 11.55 p.m.	VLA 9 — to Forces in Japan.	9.58 m.c., 31.32 metres.
6.59 — 10 p.m.	VLG11 — to China and N. Pacific.	11.88 m.c., 25.25 metres.
8.00 — 12.45 a.m.	VLB11 — to S. and S.E. Asia.	11.85 m.c., 25.32 metres.
10.00 — 2.15 a.m.	VLC11 — to North America.	11.81 m.c., 25.40 metres.
* 10.15 — 11.30 p.m.	VLG9 — to S.E. Asia.	9.54 m.c., 31.45 metres.
Midnight — 2.15 a.m.	VLA9 — to S. Asia and Middle East.	9.58 m.c., 31.32 metres.
1 — 2.15 a.m.	VLB9 — to Africa.	9.56 m.c., 31.38 metres.

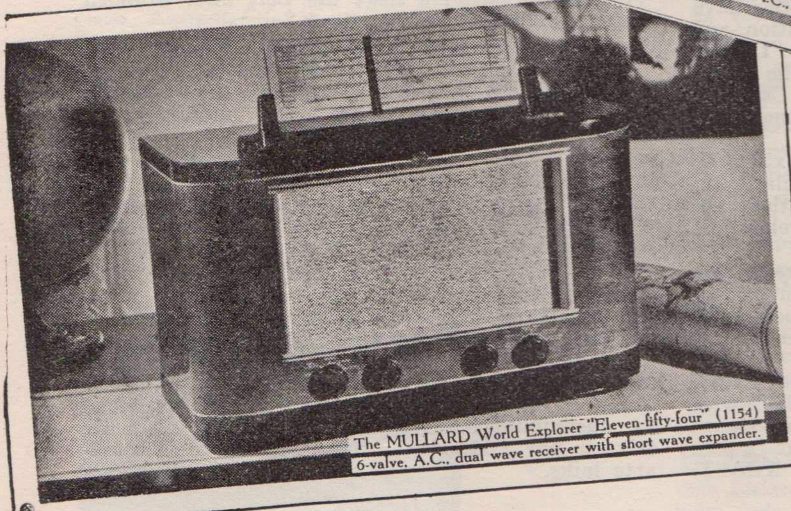
* to Midnight Saturday.

Continued on page 25

THE TWO NEW
Mullard
"World Explorers"



World-famous MULLARD Radio—
the "Eleven-one-three." 5-valve, A.C., dual-wave receiver.



The MULLARD World Explorer "Eleven-fifty-four" (1154)
6-valve, A.C., dual wave receiver with short wave expander.

With the two new Mullard "World Explorers' short-wave enthusiasts can scan the farthes corners of the earth. The "Eleven-one-three' is a 5-valve dual wave receiver and the "Eleven fifty-four" is a super 6-valve dual wave mode with *R.F. stage,* featuring the Mullar Expander on *16, 19, 25 and 31 metre band* . . . for old and new Australians who wan to bring in the most distant stations wit *added* power.

D I S T R I B U T O R S:

N.S.W.: Bloch & Gerber Ltd., 46 York St., Sydney; Martin de Launay Pty. Ltd., 287 Clarence St., Sydney, and cnr. King and Darby Sts., Newcastle. VIC.: Howard Electrical & Radio Co., Vere St., Richmond, E.1. QLD.: B. Martin Pty. Ltd., 35 Charlotte St., Brisbane. STH. AUST.: Gerard & Goodman Ltd., 192-196 Rundle St., Adelaide; Harris Scarfe Ltd., 74 Grenfell St., Adelaide; R. C. Woollard, 18 Chesser St., Adelaide. W.A.: Harris Scarfe & Sandovers Ltd., 691 Hay St., Perth. TAS.: Howard Electrical & Radio Co., Vere St., Richmond, E.1, Victoria. Tasmanian Wholesalers: W. E. Gebbie Pty. Ltd., 81 York St., Launceston.

Mullard

MULLARD-AUSTRALIA PTY. LTD.

35-43 Clarence Street, Sydney . . . 592 Bourke Street, Melbourne.

Representatives in Australia for Mullard Electronic Products Ltd., London.

MR5-51

SHORT WAVE REVIEW (from page 23)

FOREIGN LANGUAGE BROADCASTS

E.S. TIME	TRANSMITTED FROM	WAVE BAND IN METRES.
PROGRAMME IN DUTCH	**★ NEDERLANDS PROGRAMMA ★**	
7 — 8.30 p.m.	PCJ — Hilversum — Holland (Sun. to Indonesia).	13, 16, 19, 49.
8 — 8.30 p.m.	PCJ — Hilversum — Holland (Weekdays to Aust. and N.Z.)	13, 16, 19, 49.
10.30 p.m. — —Midnight	PCJ — Hilversum — Holland (Daily to Aust., New Guinea, Indonesia)	13, 16 and 49.
Midnight — 1.30 a.m.	PCJ — Hilversum — Holland (Daily).	13, 16, 19, 49.
Midnight — 1.45 a.m.	PCJ — Hilversum — Holland (Sundays and Daily to Indonesia).	13, 16, 19, 49.
4.30 — 6 a.m.	PCJ — Hilversum — Holland (Daily).	25, 31 and 49.
4 — 7 a.m.	PCJ — Hilversum — Holland (Sundays to Europe and Africa).	25, 31 and 49.
9.30 — 11.30 a.m.	PCJ — Hilversum — Holland (Daily).	25 and 31.
9.30 — Noon	PCJ — Hilversum — Holland (Sundays).	25 and 31.
5.45 — 6.15 p.m.	BBC Programme — London.	42 and 49.
3 — 3.15 a.m.	BBC Programme — London.	25, 31 and 42.
8 — 8.30 a.m.	BBC Programme — London.	42 and 49.
2.45 — 3 a.m.	CKNC — Montreal.	16.
4.15 — 4.45 a.m.	CKNS — Montreal.	19.
12.30 — 12.45 p.m.	CKCS & CKRA — Montreal (Saturdays only).	19 and 25.
PROGRAMME IN CHZECHOSLAVAKIAN	**★ CESKY A SLOVENSKY ★**	
2.45 — 3 p.m.	"Voice of America."	49, 31 and 25.
3.30 a.m. — 4 a.m.	"Voice of America."	13, 16 and 19.
6 — 6.30 a.m.	"Voice of America."	13, 16, 19, and 25.
8.15 — 8.30 a.m. & 9 — 9.45 a.m.	OLR2A — Prague.	49.
4 — 7.30 a.m.	OLR4C — Prague.	25.
2 — 2.30 a.m.	CKNC and CKCX — Montreal.	16 and 19.
3.30 — 3.45 a.m.	CKNC and CKCS — Montreal.	16 and 19.
7 — 7.30 a.m.	CHOL and CKLO — Montreal.	25 and 31.
9 — 9.15 a.m.	CHOL and CKLO — Montreal to 9.30 a.m. Sun. and Mon.).	25 and 31.
3.15 — 3.30 p.m.	BBC — London, Programme and News	41 and 49.
4 — 4.15 p.m.	English by Radio (Tuesdays and Thursdays).	41 and 49.
11 — 11.15 p.m.	News.	19 and 25
5 — 5.15 a.m.	Slovak — News and Programmes.	19, 25 and 31.
6.30 — 7 a.m.	News and Programmes	31 and 42.
PROGRAMME IN ITALIAN	**★ PROGRAMMA ITALIANA ★**	
8 — 8.30 p.m.	Radio Italiana — Rome.	19 and 25.
9.20 — 10 p.m.	Radio Italiana — Rome.	19 and 25.
10.20 — 10.30 p.m.	Radio Italiana — Rome.	19 and 25.
12.45 a.m.	Radio Italiana — Rome.	25 and 31.
5.30 — 5.45 p.m.	BBC Programmes — London.	25, 31 and 42.
5.45 — 6 p.m.	BBC Programmes — London.	25 and 31.
11.30 — 11.45 p.m.	BBC Programmes — London.	19, 25 and 31.
11.45 p.m. — Midnight.	BBC Programmes — London.	19, 25 and 31.
5.30 — 6 a.m.	BBC Programmes — London.	25, 31 and 42.
8 — 8.45 a.m.	BBC Programmes — London.	25, 31 and 42.
6.30 — 7 a.m.	CKCS and CHOL — Montreal.	19 and 25.
4.30 — 4.45 a.m.	Radio Nacional de Espana.	32.02 metres.
PROGRAMME IN LITHUANIAN		
2 — 2.15 a.m.	"Voice of America."	13, 16 and 19.
PROGRAMME IN GERMAN	**★ DEUTSCHES PROGRAM ★**	
5 p.m.	Radio Frankfurt.	48.74 metres.
1.15 a.m. — 6 p.m.	Munich — 3.	49.34 metres.
6.15 p.m. — 10.30 p.m.	Munich — 5.	48.85 metres.
11.30 p.m. — 1 a.m. and 1.15 a.m. — 6 p.m.	Munich — 5.	48.85 metres.
5.30 a.m. — 5 p.m.	Munich — 1.	48.62 metres.
10 a.m. — 10 p.m.	Munich —4.	41.38 metres.
6.15 p.m. — 1 a.m. & 2.15 a.m. — 12.45 p.m.	Munich — 3.	31.45 metres.
1.15 p.m. — 5.15 p.m.	Munich — 2.	31.02 metres.
5.15 p.m. — 5 a.m.	Munich — 1.	25.27 metres.
5.45 p.m. — 12.45 a.m.	Munich — 1.	19.64 metres.
1.57 — 6.12 p.m. 8 p.m. — 9.10 a.m.	Radio Leipzig. News in German at 2; 3; 4; 8 p.m. Midnight, 4.30; 7 and 9 a.m.	30.83 metres.
2.30 — 2.45 a.m.	CKNC and CKCS — Montreal.	16 and 19.
6 — 6.30 a.m.	CKCS and CHOL.	19 and 25.
9.15 — 9.30 a.m.	CHOL and CKLO — Montreal (Except Sundays and Mondays).	25 and 31.
3.45 — 4.30 a.m. & 5 — 5.15 p.m.	BBC Programme — London.	41 and 49.
(1 — 1.30 a.m.) 4 — 4.15 a.m.) (4.45 — 5.15 a.m.)	BBC Programme — London.	25, 31 and 42.
(7 — 8 a.m.) 8.15 — 9.15 a.m.) (11 — 11.15 a.m.)	BBC Programme — London.	40.98 and 49.59 metres.

(Continued on page 27)

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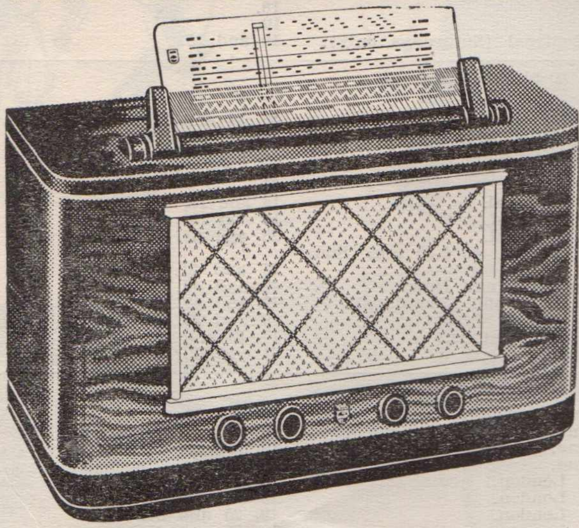


PHILIPS

most powerful world-range radio

RADIO MARKI PHILIPS MA NAJWIEKSZY SWIATOWY SASIEG ODBIORU

(IN ENGLISH)

Here is a radio designed especially for people who demand the utmost in world-range listening — and in particular for new Australians who like to listen to programmes from the old "home" country.

PHILIPS Model 125 is a 6-valve, world-range, table-radio equipped with every known device for perfect overseas reception. Features include tuned R.F. stage, multi-purpose valves, B.A.N.D.S.P.R.E.A.D. tuning and gramophone pick-up terminals Cabinet is of selected Australian timbers and features the "inclinator dial". ... ... PHILIPS Model 125 can be heard at your nearest PHILIP radio retailer . . . call in and hear this superb radio for yourself — you'll like it!

— famous as Philips Lamps.

(IN POLISH)

Oto jest aparat radiowy przeznaczony specjalnie dla osob ktorym zalezy na jaknajszerszym zasiegu odbioru — a przedewszystkim dla Nowych Australijczykow, ktorzy chcialiby sluchac programow w swym ojczystym jezyku.

Radio Philipsa, model 125, jest to 6-cio lampowy aparat o swiatowym zasiegu, wyposazony w najnowsze udoskonalenia zapewniajace jaknajlepszy odbior stacji zamorskich. Posiada on wielocelowe kombinowane lampy, kontakty do waczenia gramofonu, automatycznie strojony amplifikator i rozszerzona skale. Skrzynka wykonana jest ze specjalnie dobranego drzewa australijskiego i posiada tarcze nachylona dla atwiejszego odczytywania skali.

Najblizszy sklep z aparatami radiowymi marki Philips posiada model nr.125; wstap na chwile i posuchaj sam tego wspaniaego odbiornika, napewno Ci sie bedzie podoba!

Radio odbiornik Philipsa-rownie synny jak zarowki Philipsa.

PHILIPS

PHILIPS Radio

Short-Wave Review — Continued from page 25

E.S. Time	Transmitted From	Wave Band (Metres)
PROGRAMME IN SPANISH	**★ PROGRAMAS EN ESPANOL. ★**	
10.45 p.m. — 2 a.m.	Radio Nacional de Espana — Madrid.	32.02 metres.
10 — 11 p.m.	"Voice of America." (Call signs used: KRCA, KWID, WLWO, WABC, WGEO.)	13, 16, 19, 25, 31, 49.
8 — 8.30 a.m.	"Voice of America."	13, 16, 19 and 25.
10 — 2 a.m. 4 — 10 a.m.	Radio International — Tangiers. In Spanish, French, Arabic and English.	49.
12.15 — 12.30 a.m.	BBC Programme — London.	19, 25 and 31.
7.15 — 8 a.m.	BBC Programme — London.	25, 31 and 42.
10.40 — 11.45 a.m.	CKCX — Montreal and CKRA.	19 and 25.
12.30 — 12.45 p.m.	CKCS and CKRA — Montreal (Except Sats.)	19 and 25.
12.45 — 1.35 p.m.	CKCS and CKRA — Montreal (Daily).	19 and 25.
PROGRAMME IN POLISH	**PROGRAMY W JEZYKU POLSKIM.**	
6.30 — 7 a.m.	Radio Espana.	9.369 m.c. and 32.02 metres.
3.45 — 4 p.m.	"Voice of America."	25, 31, 41 and 49 metres.
2.15 — 2.45 p.m.	"Voice of America."	13, 16, 19, 25, 31, 41 and 49
6.30 — 7 a.m.	"Voice of America."	13, 16, 19, 25, 31 and 41.
2 — 5 a.m.	Polskie Radio — Warsaw.	9.52 m.c. and 31.48 metres.
3 — 7.30 a.m.	Polskie Radio — Warsaw.	11.74 m.c. and 25.55 metres.
2 — 5 a.m.	Polskie Radio — Warsaw.	6.115 m.c. and 49.06 metres.
PROGRAMME IN FRENCH	**★ EMISSION FRANCAISE ★**	
4 — 6.30 a.m.	Radio Paris.	42.
1 — 1.45 p.m.	Radio Paris.	49.
2 — 4 p.m.	Radio Paris.	48.4 metres.
10 p.m. — Midnight	Radio Paris.	16.
5 — 6 p.m.	Radio Dakar.	25.
9 — 11.30 p.m. & 4 — 9 a.m.	Radio Dakar.	25.
5 — 7 a.m.	Radio Dakar.	19.
3.45 — 4.15 a.m.	Radio International — Tangiers.	49.
7.30 — 8 a.m.	CKNC and CKCS — Montreal.	16 and 19.
11.45 a.m. — Noon	CHOL and CKLO — Montreal.	25 and 31.
5.30 — 5.45 p.m.	CKCX and CKRA — Montreal.	19 and 25.
10 p.m. — 2 a.m. & 4 — 10 a.m.	BBC Programme — London.	42 and 49.
6.15 — 6.45 p.m. & 5.30 — 8 a.m.	BBC Programme — London.	31, 42, 49.
10.30 — 10.45 p.m.	BBC Programme — London.	25, 31, 42.
PROGRAMME IN RUMANIAN	**★ PROGRAMUL ROMANESC ★**	
4 — 7.30 a.m.	Radio Bucharest.	32.42 metres.
5 — 8.30 a.m.	Radio Bucharest.	48 metres.
2.45 — 3 a.m.	"Voice of America."	13, 16 and 19.
5.30 — 6 a.m.	"Voice of America."	13, 16 and 19.
4.15 — 4.30 p.m.	BBC Programme — London.	31 and 42.
7 — 7.30 a.m. & 9.45 — 10 a.m.	BBC Programme — London.	31 and 42.
PROGRAMME IN UKRANIAN		
4.30 — 5 a.m.	"Voice of America."	13, 16 and 19.
PROGRAMME IN YUGOSLAV	**★ JUGOSLOVENSKI PROGRAMI ★**	
10 p.m. — 12.45 a.m.	Radio Beograd — Belgrade.	31.56 metres.
3 a.m. — 10 a.m.	Radio Beograd — Belgrade.	49.18 metres.
3.30 — 3.50 p.m.	Radio Stancia.	43.56 metres.
Midnight — 12.45 a.m.	Radio Stancia.	40.30 metres.
2.30 — 2.45 p.m.	"Voice of America."	25, 31 and 49.
1.30 — 1.45 a.m. & 3 — 3.15 a.m.	"Voice of America."	13, 16 and 19.
3.45 — 4 a.m. & 5 — 5.30 a.m.	"Voice of America."	13, 16 and 19.
4.45 — 5 p.m.	BBC Programme — London.	31 and 42.
12.45 — 1 a.m. & 3.15 — 3.30 a.m.	BBC Programme — London.	19, 25 and 31.
4.15 — 4.30 a.m.	BBC Programme — London.	19, 25 and 31.
6.45 — 7. a.m.	BBC Programme — London.	25 and 31.
7 — 7.30 a.m. & 8.45 — 9 a.m.	BBC Programme — London.	31 and 42.
PROGRAMME IN GREEK	**★ ΕΛΛΗΝΙΚΟΝ ΩΡΟΓΡΑΜΜΑ ★**	
3 — 4.30 p.m.	Radio Athens.	48.58 metres.
7.30 — 11.30 p.m.	Radio Athens.	31.24 metres.
8.30 — 9.30 a.m.	Radio Athens.	19.53 metres.
3.15 — 3.30 a.m.	"Voice of America."	13, 16, 19 and 25 bands.
1.15 — 1.30 a.m.	BBC Programme — London.	19, 25 and 31 bands.
4.15 — 4.30 a.m.	BBC Programme — London.	19, 25 and 31 bands.
6.30 — 7 a.m.	BBC Programme — London.	19 and 25.
12.15 — 12.30 a.m.	BBC Programme — London.	19, 25 and 31.
5 — 5.15 p.m.	BBC Programme — London.	31 and 41.32 metres.
PROGRAMME IN BULGARIAN	**★ BULGARSKI PROGRAM ★**	
4.50 — 6.40 a.m. & 7.40 — 8 a.m.	Radio Sophia.	32.09 metres.
3 — 3.15 a.m. & 5.30 — 6 a.m.	"Voice of America."	13, 16 and 19.
2.45 — 3 p.m.	BBC — London (News).	31 and 42.
9.45 — 10 p.m.	English by Radio (Monday and Wednesday).	31 and 42.
4 — 4.30 p.m. & 6.30 — 6.45 p.m.	Radio Sophia.	25, 31 and 42.

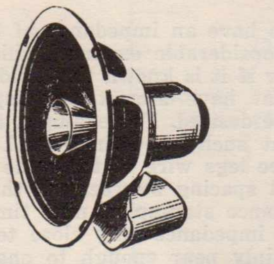
(Continued on page 28)

SHORT WAVE REVIEW (from page 27)

E.S. TIME	TRANSMITTED FROM	W-VE BAND (METRES)
PROGRAMME IN PORTUGESE	**PROGRAMAS EM PORTUGUES.**	
Midnight — 2.30 a.m.	Radio Emisora Nacional — Lisbon.	19 and 25 bands.
1.30 — 6.30 a.m. & 7 — 9 a.m.	Radio Emisora Nacional — Lisbon.	19 and 25 bands.
6 — 6.15 a.m.	"Voice of America!"	13, 16 and 19.
9.50 — 10.40 a.m.	CKCX and CKRA — Montreal.	19 and 25 bands.
6.30 — 7 a.m.	BBC Programme — London.	25, 31 and 42.
11.30 — 11.45 p.m.	BBC Programme — London.	19 and 25 bands.
PROGRAMME IN ALBANIAN		
5 — 5.15 a.m. & 6.30 — 7 a.m.	Radio Tirana.	38.22 metres.
2.30 — 2.45 a.m. & 5.15 — 5.30 a.m.	BBC — London.	31 and 25.
PROGRAMME IN HUNGARIAN	**MAGYAR**	
5 — 8.30 a.m.	Radio Espana.	30.52 and 48 metres.
7 — 7.15 a.m.	Radia Espana.	32.02 metres.
5 — 5.30 a.m. & 6.45 — 7.15 a.m.	"Voice of America."	13, 16, 19 and 25 bands.
4 — 4.15 p.m.	"Voice of America."	25, 31 and 49 bands.
PROGRAMME IN DANISH		
Noon — 1 p.m.	OZF — Copenhagen.	31.51 metres.
Approximately 8 p.m.	OZH — Copenhagen.	19.76 metres.
4 — 4.30 a.m.	BBC Programme — London.	31 band.
10.15 — 10.30 p.m.	BBC Programme — London.	31 and 42 bands.
4 — 4.30 a.m.	BBC Programme — London.	31 and 42 bands.
5.40 — 6 a.m.	CKNC and CKCS — Montreal.	16 and 19.
PROGRAMME IN SWEDISH		
4 — 8 a.m. & 10 — 11.30 a.m.	SBO — Stockholm, also SDB2 (27.83m.).	49 band.
3.15 — 5.35 p.m.	SBO — Stockholm, also SDB2 (27.83m.).	49 band.
1.15 — 4 a.m.	SDB2 — Stockholm.	27.83 metres.
5.35 p.m. — 1.15 a.m.	SBP — Stockholm.	25 band.
5.35 p.m. — 4 a.m.	SBT — Stockholm.	19 band.
1.30 — 1.45 a.m.	CKNC and CKCX — Montreal (Mondays).	16 and 19 bands.
5 — 5.20 a.m.	CKNC and CKCS — Montreal (Daily).	16 and 19 bands.
3 a.m. approximately	ACJB — Quito.	16 and 19 bands.
5.30 — 6 a.m.	BBC Programme — London.	19, 25, 31 and 42.

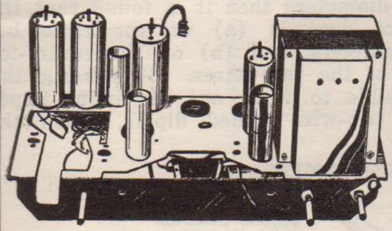
MOTOR SPARES LTD.

547 ELIZABETH STREET — MELBOURNE



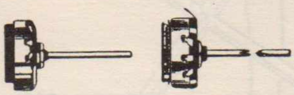
8in. ROLA SPEAKERS

Electro Dynamic type with 1500 ohm field and 5000 ohm transformer. Some have damaged cones, but otherwise are in good condition. Jobbing out at 15/- each.



RADIO CHASSIS

This is a 5 Valve Dual Wave Chassis, completely wired with all coils, I.F's, Switches, Potentiometers, Resistors and Condensers, etc., but does not include the gang condenser, dial, valves and speaker. Operates off 230 volt A.C. Suitable for use either as a console or mantle radio. Jobbing out at £4/10/-.



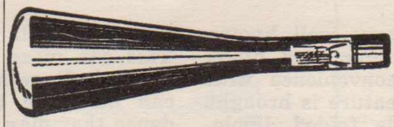
POTENTIOMETERS

Job line of Switch Pots in the following sizes:—

¼ meg.—with double pole switch.
½ meg.—with single pole switch.
1" meg.—with single pole switch.

All sizes are absolutely brand new and in perfect condition.

Usual price 10/6. Our price 5/9 ea.



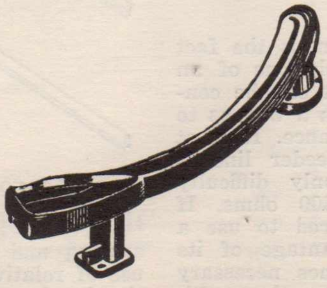
RADIO VALVES

We have large stocks of all types of valves. Below are listed some of the "hard-to-get" types.

VCR 97: 6in. Cathode Ray Tube	38/6
5 BP I: 5in. Cathode Ray Tube	37/6
2X2: Rectifier for Osc'scope	15/6
884: Gas Triode for 'Scope	28/-
866 JR: Heavy Duty Rectifier	24/-
6J6: Twin Triode	25/-
6AG7: HF Pentode	27/6
6AC7-1852: Pentode Video Amplifier	25/9
6F6: Metal Output Pentode	18/9
6F7: Triode, Pentode	23/3
6L7: Mixer	21/3
12A6: Beam Power Amplifier	19/-
12C8: Duo Diode Pentode	21/9
12K8: Converter	21/9
12K7GT: RF Pentode	18/-
12SK7: RF Pentode	18/-
12SR7: Duo-diode Triode	20/-
12SF7: Diode Pentode	19/9
12SG7: RF Pentode	19/3
2525: Rectifier	17/-
25A6 GT/G: Power Output Pentode	16/6
3525: Rectifier	14/-
1629: Electron Ray Tube	10/-
CCI: Triode, .2 amp. fil.	15/-
CFI: RF Pentode, .2 amp. fil.	15/-
CL4: Output Pent., .2 amp. fil.	15/-
CYI: Rectifier, .2 amp. fil.	15/-
CI: Barretter, .2 amp. fil.	15/3
CKI: Mixer, .2 amp. fil.	17/6
EF50: HF Pentode	15/-
U3I: Rect. 25v., .3 amp. fil.	7/6
1941: Barretter, .3 amp. fil.	13/9
6J5GT: Triode	16/-
VR21: 2V Battery Triode	2/6
VR18: 2V Battery Triode	2/6
VR22: 2V Battery Triode (Output)	2/6
7193: HF Triode	10/-
Sockets for EF50 valve. Low loss type for HF work	3/-

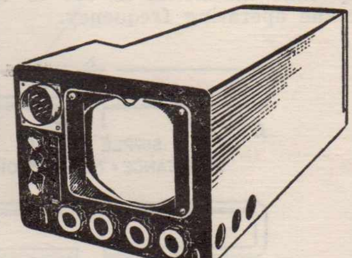
Power Transformer to give 2000 volts for use with 5BP1 or VCR97 valve 10/-

Please Note: Trade prices available on all standard type valves to genuine radio dealers, etc.



HEAD PHONES

Low Impedance 'Phones. Well-known brand. Very robust construction. Suitable for use on any radio. New and boxed. Our price 15/-.



CATHODE RAY INDICATOR UNIT

Type A.I.

This is an ideal unit to be converted to an oscilloscope. All the components are the best quality, and include the following:—

1 5BP1 valve, complete with socket and nu-metal shield.
6 6AC7 valves (1852).
3 6H6 valves.
12 Potentiometers.
10 Block Condensers.
40 1 watt IRC Resistors.
1 Three position 2 bank Switch.
1 Toggle Switch.
All enclosed in neat metal case. Worth £25. Our price £8/10/-.

CRYSTAL PICK UP

These are brand new and boxed. Are a well-known make, and give excellent reproduction with high output. Usual price 52/6. Our price 27/6.

NOTICE

All parcels will be sent registered post unless otherwise stated. Postage or freight must be included with order.

AMATEUR RADIO
SECTION
Input Impedance of Folded Dipoles

The folded dipole has become very well known among professional and amateur radio men alike, mostly because of the ease and convenience with which it may be fed. This useful feature is brought about by the fact that the simple folded dipole, illustrated in B of Fig. 1, has an input impedance that is four times that of a standard single-wire dipole. As is well known, the common or garden type of folded dipole can be fed with an untuned or "flat" line of characteristic impedance 300 ohms, without any intermediate matching arrangements, and without introducing a great enough standing wave ratio to cause trouble through R.F. losses or radiation from the feeders. For feeding a folded dipole, therefore, it is common practice to use commercially available 300 ohm "ribbon," and thereafter to forget all matching worries, provided only that the aerial is cut to the correct length for the operating frequency.

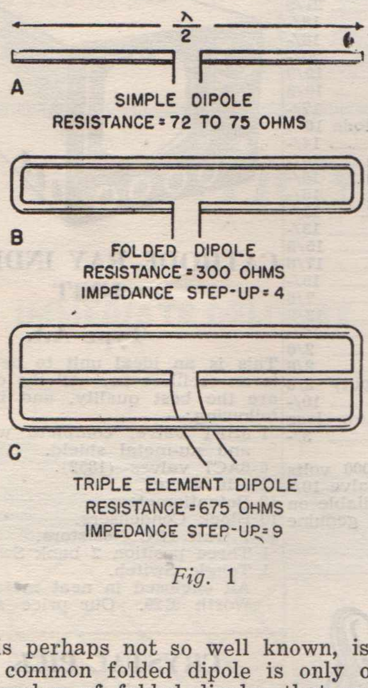


Fig. 1

What is perhaps not so well known, is the fact that the common folded dipole is only one of an infinite number of folded dipoles that can be constructed for a given frequency, in such a way as to give almost any desired input impedance. It must often happen that perfectly good feeder line is already installed in position, the only difficulty being that its impedance is not 300 ohms. If under these circumstances it is desired to use a folded dipole, in order to take advantage of its inherent matching qualities, it becomes necessary to scrap the existing feeders, and replace them with new ones built to have an impedance of 300 ohms. This can mean considerable expense, which can be avoided altogether if it is known that folded dipoles can be made that have almost any input impedance that may be desired. For example, if a three-wire arrangement such as C in Fig. 1 is made, using for all three legs wire of the same diameter, and having equal spacing between all three wires, we get an impedance step-up of nine times, which brings the input impedance very close to the 600-ohm mark—certainly near enough to enable us to use existing 600-ohm feeders without sensible mismatch.

OTHER STEP-UP RATIOS

The above example, however, by no means exhausts the possibilities, for so far, we have been considering only folded dipoles in which the two wires have identical diameters. If the wires are given different diameters then it is found that the input impedance depends (a) on the ratio between these diameters, and (b) on the centre-to-centre spacing of the two wires. This being the case, it is possible to work out the input impedance of any two-wire folded dipole, given the

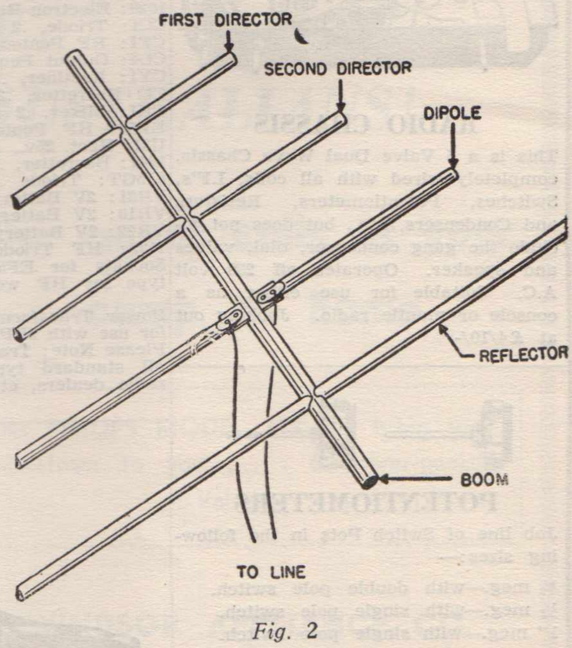
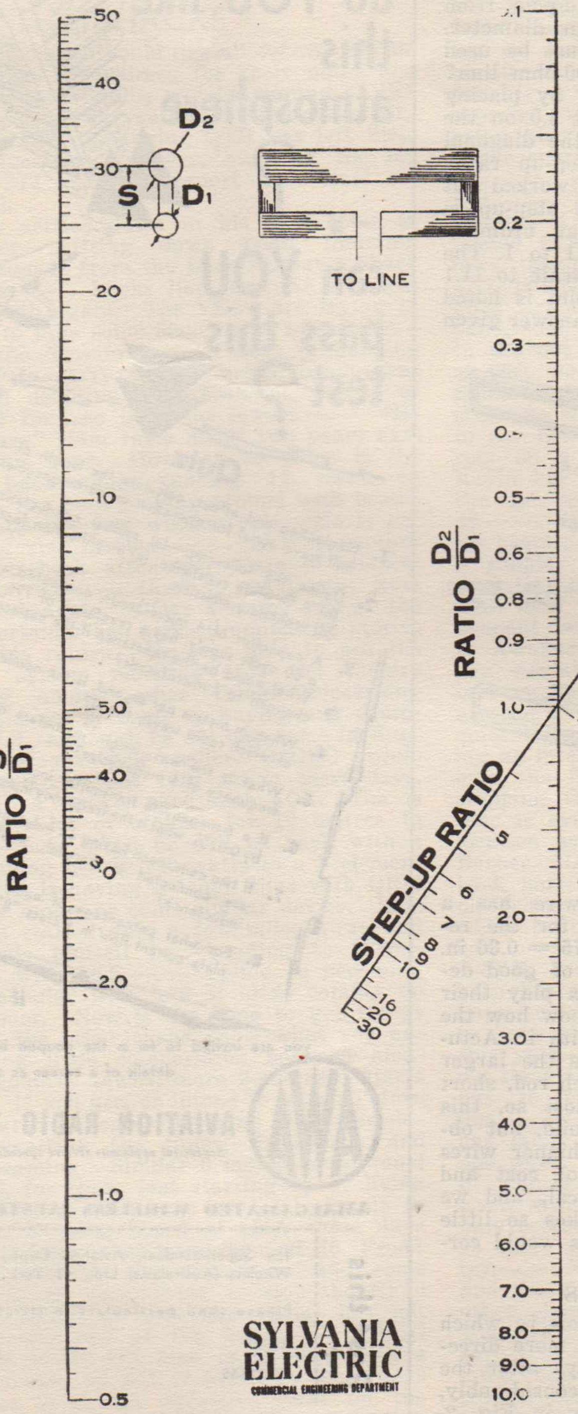


Fig. 2

spacing and the ratio of diameters. To save the use of relatively complicated formulae this calculation has been reduced to the form of a chart, which,

IMPEDANCE STEP-UP CHART

FOR A FOLDED DIPOLE ANTENNA



SYLVANIA ELECTRIC
COMMERCIAL ENGINEERING DEPARTMENT

together with a straight-edge, enables the input impedance to be found if the two ratios referred to are known, or either ratio to be found if the input impedance is decided, and the other ratio is fixed arbitrarily. For example, it may be desired to use existing 800-ohm feeders, and the wires that are available for making the folded dipole from may have a ratio of four to one in diameter. The question then is, what spacing must be used if the folded dipole is to match the 600-ohm line? This question can be answered simply by placing a rule across the chart from the point 4.0 on the scale marked D2/D1, to a point on the diagonal line corresponding to the required step-up ratio. The latter must, of course, have been worked out beforehand. In the present case, the step-up is from 72 ohms (the impedance of an ordinary dipole) to 800 ohms, or a ratio of 11.1 to 1. The is thus placed from 4.0 on the D2/D1 scale to 11.1 on the step-up ratio scale, and the point is noted where the rule cuts the S/D1 scale. The answer given by the chart is S/D1 — 5.75.

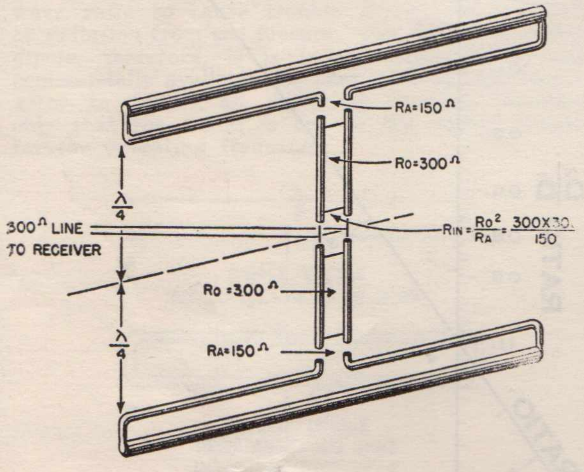


Fig. 3

Suppose, then, that the smaller wire has a diameter D1 of 1/16 in.; the answer for the required spacing would then be 1/16 x 5.75 = 0.36 in. This is not presented as an example of good design, because mechanical considerations play their part, as always, but it does serve to show how the chart works, and what can be done with it. Actually, for a V.H.F. folded dipole, where the larger "wire" would obviously be a quarter inch rod, short enough to be self-supporting, or almost so, this would be quite a practical aerial to build, but obviously for lower frequencies, where thinner wires would have to be used on account of cost and weight, it would not be very practical, and we would have to start again But it takes so little time to work out an example that this would certainly not be any hardship.

USE WITH YAGI ARRAYS

The name "Yagi" refers to any dipole to which has been added a reflector and one or more directors. It is well known that such arrays alter the input impedance of the fed element considerably, and in a simple Yagi array as shown in Fig. 2, the input impedance, if a simple dipole is used, is

"HAM" ACTIVITIES

(Conducted by J. A. Hampel, VK2AFW)

AROUND THE SHACKS

Firstly, this month I would like all correspondents to note a change of address for their notes and news; in future your scribe will be signing a VK2 call and the address for notes is 565 Radium St., Broken Hill, N.S.W. Changing QTH has left little time at the receiver; however, some of the old reliables like 3TI and 4LM report their local activity as usual.

4PO is now settled down in his new home in Brisbane after shifting down from Innisfail. Present operation is from the laundry, but a shack is on the way.—.—. Looks like Ken, 5AL, might be heading North again. The VK5's are trying to persuade him to take some 50mc. gear to provide a signal from the Territory.—.—. 5CO is building a steel tower to carry the 20 metre beam—was recently heard debating with 5MK on merits of wood or steel for use in radio towers.—.— 4BJ had "given away" Ham radio about two years ago, and sold all his gear. However, as often is the case, Vic. is back again running 12 watts on 40.—.—. 2LH has been playing around with beams since putting up the new wooden pole. He is another one interested in 50mc.—.—. 2VP is another to make a comeback after two years of silence; Ron is back on 20.—.—. Good to see Doctor Ross Adey, 5AJ, back again. After a round trip of the world, Ross certainly had some illuminating stories to relate on his return. He was able to see the new antenna system mounted atop the Empire State Building among other things concerning radio. Ross did not succumb to buying any equipment in the U.S., although he did buy some in England and also operated under G3GPC while there.—.—. 2AMX is not very active these days, except to keep a weekly sked with 4CR. Jim is waiting (with a lot of others) for 10 metres to open up once more when he will be back with a vengeance running nearly 100 watts to a 3 element beam.—.—. 5RR is having a tough time with QRM from a nearby motor or some similar device. Reg. cannot copy a station only a few miles away and tries to console himself by changing to 288mc. for a contact with 5KE.—.—. 144mc. is becoming increasingly popular with lots of ideas coming up for next summer. Now is the time to get things ready and let the other chaps know what you are doing. With a little co-operation between amateurs in the country towns, more 2 metre contacts would result. If you are, or intend to be, on 144mc. with some degree of regularity, send along the details, not forgetting the times, frequency and direction of beaming. Similar 6 metre news would be handy, too, for those just starting up or living in outlying districts and have no local signals to work on.—.—. Nothing heard of 5MA these days—perhaps it is 50mc. that keeps you off 40, Fred? When last heard, he was trying to find some negative coefficient ceramicons to stop the EF50 VFO from drifting, so hope the signal has not drifted completely out of the band.—.—. 3AUG is the only 20 metre DX man in Mildura with a beam and manages to put it over the local boys when it comes to a rare one.—.—. 3AJI for the time is inactive, but is sometimes heard conducting the Sunday morning transmissions from 3WI. John recently spent a little time in Adelaide looking up some old acquaintances he had contacted on 40.—.—. 5TW has at last got everything right for AC so more QRM around Mt. Gambier can be expected now.—.—. Despite what he says about being busy on his gear, 3TI still manages to be active every week-end with zone hook-ups and the like. A grid dip oscillator is the latest project.—.—. 3WQ is now at Freeling, S.A., but whether it is for good or not is not known. 3AJI visited Charlie while in VK5 and is reported to have taken him back to VK3 for a while.—.—. 4HZ is getting ready for when 10 metres comes good again by building a new converter for the band.—.—. 5MK hopes to move into a new QTH in the not too distant future. Ron. has ideas of an 80ft. wooden tower to carry beams for all bands! Some project at any time, but with the present situation with wood supplies, it will be interesting to see how the plan eventuates.—.—. 4OR has to rely on a home-lighting plant for his power; Kevin has been heard with a strong signal from the low-power rig and long wire antenna on 40.—.—. 4BG recently had the misfortune to have his beam come down, so is keeping on the air with a simpler folded dipole.—.—. According to 5CO while in Q50, things are pretty bright in Pt. Pirie with 5EN making all the noise on 20 with his 3 element beam. From time to time, Ernie travels to Awakurra, some 60 miles distant, to try out a new portable rig. He now has a new car and is busy installing radio gear in it. Bob, 5OD, is also on 20 fairly consistently, but he either keeps quiet about what he works or the beam isn't working as intended.—.—4IM blames the Storey Bridge over the Brisbane River getting in his way and stopping the 20 metre signals from getting out. Mac is even thinking of moving to a better DX location so bad is the bug with him.—.—. Bill Barber, 6DX, was recently on holidays in VK5; back home now on the job on 20 after renewing old friendships.—.—. 7RB is off the air for a time while in the throes of home-building.—.—. The ham population on Kangaroo Island is thinning out—5XK has left for the mainland—nothing has been heard of Bert, 5DR, for some time, so perhaps he is packed ready to leave, too. Bert was to have shifted to Northern VK5 a little earlier this year.—.—. 4FE is now operating on half his old rig almost—Arthur burned out his 815 and now has to be content with a single 807 in the final.—.—. 2OW is really after the DX—Gordon has lately added 22 new countries to his list in one week. What are you going to do in a couple of months when you run out of countries?.—.—. Even with poor conditions prevailing on 10, 2AMV only occasionally deserts that band to work on 40, so there must be something there for those who try.—.—. Pirating on the V.H.F. bands is increasing and the culprits seem to have no respect for the other chap's call sign. No news of 7MY for a while—hope the VT90's are still intact or did you forget to turn on the fan? 5GL not heard on the lower bands very much at all these days. The crystal controlled converters must be taking up

CONTINUED ON PAGE 34

all the time in the shack. Clem is still active on Fridays around 2000 hours on 2 metres. Others to join him usually are 5QR, 5JD, and 5MK.—.—.

x x x x

Disposals Equipment

Very often someone will make enquiries about a piece of disposals gear and this, coupled with the fact that a large amount of new and used service equipment is still becoming available, has prompted the compilation of this data. It sometimes happens that a particular piece of equipment is seen advertised in one of the radio magazines or lying in a coating of dust in some out-of-the-way second-hand store, but because little or nothing is known about it, it goes unbought when it might be just the thing for which you have been looking. The following list is of necessity incomplete, as it comprises only the equipment about which the author knows. Should anyone be able to assist in making this list even more complete, they are invited to forward the information.

x x x x

ATS Transmitter is by now well known throughout amateur circles. In fact, it is surprising how many stations use this type of rig, very often with its companion receiver, the A.R.8 With its parallel 807's in the final stage it gives about 90 watts on C.W. The modulation system is inefficient and needs to be modified for proper operation on the ham bands. Frequency coverage is 2-20 mcs. but some have been seen working quite well doubling in the final to reach 28 mcs. A feature of this transmitter is the compact and highly stable VFO, which is a 6V6G using any one of 8 crystals or 4 coils to cover a range of 2-5 megacycles. By switching the coils replace the crystals between plate and grid and become part of a type of Colpilts oscillator. Many chaps are using just this oscillator section, only having to rebuild the rest of the transmitter in a more orthodox layout. Other features; host of good quality components including variable condensers and coils, high quality meter, number of useful dials.

x x x x

Loudspeaking Apparatus No. 1B is suitable either in its present form as an amplifier or could be used for portable modulator or for ?wrecking?. Good genemotor and six volt series tubes. Some seen in military surplus stores.

x x x x

The ATS Aerial Coupling Unit was designed for use with this transmitter but it is so inefficient that a purchaser could but dismantle it for the good parts it contains. These include a good meter with separate external thermocouples and aerial change over relays.

x x x x

The AR8 Receiver is an excellent performer as it stands, consisting of a medium frequency and a high frequency section in the one case. Many of these have been converted so that the high frequency unit feeds into the lower one, thus making a good double conversion superhet. All standard 6 volt tubes are used. Some degree of audio amplification would have to be provided as the output is only at headphones level. The complete transmitter-receiver was genemotor powered so power supplies would have to be built.

x x x x

3BZ Receiver has been available in large quantities from time to time. It was made by A.W.A. and in general appearance, i.e., dial, controls, slow-motion drive, etc., resembles the usual type of test oscillator made by that company. Although only a general coverage receiver in the range 2-18 mcs. it is still a good performer for amateur work. Many are in use and would be a good buy if you came across it.

x x x x

Not so long a period back some disposals dealers advertised the **DR106 Transceiver** and those not in the know passed it by. Should any more appear they are 20 watt output transceivers operating on 60-80 mcs. The DR106 contains two 2" square meters, speaker and lots of good quality parts for wrecking although a better use would be to convert it to the 6 metre band by a little additional padding. An A.C. power pack is all that is required to put this rig on.

x x x x

AR12 Receiver, companion to the AT9 transmitter is a beautiful piece of equipment, giving general coverage reception from 150 kcs to 15 mcs, and includes variable selectivity and a crystal filter The AR12 should find favour with the country listener as it operates entirely from dry batteries.

x x x x

AR7 Receiver, often seen available is an Australian equivalent of the famous American HRO, which uses plug-in coil boxes and a 500 to 1 dial which operates on the micrometer principle, each new dial reading appearing in one of the five small windows provided. The AR7 boasts all the features one looks for in a communications receiver; crystal filter, "S" meter, separte R.F. and audio controls, headphone or speaker output and companion power supply which incorporates a special transformer to operate from either 6v. D.C. or 240v. A.C. Standard 6 volt tubes are used like 6U7G, 6G8G, 6K8G, etc., but the majority of users have had to convert or slightly modify the front end to achieve higher gain. As a rule this is the case with most pieces of disposals equipment because its original purpose was to transmit or receive over a short distance to give reliable operation. So some modification is generally needed before being put into use by the Ham.

x x x x

A future survey of disposal gear, some well known and other lesser known, will be continued next month.

x x x x

That is about all the news for this month. I hope you will find the listing of disposals gear of interest and useful, and should you be able to add any information on any piece of Australian, British or U.S. equipment, send it along. Also, don't forget those notes from your district by 20 of each month. Thanks, es 73.

— J.A.H.

THE ALL WAVE ONE

(Continued from page 16)

connections for a primary coil which will be used for coupling the R.F. stage to the detector.

OPERATION

The adjustment of the set is not difficult and to all who have used regenerative sets the setting up is comparatively simple. When the reaction condenser is turned to a particular point a hissing sound can be heard and if then the aerial terminal is touched with the finger or with the aerial a distinct "plop" will be apparent. This denotes that the set is in an oscillating condition. For 'phone reception the reaction control should be turned just below the oscillating point but for C.W. reception the set should, of course, be oscillating. The adjustment of the aerial coupling condenser is quite critical and for maximum efficiency may need to be reset for each change of coil. Should the coupling be too great the set may not oscillate at some part of the tuning range. It is therefore essential to try different amounts of coupling when ascertaining whether or not the set will oscillate. The set is powered by dry batteries —a 1½ volt "A" and a 45 volt "B" and for the small amount of filament and plate current used they will last a considerable time.

COIL DATA

The high frequency coils should be double spaced, and so that they will not shift when wound, a coating of clear cellulose lacquer is advisable.

Broadcast.

L1 105 turns 36 gauge enamelled wire, close wound.

L2 30 turns of same wire, close wound.

Short-Wave A (approx. 30m.—90m.)

L1 16 turns 24 gauge enamelled wire, double spaced.

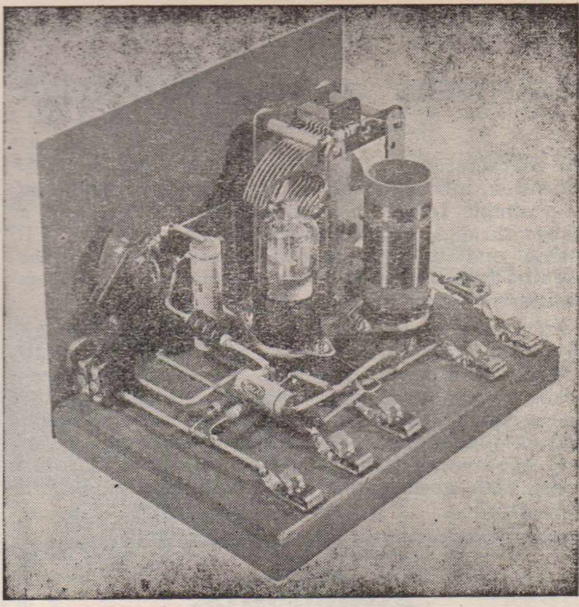
L2 10 turns of same wire close-wound.

Short-Wave B (approx. 19m.—60m.)

L1 6 turns 24 gauge enamelled wire, double spaced.

L2 10 turns of same wire, close wound.

Note.— All tickler coils spaced ⅛ inch from top of grid coil.



The 1D8-GT has only the one filament, which supplies the triode, pentode and diode sections of the valve. On the circuit, the diode has not been shown at all since it is not used, and for clearness the circuit has been drawn as though triode and pentode were separate valves. To simply further, a filament has been shown dotted for the pentode section. At the left is a socket connection diagram for the valve. This diagram assumes that one is viewing the underneath of the valve socket.

The set we have described works really well. The overseas short-wave reception is excellent and has to be heard to be believed; there is, however, one final hint. The receiver is capable of good performance provided it is on the end of a good aerial and earth system.

BEGINNERS' QUALITY AMPLIFIER

(Continued from page 14)

flat characteristic will need a further stage of amplification, although only a low-gain one. This can be a simple triode resistance-coupled stage, and a glance through past numbers of this magazine will enable one to find several useful pre-amplifier circuits that can be built up seperately, or used as additions to this basic amplifier.

As a last word, let us recommend that although any output transformer can be used with this amplifier, the results will be better, the better the transformer is, and the same remarks go also for the speaker and pick-up. In any case, we have no doubt that the builders will find this amplifier capable of very good results, and for ease of construction combined with good performance, will be found hard to beat.

CLASSIFIED ADVERTISEMENTS

FOLDED DIPOLES

(Continued from page 32)

in the region of 25 ohms. It then becomes a matter of some importance to get a high step-up ratio in the folded dipole, because transmission lines of 25 ohms are not practicable. Now it is a rule that whatever the impedance of a simple dipole may be, whether or not it has been lowered by making it part of a directional array, the impedance step-up obtained by using a given type of folded dipole instead is not affected. Thus, if an ordinary two-wire folded dipole, with equal diameters, were used in the array of Fig. 2, the input impedance would be 4 x 25 = 100 ohms. Similarly, if the three-wire dipole of Fig. 1 (C) were used, the input impedance would be 9 x 25 = 225 ohms. If a four-wire dipole should be used, the impedance would be 16 times 25, or 400 ohms. It is for this reason that the chart has been drawn in terms of impedance step-up ratio, rather than directly in impedance. If you see the input impedance quoted for any array in which the driven element is a simple dipole, it is an easy matter to design a folded dipole to bring the input impedance up to a suitable figure for feeding.

OTHER AERIAL ARRAYS

Folded dipoles can also be used in other aerial arrays in which more than one element is driven, as in Fig. 3, which illustrates the case of two dipoles spaced by half a wavelength, and fed by the same 300-ohm line. The line feeds two quarter-wave sections of 300-ohm line connected in parallel, so that at the junction, the impedance must be arranged to be 300 ohms, for the benefit of the main feeder line. Thus, the quarter-wave sections act as matching transformers. Now if the two connected in parallel are to have an impedance of 300 ohms, each must display an input impedance at the line end of 600 ohms. Also, if the quarter-wave sections have a characteristic impedance of 300 ohms, their transformer action will give the aerial ends impedances of 3002 ÷ 600 = 150 ohms. The dipoles must therefore have an input impedance of 150 ohms, and all we have to do is to use the chart to design a folded dipole with a step-up ratio of 2.1. The whole system is then matched. and no adjusting arrangements will be needed if the dipoles are properly constructed.

V. T. VOLTMETER

(Continued from page 7)

which applies progressively smaller proportions of the total diode output to the metering circuit, as the ranges get higher. This scheme has the disadvantage of requiring a large number of accurately known resistors, especially in a circuit like this one, where the signal voltage divider would have to be duplicated in the circuit of V3 and V4 in order to keep the zero stability. The present scheme has the advantage of requiring only four accurately known high-value resistors, and obtains this at the expense of a limited upper end to the voltage range. When the meter reads 300v. peak, as it does at the upper end of the highest range, the actual D.C. voltage applied to the meter tube is only 120 volts, so that a reasonably low H.T. voltage can be employed.

(To be continued.)

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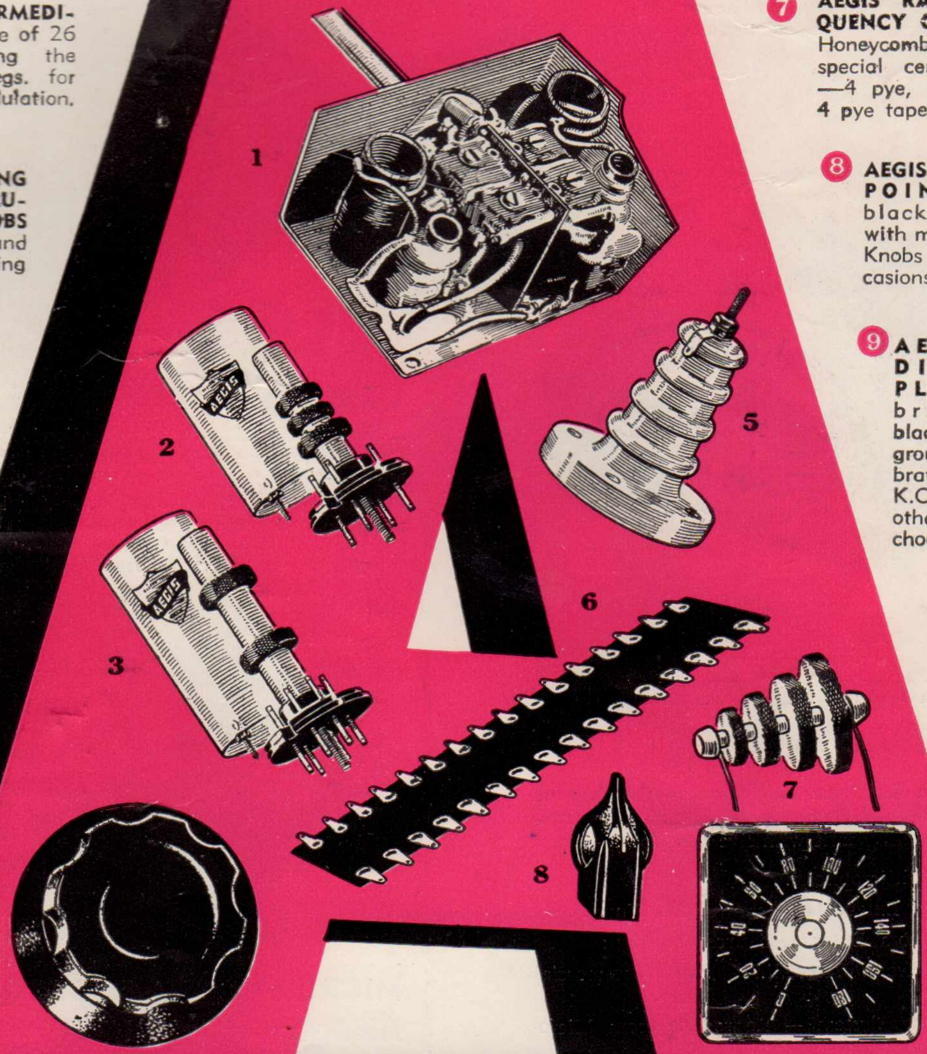

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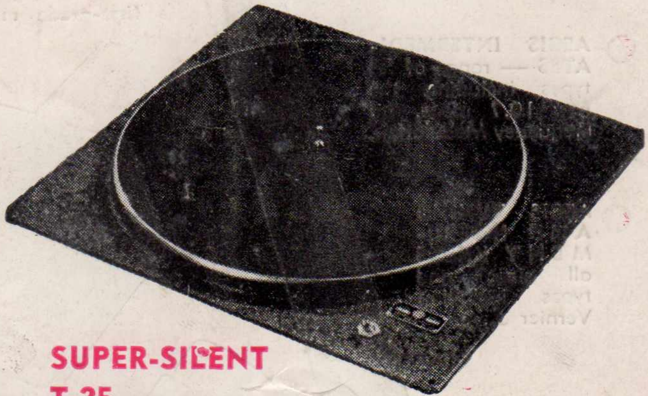

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