THE AUSTRALASIAN

Radio World

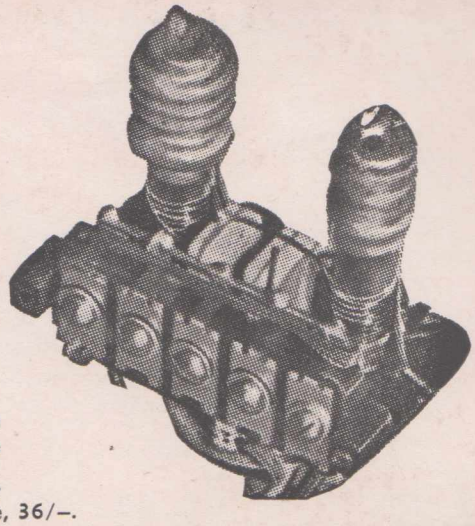
Registered at the G.P.O., Sydney, for transmission by post as a periodical.

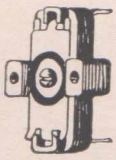
1/-

VOL. 12 ..... NO. 12

MAY 15, 1948

CROWN
COMPONENTS





P.12. STANDARD 5-PLATE PADDER CONDENSER

455 Kc. using Polystyrene base. For use in conjunction with H. gang condenser. Price 2/6.

D.C. 2A TUNING UNIT

(13 to 42 metres) 1600 to 550 Kc/s. for use with H gang condenser. Suitable for compact chassis construction. Price, 36/–.

STANDARD "PERMATUNE" COILS IN ALUMINIUM CANS

Aerial PC53, R.F. PC54, Osc. PC55. Iron-cored. For use with H gang condenser. Wound on Polystyrene formers. Price 8/9.

455 Kc. STANDARD "PERMA-TUNED" I.F. TRANS-FORMER

In aluminium Can. First Stage P.T.31, Second Stage P.T.32. Price, 13/9.

AIR CORE S/W COILS

13 to 42 metres, Z.C.59 aerial, ZC.60 R.F., ZC61 oscillator, for use with H gang. Price, 2/10 Each.

IRON CORED SHORT WAVE COILS

I.C. 62 aerial,
I.C. 63 R.F.,
I.C. 64 oscillator,
13 to 42 metres, for use on standard H. gang. Price 4/9.

M.E.B. TRIMMER CONDENSERS

2 to 35 mmfd. on Polystyrene base. Price, 1/1.

R.F. CHOKE

Standard general purpose honey comb winding, will carry up to 50 M/a. Price, 1/10.

D.P. 3A Tuning Unit: 3 Stage, range 13 to 42 metres, 1,600 to 550 Kc/s. Price, £4/17/–.

B.F.O. 455 Kc/s. Oscillator Coils. Price, 12/–.

R.F. Coil with reaction in aluminium can. Price, 9/10.

Reinartz Coil in aluminium can. Price, 7/6.

Crown

RADIO PRODUCTS PTY. LTD.

51-53 MURRAY ST.
PYRMONT, SYDNEY. TELEPHONE: MW 2628

THE AUSTRALASIAN
RADIO WORLD

Devoted entirely to Technical Radio

and incorporating

ALL-WAVE ALL-WORLD DX NEWS

★ EDITOR
★ PUBLISHER
★ PROPRIETOR—
A. G. HULL
Balcombe St., Mornington, Vic.

★

★ SHORT-WAVE EDITOR—
L. J. KEAST
6 Fitzgerald Road, Ermington, N.S.W. 'Phone: WL1101

★

★ HAM NOTES By—
D. B. KNOCK (VK2NO)
43 Yanko Av., Waverley, N.S.W.

★

★ ADVERTISING REPRESENTATIVES—
AMALGAMATED PUBLICATIONS PTY. LTD.
83 Pitt St., Sydney
Phone: B 1077

★

★ REPRESENTATIVE IN QUEENSLAND:
JOHN BRISTOE,
Box 82, Maryborough, Q.

★

★ REPRESENTATIVE IN ENGLAND:
ANGLO OVERSEAS PRESS LTD.
168 Regent St., London, W1.

★

★ SUBSCRIPTION RATES—

12 issues	10/6
24 issues	£1

POST FREE
To N.Z. and Overseas
12 issues 12/-

Address for all correspondence:
AUSTRALASIAN RADIO WORLD
Balcombe St.
Mornington
Victoria

Vol. 12 MAY, 1948 No. 12

CONTENTS

EDITORIAL

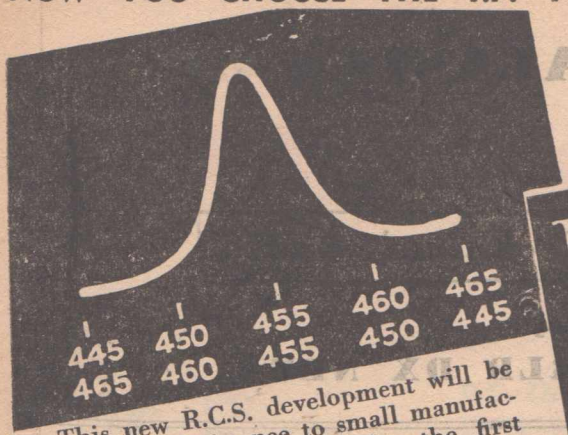
There are still quite a few of our supporters who deplore the passing of the "good old days." They cannot become reconciled to existing conditions. Some are giving up their hobby because they feel that the price of components is too high, taking as a basis for comparison the prices they paid in 1939. Others point out to me that the present issues of Radio World are not as attractive as those of the 1939 era; the quality of the actual paper not so good.

Dealing with my own problems, I readily agree that in several ways the present issues are not as glamorous as in pre-war days. There are two reasons. Paper is scarce and we have considerable difficulty in getting sufficient, irrespective of its quality. The second is purely economic. Not being backed by a big newspaper organisation with unlimited financial resources, it is necessary for each issue of Radio World to pay its own way. Paper cost is up about 400 per cent., printing costs about double, all wages and material prices have risen considerably. Yet the price of the publication has not been raised, and advertising rates are still the same as twelve years ago. Only the great increase in the number of subscribers makes it possible for the business to be carried on as a profitable proposition.

Although the modern issues may lack glamour they still contain a lot of good technical reading matter, and this is not overlooked because of the absence of ballyhood, fancy headings and artistic layouts.

—A. G. HULL.

NOW YOU CHOOSE THE I.F. TO GIVE THE PERFORMANCE YOU WANT



R.C.S. develops 6 new I.F.'s

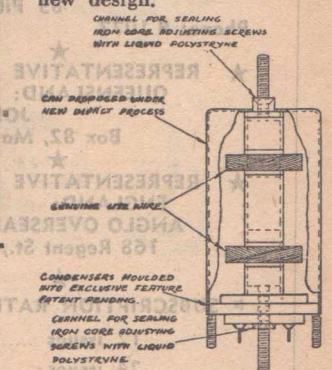
This new R.C.S. development will be of major assistance to small manufacturers and amateurs. For the first time, you can tell at a glance the relationships of gain or sensitivity, selectivity and tone quality that you can expect from each of the six sensational new R.C.S. I.F.'s.

Revolutionary "new" Performance Chart tells you I.F. performance at a glance!

R.C.S. I.F. SELECTION CHART

TYPE No.			GAIN	SELECTIVITY	QUALITY
STAGES.					
1st	2nd	3rd			
IF170	IF171		Standard	Standard	Good
IF172	IF171		Good	Average	Good
IF172	IF173		Good	Sharp	Average
IF170	IF173		Standard	Very Sharp	Fair
IF174	IF174	IF171	High	Sharp	Good
IF168	IF169		High	Good	Fair
(Portable)					
IF169	IF168		Standard	Fair	Good
(A/C Mantle)					

You now choose your I.F. to fulfil the performance you require. If you live in an area in which reception is rendered difficult you will probably require Type 172/173 where tonal quality suffers to maintain gain and selectivity at their peak. This sensational R.C.S. guarantees you the performance you specify. Order R.C.S. I.F.'s and other components in your new design.



Sealing cavity in former at top and bottom (where iron core screw emerges). Condensers moulded into base.

Patents Pending on DESIGN ADVANCEMENT

The new R.C.S. I.F.'s have the amazing new R.C.S. development (over which patents are pending) . . . condensers moulded into the polystrene base. To enable them to remain constant under all conditions, the condensers are first dried out under infra-red rays, thereby expelling moisture and raising their Q. They are then moulded into the polystrene former base, an exclusive R.C.S. patented feature, where they are beyond the reach of climatic variations. The aluminium cans, too, are now pressed out under a new "impact" process.

PRICE 13/- RETAIL

Obtainable from your local Radio Retailer.

R. C. S. RADIO PTY. LTD.

174 CANTERBURY ROAD, CANTERBURY, N.S.W., AUSTRALIA

LIMELIGHT ON QUALITY

Increased Interest in High-fidelity Reproduction

By

A. G. HULL

THINGS in the radio game are pretty sick at the moment. Regarding the set manufacturing business it is stated in a trade paper (Radio Electrical Weekly) that about 100,000 sets too many were produced in the past twelve months and present production rate will mean about three or four times too many sets on the market this year unless something drastic happens. Many look to television and FM transmission to get them out of the bog, but these things don't move quickly, and it is most unlikely that television, for example, will be working here on a commercial basis within a matter of months.

Of the radio sets which are selling at the moment the expensive radio-gramophones are making up the turnover. At the Sydney Show the emphasis was on automatic record changers. So far these radio gromophones are selling with little regard to whether the quality of reproduction is good bad or indifferent, but this is unlikely to continue for long. Eventually the jobs with smooth (not necessarily wide-range) reproduction are bound to go to the top. Resonances, peaks, and distortion are distressing to the ear and the buying public will realise this sooner or later.

In our particular sphere we have had a great boom in the kit-set business, but this is now a little overdone, with too many kits available, some of them not up to the high standard of those which have been publicised in our columns, and all of them selling at a retail price which is just a pound or two below the price of factory-built sets. Personal portables and the kit-sets for these receivers enjoyed a bit of a boom, but these are now steadying down, according to latest reports.

Booming

But our biggest boom at the moment is in connection with the super-quality reproduction. As we have mentioned in the last three or four issues, the introduction of the latest English pick-ups and speakers has done quite a bit to whet the appetites of those who want to get real music from records. There is a positive stampede after Williamson amplifiers, Lexington and Connoisseur pick-ups and Goodman's speakers. It might even be permissable to add after the last sentence "for better or for worse," for the proper application of these new pick-ups and speakers is not as easy as it seems at a glance. We even heard an authority on these things express his opinion that Lexington pick-ups should not be sold in the ordinary way of business but should be supplied only to those who know what they want, know what to expect and know how to go about getting it.

Even those who should know better have disregarded our warnings about pick-ups with low output, and a contemporary publication describes how to put a pre-amplifier on to the same base as a Williamson amplifier. To do so is a tragic mistake and can only give you trouble.

Know Your Pick-ups

Don't jump to the conclusion that we are against the Lexington pick-up. It is a terrific price, requires an expensive pre-amplifier, but under proper operating conditions it can give high-note reproduction of a type which you simply can't obtain from cheaper pick-ups. Whether your taste will appreciate these highs is still another point. A recent test with half a dozen local businessmen in an average sort of room with ordinary commercial records showed that they were unanimously against the wide-range reproduction and greatly preferred a strong bass lift and a sharp cut-off at about 4,000 cycles.

There are, however, many enthusiasts who can ignore scratch, and they simply rave at the realism which can be obtained from the comparitively poor recordings at present on sale.

The record position seems to be

(Continued on next page)

ANOTHER CLAIM TO FAME

Mr. H. W. Holdaway, B.Sc., B.E., etc., writes: "Considerable interest has been evoked recently by the descriptions of high-fidelity amplifiers such as that of D. T. N. Williamson, and the Radiotron A515. I wish to draw attention to the similarity between these and the circuit published in your issue of September, 1945. In both cases there is a triode, direct coupled to a phase-splitter, followed by push-pull driver stages and a push-pull output with triodes and inverse feedback. Allowing for the different voice coil impedance specified, the feedback in the earlier circuit was about 3.5 db. greater, and this was achieved without the use of a special output transformer. The signal required was less than one-quarter of that required to fully drive the more recent circuits."

An examination of the circuit in the September, 1945, reveals that it is something which merits far greater attention than it earned at the time it was published. Not being backed up by a lot of ballyhoo, it seems to have been passed over as just another circuit, whereas in fact it is a circuit capable of extremely fine performance.—A.G.H.)

QUALITY

(Continued)

in an interesting stage at the moment, incidentally. Sir Ernest Fisk gave a demonstration of wide-range reproduction at the Sydney Conservatorium recently, with records which were handling frequencies of up to 20,000 cycles, which as you probably know, is well beyond the hearing of the average ear. The big query mark goes to the question—why? Why is the Gramophone Company encouraging the public to appreciate the failings of present records unless they have in mind to replace them with wide-range recordings in the near future? Rumour has it that the new wide-range records will be released to the public in June, but this seems highly unlikely when the old records are still in such short supply. We've had an order lodged for six months with our local H.M.V. dealer for any Carmen Cavallero record, but he hasn't been able to get one yet.

Pre-amplifiers

If, and when, wide-range recordings do come on the market there will be a far more definite need for the Lexington and Conniseur pick-ups, but there will still need to be proper pre-amplifiers, bass compensation, scratch filters and tone control.

Such matters are not too easy, as you will realise if you read H. A. Hartley's article on Judicious Distortion in our December, 1944 issue (now out of stock) and the article by H. C. V. Smith in our July, 1947 issue (still available). These two articles contain a number of truths which should be kept in mind by those who have the money and enthusiasm to really get out after quality reproduction.

Mr. Swales of the Red Line Equipment Company, who is a leader in the pursuit of quality, is working on the design of a pre-amplifier and tuned filter to allow a wide control of frequency response to suit different types of recordings and a scratch filter to take out the bulk and still allow even higher frequencies to come through at full strength. Mr. Swales has promised to let us have full details for publication in an early issue, together with data so that the special choke can be wound by those who have facilities. Of course these will also be made available for those who prefer to buy them ready-wound.

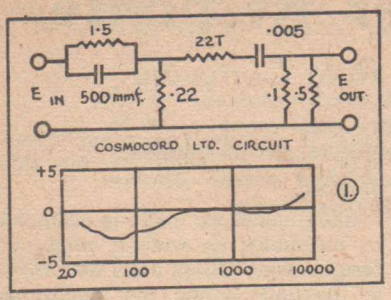
Frequency Response

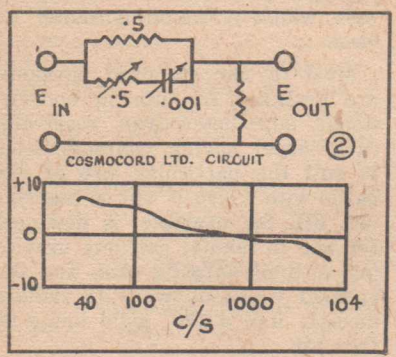
A few days ago we made some tests with several crystal pick-ups of different brand and vintage, tried them out on frequency test records, and then tried them out on a small audience of mixed moderns. The pick-up which was most favoured was a ten-year-old American cartridge in a home-made wooden arm. On test this pick-up delivered 5 volts at 100 cycles, 4 volts at 400 cycles, dropping away steadily to 1 volt at 1600 cycles, and half a volt at 6400 cycles. Fed into an amplifier of flat response and with a Goodmans speaker this gave pleasing reproduction and the lows, although so strong, did not appear over-emphasised at reasonable volume levels. Fortunately the amplifier being used was an FFR job (December, 1946 issue) which would accept the high signal voltage from the pick-up. To feed such a pick-up into an amplifier with a volt or two of bias on the first stage would mean terrific distortion. An outstanding impression of these tests was the latitude which is possible in frequency response. One of the pick-ups had voltage output of from .15 volt to 1.5 volts at various frequencies, with high peak at 3,200 cycles and low peak at 1,600 cycles, yet it did not sound too bad.

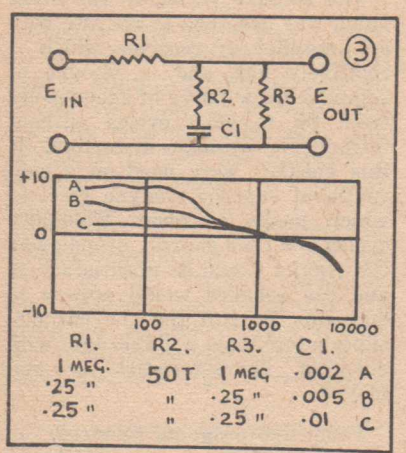
Frequency Control

The two tests proved to us that it is little use going out after "flat" frequency response at the moment and a far better scheme to investigate the various ways in which the frequency response can be altered to suit individual taste. This opens up a vast field for experimentation and one which we can strongly recommend to our readers. Even if you have only a cheap crystal pick-up and a mediocre amplifier you can put in some interesting hours working along various lines with a view to altering the natural characteristics of the pick-up and what it scrapes off the record.

Mr. K. M. Cocking of Kelman







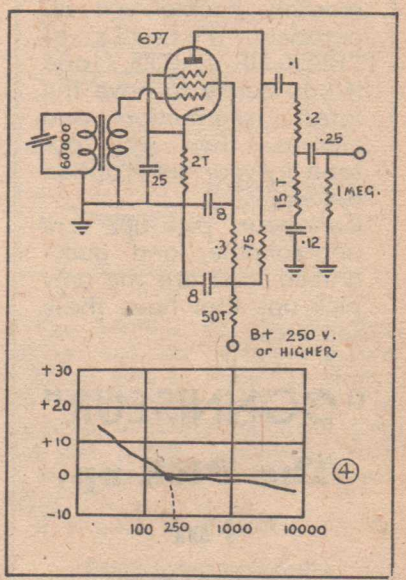
Industries who handles the "Conniseur" crystal pick-up has been most helpful in letting us have a number of circuits which he has tested in his laboratory, and these are reproduced on these pages as they form a fairly good start for the experiments we suggest.

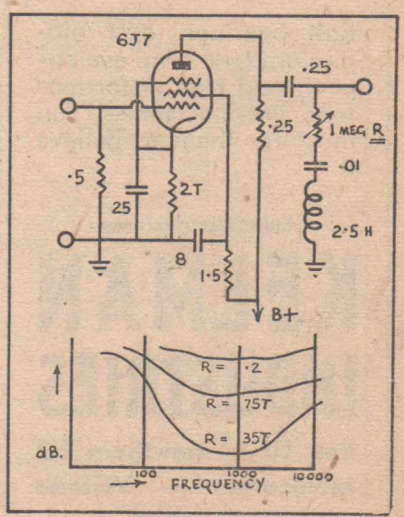
With the diagrams we show the resultant frequency response which can be expected with a crystal pick-up. Of course not all crystal pick-ups have identical characteristics, but whatever characteristics they have, they will be altered when used in the circuits shown, and somewhat according to the curves shown.

There are a few things to be remembered when experimenting along the suggested lines. First of all be sure you have ample power reserve. If you give the lows about an 18 decibel rise you will need some power in the speaker to make the old cone push a bit of air about. If you have the medium frequencies coming out at a fairly loud room volume of 5 or 10 watts the boosted lows will require 20 or 30 watts of power behind them before you will hear (or feel) the difference. Then you need to be sure that the first valve in your amplifier will accept the signal input you give it. A quick way of checking on this is to see that the actual d.c. bias on the valve is 50% greater than the proposed signal input. As mentioned earlier in this article, some crystal pick-ups can deliver several volts of signal, especially on lows, so the first valve may need a bias of ten volts negative. It is of course, useless to over-bias a valve. What is required is ample high tension voltage at the end of the plate load resistor.

Added power into the lows brings up the problem of baffling and unless you can get hold of something in the way of a properly designed and built reflex baffle we suggest that you look around to see if you can mount the speaker in a wall between two rooms or something like that. Here at Mornington we have the Goodmans speaker mounted in the wall of the attic, the rear opening up to the space between the ceilings of the downstairs rooms and the tiles of the lower gable. A certain amount of damping in the space is obtained from spare sheets of Celotex and half a dozen large model aeroplanes which are stored there!

When the speaker was fist installed in this position it gave an impression of loss of lows, but this was soon proved to be due to lack of resonance. Theoretically a yard square baffle board will not allow reproduction of lows below about 200 cycles or something, but in practice it is possible for a yard square of even five-ply timber to have its own mechanical resonance point, which you soon find when you run a frequency test with plenty of power in the lows. It can make the baffle board rattle in an unmistakeable manner, easily felt by hand. A yard square of inch-thick celotex has an entirely different characteristic to a yard square of five-ply, and is to be recommended for those who want to get true lows. Better still, of course, if you must use a flat baffle, is to make one four, five, or even six feet square out of several pieces of celotex, such as two layers of half-inch thick sheet, rather than a single thickness of one inch. Once a really effective low-note response has been achieved it becomes possible to have a strong high note response without harshness.





Loud Speaker Response

Letter From the Rola Company

YOU recently asked us to supply you with response curves of our 12" speakers for publication in your fine little technical journal.

We have taken no action to supply these curves because single response curves cannot be used as a measurement of performance of a speaker of the direct radiating type.

It is for this reason that we have never published reponse curves, although on the other hand we have recognised the need for engineers to have some information available on what to expect from a speaker when designing a radio receiver. We did, in fact, at one stage, consider the issue of response curves giving fullest possible details of the conditions under which they were taken, to engineers of reputable radio manufacturers who could reasonably be expected to interpret the information and recognise its limitations. We finally gave up the idea.

You will understand that it is possible to take a response curve of an amplifier, a pick-up, or even a microphone, which means something.

Taking a response curve of a direct radiating loudspeaker, however, presents an entirely different problem. Any response curve taken under a given set of conditions, even if the conditions would be accurately described or duplicated, would be quite meaningless unless the effect on the curve of the new conditions was known or could be calculated.

A response curve of a speaker then may be considered as a record of measurements taken under constant conditions with a measuring stick which remains accurate only so long as the conditions are unaltered and with no absolute means of applying a correction factor for other conditions

Response curves of direct radiating speakers are useful to us in interpreting listening tests. A sound pressure room is only of use to us for design purposes because it provides a reasonably constant set of conditions for this purpose.

Each model we make is designed to reproduce as wide a range of frequencies with as little distortion as possible under the conditions imposed on it by the radio receiver with which it would normally be used.

Most of our standard speakers are designed for use in conventional superheterodyne receivers, each model having characteristics to suit the particular size of the baffle with which it will be associated. 6H, for example, is designed for use in mantel cabinets providing a limited baffle area for the speaker which allows it to radiate directly into a 180° solid angle of free air.

The DeLuxe 12/42, on the other hand, was designed to operate with an amplifier or receiver which is relatively flat, and is capable of reproducing a range of frequencies from 60 to 6000 cycles without introducing serious distortion. If this speaker were used on a conventional superheterodyne receiver which peaks at about 2500-3000 cycles and then sharply drops away the results would be unsatisfactory and the speaker would appear to lack top. To suit the conventional superheterodyne, a diaphragm with different characteristics is employed.

From the foregoing remarks, you can see that publication of curves would be misleading as such curves would undoubtedly be compared with curves of other manufacturers taken under entirely different conditions and a very wrong inference could be drawn from this comparison.

As mentioned to you during our conversation, it very rarely happens that the characteristics of the speaker are being exploited and the average amateur will be surprised if he designs and manufactures his set so as to take full advantage of existing speakers.

No speaker can sound better than the signal that is fed into it.

A HOME-MADE HI-FI PICK-UP

In our January issue one of our readers told of his success with a home-made pick-up. In response to our request he has sent along this article, which tells how you can make your own high-fidelity pick-up.

By

A. MARCH

144 Pacific Highway
North Sydney

I STARTED off about three years ago by building up a single-ended 'V6 amplifier and feeding a B.T.H. curved bakelite arm pickup into it. The wear on the records was rather fantastic apart from anything else, so I started playing about with damping and added a bit of counter-balancing. The effect was a little better but I scrapped the B.T.H. shortly after in favour of a Brush crystal cartridge in a homemade arm. By this time the amp. had graduated to P.P. 2A3's where it has remained (indifferent versions) ever since.

The wear on the record for reasonable tracking in the 100 cps track of the "Decca" frequency disc was still too much for my liking so, contrary to my elders' advice, I pulled the cartridge to pieces and had a go at redamping it.

The cartridge did not fracture and except for a peak of about 5 db at 4000 cps, results were somewhat better. In attempting to remove the peak at 4000 cps however, I managed to fracture the crystal, too far back to effect a repair. Lack of finance (I was still at school) curtailed the purchase of another cartridge, although it is doubtful as to whether I would have bought one anyway, having then discovered that some recordings **do** have frequencies above 5000 cps on them.

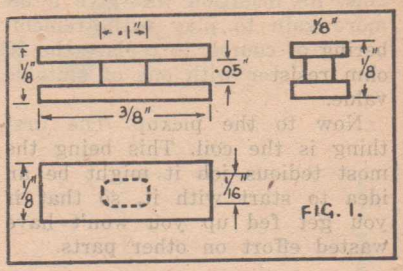
A chap from the ABC and I got talking one night after I had seen one of their shows put on and I asked him about pickups. He told me of an article in "Wireless World" on the construction of a moving coil pick-up. So I hied me to the Mitchell Library and proceeded to do a little digging.

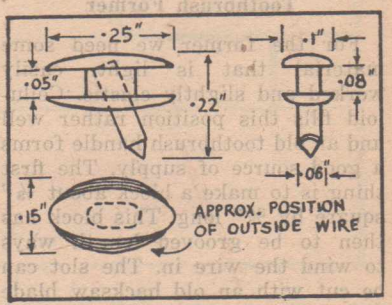
I built up a very rough model and found that it sounded OK but lacked bass, this because the output is a function of the velocity and the velocity of S.H.M. is constant only when the amplitude is increased as the frequency decreases.

With ordinary commercial recordings to prevent the amplitude becoming excessive the recorded level is reduced by 6 db per octave below 250 cps.

Bass Compensation

The problem then was to arrange for compensation. The first circuit tried was one for a 200 ohm line and is used in conjunction with the H.M.V. transcription pickup. Owing to the lack of a good 20 ohm to 200 ohm trannie (20 ohm is approx. the impedance of the M.C. pickup) and also because of the hum picked up by the chokes in the compensator this idea was discarded and another was sought.

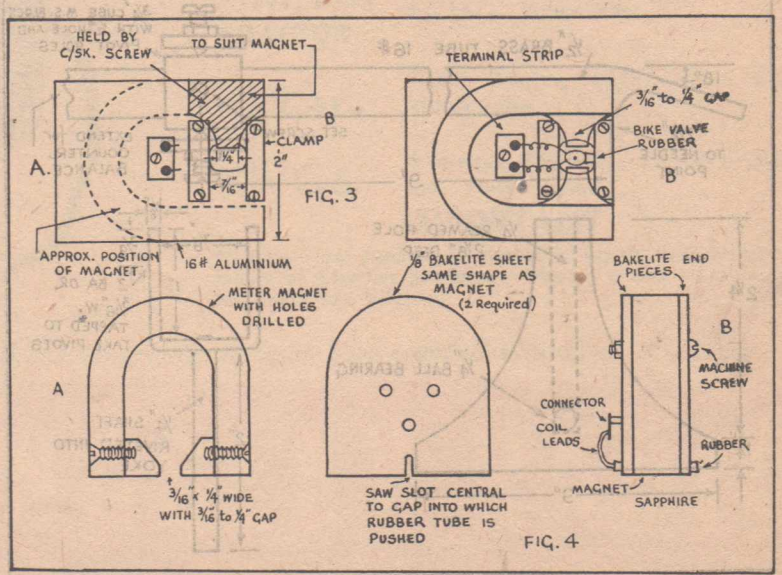




The solution was surprisingly simple and the circuit together with an amp to bring the output up to about magnetic P.U. level is included. In theory the circuit does not give perfect equalisation, but it sounds right, which is the main thing.

If a good 20 to 10000 ohm or

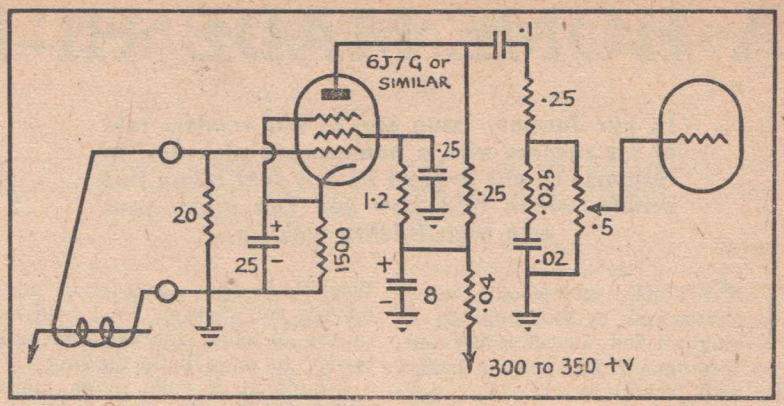
(Continued on next page)



(Continued)

grid trannie (within a couple of db from 30 to 10000 cps) is available, its insertion will give a bit more gain to play with, remembering of course, to replace the 20 ohm resistor with one of suitable value.

Now to the pickup. The first thing is the coil. This being the most tedious job it might be an idea to start with it, so that if you get fed up you won't have wasted effort on other parts.



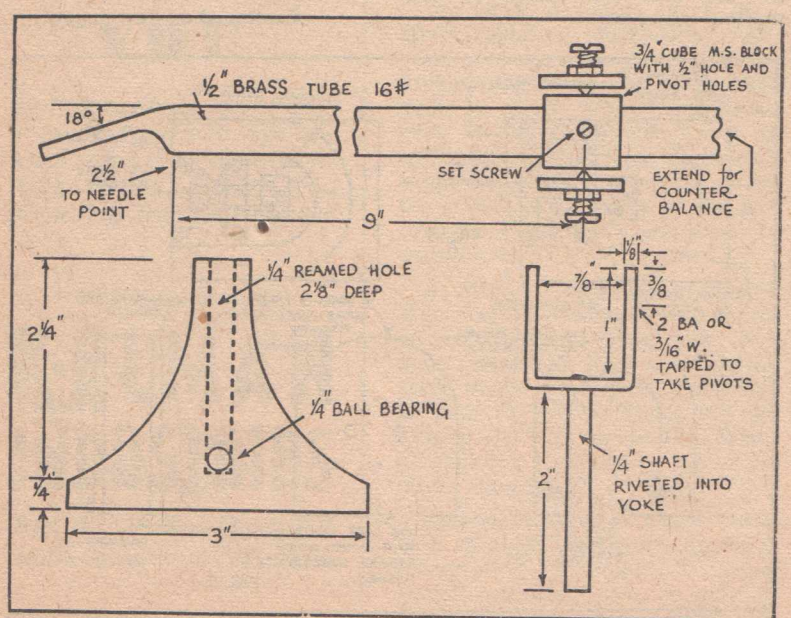
Recommended pre-amplifier circuit for bass compensation with the home-made high-fidelity pick-up.

Toothbrush Former

For the former we need some material that is light, easily worked and slightly elastic. Celluloid fills this position rather well and an old toothbrush handle forms a good source of supply. The first thing is to make a block about ⅛" square by ⅜" long. This block has then to be grooved length ways to wind the wire in. The slot can be cut with an old hacksaw blade which has been ground to remove the "Set" and cut a slot no wider than the blade. Although the final slot is wider than this it is much easier to handle the narrow blade. A core should be left in the centre about $\frac{1}{16}$" wide and .1" long (Fig. 1). The slot is about .05" wide.

The former is then shaped as in Fig. 2 and a hole drilled through the core at about 60° to the axis of the coil with a No. 54, or No. 55 drill. The former should by this time be about .25" long, .1" wide, and .08" high. All excess celluloid should be removed in the interests of lightness and when this is finished the winding can begin.

The easiest way to hold the coil former is to dip the shank of the drill in acetone and push it into the hole already drilled. A twist will remove it when the job is complete. The drill is best held in a vice and the winding done by hand. The idea now is to wind about 150 to 200 turns of about 45 gauge or finer to fill the former and overflow slightly on the sides to make the coil .15" wide. The needle, which should be a sapphire to save changing frequently, has to be cut down to not longer than .25" long overall. The one in use at the moment is .2" long. The needle is pushed into the drilled hole—its diameter may have to be reduced slightly—and cemented in with celluloid cement. This is the coil complete and should not weigh more than 150 milligrams.



Base Plate

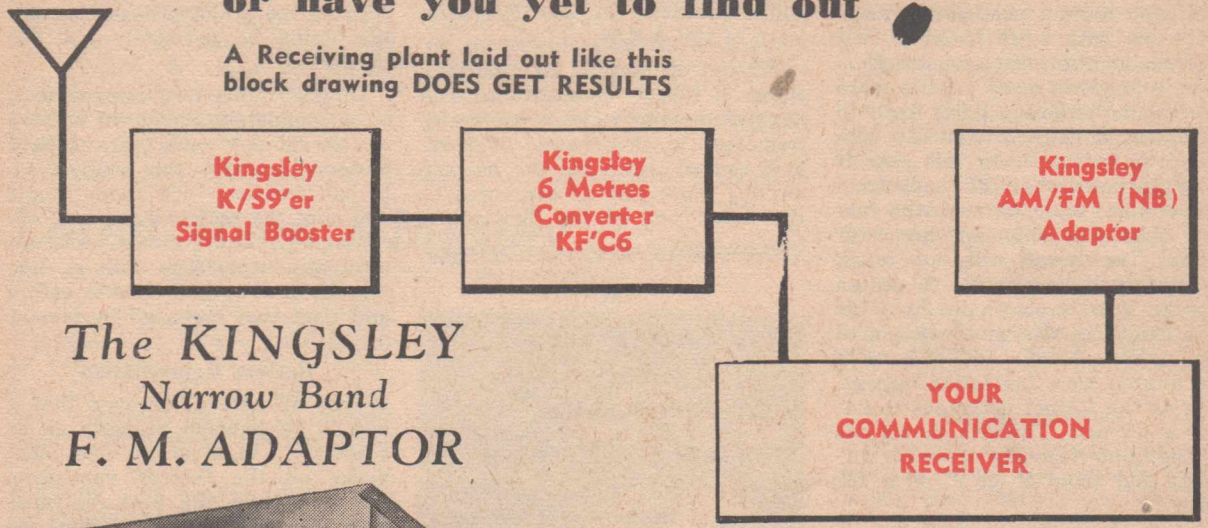
Next consideration is the base plate. The shape and size of this is largely dependent upon the magnet to be used. At the moment I am using a couple of alnico magnets 1 9/16" by ⅞" by ½" thick (horseshoe shape) which are not bad, but a bit heavy and so need a lot of counterbalancing. I hope to get some new small anistropic alnico magnets shortly and this should improve the weight factor considerably. Assuming that you have a good magnet of the horseshoe variety the general idea of a baseplate is shown in fig. 3. Do not make the distance between the suspension clamps for the rubber any further apart than shown or you will get a most unpleasant surprise. The rubber damping introduces its own ideas on resonance. Enough said.

The suspension by the way is bike valve rubber of the red variety. About ½" at each end pushed onto the ends of the coil and cemented with celluloid cement. The rubber is then clamped down under the suspension clamps, the ends of the winding coming out the side of the coil (its no

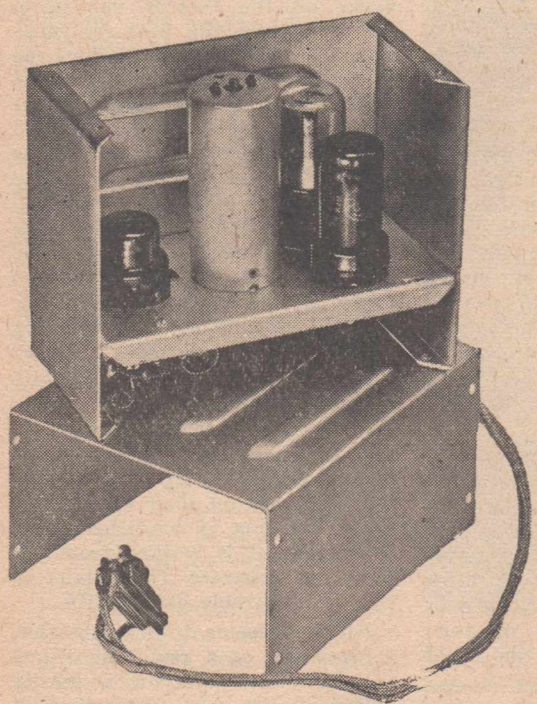
Do You Know?

or have you yet to find out

A Receiving plant laid out like this block drawing DOES GET RESULTS



The KINGSLEY *Narrow Band* F. M. ADAPTOR



The Kingsley narrow band F.M. Adaptor (illustrated here) is intended for use with any communications type or dual wave receiver with a final I.F. frequency of 455 KC's and a signal tuning range covering the 20, 11 and 6 metres bands or higher frequencies, and consists of a Cathode follower to couple to the receiver I.F. Channel, a limiter and a phase difference discriminator giving Audio frequency output, to be coupled back to the Audio frequency Channel input Circuit.
When ordering, please designate type required—KA1 or KA2—the latter having been developed for use with the AR7 Communication Receiver.

AM/FM ADAPTOR £2/16/-. Valves extra.

KS9'er Signal Booster, £5/5/- plus tax. Valves extra.

KF/C6 6 metres Converter, £6/18/6 plus tax. Valves extra.

IMPORTANT

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

Ask for—Insist on—DEMAND genuine Kingsley parts from your Supplier.

KINGSLEY QUALITY RADIO PRODUCTS

KINGSLEY RADIO

KINGSLEY RADIO PTY. LTD.

380 St. Kilda Road, Melbourne, Victoria . Phones: MX 1159, MX 3653

good putting them through the rubber tube because when the clamp is tightened up the wire simply breaks) and up to the connector strip. The pole pieces also are quite simple and are made of $\frac{3}{16}$" by 1" mild steel strip.

If you have a good meter magnet—one with holes bored in it—there is an alternative construction. The pole pieces need a little more work but the design lends itself to lightness a little better. The idea is given in fig. 4. In this case it may be noted that the leads from the coil are taken through the rubber tube and onto the connector strip. The wires will not break with this arrangement. A design for an arm is shown in fig. 5. If the length is altered the angle of inclination of the head will have to be altered also, the latter increasing as the former decreases to 23° for a 10" arm. The arm shown has a negligible tracking error for 12" discs and about 1° or 2° on a 16" disc.

Performance

The response curve which was drawn up by a friend who had access to good test equipment is also included. He also checked the distortion and found the maximum to be about 1% at 6000 cps, anywhere else the distortion was negligible. This pickup, by the way, is the only one I have seen, apart from a few transcription heads, which will sit well and properly in the 50 cps track of the Decca frequency disc. No magnetics will stay below 160 cps and few crystals below 100 cps. When you consider that on a well-modulated transient the acceleration applied to the needle point may reach the astounding figure of 5000 g. (g being the acceleration due to gravity) you can see how necessary a low inertia movement is, and what will happen to your discs if it isn't.

The top curve on the graph by the way is the response taken across a 500 ohm resistor on the line from the old amp, with the bass lift circuit in but the tone control disconnected.

It will be noticed that the high end is down about 7 db. Due I think to the output trannie. That is about all I can tell you with regard to the pickup, but any queries which I may be able to answer, can be sent to the address above and I will do my best to answer them (please include a stamped self-addressed envelope).

If you decide to construct this unit I feel quite sure you will be amply repaid for your efforts.

With regard to the pickup—due to the close proximity of the turntable to the magnet, a non-ferrous turntable is preferable. Otherwise ¼" beaver board or cork will help minimise the attraction effects.

More on the Powerport

Here is a bit more "dope" on the Powerport, a power unit for portable radios, which has been fully described in the February issue of the A.R.W.

First of all there is an important thing I forgot to mention: The negative heater, which is generally connected to the chassis of portable radios (often via the battery switch) must also be connected to the metal box of the Powerport, together with the electrostatic winding of the power transformer. If this is not done, modulation hum or warbling may result.

By

PAUL STEVENS

21 Fletcher's Avenue

Bondi, N.S.W.

In very rare cases modulation hum also occurs in spite of everything being connected all right, due to a badly earthed power line in conjunction with wiring and circuit peculiarities of the portable. This can be removed by either earthing the Powerport, if possible at the point, or by connecting a .02/600 condenser between one side of the power line and frame. Which side depends on the way the plug is put in.

An important and controversial point on the Powerport is, whether it can and should be used to "charge" or better "rejuvenate" dry batteries. The question is actually, whether or not dry batteries can be charged. It is very hard to get reliable information on this, because the only people, who could be really classed as authorities on this matter, the battery manufacturers, will at any rate say "no," because the prolongation of battery life would be extremely bad for business.

I, myself have only tried it once, on a completely run down battery and it did not work there. I have however brought this subject up in conversation with radio people and here the results were very encouraging. They either did not have any experience with it, like myself, or they had tried it before and then they were all in favour.

Battery Rejuvenation

They all agreed, however, that it had to be handled properly to be successful. First of all one must never let the battery run down too far before the first rejuvenation, it should be done, when the B battery was at about 80 volts under load, the A battery at about 1.2V. Batteries could be charged two or three times, their life is supposed to be doubled or trebled that way. The experts disagreed on the charging time, some said a few hours, some said a day or more. The rate of charge should be higher at the beginning, diminishing to less than normal operating current towards the end. This, by the way would be automatically achieved by the Powerport.

A further interesting fact is, that American portable-AC-DC set manufacturers incorporate "charging" switches on their sets, which allow charging of batteries either while the set is worked from the power, or separate. Their claim is, that it will treble battery life.

All this seems to indicate that rejuvenation is a real proposition, to which the Powerport is ideally suited. I am very interested in this subject and would be very grateful to anyone, who could give me more reliable information on it.

* * *

AMATEUR TRANSMITTERS

The number of licensed amateur transmitters in Great Britain and Northern Ireland on June 9 was 5,101.

SAD LACK OF TECHNICAL DEVELOPMENT

Reflections on the Radio Exhibition at the Sydney Show

By PAUL STEVENS

TO the uninitiated and lay man the Radio Show was mainly a mass of highly polished walnut veneer, with music coming out the front and a record changer dropping records and doing other tricks on top. But just as the doctor sees the symptoms, the detective finds clues, which the ordinary mortal would overlook, so the radio man with an analytic mind can read quite a few interesting things out of this not particularly exciting exhibition.

There was, of course, one section of the show, which demonstrated things, which you do not see normally and which, because of this fact, was interesting to the majority. There was a radio station in operation, you could watch the working of a telephone exchange, of automatic lifeboat radio, of a facsimile transmitter and receiver, radar, etc. There was certainly a lot to be seen and I spent quite a while at this part of the exhibition.

Commercial Sets

Of more importance, however, was the commercial receiver show, which, this year, stood definitely in the sign of the radio gramophone and the record changer. Every firm, from the very biggest to the small man, who makes them to order for his retail customers, had radio gramophones as their working models and comparison of performance was therefore easy. Outwardly they were of excellent finish, piano polished high class veneers, in often extravagant streamlined styling. Nearly all of them had automatic record changers, the "magic" operation of which prooved to be a main attraction for the lay public.

As for performance it is interesting to note, that they were more or less alike, irrespective whether the makers were a "nation-wide organisation" or just a small "tin-pot joint." I even found a few models of big firms, that had a definitely poorer tone quality than the average, although it is quite possible, that the records used were not up to standard, or the needle might have been worn.

The quality of reproduction was up to that of any good radio of similar size and price for the last ten years, during which period practically nothing of importance has changed. The basses were full, mellow and pleasing, assisted by large and well-built cabinets and big loud speakers. The treble if not attenuated, was without ex-

(Continued on next page)

Latest from Kingsley

Kingsley's research engineers have been engaged for some considerable time on the development of intermediate frequency transformers for F.M. operation. They have perfected for use in "narrow band" F.M. systems the new types —KIF 21 and KIF 22—tuned with Kingsley Iron Cores, type 114/8.

The iron powder known as IRN8 used in the manufacture of these cores possesses special H.F. characteristics eminently suitable for operation to 100 megacycles.

KINGSLEY TYPE KIF 21 (illustrated here) is a high frequency Intermediate Frequency Transformer suitable for "narrow band" F.M. systems using ±15 kilocycles deviation or any other application where a high frequency I.F. channel is desired.

TYPE KIF 22 is the Discriminator transformer for use in conjunction with KIF 21 in the system as described.

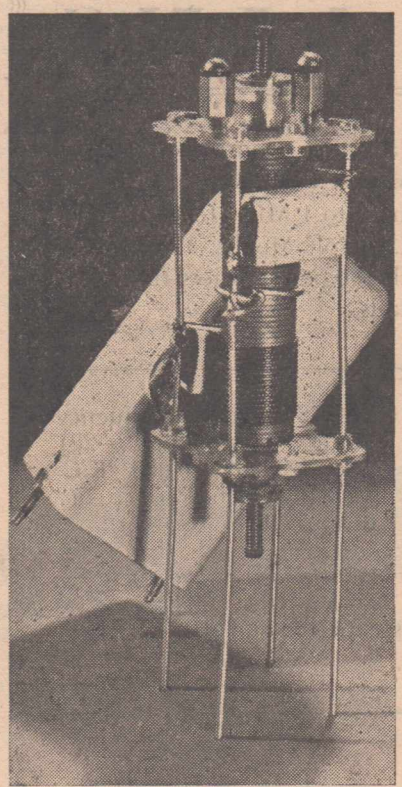
These I.F. Transformers are core-tuned with a "Q" figure of 180 giving a dynamic resistance at 10.7 megacycles, of 36,000 ohms. Dimensions of the can are 3 " x 1½ square.

Further particulars of these outstanding products and type 114/8 iron dust cores may be had on application.

* * *

Mr. H. K. Love — Managing Director of Kingsley Radio Pty. Ltd., Melbourne — announces that important and far reaching move has been made by Kingsley in sending its General Manager — Mr. Lay W. Cranch — to be resident in Sydney for an indefinite period.

A number of new products are becoming available to radio manufacturers from the Kingsley plant and it was felt by the Directors that as the introduction of these lines to manufacturers involves close collaboration with their laboratory staffs, Mr. Cranch, by giving personal attention, would thus render an engineering service to the N.S.W. trade, as well as being in a position to handle the commercial aspect.



Mr. Cranch may be contacted at Kingsley's branch office, 17 Bond Street, Sydney — 'Phone B 1086.

(Continued)

ception as unpleasant as usual, full of harshness and resonance peaks. Resonance peaks were also noticeable with treble attenuated and I am convinced, that this sort of shortcoming can in almost every case be directly attributed to an inadequate pick-up. There are only few record changer chasses on the market and it is very unfortunate that their makers have concentrated too much on the changing mechanism and too little on the pick-up itself. On broadcast reception, especially of national stations, the tone quality seemed to be slightly better, there were definitely less resonance peaks, less shrillness in the upper register.

There were quite a few combinettes (table radiograms) demonstrated and I left with the conviction, that these were just good enough for Tommy Dorsey's or Harry James'' screeching noises, but definitely not for anything more serious. Quite obviously it is the peculiar cabinet shape, which gives them a boxy and boomy tone, with peaks both in treble and bass region. Certainly nothing for the "discriminating music lover."

Tone controls were, apparently mostly of the inverse feedback variety, in many cases with bass and treble boost or cut. Some sets had separate, continuously variable high and low note controls, an arrangement, which I like in particular, although it may be a little harder to handle. What surprised me was the fact, that many makes still use a form of tone control, which also influences the volume to a large degree, which, in my opinion, is particularly annoying.

Waste of Material

Many of the big radios on exhibition had push pull output, the largest ones even separate channels for high and low notes, with separate amplifiers and speakers. At least two of the highest priced ones had three, for low, medium and high frequencies. For any receiver or gramophone, which is primarily intended for use in the home, at medium or loud room volume, this seems to me a terrific extravagance and waste of material and money. At room level, a good single output with inverse feedback and bass and treble tone control is up to the standard of a push pull or multiple amplifier, in fact, in spite of all theoretical claims, I cannot find that twin speakers have any practical advantage over the normal single speaker.

Recording Units

A nice and useful innovation is the inclusion of a recording unit in the more expensive radiograms. The current record shortage and also the fact, that many older recordings one would like to have are not available any more, but can still be often heard over the radio, makes this outfit an expensive, but definitely useful attachment to the radiogram. I am sure, that in the near future many manufacturers will include this, instead of the now modern record-changer, which is actually not much more than a toy. It is also quite on the cards, that soon the magnetic recorder, whether on

wire, tape or disc, will oust our present system for immediate play back units, although the commercial record will probably be with us in the present form for considerable time to come.

Against all the effort spent at the audio end of the receivers, the "tuner" portion was the Cinderella of 1948 radio designing. The only positive item here was the increasing number of sets with effective band spread on short waves, with properly calibrated dials. Otherwise all receivers I saw and heard, whether four or eight valvers, were built as local receivers. Although they definitely had enough gain for long range reception, selectivity would have been too poor to separate stations 10 kC/s apart. Even on the small aerials used, local stations covered at least 20, in most cases 30 to 40 kC/s which means, that, apart from them, only a limited number of other stations can be received without interference from "neighbours." Variable selectivity switches seemed to be completely unknown. One maker of first class radio, who incorporated one in earlier models in conjunction with a third IF transformer for high maximum selectivity, appeared to have dropped the idea. There is still a "wide range" position on his tone control, which seems to indicate, that in this position his broad selectivity is further broadened, but the third IF transformer was not included in any model I saw. Other manufacturers, who used to incorporate variable selectivity with a minimum of about 10 kC/s band width in prewar models, have dropped the idea too. It therefore becomes quite apparent, that the Australian radio industry has lost interest in the building of proper long range receivers and those who want to listen to more than a few locals on the broadcast band, will have to import their radio from the Continent or England, or else build one for themselves.

Portables Past Peak

Another interesting deduction from the Radio Show is, that the personal portable, which was expected to be the great hit of post war days, played a minor role and seems to be well past its peak.

The one outstanding feature amongst mantel radios were the all enclosed cabinets; "beauty back and front." Wrapped in the usual thick layer of sales boloney, makers pin a great deal of hope on this new feature to lift their lagging sales. These all-enclosed types, with one grille in front and one in the back, are carefully designed, to keep the maximum amount of heat inside the cabinet, so that electrolytics, loud speaker, wax sealed condensers and other "heat loving" components don't feel too cold on a hot summer day. One manufacturer in particular made a world shaking invention. He mounted his speaker in almost horizontal position under the top of the cabinet, fitted three speaker grilles in front, top and back of the cabinet and was so proud of his achievement, that he based his entire sales campaign on it. Another one had the idea, that the slowness of radio sales was mostly due to the fact that people did not like to have knobs at the front of the set; so he fitted them to the sides, advertised this feature in big letters and is now waiting for the rush. A third one also thought, that knobs increased sales resistance, so he hid them altogether and the handling of the controls is like the pressing of concealed buttons to open the Hollywood version of a secret wall safe. Only the tuning control is not hidden, it consists of a shiny roller across the front of the receiver and is, according to the advertiser, the main reason why people should buy this set, of which there was a 6ft. model built up, with the roller and the drum dial turning 'round and 'round and 'round.

To sum up: This year's Show, like the last one, was again a demonstration how the radio industry, unable to offer anything real new, had to rely again on artificial sales features to simulate non-existing progress. It was this time mostly concentrating on new fashions, should make last year's radio look obsolete and induce the public to new purchases; a sad state for a technical industry.

PROTECTIVE CIRCUITS

How to Make Your Equipment Shock-proof

THE complete protection of transmitters and similar equipment—and incidentally, the operator—can be carried out quite simply, using some of the large-range of surplus parts available at present.

Anyone with Service experience will remember what a fine job was done on the larger transmitters,

By

DAVID DEWHURST

Hood Crescent

Caulfield, Vic.

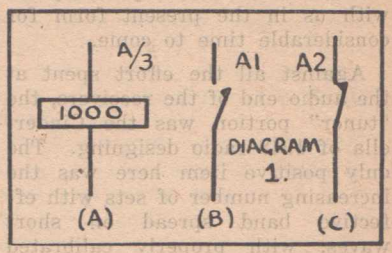
in rendering them proof against the inexperienced operator! A practical system of protection in an experimental transmitter can be simpler than this, and still save a lot of trouble. The main requirements for a complete system are:

1. To prevent the application of plate voltage to transmitting tubes, particularly mercury vapour rectifiers, before they have warmed up.
2. To prevent tetrodes and pentodes receiving screen voltage without plate voltage.
3. To make it impossible to have HT on a stage without bias.
4. To remove HT in the case of an overload on the power supply.
5. (And probably the most important). To make access to live equipment impossible, unless this is necessary for test purposes.

How much of this programme is needed in each case can easily be decided.

Relays

First, a word about relays in general. These are available in several types, but nearly all have



one thing in common—they require DC for satisfactory operation. This may be provided by means of a half or full wave metal rectifier with a suitable rating. Particularly in the case of a half-wave rectifier, a condenser of 2 mf or more across the relay may be necessary to stop chattering.

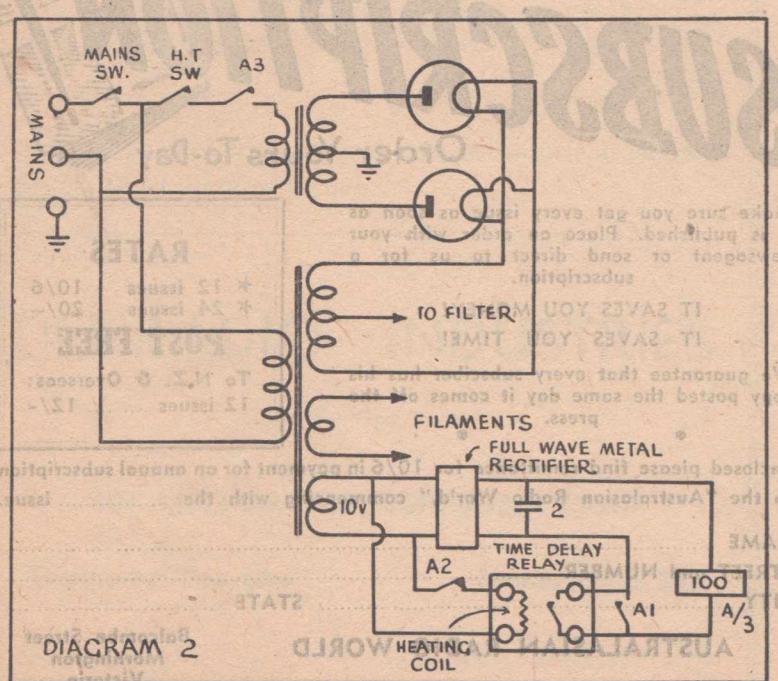
The Post Office type 3000 relay is ideal for all but circuits carrying large currents: in this case heavier contacts will be needed, and a relay of the type used in aircraft, designed for 12 or 24 volt operation, will be suitable. The type 3000 with a 1000-ohm coil operates satisfactorily with a few milliamperes, while the heavier types may need 100 ma or more.

For convenience in circuit drawing, several conventions are usual to show relays. The main ones are shown in diagram 1. The relay winding is drawn as in 1a; the one shown is number A in the particular circuit, operates three sets of contacts, and has a resistance of 1000 ohms. In 1b is shown contact number 1 of relay A, which is normally open, when the relay is not energised. 1c is contact number 2 of relay A, which is normally closed.

Time Delay Circuits

Nearly all transmitters are fitted with separate filament and plate switches, but it is only too easy to forget, and cut off the mains with the plate switch still on. Next time the mains go on—disaster to any transmitting tubes in the circuit! Tubes like the 807 may survive with a shortened life, but mercury vapour rectifiers certainly won't. So a time delay relay is a good investment.

Some manufactured units have



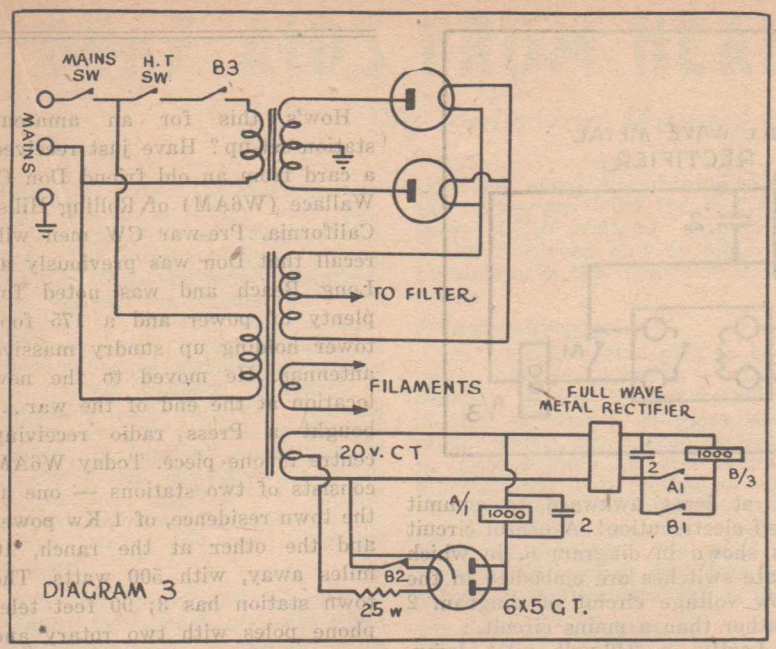


DIAGRAM 3

been available through Disposals. These consist of a heating coil wound round an insulated rod or strip. As the rod warms up, it expands, and the movement is magnified by a level system to close a contact. To use these, an ordinary relay is also needed. A typical circuit is shown in diagram 2. When the mains switch is closed, the filaments come on, and the time delay starts to heat. After a fixed time (30 seconds suits most small transmitting tubes), its contact closes. This operates relay A. Contact A1 closes, which "locks" relay A closed, i.e., keeps the coil energised, no matter what happens anywhere else, until the mains are turned off. A2 opens and lets the time delay cool, ready for next time. A3 closes, making it possible to turn the transmitter HT on. If desired, a pilot light may be connected across the relay coil, to show when the transmitter is ready.

If you can't pick up a time delay relay cheaply, there is a good alternative. An indirectly-heated valve connected as a diode may be used to give the delay. To increase the time it takes to heat, it may be worked with reduced filament voltage, since it is on for only a few seconds at a time. Diagram 3 shows a circuit I have found very satisfactory.

On turning on the mains, all filaments start to heat. As soon as the 6X5GT draws sufficient current, relay A closes. Contact A1 at once closes relay B. Its contact B1 locks it closed. B2 opens, lets the rectifier cool, and lets A open ready for its next operation. B3 allows the HT to be turned on, as before.

Interlocks and Overload Relays

Transmitting tetrodes and pentodes usually have their screens and plates supplied from the same source of HT, but in circumstances it may be desired to use separate power supplies. In this case the application of screen voltage in the absence of plate voltage will cause excessive screen dissipation, and probable failure. This risk may be lessened by a fuse in the screen circuit; a pea lamp of the proper current rating is handy here. However, a much more certain protection is given by means of an interlock between plate and screen supplies, as shown in diagram 4.

Should the plate supply not be present, screen voltage cannot be applied. Resistor R must be of a size and rating to suit the relay used.

Overload protection of some sort is most desirable. As a minimum, a fuse should be included in the HT lead to the plate, but in this case too a relay is more certain in action and more easily adjusted to the exact maximum current allowable. Diagram 5 shows a most effective arrangement, which protects not only the tubes, but meters, transformers, and chokes.

Resistor R is adjustable; usually about 20 ohms is suitable. It is set to let relay A trip at the required current limit. When A operates, A1 closes relay B. Contact B2 opens and disconnects the mains from the power transformer. A1 of course at once opens, but the condenser across B holds enough charge to close B completely. B1 then locks B closed, until it is re-

(Continued on next page)

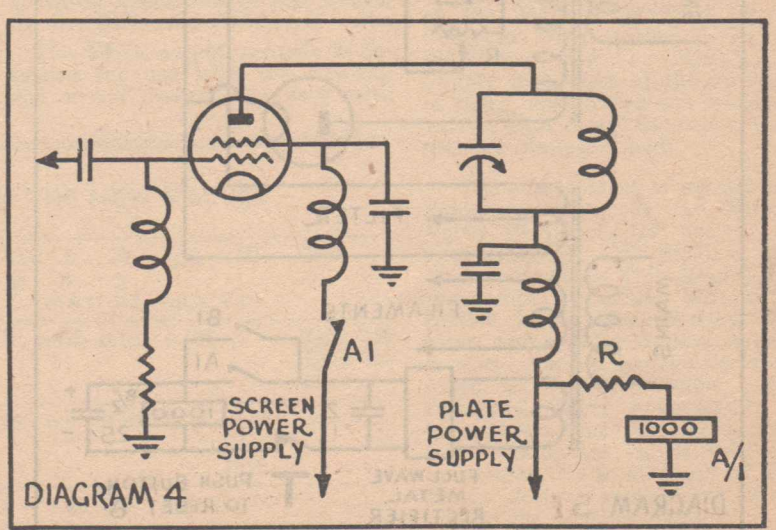
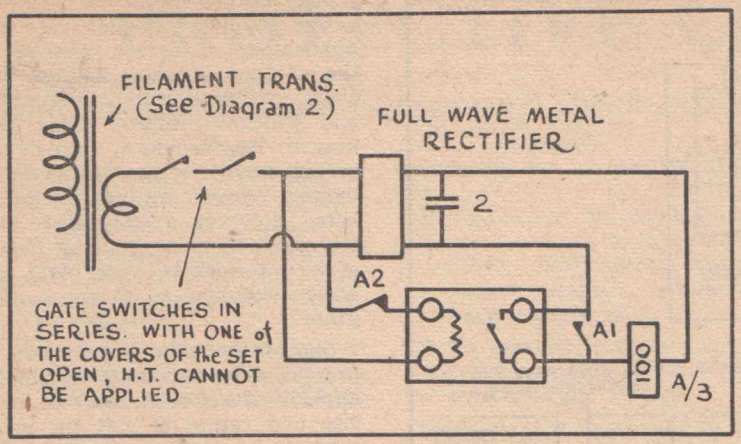


DIAGRAM 4



leased by the overload reset button.

Gate Switches

Safety measures are probably the best investment in time and money that can be made. Few experimenters would disagree with this, but very many fail to take adequate steps with their own equipment. First, all live equipment must be inaccessible in the normal course of events. Then, the use of spring-off switches on the doors or lids of the set will make it at least awkward to commit self-electrocution! A useful circuit is shown in diagram 6, in which gate switches are embodied in the low voltage circiut of diagram 2 rather than a mains circuit.

Lastly, a 240-volt pilot lamp, neon for preference, permanently across the mains inlet to the power supply, is a simple warning of danger. Protect your equipment and yourself!

Reference: RCA Transmitting Tube Manual.

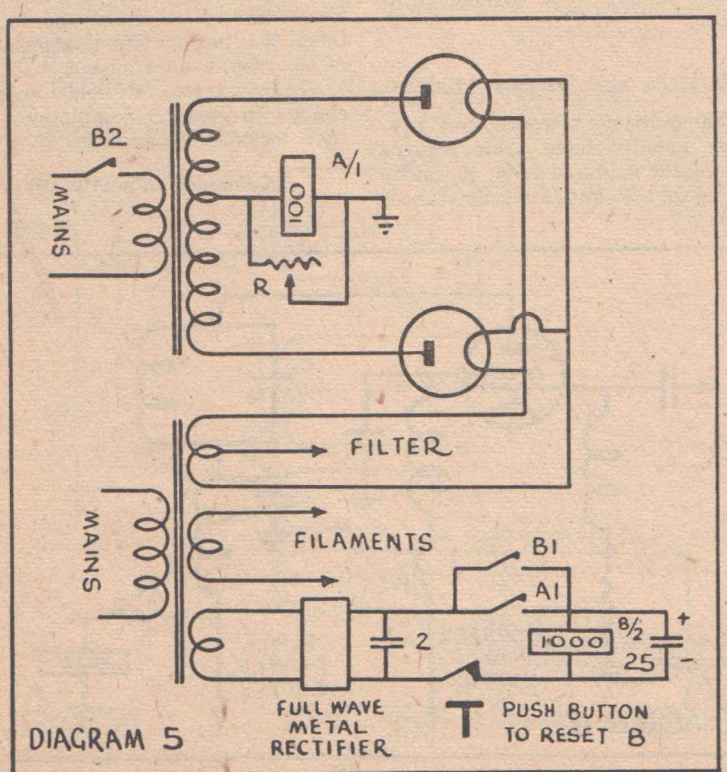


DIAGRAM 5

How's this for an amateur station set-up? Have just received a card from an old friend Don C. Wallace (W6AM) of Rolling Hills, California. Pre-war CW men will recall that Don was previously at Long Beach and was noted for plenty of power and a 175 foot tower holding up sundry massive antennae. He moved to the new location at the end of the war... bought a Press radio receiving centre in one piece. Today W6AM consists of two stations — one at the town residence, of 1 Kw power and the other at the ranch, 10 miles away, with 500 watts. The town station has 3; 90 feet telephone poles with two rotary and 9 fixed beam arrays. At the ranch there is a space of 105 acres, and across the face of the earth there are no less than thirty-three 80 feet telephone poles holding 9 rhombics and two Vee Beams. All this, to boot, is on a 1,200 feet high hillside overlooking the Pacific Ocean. We shall now all retire modestly into our suburban garden plots and gaze wistfully at our Windoms and whatnot ! !

* * *

Want to make use of that delta-matched half-wave array on the second harmonic as a collinear system giving two half-waves phased? Simple says Harold Cox of VK2GU. All you do is to break the antenna at the centre of the delta and insert therein a cord operated switch of the kind you pull "now its on" . . . pull again . . . "now its off" variety. A low voltage relay would be handy for the purpose too. Only catch with the cord switch idea is that one might forget which way the antenna was perking the last time one pulled the cord.

—D.B.K.

DEAF AIDS FROM HEALTH CLINICS

Big Order for Mullard Valves

THE British Government have placed an order with Mullard Wireless Service Co. Ltd., for 400,000 valves for use in the state-sponsored hearing-aid, known as "Medresco." This device is to be made available to all persons suffering from defective hearing, and will be distributed through Ministry of Health clinics when the National Health Service Act comes into operation in England on July 7. It is stated that 400,000 units are to be produced together with 100,000 annual replacements, and that the whole scheme will cost £5,000,000 a year.

The "Medresco" unit is a wedge-shaped instrument of very small dimensions. The maximum width at the top is 2½" and at the bottom 1½". The overall length is 3¾" and it is 1" thick. In this confined space is housed an amplifier using two of the new Mullard sub-miniature voltage amplifying pentodes DF70 and either a DL71 or a DL72 output pentode. These valves are similar in basic design to the American types CK505AX, CK502AX and CK506A, but have the very important advantage of a marked reduction in power consumption. This means that the L.T. battery supplied with the "Medresco" unit does not require such frequent replacement. The average running cost of the instrument is thus considerably reduced.

SIZE:

These valves are 10 mm. (25th") in diameter, the lengths being 30mm. (1-1/5th") for the DF70 and 38mm. (1½") for the DL71 and DL72 output pentodes. The extremely small size of these valves can be gauged from the fact that three DL70 voltage amplifying pentodes placed end to end, approximate to the length of a cigarette.

CONSTRUCTION:

The electrode structure is built up on a flat glass disc in a manner basically similar to that employed in the well-known all-glass technique which has been perfected in this country in the Mullard Laboratories. This method of construction ensures a high-degree of rigidity and consequent freedom from microphony. The lead-out wires are tinned to facilitate soldered connection into the circuit.

FILAMENT RATINGS:

Reference to the chart below will show that the filament current ratings of the Mullard sub-miniatures are extremely low. This advance will be apparent when it is considered that the three-stage amplifier in the Hearing-Aid consumes a total filament current of only 50 mA as compared with 70 mA for a similar circuit employing American sub-miniatures. This represents over a 30% saving in current.

ANODE RATINGS:

Taking into consideration the high performance obtained with the Mullard sub-miniatures, the anode current ratings are also extremely low. The nominal anode voltage rating for the DF70 is 30 volts, whilst the voltage rating for the DL71 and DL72 is 45 volts.

The DL71 output pentode is intended for use with the Hearing Aid circuit designed to work with a crystal earpiece of the insert type, and delivers a power output of 6mV at a distortion level of not more than 10%. An alternative circuit is available for use with an external magnetic-type earpiece. This incorporates the higher-powered output pentode DL72.

THE TOTAL POWER CONSUMPTION OF THE HEARING AID:

The choice of earpiece is governed by the particular needs of the deaf subject, but in either case the total power consumption of the Hearing Aid is extremely low. For example, the circuit for use with a crystal-type earpiece normally consumes not more than 1/10th watt, whilst the total power consumption of the circuit intended for use with a magnetic-type earpiece is not greater than 1/8th watt. By way of comparison, it may be well to consider that 600 amplifiers of the first type consume less electrical energy than a single 60 watt electric lamp. This is really astonishing when account is taken of the inestimable value that these extremely compact and lightweight units have for those suffering from defective hearing.

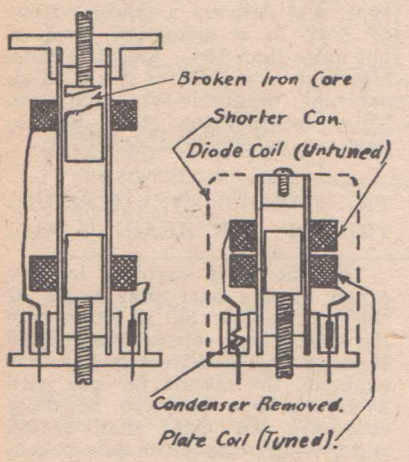
To many, the significance of this new development in valve manufacturing technique will not at once be apparent. However, they may do well to consider the views of Commander H. St. A. Malleson of the Mullard Wireless Service Company, who conducted the negotiations with the Ministry of Supply in respect of the provision of these new British sub-miniature valves. At a recent interview, Commander Malleson said:

"The development of special sub-miniature valves by the Mullard Valve Company, for use in the new Hearing Aid, requires particular emphasis. This development represents a marked advance in British valve manufacturing technique, and enables Mullard to enter a world market previously dominated by American valve manufacturers. There appetars to be every hope that this achievement in sub-miniature valves will open up possibilities in all kinds of electronic design applications where size is the limiting factor."

CHARACTERISTICS OF THE NEW VALVES

Type	Vf	If (mA)	Va	V2g	Vlg	Ia (mA)	I2g (mA)	gm (mA/V)	W	Gain
Mullard DF70	0.625	25	30	30	0	0.375	0.125	0.175	-	Rg = 1M Rg = 3M 40
Mullard DL71	1.25	25	45	45	-1.25	0.6	0.15	0.55	6mW Dt= 10%	———
Mullard DL72	1.25	25	45	45	-4.5	1.25	0.4	0.5	23mW	———

A Handy Hint



A tip for the experimenter who has an IFT of the adjustable iron cored type having one plug broken off the adjusting screw. The transformer may be made into a useable unit suitable for No. 2 position in a receiver using diode detection.

This is done by removing the end bracket carrying the slug screw and taking out the broken slug. Next slide the coil originally tuned by this slug as close as possible to the other coil. This can usually be done by warming to soften the impregnation. Remove the fixed condenser which normally tunes the coil—this is sometimes part of the leads and is fitted into a receptacle in the IF Base. If this is so replace the leads with two plain wires waked in place. A kink in each wire will help to lock them in place.

With this arrangement using the tuned coil as plate coil and the untuned one as diode coil the performance is little inferior to a standard unit and, where space is important, may be made much smaller.

If the lower iron core is broken off the one from the upper position may be used as they are usually interchangeable.

At least one IFT manufacturer lists a single tuned IFT as a standard unit for certain applications. From W. S. Londey, 8a Barkly Street, Sale. Vic.

AN ENGLISH THREE-ELEMENT BEAM

By C. G. ALLEN, Bromley, Kent, England

THE photograph and description of my 3-element beam array might be of interest to your readers.

The wooden lattice tower is 31 ft. high with a base dimension of 4 ft. The main supports are bolted to channel iron sections, which are sunk in concrete blocks and hold the whole structure very rigid.

The lower beam is a 3-element close spaced 14 m/c array, using a folded dipole as a radiator. The 3 elements and their supports are made from duralium tube. The centre section is $1\frac{1}{16}$" dia. and the end sections, a telescopic fit suitably clamped to ensure good contact.

The thinner element of the radiator is also in three sections with the centre section ½" diameter.

The main boom is duralium and all the elements are supported and insulated from it by blocks made of gear fibre. Gear fibre blocks are also used for the minor horizontal tubes supporting the director and reflector. These minor tubes are 8 ft. long by $1\frac{1}{16}$" diameter.

Similar supports are used for the radiator spacers, but the end blocks are of duralium.

The element lengths are as follows:

Director — 32' 1".
Radiator — 35'.
Reflector — 36'.

The spacing between the director and radiator is 10' and between the radiator and director - 7'. The elements of the radiator are spaced 6" from the centre.

The smaller element of the radiator is fed direct with 45 ohm co-other axial line and gives almost a perfect match with the above measurements on 14,200 k/c. The aerial being 33' above ground. The measured standing wave ratio at this frequency is 1.4 to 1.

The standing wave ratios for
14,000 kc/ 4.2/1
14,100 kc/ 3.2/1
14,300 kc/ 2.5/1
14,400 kc/ 4.3/1

The whole 14 mc array weighs only 28 lb.

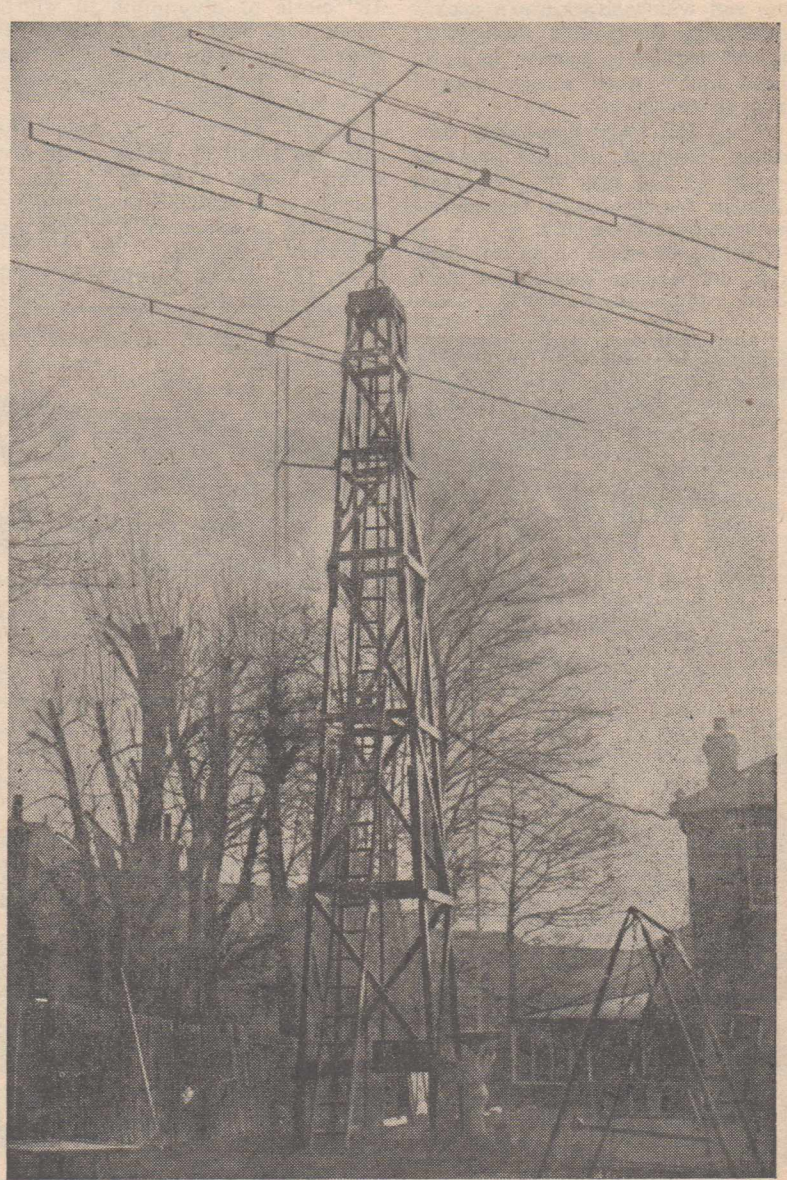
The 28 mc array is mounted 8' above the 14 mc beam and is a half size replica of it and is also fed with 45 ohm coaxial line. It has almost identical characteristics and weighs only 7 lb.

Careful checks were made to ascertain if the mounting of the beams parallel to each other adversely affected them but no apparent effect was noticeable.

The driving shaft up through the centre of the tower is 2" water pipe and stands on a ball race. Half way up the tower, the tube passes through a steady bearing.

The boom of the 14 mc beam is clamped in a steel cradle and the cradle is fitted to a steel tube

(**Continued on next page**)



The 3-element beam at G8IG.

BEAM

(Continued)

1⅝" diameter and 8' long. This tube is passed through a ball race sunk into the top platford of the tower and a heavy bolt through the driving shaft and this tube securely anchors it for rotation. A steel collar is fitted to the steel shaft and rests on the ball race in the top platford to stop it dropping through when the lower bolt is removed.

The 28 mc array is clamped to a 8' length of 1" diameter duralium rod which slips into a socket welded to the cradle supporting the 14 mc beam and is held by three heavy grub screws tapped through the socket.

A ⅓rd HP reversible motor connected through suitable gearing housed at the base of the tower provides for rotation at a speed of one rev. per 56 seconds.

Continuous rotation is not possible due to the method of feed but this has not been found a disadvantage. The feeders are wound around the driving shaft, three times so that the arrays may be rotated continuously for six complete turns if necessary, before reversing.

The beam indicator unit is considered worth mentioning.

A great circle map of the world was photographed down to 10" dia. and printed off on thin paper and suitably coloured to make the various countries stand out.

The print was then mounted on a 12" circle of aluminium in which holes had been drilled every 10 degrees and slots cut with a fret saw from the drilled holes to within ½" of the centre.

Behind every other hole are mounted small 6v. bulbs which are wired through a 6v. mains transformer to a suitable multi-connector fitted to the case in which the assembly is housed.

An 18 point stud switch is fitted to the centre of the tower and the main driving shaft passes through it. On the main shaft is fitted a wiper arm, with the blade just wide enough to touch two of the studs at a time.

The studs are connected to the indicator in the shack via a multicore cable. When two lights show on the indicator, the beam is between them, so that indication of the beam is obtained every 10 degrees. The lights also illuminate the slots and show the path of the beam over the great circle route.

All cables including the feeders are carried neatly to the eaves of the house on a steel stretch wire.

The 2-element vertical beam on the side of the tower is a television receiving aerial."

Footnote: G8IG is one of the best known G stations using 14 Mc/s phone and rare indeed is the day that "Bert" Allen's familiar voice is not heard in Eastern Australia.

(Continued on page 23)

GERMANIUM CRYSTALS

Now Available in Australia

FOLLOWING its pioneering work in developing a stable SILICON crystal rectifier, the British Thomson-Houston Co's Research Laboratory have produced an equally stable GERMANIUM rectifier, of similar construction but capable of handling higher voltages and heavy transient overloads.

These are now available in Australia from J. H. Magrath and Co.

The CG1-C type rectifier may be regarded as complimentary to, and not, normally, to replace the silicon C.S. types which remain the unique rectifiers in all centimetre wave applications.

At lower frequencies, however, the germanium rectifier has definite advantages over other types hitherto employed. For example, it will replace the diode in those applications where absence of heater connections, compactness, and reliability are chiefly required, and its frequency response is much superior to other types of rectifiers, with similar high voltage characteristics.

In common with other contact rectifiers, it passes current freely in one direction whilst presenting a relatively high resistance in the reverse direction, but because of its point contact construction the contact capacitance is much lower than in other well known types.

Mounting

The unit is comparable in size and has end connections similar to a ¼ watt resistor. When soldering the end wires in circuit, however, care must be taken to minimise the conduction of heat to the inner elements of the unit, otherwise it may be damaged. To prevent over heating, the wire should be gripped by a pair of thin nosed pliers, close up to the metal end.

Overload Characteristics

Sudden applications of excessive voltage do not necessarily damage the CG1-C rectifier. It will return to normal almost at once if the overload condition is not maintained for longer than a few milliseconds.

Applications

Second Detector: In low impedance wide band I.F. amplifiers, up to 100 mc/s. Normal load impedance from one to ten thousand ohms.

Limiter: With suitable bias and load resistor it can be used to replace the diode with the advantage of circuit amplification.

D.C. Restorer: Relatively low circuit loading and absence of heater connections provides more convenient means of re-establishing the peak values of either positive or negative voltage to a given D.C. potential.

Discriminator: For Automatic Tuning and in Frequency Modulation Systems, where good frequency response and compactness are of particular importance in U.H.F. receiver design.

Automatic Gain Control: The CG1-C Rectifier can be used in practically all types of receiver, as the means of developing the A.G.C. bias voltage.

Special Applications

Power Rectifier: In minature components development.

Pulse Generator: In modulating systems.

Telephone System: In conjunction with telephone relays, permitting AC operation.

Valve Voltmeter: To replace the diode.

Signal Generators: Power, Voltage or frequency monitoring.

Wavemeters: Detector.

Voltmeters: Instrument Rectifiers.

Ammeters: Instrument Rectifiers.

Rating and Operating Conditions

Maximum Reverse Voltage: -80 (peak value).

Maximum oContinuous Current : 50 mA (D.C.).

Maximum Peak Current (overload): 400 mA (D.C.).

Minimum Forward Current: 4mA at +1 volt.

Max. Resistance at +1 volt: 250 ohms.

Min. Resistance at -50 volts : 50,000 ohms.

Overall Capacitance: 1.0 mmfd (average).

Polarity Markings on Unit: +ve and — ve corresponds to connection for 'Forward' and 'Reverse' current respectively.

Mechanical Stability: Will withstand 5' drop onto hard floor.

Maximum Operating Temperature: 100°C.

Construction: Moisture proof to tropical specification.

Expected lifeunder continuous maximum rated conditions: Over 1,000 hours.

RESTORING BASS

If the bass response of a set several years old has gradually failed, and if everything possible to restore it electrically has been done, it may be worth while to take more drastic measures.

Like most other things, loudspeakers deteriorate with age. One part most likely to suffer from old age is the cone suspension. If it is made of some composition fibre, it will slowly harden with age until it feels quite stiff when you try to move the cone by hand. If and when that happens, bass response will disappear, because the cone can no longer move freely to pump an air column.

To rectify the trouble, set the speaker down somewhere with the cone upward. Take a tin of very light machine oil, and run some oil round the two corrugated grooves in the cone suspension. Let it stand until no more oil soaks in, then remove the surplus with a piece of cotton wool. Dont let oil run down the cone, or get anywhere else but in the suspension grooves.

Results may not be immediately apparent, but within twelve hours the loudspeaker should be producing bass as robustly as in its pristine youth.

—"Wireless World" (England).

BEAM (Contd).

His signal is always outstanding, and one reason for this is obvious in the beam array pictured here. In business life C. G. Allen is Sales Manager for McMichael Radio. The "Bert" is derived simply from the G, which stands for Gilbert. Regular contacts for G8IG are VK's 2AGU, 2OQ, 3KU, and 3SB.

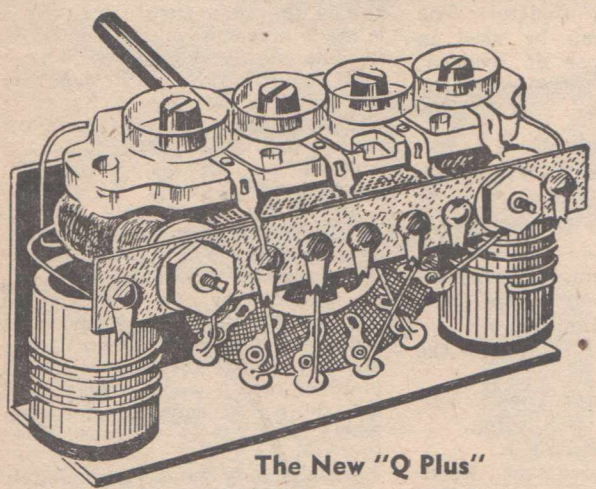
D.B.K.

COMING RELEASES FROM OUR NEW FACTORY...

FIRST RELEASE -- Without R.F. Stage

For 6SA7, 6J8, ECH35 and 1R5 Converter Valves

FOR LATER RELEASE, WITH R.F. STAGE



The New "Q Plus"

DUAL WAVE BRACKET

- ★ "Q Plus" midget Iron Cored Aerial & Oscillator coils.
- ★ Available for 6J8G, ECH33 or 35, 6SA7 & 1R5.
- ★ Large ¾-in. diameter short wave coils (air cored) with exceptionally high Q value—so necessary with S.W.
- ★ B/cast Coils, litz wound with high impedance primary.
- ★ Guaranteed performance values as with all "Q Plus" Coils.
- ★ Full circuit instructions and recommended circuits.

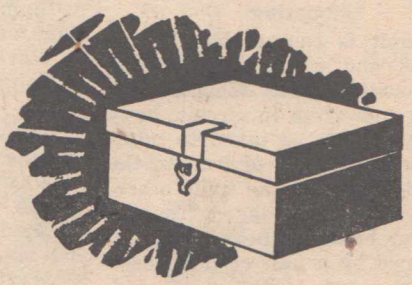
THE SMALLEST D.W. BRACKET

Depth	1½ inch.
Min. Chassis height	1-5/8 inch.
O/all height	2 inch.
O/all width	3¼ inch.

COUNTRY USERS NOTE

Available for 1R5 Converter Valves

REMEMBER you cannot get maximum performance without using the correct coils for the correct converter valve.



Something "out of the box"

Watch for more "Q Plus" Midget Releases.

NO HALF MEASURES WITH "Q PLUS"

R. W. STEANE & Co., Pty. Ltd., Auburn, Victoria

Trade Enquiries Direct or to A. J. Phillips Agencies, 27 Hunter St., Sydney—Brisbane—Adelaide
Factory Rep. New Zealand: Messrs. Carrel & Carrel, 41 Shortland Street, Auckland, N.Z.

Well-Tested Battery Receiver

Circuit From An Up-country Reader

I HAVE been reading "Radio World" for quite a few years now and have always noticed the difficulties in the way of anyone who tries to design a sensitive set for country use, particularly if the set is to be dual wave.

In the January 1947 issue of "Radio World" the editor Mr. A. G. Hull, who has had years of experience with battery radios, set out and explained the difficulties

By

BERNARD S. SMITH

Towrana Station
Gascoyne Junction, W.A.

very clearly, namely these. In the country, perhaps 500 or 600 miles from the broadcasting stations, sensitivity is very important, it should be the maximum obtainable with stability, yet battery type valves have not got the gain of the a.c. type tubes.

This means the use of more battery type valves than would be necessary with an a.c. type set of comparable performance to the battery job we are trying to design. The use of more valves means more milliamperes which means more flat batteries which means more cost to the owner.

Now a country radio using, say the a.c. series type EK32, EBF35, 6J7G, EL3NG., only 4 valves in all would give good performance, but a vibrator becomes necessary, as the current drain, around 45 mills., is too heavy for batteries to supply at 250 volts. The vibrator is OK but with the drain of the vibrator and valve filaments combined the total drain on the 6 volt "A" battery would at least be 2.2 amps, too high for economical running.

Now, using the battery series, we'll take the 2 volt types first, we have types 1C7G, 1M5G, 1K7G, 1L5G, still only 4 valves, but no good, the set wouldn't have enough gain, and the 1C7G is not a good converter on short waves.

In the 1.4 series we have 1R5, 1T4, 1S5, 3S4, or 3V4, still 4 valves but not enough gain, although it would be cheap to run.

If Philips would introduce to Australia types KCH1, KF2, 1K7G, KL5, in the two volt series, or DCH31, DF32, together with present types 1H5G, 1Q5G, in the 1.4 volts series a really good battery 4 valve set could be made.

However I have designed and built a good set, with good sensitivity, good selectivity and low noise level, and most important, low running cost, using 5 valves of the present 1.4 volt type.

Valve Types

As can be seen from the circuit diagram, types 1R5, 1T4, 1S5, 3S4, are used, the set is dual wave and operates from one 1.4 volt cell, type S2/0 Buzzer, and two 45 volt tripledynes.

The 1R5 is used as the converter, with a.v.c. on B/c. only, 83 volts on anode, 30-45 volts on osc. anode. The osc. grid current, measured between the cold end of the .1 meg. resistor and earth should read .06 to .1 milliampere on S/w., .06-.15 milliampere on B/c.

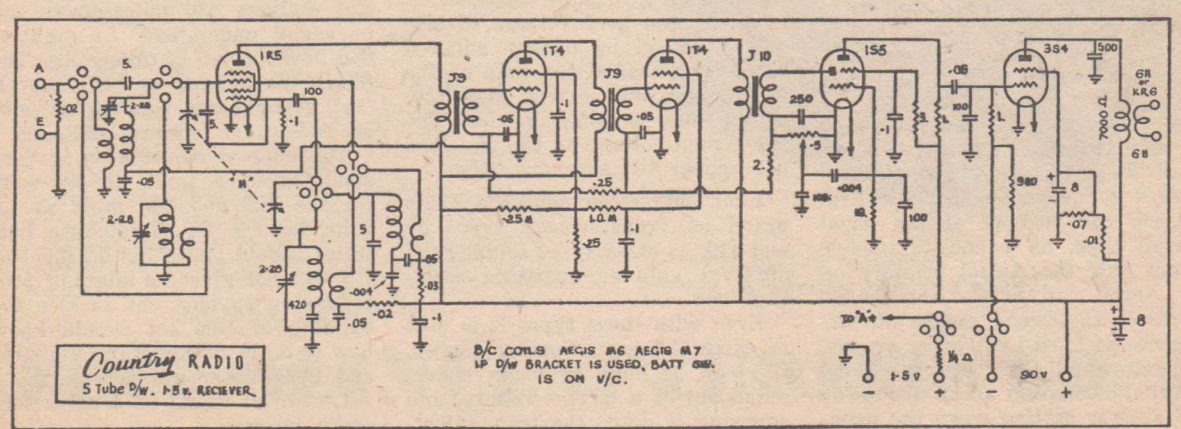
This valve is used with padder feedback in the osc. section, to limit grid current to the valves mentioned, this method giving lower noise level to the alternative method of using combined plate and screen feedback with 67 volts on both elements.

The Coils

The converter feeds into an "Aegis" J9 455 k/C IF. Transformer, thence into the first 1T4 amplifier, which operates with 83 volts on the plate and about 25 volts on the screen. This valve feeds into another J9 transformer and 1T4, the second 1T4 operating on very reduced ratings, 83 volts on plate, screen voltage unknown, but probably about 15 volts.

This valve feeds into an "Aegis" J10 IFT., and the 1S5. The set from here on is quite standard, except for the 3S4 screen which operates with about 55 to 65 volts, it is not critical. The 3S4 is used on these ratings because it will not take

(Continued on next page)



(Continued)

83 volts on both plate and screen, it is really intended to be used with a maximum of 67½ volts, but it is quite safe on the above ratings.

The total HT. voltage is only 83 volts because 7 volts are removed from the supply of 90 for back bias. Actually, more than seven volts bias is applied, this tending to keep the current drain down, enough power output with a 6 inch speaker is available however.

The Chassis

The chassis is of sheet steel sprayed with enamel on the outside, the inside is cleaned up with sandpaper, for soldering, as I do not believe in running a bare wire around for an earth return, I think it is best to solder direct to the chassis. It would have been cadium plated but I could not get this done in West Australia. It measures 10" long by 6" wide by 2½" deep. All valves and Transformers are along the back edge. (See Photos).

The Converter

The converter valve is an 1R5 for low noise level and reliable oscillation on the short wave band, which incidentally in this particular model is 18.8 to 5.8 mC/s' 16 to 52 metres. This range is far superior to the 13 to 42 metre band for country use, but no dials with this calibration are available. The RCS type DA7 is easy to alter though, just scrape the 13 to 42 letters off and replace with white enamel, the 13 metre band becomes 16, the old 16 is 19, the old 19 is 25, the old 25 is 31, the old 31 is 42, the old 42 is 50 metres.

The Coils

On the broadcast band the range is 1620 to 540 kilocycles, so standard "H" type coils are okay, however, I suggest using a Radio Frequency coil instead of the usual Aerial type, as I had to remove about half the Aerial primary on an Aerial coil I used, an Aegis, however the brand makes no difference as I tried two other brands, Kingsley and QT, with the same results, oscillation above about 700 kC/s. Only cutting down the primary would cure it, no other method was effective, plenty of gain was still available.

However an "RF" type coil should save all that bother. This trouble is unusual but it was most likely caused by the high gain Intermediate channel.

The Short Wave band has home wound coils, but 16-50 metre H type coils are available in the Kingsley and Aegis range

Should an ordinary commercial D/W bracket be used it will have to be 13-42 metres as no 16-50 metre types are available, although separate coils are. Then again it will be necessary to separate the HT return from the two oscillator coils to incorporate padder feedback. The B/c aerial coil will probably have to be replaced with an "RF" type.

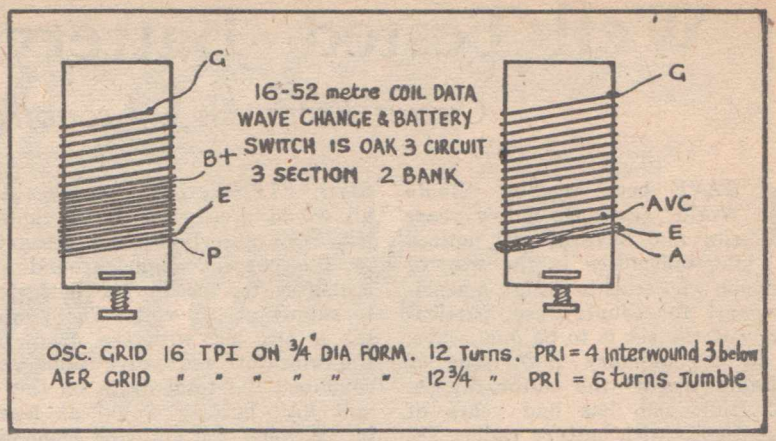
The Intermediate channel will have to have very short leads, and careful layout as it is very high gain and the valves used have rather high grid plate capacitance.

The screen grid voltage divider valves should be closely adhered to as they control the gain of the IF channel, this is true especially of the one megohm resistor. The low screen voltage on the 2nd does not appear to cause distortion.

I can only recommend the Aegis brand of Transformers, types J9 and J10, as other types might have different gain so upsetting stability.

Even with these types it is best to earth the top adjusting screws, this can be done by using a terminal nut of a 'phone battery, and screwing it down the long adjusting thread of the IF until it binds on the top of the can.

This should be done before the IFT's are adjusted for frequency.



Here are the coil winding instructions for the home-wound coils which were used by the author. Ready-wound coils are also available in leading brands.

Conclusion

As was first pointed out, the country man's set for use at distances greater than 500 miles from a radio station must be sensitive, selective, have low noise level, be dual wave because in the summer months the B/c band is one big barrage of storm static, and it must be economical to run.

The receiver just outlined fulfills these requirements.

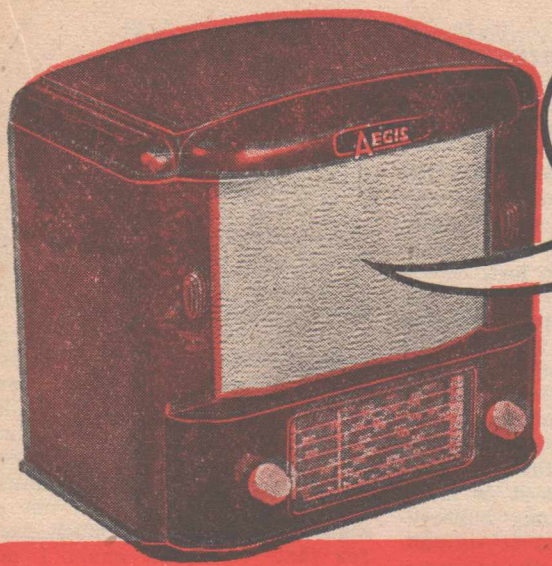
It was first designed on paper and next the components were ordered and when received were mounted and wired up. Then the fun started! However by careful cut and try methods the bugs were ironed out and a very nice little job is the result.

It can give a good daylight range of 300 miles with an aerial about 30 high but without an earth and stations 630 miles away can be easily understood. At night it can cover most of Australia. The Short Wave band is really excellent, stations are very stable with no fading, no sign of drifting.

The current consumtion is very small about 8 mills at .90 volts for the HT and 300 mills at 1.5 volts for the LT. Tripledyne batteries should last about 12 months.

I will not give the aligning procedure as anyone who tackles the building of this set should know how to do it, however an Oscillator and O/P Meter are necessary.

I wish all would be constructors every success.

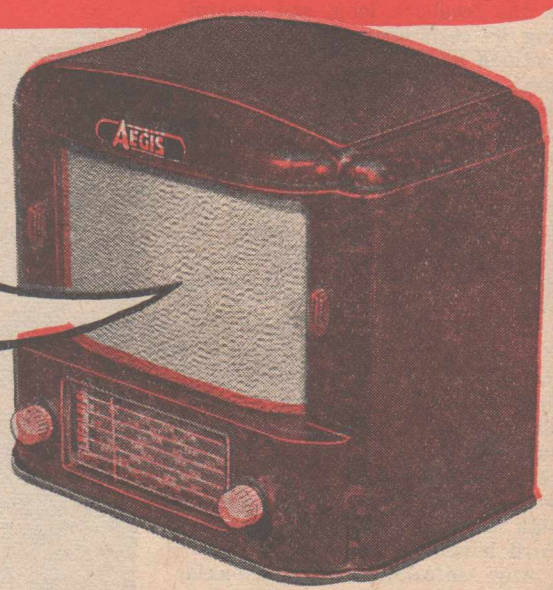


I WORK IN THE 'METROPOLIS'

METROPOLIS "4"—The popular Kit Assembly for A.C. use! It's a 4-valve Broadcast model with such quality features as Bakelite Cabinet, Rola Speaker with new Anisotropic Alnico, Aegis Permeability Iron-cored B/C Coils and Intermediates, Trimax Power Transformer, etc., and of course complete down to the last nut and bolt. The complete price, retail (sometimes slightly variable interstate), including Sales Tax **£11/17/6**
Plus Valves, £3/12/7.

The AEGIS '4' TWINS

A 'RURAL' LIFE FOR ME



RURAL "4"—The ideal Kit Assembly for country use. As illustrated, it features attractive mottled Bakelite Cabinet, button Valves for low drain, Aegis iron core I.F.'s J9 and J10 specially designed for Optimum gain, Rola 6" Permag Anisotropic Speaker with Isocore Transformer—highly important for battery sets, Chassis and all metal brackets cadmium-plated, W.S.T. Switch Potentiometer. Price (sometimes slightly variable interstate) **£13/13/-**
(plus valves and batteries)

★ **ATTRACTIVE DISCOUNT TO AMATEURS AND THE TRADE**

AEGIS MANUFACTURING CO. PTY. LTD.

208 LIT. LONSDALE STREET, MELBOURNE

DISTRIBUTORS IN EVERY STATE

AMONG OUR READERS

Letters from Subscribers

"HAVING found your 'Among Our Readers' section very interesting, thought I would pen a few lines for it. I have followed radio since 1923, but it was only while serving with the RAAF radar that I acquired a taste for what seems to be an increasingly popular radio activity, namely, quality amplifiers. I have built Williamson's Feedback Amplifier, using friend Swales' transformer and chokes, and while I have yet to acquire a hi-fi pick-up, results from it are most pleasing. Bass boost has been obtained by the fitting of a .05 condenser in the feedback loop, and it was while experimenting with this boost that the possibilities of using the feedback system for volume expansion occurred to me. I have seen little of expansion, but every system seems to be blamed for excessive distortion, so wondered what the 'slide-rule boys' could do in the way of using a variable resistor in the feedback loop, and controlling its resistance with the aid of rectified audio as per existing systems. Principal stumbling block that I forsee is the degree to which such a resistor would favour the positive portion of the audio cycle, especially where amplitudes are high, as in 500 ohm outputs, but will leave the idea and the stumbling blocks to the design chiefs."—Frank Bound, 21 Leahy Street, Nhill, Vic.

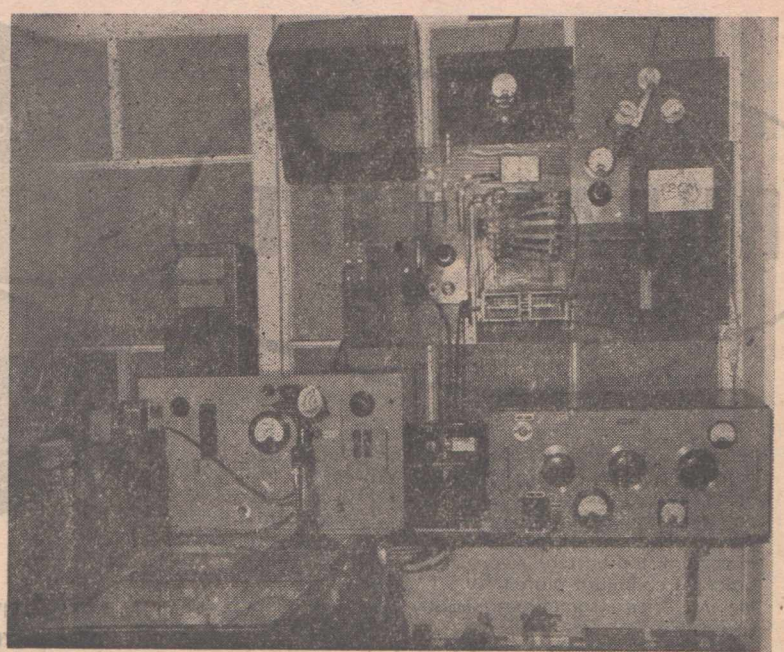
* * *

"Construction is ruled out for the next eight months, but after that I hope to get at the 807 amplifier with a Ferrotune tuner. We have a couple of radiograms up here, but I fear that high-fidelity does not apply to them. They have high notes, but sounds like 15% third harmonic distortion.

Any information re co-axial speakers by Australian manufacturers would be interesting. Jensen have one in America for 30 dollars. Many thanks for the only genuinely technical radio magazine."—B. C. Hann, Mildura Branch, University of Melbourne, Mildura, Vic.

"The first set I had a shot at was "Little Companion" but when I finished the set I could only get a hum from the speaker. A visit to Mr. McGrath put things right, and now I have a fine radio without which I would be lost. Now I am trying to make up my own home recording set-up. Everything is too dear for me, so I try to make it myself. I am a traffic clerk with a well-known airline, on shift work. I decided that to fill my spare time I would take up radio as a hobby. About Radio World though, I like it all. Everything in it is interesting to me. The only improvement I could suggest is to publish a section for the younger chaps, who know only a little about circuits, diagrams and technical terms. I myself find it hard to understand a circuit and generally take a week or so to fathom things out."—Keith Sharp, 3 Normanby Road, Caulfield, Vic.

"I received the consignment of back numbers the other day, and up to date all my good wife has done is to growl that she can't get my nose out of them. I was working before the war as a radio serviceman, but on discharge took to driving a tram. As usual though, once bitten by the radio bug one never seems to get cured of it and I am no exception. I still do a bit of service work from the much - maligned under - the - house shop. Between the daily work and trying to get materials and whatnots for a new house, to say nothing of keeping a couple of future radio enthusiasts (maybe) out of mischief, I don't get much time for that. Now and again I put in a bit of time building up any weird and wonderful circuit I come across just to see if it will work. I think that Paul Stevens is on his own for explaining technical points in non-technical terms and I hope we see a lot more of his articles."—E. L. Stevens, Trundle Street, Coorparoo, Queensland.



Among our subscribers we have many prominent amateurs, including Charles Maclurcan, managing director of the Wentworth Hotel, Sydney. One of Mr. Maclurcan's hobbies is ice skating; another is sailing, but he also finds time to operate VK2CM, pictured here.

EFFECTIVE STATIC REDUCTION

How to Deal With Interference from Electrical Appliances

"STATIC" interference can be divided into two distinctly different kinds: The man made variety, which can be completely eliminated and the one provided by Mother Nature, which, with our present scientific means, we can only reduce to a certain degree but cannot

By

PAUL STEVENS

21 Fletcher's Avenue

Bondi

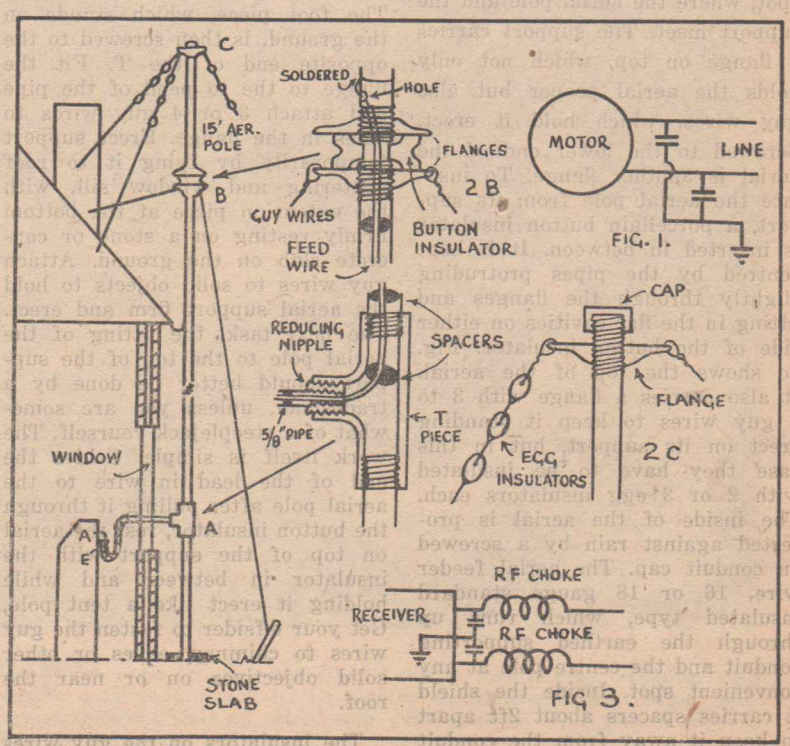
get rid of altogether. It is however the man made static, which reaches sufficient energy to interfere even with local reception and by eliminating it we would practically achieve all that could be wished for regarding static free reception of reasonably strong transmitters within a radius of about 30 miles. Electrical discharges in the atmosphere, the real static, becomes troublesome only in the reception of remoter stations and only in the rare case of a thunderstorm will interfere with the locals. I will therefore in this article concentrate more on the real culprit, the man made interference.

Anyone who has ever listened to a radio with a good outside aerial in a country location far away from any noise providing electrical apparatus, will realise, how wonderfully clear radio reception can be. In residential areas of a city we may get those conditions too, but mostly there are always some sort of "trouble makers" in the electric wiring of your own or nearby homes, which marr the reception. These trouble makers are, contrary to general belief, more wiring faults or loose connections and contacts than normal working machinery. If your own or the neighbours' vacuum cleaner causes the well known continuous row in your radio, it is because it is not in proper condition. But as most vac. cleaners and other high speed commutator motors, such as small sewing machine motors, mixers, electric fans etc. are only in proper condition while they are still new, it is best to "decontaminate" them by means of two condensers as shown in fig. 1. It is a cheap and effective method and legislation in many overseas countries compels manufacturers to include them in their original equipment or else forces owners of interfering appliances to install these condensers at their own cost, which is only a few shillings anyhow. Similar legislation in Australia would certainly be of great benefit.

As for defects in the house wiring, which cause the well known irregular, but persistant loud crashes and crackling, the location of the trouble spot is far more difficult. You cannot get the electrician to take your place to pieces every time the radio makes a noise (I don't mean Spike Jones) only to find out, that the offending loose connection must be in one of the neighbours' wirings, over which you have no control.

The best thing here is to use an anti-static aerial, which not only removes all man made static, but also gives all the reception advantages of a high outside aerial, if properly designed. The principle is simple: An aerial located high up outside the reach of man made interference, with a shielded lead in wire. Fig. 2 shows the general lay out of a very effective type, which is easy to make out of standard electricians wiring components. Shield and aerial are made of screwed conduit pipe, at least 1½" thick and cadmium plated to make it rust proof, or water pipe. The lead in is the usual 16 or18 gauge wire, which is used for installation work. The lower part of

(Continued on next page)



(Continued)

the conduit, which serves as grounded shield and aerial support, runs from the window nearest the radio set up past the roof guttering as high as practicable and is then followed by another length of vertical screwed conduit or water pipe of 10 or 15 feet length, which is insulated from the lower and is the aerial proper. Both shield-support and aerial pole are held rigid by guy wires on as many spots as necessary. The other standard parts used in the rectiaon of the aerial are shown in fig. 2a, b, c, 2a shows the point, where the aerial leaves the window. As this part has to take the full weight, it must be well supported. In cottages or ground floor flats, an extension of the conduit to a stone slab on the ground is a good solution. As shown in fig. 2a, a T piece is used to fit the 3 branches of pipes together. fig. 2b shows the spot, where the aerial pole and the support meet. The support carries a flange on top, which not only holds the aerial proper but also guy wires, which hold it erect. Screwed to the lower end of the aerial is another flange. To insulate the aerial pole from its support, a porcellain button insulator is inserted in between. It is kept centred by the pipes protruding slightly through the flanges and fitting in the flat cavities on either side of the button insulator. Fig. 2c shows the top of the aerial. It also carries a flange with 3 to 4 guy wires to keep it standing erect on its support, but in this case they have to be insulated with 2 or 3 egg insulators each. The inside of the aerial is protected against rain by a screwed on conduit cap. The aerial feeder wire, 16 or 18 gauge standard insulated type, which runs up through the earthed supporting conduit and the centre pole at any convenient spot. Inside the shield it carries spacers about 2ft apart to keep it away from the conduit wall and thus reduce capacity losses to a negligible figure. The spacers, which can be made of any available lot of porcellain, glass or plastic rolls or disks are held in place by adhesive tape. Their overall diameter, including tape, should be about ⅛" less than the inside of the conduit or water pipe to ensure easy pulling through of the wire. If black tape is used, it should be thoroughly rubbed with plaster or talcum powder before pulling the wire through, to take the stickiness out of it and make it slide easily through the pipe.

Assembly

The assembly is a simple job any handyman can do. First measure out the lengths required, buy what you need in any warehouse and cut it to size with a hacksaw. Get the conduit threaded by your local electrician or plumber. There are special couplings on the market to screw two lengths of conduit together, elbows, T-pieces, flanges etc. Assemble the straight part of the aerial support, pull the wire through it (after putting the spacers on) and in right angles through the T-piece, which can then be screwed to the bottom end. The foot piece, which stands on the ground, is then screwed to the opposite end of the T. Fit the flange to the to pend of the pipe and attach 3 or 4 guy wires to holes in the flange. Erect support temporarily by tying it to roof guttering and window sill, with the extension piece at the bottom firmly resting on a stone or concrete slab on the ground. Attach guy wires to solid objects to hold the aerial support firm and erect. The next task, the fitting of the aerial pole to the top of the support should better be done by a tradesman, unless you are somewhat of a steeplejack yourself. The work itself is simple. Solder the end of the lead in wire to the aerial pole after pulling it through the button insulator, rest the aerial on top of the support with the insulator in between and while holding it erect like a tent pole, Get your offsider to fasten the guy wires to chimney, eaves or other solid objectives on or near the roof.

The insulators on the guy wires should be close to the top of the aerial, the wires themeslves can be 7 strand earth wire, made of 20 or 22 gauge copper strands. A few long poles with forks on the end are very handy to hold the aerial up before the guy wires are tied into position. This achieved without broken bones or necks, the main work is done.

We now have to fit the reduction nipples—also commercially available—to the T piece, where the feeder wire emerges at the bottom, to reduce the thickness to ⅝". We then drill a ⅝" hole through the window frame, push a piece of conduit through and screw it into the reduction nipple. Flexible conduit, a sort of spiral affair like a vacuum cleaner hose, then shields the lead in wire between the window and the receiver, where it is connected to the earth terminal of the set, while the wire naturally goes to the aerial terminal. The spacers inside the ⅝" conduits, now only 3-4" apart, can be fashioned simply out of thick bandages of adhesive tape. Connect the wire to the aerial support by means of an earth clip or better soldering and run it to the nearest water pipe, where an earth clip has to serve as connection, as you cannot solder a pipe with water in it.

Low Capacity Loss

You now have a first class aerial for static free reception that would not cost you more than £5. Its capacity losses are far lower than these of any other shielded system on the market and it is therefore also suitable for short wave reception.

But there remains still the very real danger of getting all the man made static into the receiver by the back door, the power line. Most people are using the power line instead of an earth connection and can be readily understood, that any noise voltage created in this rough and ready "earth wire" must necessarily find its way into the receiver. In our case most of it will be bypassed by the earthing of the shielded aerial system, but the coupling to the power line through the stray capacities of the power transformer still exists and thus a certain amount gets through. To prevent this, we have to install a line filter as in fig. 3.

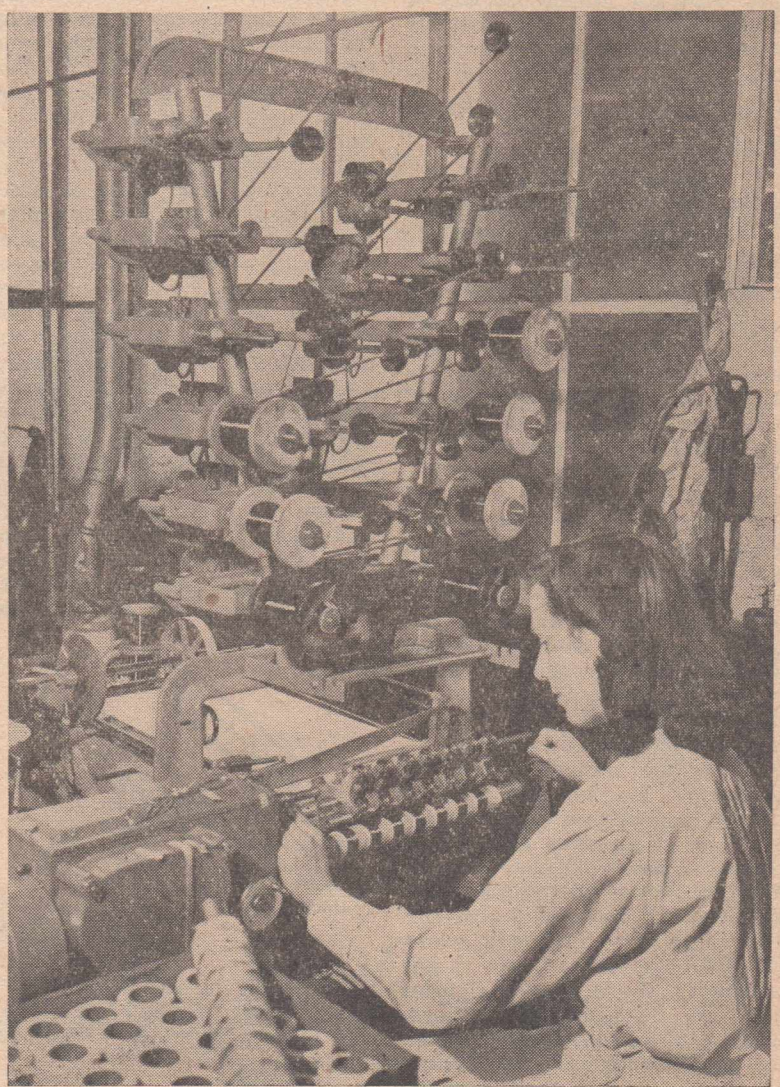
It simply consists of two RF chokes wound on heavy gauge wire to allow the receivers operating current to pass without undue heating and voltage loss. On the receiver side can be two condensers from either side of the line to earth, but this is seldom necessary. Our receiver should now be practically free from man made static, the reception being equal to a quiet country area. As this sort of interference is mostly propagated along the electric wiring without much radiation, the success of the job depends mainly upon the heighth to which the shield-aerial support extends. The vertical aerial pole also does not pick up much inducted noise energy from the usually horizontal house wiring.

Remains still the natural static or "atmospherics" to be dealt with. These hissing or crackling noises reach annoying proportions only when there is "a storm in the air," but interfere with local reception very seldom. For country or interstate reception however it sometimes becomes a serious problem. The line of attack against it is at the same time the way to improve the telereception-qualities of receivers. The higher the selectivity, the narrower the band width, the less static of any description will get through. In the December 1947 issue of the 'Radio World' I described a 5 and 6 valve receiver using RF stages and 175 KC flat top IF for 10 KC band width, which avoids the attenuation of high notes usually encountered with the standard pointed IF curves, in better of its better selectivity. Apart from the advantage of being able to separate stations only 10 KC apart, we also get a much reduced noise level.

This is as far as we can go towards interference free reception, and it is the biggest part of the road. Commercial interests however have decided on a different, to them far more profitable and to the public far more expensive way to achieve the aim of interference free reception, namely Frequency Modulation. Against the disadvantage of expensive receivers and very limited range, FM has the advantage of freedom from interference. However as FM is limited to local reception, this advantage is greatly reduced, as we hardly get much interference on local stations anyhow, even without shielded aerial systems and line filters in most locations. A complete switch over to FM would seriously handicap anybody who does not live within 30 miles of a number of FM stations with no hills or big masses of buildings in between. FM would be o.k. alongside AM as additionau service, but the "switch to FM" project in my opinion, stinks. The only ones profiting from it would be radio manufacturers, who would unload a lot of new receivers on to a victimised public' who would be forced to buy them or be without radio, and a lot of new broadcasting station operators, who'd make big profits from advertising.

FM adaptors, which enable the use of our present sets on FM, take the only advantage of it, the freedom from static, away, as they have not got the "limiter stage," in which interference is suppressed.

ENGLISH FACTORIES BUSY



The British radio industry has decided not to hold a radio exhibition this year in order that manufacturers may concentrate upon their export programme which is forging ahead with great success. This picture shows a Douglas automatic coil winder in operation at the E.M.I. factory in Middlesex.

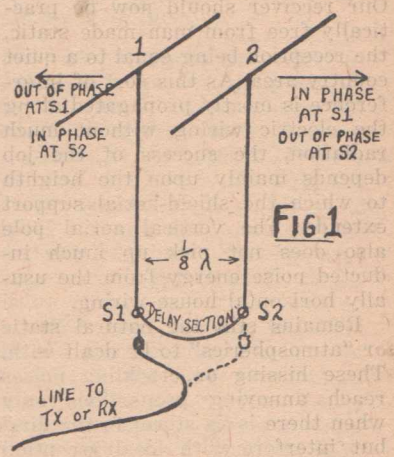
The "VK2NO" Ribbon Beam

Designed for the 14 m.c. Amateur Band

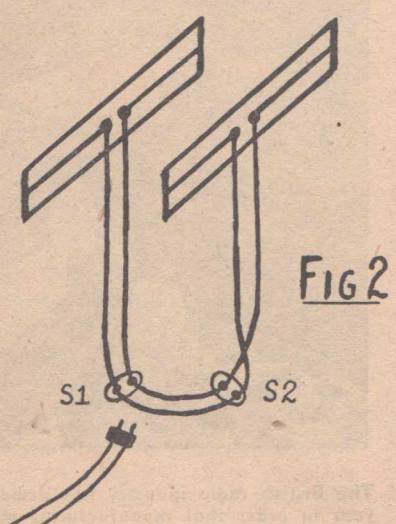
By
DON B. KNOCK
(Transmission Dept., Philips Electrical Industries of Australia Pty. Ltd.)

DX communication on any amateur band is characterised by a continual striving for higher efficiency on the part of the man who makes DX his primary objective. Despite the presence of transmitting equipment in the shack that will do just what the Handbooks say it should, such equipment is virtually wasted if used in conjunction with any old piece of wire for an antenna. Prior to the Big Shut-down in 1939, elaborate rotary beam arrays were in the minority in Australia. In the Sydney area there were one or two, but nine times out of ten it was a case of the Windom, or Zepp. Competition too, wasn't by any means so acute, and the man chasing DX knew he had about an even chance of working it along with most others. Such is not the case today; techniques have progressed, mainly under the impetus of wartime development, and progress means something better in the way of radiating systems than haphazard lengths of wire with indifferent feed systems.

Every other station in the DX picture of 14 (and 28) Mc/s is the proud possessor of some form or other of directive array. Furthermore, most of the post-war beam creations are rotatable by electrical and/or mechanical means. The single wire man still works his DX, but not by any means constantly. He is labouring under a severe handicap. Not all aspirants to beam arrays can put into practice their pipe-dreams; timber for towers isn't easy to come by, and if it is available, it is extremely expensive in most city suburban areas. Space limitations of the average garden plot militate against plans also; for it often turns out that the man who does put up a high and well braced tower with a rotary thereon, develops into a "one band man." Eveything in his own amateur radio centres around that beam. It may start off with a simple two element affair for "twenty," but after a few months it usually grows a three element array atop that for "ten," and might even sprout a version for "six." There are structural difficulties also about a well elevated rotary that call for a lot of arduous pruning and adjustment to get the array (or arrays) tuned up to satisfaction. Even with a cat-walk platform atop a solid telephone polee or tower, a fall from 50 feet or so up can be an unpleasant affair, even on to a grass lawn. Which thought of course won't deter the keen DX man. The rotary has the vast advantage of being speedily directable where wanted, but there are stations to whom DX only in one or two preferred directions is important. Take Europe for instance. Communication with G's and others in the European scene calls for consideration of directivity in two alternatives; North West for the short route in the early mornings here, and South East for the long route during our late afternoon's. Such requirements can be taken care of rather nicely by a form of fixed bi-directional beam such as the ever-popular W8JK type. But here is a catch, and that is during conditions of "short skip." Unwanted stations on the "back-side" of the bi-directional beam produce oft-times terrific signals that smear over the DX on the other side. It can happen when working G's in the early morn in Eastern Australia that ZL's cut big holes in the band thus. It goes without saying that the ZL's experience heavy QRM from VK's similarly. A fixed beam of simple nature is easy enough to sling between two poles. Instead of the W8JK type it can be a radiator with director or reflector. That also is something of a handicap for the reason that it is fully usable only in the one direction, and is wasted for a large portion of the 24 hours. One scheme is to construct a "flop-over" array, in which end spreaders are supported off centre, so that a pull on ropes at each end "flops" the parasitic



Illustrating the principle of the reversible beam as outlined originally by G8PO. The principle applies similarly in the "Ribbon-Beam," the difference being in the method of construction and feed.



Showing the reversible beam idea as applied with 300-ohm feedline.

around and over the radiator to the other side. It means going outside to do that, and it isn't convenient in the dark, or in inclement weather. For many moons a quest has been under way at VK2NO for a reasonably small fixed array to take full advantage of the two European directions, but with some form of controllable directivity. The answer was provided by an active G amateur.

The "G8PO Special" System

Followers of European DX conditions on the 14 Mc/s band will recall that throughout 1947, one of the most consistently strong British stations to be heard in Eastern Australia was that of G8PO, owned and operated by Lt. Commander Ted Ironmonger, RN from Putney, London. Protracted tests were made in conjunction with VK's at the Putney location, until the final version of this remarkably simple but effective array was developed. It was described in detail by G8PO in R.S.G.B. Bulletin, and due acknowledgement is made to his description for the idea resulting in the construction of this 'Ribbon-Beam." G8PO, is by the way, at present attached to the R.A.N. in Australia. The fundamental idea of the G8PO Special Beam is illustrated in Figure 1. Physically the lay-out consists of two half-wave radiators, supported on spreaders, spaced an eighth wave apart, and fed at the centre of each by coaxial cable. These feedlines may not appear to be critical as to length, but should be an even multiple of a quarter-wave, in order to keep standing waves out of the "shack." At the end of these equal lengths of feedline, which are arranged inside, an extra length is connected to join one to the other. This length is equal roughly to the spacing between the dipoles, which is an eighth-wave as shown. Henceforth this extra length of cable is referred to as the "Delay Section." Where the delay section joins the ends of the feeders, a two-pin socket is connected across the line. Thus there are two sockets, marked S1 and S2 respectively. Note carefully that the two dipoles are connected in parallel; that is, the left hand side of No 1 connects to the left hand side of No. 2, through the feedline, and vice versa. This

(Continued on next page)

RIBBON-BEAM

(Continued)

sequence of connection is vitally important to the functioning of the array. The two dipoles are connected for In Phase and not Out of Phase feeding. A length of similar feedline is used to transfer the output from the transmitter, or input to the receiver, from S1 to S2 as required.

G8PO recommends that it should be an even number of quarter-waves similarly to the feeders. Assume now that the transmitter plug is placed in socket S1, to the left. RF will arrive at the two dipoles, 1 and 2. Consider energy leaving dipole 2 and travelling to No. 1; it arrives 90 degrees out of phase with the energy leaving No. 1 because of a 45 degree delay in transit from No 2 to No. 1. Thus horizontal radiation to the left is correspondingly reduced for the reason that No. 1 dipole is functioning as a driven reflector.

In the vertical direction, upwards from the array, radiation is 45 degrees out of phase and thus there is a tendency to concentrate the energy at a low vertical angle, and in one direction. Reversal of the action is obtained simply by transferring the plug from S1 to S2, when, for the same reasons outlined, concentrated energy is to the left, or from No. 1 Dipole side of the array. Note that the dipole with the longest feeder, is always the radiator and the dipole with the shortest feeder is always the driven reflector.

It is interesting to note that G8PO hit upon the action of this type array originally by accident. An intended 8JK type system was under test with coaxial feedlines, and one feeder happened to be about an eighth of a wave longer than the other. Measurements were made and the idea for the G8PO Special system developed therefrom.

Twin-Lead Construction

Reference to Figure 2 shows the application of the Folded Dipole principle for the construction of the radiators in an array of the G8PO type, also the use of 300 ohm twin lead or "ribbon" for the feedlines. In place of the plain radiators shown in Figure 1, two three-element Folded Dipole radiators are arranged similarly. The reason for the 3 element radiators will be apparent. Depending upon conductor size and spacing, the impedance at the feedpoint of such a half-wave radiator may be in the vicinity of 650 ohms. This impedance may be raised by adding conductors in parallel Because of the close proximity to each other of the half-wave radiators there will be a considerable reduction in centre impedance, so much so that coaxial cable of the 72 ohm variety may be applied as the feedline as for the G8PO arrangement. There is obviously some mismatch in G8PO's array because of the close spaced radiators, but in actual practice results were so good that the array was left as constructed. On this basis that some mismatch could be tolerated, the Folded Dipole scheme was tried at VK2NO, using 3 elements to each dipole as diagrammed.

Open wire spacing was not used, mainly because of weight consideration on existing light poles, and a method of utilising 300 ohm twinlead as the actual radiator was substituted. It is desirable to emphasise at this stage that higher efficiency will be obtained with the spaced conductor form of Folded Dipole than with the ribbon. The "Ribbon-Beam" is the result of a need for extreme lightness in the construction of the array, but has proved to be an excellent method.

Many Australian amateurs are using with considerable success, antennas of the Folded Dipole variety in which the radiator itself is also made up of the same material as the Telcon K25 Twin-lead. The usual half-wave formula is applicable in working out a resonant length for a determined frequency, and with the Folded Dipole scheme there is the advantage that the radiator is responsive over a wide frequency range. Thus a radiator cut for the centre of the 14 Mc/s band is fully effective 100 Kc/s either way. In using the ribbon radiator, the length is cut as required, and the conductors soldered together at each end. This makes an elongated loop of wire. One conductor is cut at the centre of its length, and the feedline, of the same material, soldered thereto at that point.

It is advisable to fit a T shaped splint of Polystrene behind the joint, and to tape this with the sticky poly-tape available at most stationer's shops. Otherwise the wire somewhere near the soldered joints will break with continual flexing of the material in the windy weather. Also, it is important to provide some form of solid anchorage at the ends of the radiator. The writer's method is to cut small brass plates and to drill two small holes at the spacing of the conductors, loop the wires through and solder them securely. Another hole is drilled in the plate for the insertion of binding to an insulator. The brass plates of course, form the closed metallic loop between the conductors to make the Folded Dipole radiator. In order to raise the impedance of the Folded Dipole radiators for the "Ribbon-Beam," a third wire was added very simply to the material Reference to Figure 3 shows how it is done A strip of Polystrene the width of the ribbon and about 2 inches long, is drilled to take two 5 BA screws spaced half an inch. These are locked up with nuts and to the heads at the back are soldered two lengths of insulated stranded flex such as Belden wiring material These lengths are stretched out to the ends of the Twinlead radiator and are soldered to the brass plates through a centre anchoring hole as shown. The extra wire is then bound with

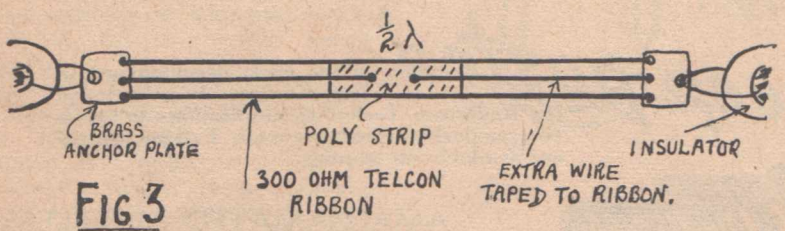


FIG 3

Showing the method of utilising lengths of 300-ohm twin-lead to make up three-wire folded dipole radiators. Constructional details are given in the text.

(Continued on page 38)

CALLING CQ!

By Don B. Knock, VK2NO

LOOK out for some of those moulded by-pass condensers in one series of the ever-popular BC348 Receiver, ex US Sig Corps Disposals. They "aint what they looks." After a period of breakdown of such condensers, one user of a BC348 broke a condenser open for examination. It was found to consist merely of wrapped paper and tinfoil in a moulded case plus pig-tails. Working voltage is in the vicinity of 200, which doesn't leave much margin. An ex-US Army Colonel tells us that at one stage the Intelligence people traced the presence of such faulty items in equipment to undercover enemy agents working on the production lines. Could be.

* * *

The boys for whom bands such as 166 mC/s have the appeal of compactness of gear should be attracted to 400 mC/s when that time comes. Just imagine, a beam array with lots of gain is virtually a yardstick! A half-wave dipole for 420 mC/s is only 12½ inches long and a reflector inches. A quarter-wave matching section is about 6¾ inches long and spacing between elements 5⅜ inches. This will be a handy band for a lot of fun in the portable-mobile field but don't get ideas about crystal control and superhets thereon. This is where the "rush-box" and "mod osc" will be kings in their own domain!

* * *

What is probably the record for extended-local range working on 6 metres in this country was established recently when VK2GU of Canberra worked with VK2ADT of Cessnock, a distance of about 270 miles. There were many instances of "signals heard" at similar distances on 5 metres pre-war, but never any two-way communication. Outstanding station in this post-war work have been VK's 2GU Canberra, 2TA Young, 2TC also of Young, 2PN Tumut, 2BZ Newcastle, 2ADT Cessnock, and 2JU Sydney. Recently also VK2NO has been able to work with VK2KQ of Toronto on Lake Macquarie; quite a difficult path for a ground-wave signal to traverse.

* * *

Amateurs wanting to make the most of VHF's should acquire a couple or so of the handy type 834 valves offered now by the Philips people at £1/8/9 with 10% discount to AOCP holders. Another excellent valve is the 830 B . . . a sturdy Class B Modulator type at £1/2/3. The 834 is good for frequencies up to 350 mC/s and thereby is a proposition to bear in mind for 420 mC/s at reduced input. It has a 7½ volt filament and the 830B is a 10 volt type. Philips have a limited number of 800's offering at the same figure as the 834.

* * *

Visitor to Sydney and your "Calling CQ" editor's shack has been the affable and portly person of Jim Herd, VK3JK, of Wangaratta, Victoria. Jim is a dental surgeon of long standing, but in be-

(Continued on next page)

THE ROUND-TABLE TERMITE

FOLLOWING is from the current issue (in Aust.) of "QST", and it goes without saying that the par might have been written with express consideration for the 7 Mc/s band in this country . . .

"This particular parasite, to reach its full bloated flowering, must attach itself to a live and going QSO. It does this simply by settling down on the frequency of yourself and your friend, and asking to be let in. Once this permission has been granted the Termite really goes to work. First, he takes full and complete charge of the QSO, that, presto-chango, has been converted into "our little old round table." He dictates the order of transmission, invites stations on adjacent channels to join you, and insists on standing by after each transmission to see "if someone else would not like to get into this thing. All of his transmissions—and they are frequent and lengthy—are taken up with his self-appointed master-of-ceremonies duties. He insists on briefing minutely each new sucker caught by the dragnet, as to membership, handles, QTH's, etc. Inasmuch as his frantic efforts to get more and more fellows on the frequency make it necessary for him to go through this rigmarole about every five minutes, this grows a trifle monotonous to you charter members.

What is worse, he will break in on any transmission to call a station within 15 kilocycles of the frequency that sounds like a possible recruit. Obviously, the important thing to him is simply to see how many stations can be rounded up on one frequency. What the fellows say once they are in the round table simply does not matter.

Do you know one of these?
John T. Fry, W9EGV.

Yes indeed John, we know of several.

2/4/48

HAM NOTES

(Continued)

tween professional demands on his time, managed to erect a snappy looking 14 Mc/s beam atop a windmill tower. He is a fine example of the old time amateur who is just as keen today on his hobby as ever; so much so that during a holiday jaunt to Sydney, he brought along a little ex-service portable TX, and had lots of contacts on 7 Mc/s therewith.

* * *

A point in the Philips valve book about the EF50. The remarks column says "control voltage applied to grid No. 3," which is meant to indicate that AVC may be applied to grid No. 3. The control grid, is of course, grid No. 1. Because of similar characteristics the double-ended VR65 (Mazda SP41) valve may be used with AVC applied to the suppressor grid.

"Looksee": One thing about television, it is never likely to become the over-ridden broadcasting horse that endures in many homes. Some loudspeakers blare all day long, with nobody really listening to anything. Music while you work is all very well in its way, but it is not really a forceful medium for inspiration . . . most of the stuff is overdone. Television will not be in the same category as radio broadcasting, for the reason that concentration is essential.

* * *

"Raager": Those "Fone Band Funnies" of "QST" fame. Lord knows we seem to have 'em in VK too. Another title would be "Miniature Marconi's" or perhaps "Drivel Dispensers." Whatever the theme, their antics appear to arise from some form of frustration or inferiority complex. So they needs must take it out of the suffering microphone.

* * *

"Modus Operandi." How nice it would be if one could say that all is well with amateur methods of operating, but such Utopia is a pipe dream. Noticeable among the present spate of things that could well be done without are the following: The VFO station that shifts to several different frequencies in a band in the space of an equal number of minutes . . . the laziness of some who slur in the A in three letter callsigns, leading often to cases of mistaken identity . . . and the "smart alecs" with bug keys who shift the weights in and by reason of rhythmic brevity in a callsign bat out CQ's and callsigns in an imposing-sounding style, only to stutter and stumble over themselves as they get immersed in the text. "Copper plate" 'bug' operators aren't any too prolific.

VHF DOINGS

There is little or nothing to record in the shape of 50 Mc/s DX, and the feeling is that the band has "had it" in that respect. The slump should awaken us all to the realisation that 50 Mc/s is, anyway, a local cross-town band of outstanding attraction, relatively free from QRM, and at the moment, in the doldrums. One reason for lack of activity is the pending attention to the new 144 Mc/s band.

This band has replaced the old 166 Mc/s region and many VHF men have been making arrangements for direct use of gear like SCR522's replete with crystal-control operation. There are still those however, who prefer to "roll their own" so that not all the signals on 144 will originate from SCR522's. . . . Remember Les Page VK4LP, and lately VK2YQ? Now he is VK3TH . . . is out of the RAAF and blossomed forth in the Mont Albert suburb of Melbourne as a radio dealer. Good luck OM, bet it won't be long before the VK3'c hear you on Six. . . . Those 50 Mc/s permits for the G's . . . they expire on April 30, "so it looks as if we've had it, unless something happens in the next few weeks" says G6FO. . . . Early in April a few VK5's broke through to Sydney one late evening and VK2LY of Katoomba got in among them. There seems to be little attraction now in such interstate contacts . . . the icing seems to be off the cake, but at the back of all 50 Mc/s minds is the feeling that Sporadic E or something treated us all shabbily so far as Westralia is concerned. No contact has been recorded, and the chances look very slim.

EXPERIMENTAL RADIO SOCIETY OF N.S.W.

President R. A. Blades (VK2VP) 4 Service Ave., Ashfield. Hon. Secretary, W. Hayes, 34 Nicholson St., Chatswood.

The recent Field Day held at Como was a semi-"washout" owing to torrential rain throughout the afternoon. Calls used on 7 Mc/s and 166 Mc/s were VK's 2LR, 2AGL, 2VP, and 2YE but the intention to run 166 Mc/s tests from a launch further up the river was not realised because of the bad weather. The resignation from the club of Rev. Kennedy, VK2WK, owing to ill health is announced with regret. Results of a contest to be run in conjunction with the BERU should be available in the near future. Jess Carter, VK2QC, popular dealer of the "Ham Mart" is donating a prize for the receiver section in the shape of quite a few valves.

HAM NOTES

(Continued)

"DBK." It seems that the genus Old Timer is somewhat of the same breed as the old soldier who "merely fades away," for many OT's after years of absence and apparent lack of interest in the hobby, undergo a process of rejuvenation. How things strike them by comparison to the peacefully quiet conditions of long ago is another matter. Returned to the air in the Sydney area is none other than Alec Marshall, VK2HM, who is to be heard on 14 Mc/s CW steadily batting out CQ's. Old 2HM will be remembered by amateurs of the early 1920's as being active in Armidale, N.S.W., what time "200 metres" was all the rage. Later, he came to Sydney, and did quite a bit on the long lost "32 metre band;" he and OA2NO oft-times worked each other over the back fence with 'loop modulation' forsooth, which was forgivable at that stage of things. So far, Alec hasn't been heard on phone in this ultra-modern era, but sooner or later . . . one wouldn't be surprised!

* * *

PICTURE FROM ENGLAND

Ken McTaggart (ex VK3NW) writes . . . from Cambridge . . "I find a little time for Ham radio, and since Xmas have worked quite a number of VK's 3YP, 3XU, 3BZ, 3CZ, 3AIG, 7YL, 7LZ, 5BZ, 4EL, and 4JU. All this has been on 14 mC/s CW, as conditions haven't been good enough for phone. I entered the "Short Wave Magazine" 5 metre Test and there again conditions weren't the best. Nobody in this area heard signals further than 60-70 miles. I have worked G2XC a few times but not during this Test. I did hear G6FO weakly, but couldn't raise him. Altogether I contacted 25 different stations . . . heard 30 . . . and made 57 QSO's. It was fun, but would have been more interesting if distant stations had been audible. The boys up North must have had a dull time. I used a rotary dipole with 21 watts to an 832; the full line-up being 6V6 tripler from 9.8 mC/s—(which by the way, seems to dodge Television interference. Those with 7 mC/s crystals give TV Lookers trouble for miles around here where the TV signal is not over strong)—807 doubler and 832 P.A. Work was on CW mainly and it is quite remarkable in that respect, nearly all 5 metre work here being CW. I have acquired a BC342 receiver which cost £15 complete with LS and phones. It is a good performer now that I have done the QST modifications, but the crystal filter is not so good. One can buy almost new AR88's and SX28's for £40-50. Recently I got two R1147 receivers. They have nice butterfly tuning condensers with slow motion dial, and cover 180-220 mC/s. They are easily converted for either 144 mC/s or 235 mC/s. The price is 30/- each. There is another type at £2/5/- with a quantity of EF50's therein. The boys who got 50 mC/s permits here have had plenty of fun working W's and VE's, but there has been some strife over the permits. Seemed to be a case of who, and not what one knew! You haven't heard anything if you think the 7 mC/s band is congested in Australia. Here it is completely occupied by commercials in the evenings. It is shared, but they blast all over it at S9 and amateurs give up the unequal battle around 7 p.m. On 14 mC/s you wouldn't credit the number of awful signals from Europe. TNT's TPTG's and the like abound with AC on the plates . . . just terrific . . . with phone in the CW band and "appelle generale" for hours on end. The worst kind of VFO's woosh up and down the band with full power. I shall be glad to get back to peace and quiet some day . . .

73 Ken. G3CUA.

* * *

A type of coaxial relay-switch has been available lately in some types of ex-Radar gear. Noticed an advertisement in an American technical publication for a de-luxe gadget of this breed. It is a 6 position switch for use with RG-8/U cable, remotely operated by a 110 volt AC motor built into the assembly. There are position-indicating miniature lights to show which position of the switch is in use. A handy kind of thing for the lad who wants to switch in a few arrays for different bands from a band-switching transmitter. Truly a far cry from the hand-operated station of a few years ago, with DPDT knife switches scattered around the shack!

* * *

Here is something for the benefit of the 6 metre men who hope that even a QSO with Europe may eventuate—a list of British Air Beacons with call signs and frequencies.

They are:—

HN, 33.6 mcs; FD, 34.2; WA, 34.6; BK, 34.8; PI, 36.2; LA, 36.4; GN, 37.2; FU, 37.6; CA, 38.8; LT, 39.6.

If any G reader of "ARW" cares to drop along the information as to just where in the Old Country these Beacons are situated, the incentive to listen for them will be even greater. It is suggested that at the times the 28 m/Cs band may be wide open for nightly G contacts during the imminent season, a check on the Beacon frequencies may be of interest as indicating the degree of MUF in direction Europe-Wards.

DX ON "FORTY"

I have been on 7 M/c for the last three months, having previously been exclusively on 14 M/c, and during that time have found the DX possibilities of the 7 M/c band very promising. With a transmitter comprising a 6J7 e.c.o. driving a 807 I have worked the following:—191 W's including, 34 on Sunday 15th during the W/VE contest. G, F, ON, J, V52, VS3, VR2, J9, KH, KG6, KS6, KL7, VE, CM, ZS, KM6, W, VK, ZL.

The power used is 35 watts and the antenna is a ½ wave semi-vertical "Windom." It is hardly necessary to say that with the QRM a crystal in the receiver is a necessity, but it shows that the old 40-metre band still has its possibilities.

I heard a LU8 last evening at 6.30 p.m., so I am keeping a look out for him for that 7 M/c W.A.C. The "G's" come through very well of an early morning and a few can be worked about dusk, notably G6CJ and G2JT, it seems a pity a few more of the boys don't get up early now and then and give the band a bit of a lift along. You know what it used to be like in the old days of 1927, eh!

E. G. (Ted) Cawthron (VK5JE).

(Continued)

poly tape at intervals of about 12 inches along the radiator. The two 5 BA screws are the connectors for the 300 ohm feedline. It was found with the array made up on these lines, that the standing wave ratio along the lines did not appear to be excessive, and that plenty of RF was reaching the radiators. No impedance measurements have been made up with the 3 element radiators made up in this fashion, but it is found that the array works, and very well indeed. Nevertheless, study of formulae regarding multi-element Folded Dipole construction will be a decided advantage to those intending to follow the usual spaced element type of radiator. With the array made up of the ribbon material as indicated, and arranged on three light bamboo spreaders, one at each end, and one in the centre to maintain spacing, the whole affair is amazingly light and offers very little wind resistance. As such it lends itself nicely to average suburban garden application where the user must often of necessity make use of short poles arranged on chimneys and suchlike. With a heavier affair dragging at lightly stayed supports, there is always an uncomfortable feeling extant during high winds. In the writers array, the length of the feedlines happens to fall at 40 feet from radiator to the sockets, which are inside the shack on the wall, together with the delay section of line. Eighth wave spacing is suggested between the dipoles, but this may be varied as desired. The spreaders used in the VK2NO array are 8 feet 6 inches in length. The array is arranged so that it is firing approximately North West or South East and at that positioning it takes care nicely of communication with Britain and Europe over long and short Great Circle routes. Preliminary tests were made on reception, and the back to front discrimination on local signals is striking, although as would be expected, the cut-off is not equal to that of a well adjusted multi-element parasitic array. The line for transmitter coupling to either socket as required is coupled to the transmitter via a 3-turn swinging link coil, and no difficulty is experienced in loading the Final stage fully.

RESULTS

The first attempt at European communication was over the long route, when in answer to a call, an Italian responded with a Q5 S8 report. The most interesting report however, came the next morning over the short path when G8NY replied with a statement that the level showed "25 Db over the 9 on the HRO Meter" there. No "S" Meter was in use on the receiver at this end, but G8NY sounded like a local. Information from him revealed the interesting point that he was using the same type of array there, but with spaced conductor folded dipoles. Moreover, he has his system arranged for rotation. The latter consideration calls for simplicity in one respect. Rotation is necessary only over 50 degrees in order to secure 360 degree world coverage, because of the reversible directivity of the array.

Those Australians who worked with G8PO prior to his arrival in this country will remember the outstanding signal from his station. It is not claimed that this "ribbon-beam" is any more efficient that Commander Ironmonger's original—it is merely an adaption making use of a higher impedance line. It is an interesting scheme, and provides room for considerable experimentation. One suggestion is that the two radiators may be plain wires and fed in the delta-match method, with 300 ohm line feed as used in the array described here. Another is that two "inductively coupled" dipoles can be applied similarly and a variation of that idea would be a particularly compact array built on the lines of the "Shortened Beam," as described recently in the American publication "CQ." It is found that the weather does affect slightly the loading of the system in the case of this array as constructed entirely of the ribbon material. The cross section is conductive to the lodging of water in the channel between the conductors and thus causes a change in capacity between them. There is no question of electrical leakage—the material is of polyethelene, and as such, an insulator par excellence. It is noted that the latest versions of 300 ohm twin lead material are extruded in oval shape, so that the insulation between conductors is thicker than at the wires. Water therefore will run off immediately

A tip from our American friends is useful, any tendency to wet weather variation in transmitter loading can be obviated by treating the line with wax-base car polish. Water will run into globules and be shed rapidly.

A final suggestion about rotation of an array of this kind: Many American amateurs had, in pre-war days, rotatable arrays of the W8JK type. The bidirectional feature calls for 90 degree movement. With an array of the G8-PO kind arranged for rotation, the 50 degree movement needed can be taken care of very simply by arranging a pull rope and return weight with stops. Length of the folded dipole radiators is in the instance of this beam, 32 feet overall, and this dimension is resonant over the lower frequency portion of the 14 mcs band. At the higher frequency end of the band, around 14.35 mcs, there is a considerable falling off in loading. For those interested in the controllable directivity feature of the arrangement, there is plenty of scope for experiment with the length of the delay section. As the ribbon beam stands, it can be considered as a first cousin to the "Twin Triplex" as described in "CQ," U.S.A., but in that array the directivity is in the two directions simultaneously, similarly to the W8JK beam.

Outstanding feature is the front to back discrimination of this G8PO scheme, and in that respect there is room for tests with varying lengths of feedline between radiators and delay section. 40 feet of the K25 300 ohm material seems to be a useful length to start off with, and this can be added to or reduced in length easily. It is not a difficult matter to join up lengths of the 300 ohm ribbon; in contrast to coaxial cable. But where joints are made, splints of polystyrene strip should be included as in the centre joint of the radiators.

Shortwave Review

CONDUCTED BY L. J. KEAST

NOTES FROM MY DIARY

Meet the Doctor

April was a very fortunate month for me as it enabled me to meet in person none other than Dr. Keith Gaden. I think Keith and I have corresponded for well over 14 years . . . maybe the Dr. can tell you the exact time, as his meticulous care for all things has made it so easy for him to log so many stations all over the world.

An avid reader of all things pertaining to Radio, a subscriber to almost every magazine that comes into this country, probably one of the most prolific correspondents, it is little wonder he has so many friends in the DX world.

Dr. Gaden was spending a vacation and on arrival in Sydney came out to my "little flat in a garden," which made him our very first footer, the last batch of cement being poured into the path by me as he stepped up it.

His stay in Sydney was all too short, and the dinner I had arranged for him to meet several of the "boys" had unfortunately to be cancelled to enable him to board his plane for Killarney.

On his arrival there he will pack his traps and make for Tambo, 125 miles from Charleville. There he will be domiciled and the lucky residents of that town will be kept in, or restored to, health by his skilful direction.

No. Seven

Yes, April was a lucky month for me, as on the 30th, with my good wife, I moved into my new home on which she and I have toiled—as time permitted—for just on a year. Built by us to our own design, it has so far stood up well to the christening it got from the heavens—May being ushered in in N.S.W. by torrential rains.

I am inclined to believe that reception here will be excellent and when Don Knock and I have finished the erection of my aerials, Arthur Cushen and Rex Gillett had better watch their step.

So all you good people who intend sending me reports—No. 7 Fitzgerald Road, please.

Thanks for Listening

Readers of these pages will remember how I have over a period of years hoped and prayed for a better service from Canada. For a good while now we have been getting this and for a "thank you" to Canada I received the following letter:

"Dear Mr. Keast,—During the past few months you have been kind enough to write us to let us know how our programmes are sounding down your way.

"Pressure of work has prevented me from writing earlier, so now I would like to pass on a very special 'thank you' from all of us associated with the Sunday broadcast.

"If at any time you would care to write us again please don't hesitate, as it gives us a tremendous thrill knowing that our programmes are being heard so well, and that the quality of the programmes is to your liking.

"Best wishes from Canada, and successful listening, — (Signed) Neville Friedlander, Pacific Unit, P.O. Box 7000, Station "H", Montreal, Quebec, April 19, 1948."

Congratulations

A note from Arthur Cushen tells me that Miss Blanche Spence of Crosley Corporation is now married, is Mrs. Blanche Underwood, but still with WLWO.

Congratulations, Mrs. Underwood, and delighted you are still with the old firm.

This lady has for years been sending me Crosley schedules (the latest appears in this issue) and, for I do not know how long now, WLW Radio News published by Press Dept. of Radio Station WLW. It is from that sheet I find what I am sure are those interesting bits about the players I print from time to time.

New Stations

RADIO MARIMBA, Guatemala, 6.22mc, 48.23m: Heard till 4.15 p.m. on Sundays. Has a news broadcast from 4-4.15. Signs with a marimba number. (As you can guess, this report comes from N.Z. and A.C. sends the information. This frequency, by the way, is that which for a long time was used by TG-2 of the same address, Guatemala City.—L.J.K.)

RADIO LIBRE, Guatemala, 6.325 mc, 47.47 m: Heard with Costa Rican war news to 4 p.m. on Sundays. This also reported by Arthur Cushen.

Schedules

Japan

JKC, Tokyo, 7.257 mc, 41.34m: 5.55 a.m.-midnight.

JKF, Toyko, 9.655mc, 31.08m: 5.55 a.m.-5.45 p.m.

JKF2, Toyko, 4.91mc, 61.09m: 5.55 p.m.-midnight.

JO9K, Tokyo, 9.55mc, 31.40m: 10 a.m.-noon; 2-3.20 p.m.

JKA, Toyko, 7.285mc, 41.18m: 6.55 a.m.-9 a.m.; 10.20-11 a.m.; 12.20-1 p.m.; 5.55-11.30 p.m.

JKG, Tokyo, 9.69mc, 30.96m: 6.55-9 a.m.; 10.20-11 a.m.; 12.20-1 p.m.

JKG2, Tokyo, 4.93mc, 60.95m: 5.55-11.30 p.m.

JVW, Tokyo, 15.225mc, 19.71 m: 8.50 a.m.-5.30 p.m.

JVW2, Tokyo, 9.505mc, 31.57 m: 5.55 p.m.-midnight.

JVW3, Tokyo, 15.235mc, 19.69 m: 8.50 a.m.-5.30 p.m.

JVW4, Tokyo, 9.56mc, 31.38m: 5.55 p.m.-midnight.

CROSLEY RADIO STATIONS, CINCINNATI

WLWK, 15.25mc, 19.67m: 3 a.m.-8 a.m.

WLWK, 17.80mc, 16.85m: 11 a.m.-1 p.m.

WLWO, 17.80mc, 16.85m: 3 a.m.-8 a.m.

WLWO, 11.79mc, 25.45m: 11 a.m.-1 p.m.

WLWL, 21.69mc, 13.83m: 2 a.m.-9.05 a.m.

WLWR, 15.35mc, 19.54m: 4 a.m.-8 a.m.

WLWR, 11.71mc, 25.60m*: 9 a.m.-3 p.m.

WLWR, 15.33mc, 19.57m: 9 a.m.-3 p.m.

WLWS, 21.65mc, 13.85m: 3 a.m.-6 a.m.

WLWS, 11.705mc, 25.63m: 6.15 a.m.-8 a.m.

WLWS, 6.08mc, 49.34m: 10 a.m.-3 p.m.

*From 10 a.m. on Sundays.

TRANSMISSIONS FROM SPAIN

Radio Nacional de Espana, Madrid, 9.368mc, 32.02m: French 4 a.m.; German 4.30 a.m.; Italian 4.45 a.m.; Portuguese 5 a.m.; Russian 5.20 a.m.; English 6 a.m.; Arabic 6.30 a.m.; Spanish 6.45-9 a.m.

Radio Falange de Alicante, 7.94 mc, 37.70m: 10 p.m.-12.30 a.m.; 5-9 a.m.

Radio Sue, Madrid, Edvic: 7.147 mc, 42m: 10.30 p.m.-2 a.m.; 4 a.m.-5.30 a.m.; 6.30-11.30 a.m.

Radio Falange de Cordoba, 7.042mc, 42.68m: 5-7 a.m.

Radio Falange de Oviedo, 7.13 mc, 42.07m: 9.12-10.30 p.m.; 4.45-9.30 a.m.

Radio Mediterraneo de Valencia, 7.035mc, 42.64m: 10 p.m.-1 a.m.; 5-9.30 a.m.

Radio Nacional de Espana en Malaga (EAJ9), 7.024mc, 42.70m: 11.30 p.m.-1.30 a.m.; 6-10.30 a.m.

Radio Falange de Valladolid, 7.006mc, 42.38m: 10.30 p.m.-midnight; 6-9 a.m.

Tetuan (Spanish Morocco), 6.067mc, 49.45m: 5.30-6 p.m.; 11.30 p.m.-1 a.m.; 4-9 a.m. (In Arabic 5-6 a.m.)

Radio Singapore, 6.77mc, 44.31 m: 5 p.m.-2.30 a.m.

Radio Singapore, 11.73mc, 25.575m: 5 p.m.-2.30 a.m.

Radio Singapore, 15.30mc, 19.61 m: 5 p.m.-2.30 a.m.

Radio Singapore, 9.69mc, 30.98 m: 8.30 p.m.-2.30 a.m.

XLRA, Hankow, 11.50mc, 26.08m: 9-10.15 a.m.; 8 p.m.-1.30 a.m.

HELP WANTED:

If you heard this one and know for certain who it was, please drop me a line as it has Arthur Cushen tricked. Here is what he says, "A powerful station heard in the first week of April (glad he does not say April 1) on 10.22mc. Broadcast was all in French and seemed to be a test. Time was 3 p.m. onwards till 5.50 p.m."

Another he wants more information on is: On same frequency at 6 a.m. Programme was all French —used a three-note identification signal. Only heard once and took it to be Radio Monaco. Have not heard them since.

SAYS WHO?

Arthur Cushen writes:

OAX4G, Lima, has moved from 6.405mc to 6.71mc. Signs at 2.30 p.m. with good signal and "Goodnight Melody."

OAX4V, 5.905mc, and OAX-4W, 9.38mc, signs at 2.28 p.m.; announces as "Radio America Lima."

XEBT, Mexico, 9.625mc, added an English news broadcast from 1.45-2 p.m. daily.

ZOY, Accra, 4.91mc, heard with news in English at 3.45 a.m.; signs at 4 o'clock. Signal is only fair. Better 60-metre transmitters are Johannesburg, 4.895mc, with news in Afrikaans at 6 a.m., and Lourenco Marques, 4.92mc (English), 4.82m (Portuguese).

HH2S, Haiti, announcing as "Radio Society Haiti Radiodifusion," 5.948mc, heard opening at 9.30 p.m., but morse is troublesome.

CKCS, Montreal, 15.32mc, and CKNC, 17.82mc, are broadcasting UN programmes from 1.30 p.m. daily except Monday. Strength is good.

Have heard Monte Carlo, 6.038 mc, and sent them a report.

LRS2, 11.97mc, is also reported.

Heard a Brazilian on 11.99mc which opens at 8.30 p.m. Has march, then goes into Portuguese-English lessons; gave time as 7.30 a.m., so presumed it was PRA8 or relay of same.

ZOY, Accra, 4.9mc, 61.25m, is heard with news at 3.45 a.m. Signs with National Anthem at 4 a.m.

HH2S, Port-au-Prince, Haiti, has fair signal. French-Spanish. Opens at 9.30 p.m.

RADIO MUNCHEN, Munich, opens at 3 p.m. and replaces A.F.N., which has ceased short-wave transmissions. Munich heard

in all German broadcasts except for period 2-8 a.m. when Voice of America uses transmitter. Address is: Office of Military Government Radio, Munich, Rundfunkplatz 1, Munich, Germany.

Radio Marimba, 6.22mc, and Radio Libre, 6.325mc, couple of new Guatemalans heard till 4 p.m. Sundays to add to the "radio war" against European countries with colonies in the Americas.

* * *

Rex Gillett, of Prospect, South Australia, writes:

Conditions here for the past several weeks have been far from satisfactory. However, rain again a few days ago made things O.K. for DX.

CS2WL returned to the air about the last week in February, according to advice from the station. A station believed to be CS2WL had been heard for several weeks here on 12.86mc. It proved to be CS-2WL. Best reception is about 7.30 a.m.

Radio Monte Carlo, Monaco, announces it is on the air on 6.035 mc. Announcements in English, French and Spanish have been heard. Reception reports are sought. Arne Skoog of Sweden states Monte Carlo is using a new 20 k.w. transmitter at the following times: 4.30-6.30 p.m.; 9-11 p.m.; 3.30-8.15 a.m. Signals here are very good at 7 a.m.

I am almost certain it is CQM-4, Bissau, Portuguese Guiana, I have been hearing taking the air at 7.30 a.m. Signals are only weak during a light musical programme on about 7.948mc. Language seems to be Portuguese. The station fades out after about 30 minutes. (It is quite possible you are hearing Bissau, Rex, as they are scheduled from 7.30-9 a.m. Most likely with the approach of winter the signals will stand up a little longer.—L.J.K.)

The Lourenco Marques station on 4.82mc leaves the air at 6.45 a.m. following programmes in Portuguese.

Miss Dorothy Sanderson writes that she has not been able to do much listening lately but has received some fine veries: Radio Indonesia, WGEX, for 9.67 and 17.78mc. Air-mail letters from XGOY, XURA and XIRA. Cards from HER5 and HEI5 for frequencies of 11.865 and 11.715mc. A letter and schedule from VUM2. (Miss Sanderson kindly ran me off a copy of XGOY and VUM2 which will appear in our next issue. —L.J.K.)

This is not a radio valve, but the new Mullard flash tube for photography. When a charge from a condenser is released through this tube it emits a brilliant flash of light, similar to that from the photo-flood bulbs which have been used by photographers in the past. The flash tube, unlike the photo-flood bulb, is good for thousands of exposures.

SHORTS

Rex Gillett has been adding to his already long list of wins by securing first prize in an interstate contest. He got 123 veries for a points total of 750, representing 52 countries.

I am sure I am echoing the sentiments of all the regular readers of these pages when I say how grieved we were to hear of the passing of Miss Sanderson's mother.

Despite being on the sick list for a couple of weeks, Ken Boord of West Virginia sends along his usual closely-typed air-mail sheet from "Radio News." Many of these will be found under "Says Who."

If you want a verie from Japan send your report to R. H. Niino, Vice-Chief of Liaison, Broadcasting Corp. of Japan, Tokyo. As well as verification letter, a copy of the report submitted and that which the station actually broadcast is forwarded.

RADIO INDONESIA advises: A 3 k.w. transmitter is operating beamed to Malaya, Australia, New Zealand, America, Europe and the Middle East and in the near future they hope to install a 100 k.w. transmitter.

Spain, as previously announced, is building four new 100 k.w. stations. Radio Nacional de Espana on Cuenca is closed for alterations.

The recent cyclonic storm in Adelaide blew in a window of Rex Gillett's sleep-out where he houses his radio gear, but fortunately neither the receivers nor the records were damaged.

"Command Performance," probably one of the best of the now many years old, regular items from "The Voice of America," which was dedicated to "the men over there," is still a great favourite and can be heard, and heard well, at 10.30 p.m. every Wednesday over KWIX on 11.86mc.

Mr. Ron Akersten of Auckland, N.Z., sends an air-mail and reports some fine veries: CE-1180, which was answering his report of May, 1947; Radiodiffusion Francaise, 17.85mc; PHI, 17.775mc; WLWR, 15.13 and 9.70; WLWL, 15.20; HCJB, 15.115; "Abdorra," 5.98 mc; WOOC, 15.19; ZAA, 7.85; SBP, 11.705; XEBT, 9.625; KWID,17.76; XEBR, 11.822.

Speedy Query Service

J.A.R. (Heidelberg) has a high-fidelity outfit and asks whether the r.f. tuner should feed through the bass boost pre-amplifier of the pick-up, or whether a flat response is to be preferred.

A.—Normally the bass boost is kept for the pick-up only, but it is largely a matter of taste. The next letter in the mail after yours was from a reader who says that he uses an r.f. stage with infinite impedance detector and then feeds through the 15 db. bass boost of the Lexington pre-amplifier and finds that this is the best arrangement. Incidentally he remarks, "I have just completed a negative feedback job of Williamson's circuit, and found the reproduction a little dead, that is, comparing it with the FFR amplifier from the December 1946 issue."

* * *

T.S. (Auburn) is worried about the resistor values shown in an overseas circuit which he is working from.

A.—It is no use looking for resistors with a value of 470,000 ohms on the Australian market. Such a resistor would be called a half-meg by us. In all cases the tolerance on commercial resistors is ten per cent. or more, and you can use any resistors within 10 per cent. of the value specified. If a circuit is so critical that resistance values are required to be within less than 10 per cent., it would not be considered practical. The odd values come about through a plan of preferred values which was worked out to cover all likely values with least overlap on the tolerances, thereby cutting down the number of values to be stocked, but is a little too involved to go into in detail in this column. Anyway there seems little chance of its adoption in Australia.

* * *

T.A. (Sale, Vic.) wants a circuit for a car radio to use modern high-gain valves such as the EF50.

A.—Whilst it is often necessary to put high-gain into the performance of a car radio, it is probably more important to use robust valves which will withstand vibration and rough treatment. Most high-gain valves have small clearance between the electrodes, and are therefore liable to suffer internal short circuits when knocked about.

* * *

W.D. (Pascoe Vale) suggests incorporating other technical subjects in Radio World.

A.—No, at the moment we have not the slightest intention of getting away from our present policy of "Technical Radio Only."

* * *

L.P. (Port Adelaide) asks if we have recently detailed any circuits for car radios.

A.—No, we do not appear to have dealt with these sets for some time past. They present plenty of problems for the uninitiated but none of them is insuperable. It would be nicest if we could get a kit-set, as otherwise there is always a difficulty about getting a suitable metal cabinet, remote control dial and so on. It is quite a sound idea to keep the vibrator unit quite separate from the set, mounting it a few feet away, under the bonnet, for example. Shielded leads will be needed for connecting up.

* * *

S.H. (Newcastle) is displeased because he has not had an answer to a letter which he wrote some weeks ago.

A.—Sorry, old man, but it is a physical impossibility to answer all letters individually. The mail these days runs into several hundred letters per week and business matters receive priority of handling. All letters are welcome, and they are always read intently, but there just aren't enough hours in the day to get around to writing answers in full.

* * *

P.L. (Lane Cove, N.S.W.) wants to know whether converter valves such as the 6J8G can be used instead of triode-pentodes like the 6F7 used in the old "Tip-top" circuit.

A.—It is possible to use the triode portion (oscillator grid and oscillator plate) of the 6J8G as a leaky-grid detector, and the pentode portion as I.F. amplifier, but there is sometimes a tendency towards instability due to interaction inside the valve. A few .0001 mfd. condensers will usually cure this trouble without much difficulty.

BARGAIN CORNER

WANTED to Buy: Battery Charger, any size, from 230 volt a.c. Price and particulars to C. Gartside, Lockington, Victoria.

WANTED to Sell: 40 new valves in cartons, 1J6G, 1D5GT, 1H6G, 19. All guaranteed. 7/6 each or offer for quantity. L. Ralph, 83 Park Street, Abbotsford, Vic.

FOR SALE: Palec VCTV multi-tester, Rola PM12 speaker with transformer to match PP 2A3. Both as new. Best offers to W. R. Jardine, Box 52, Leongatha, Vic.

WANTED: Some firm or person to wind a special set of coils for Radiotron Amateur Battery receiver (November, 1937, issue). Formers and data available. R. H. Hilder, Hunthawang Station, Hillston, N.S.W.

R.Y. (Brunswick) enquires about the "Hambander" receiver mentioned in the March issue.

A.—Yes, there seems to be quite a good chance that these receivers will be available in Australia at a most reasonable price in the immediate future. Further details will appear in future issues, but if you want advance information send us a stamped envelope and we will let you have a statement about these as soon as we are able to release it. Other readers also please note.

* * *

W.G.H. (Elwood, Vic.) wants a circuit for a modern version of the regenerative type of three-valve a.c. receiver.

A.—We hope to have an article on this subject in next month's issue.

* * *

N.A. (New Zealand) built one of our "World Cruiser 8" receivers and wants to know why we never feature circuits of this type these days.

A.—Up till now there have not been any five-band coil kits available, but there is now a very fine one in view. We hope to give the circuit and full details in an early issue. Present plan is to make it a really powerful job with about twelve valves or more.

VALVES AND THEIR APPLICATIONS

By M. G. SCROGGIE, B.Sc., M.I.E.E. (Eng.)

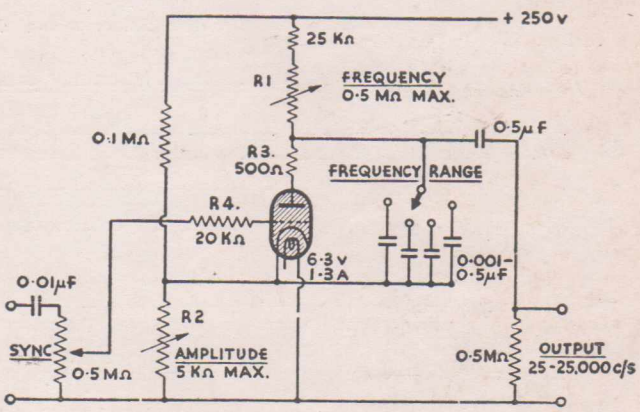
No. 1: Mullard GAS TRIODE EN31

OF the many applications of "soft" triodes, time base generation has always been the most widely used. The main reason for its popularity in that role is its ability to change suddenly from zero to a heavy current at a low voltage, and thereby to discharge a capacitor so quickly that the flyback is accomplished in a very small fraction of the whole cycle. By contrast, a hard valve requires some amplified triggering device to speed up the discharge, and even then is not such a low-resistance "switch."

The explanation, of course, is that directly any appreciable electron current starts to flow through low-pressure gas the molecules are ionized, or split up into electrons and positive ions, forming an electrically - neutral highly - conducting cloud. It is as if the anode were suddenly brought within a microscopic distance of the cathode. There is, therefore, negligible space charge for the anode voltage to overcome, even when the current is very heavy. The anode-to-cathode voltage is constant at quite a moderate critical value, depending on the kind of gas enclosed. Although the 33 V drop in the EN31 is higher than in a mercury-vapour valve, its characteristics depend much less on temperature.

Since the control grid is smothered by the conducting cloud, it ceases to control, until the discharge ends through lack of voltage to maintain it. Its function is then to determine, by the negative bias applied, the anode voltage needed to re-start the discharge, and hence the amplitude of the time-base voltage. In the EN31, 1 volt of bias is needed for every 35 additional anode volts.

The circuit diagram shows a very simple form of time base generator. It can, of course, be modified to include one of the usual linearizing devices, but except for precise work the stroke is linear enough if restricted to about 30 or 40 V. R1 controls the speed of charge, and R2 the bias. R3 is to limit the discharge to the rated maximum, 750 mA. 2 ohm. for every HT volt is well on the safe side. R4 is another limiting resistance, to keep the grid current within 1 mA. The total resistance between grid and cathode should be 0.75 ohms at most; preferably less. Since the bias required for control is only 1-35th of the anode voltage, the heater can be joined to —HT without fear of its voltage to cathode exceeding the rated limits of 0 to —100 V.



Mullard

This is the first of a series written by M. G. Scroggie, B.Sc., M.I.E.E., the well-known English Consulting Radio Engineer. Reprints for schools and technical colleges may be obtained free of charge from the address below. Technical Data Sheets on the EN31 and other valves are also available.

Build These Two Fine Kits

• MODEL OK1 OSCILLATOR

Here's the kit you've waited for—an oscillator kit which covers all the fundamental frequencies necessary to line up the modern receivers.

EASY TO CONSTRUCT WITH ORDINARY TOOLS

The new OK1 oscillator is a simple kit which you can build at hame with a few ordinary tools yet which, when completed, will give accurate and lasting service for many years. A complete book, giving pictures and wiring diagrams, and constructional details, included in every kit. All fundamental frequency ranges are covered by this oscillator and are in three distinctive separate bands. The A band covers 150 to 490 kilocycles, the B band covers from 550 to 1600 kilocycles, and the C band covers from 16 to 45 metres. Lining up is permanent and simple.

USES STANDARD BATTERIES

"University" pioneered oscillator kits and many are still in use. Model OK1 is a companion to our famous multimeter kit model MK1 and they make a handy pair—readily portable and easily built.

The OK1 oscillator operates from built-in batteries and these batteries are standard types tha may be easily purchased everywhere.

PRECALIBRATED DIAL

The "Universiy" OK1 oscillator kit comes with a dial precalibrated in the factory.

This means that when you construct according to directions you have a calibrated dial off which frequencies can be read direct. Most home-builders' kits in the past have had an ordinary 0/100 dial which limited the effective use of the oscillator.

The OK1 oscillator is available to you at a new low price with everything included, right down to the last nut and bolt.

Price £8-0-0 Plus Tax

• MODEL MK1 MULTIMETER

This multimeter is an attractive looking instrument—handy size 6" x 8" x 2½", with leather carrying handle fitted to the top of the case. It is housed in a steel box, finished in black brocade. Etched brass labels in black and nickel finish set off the instrument.

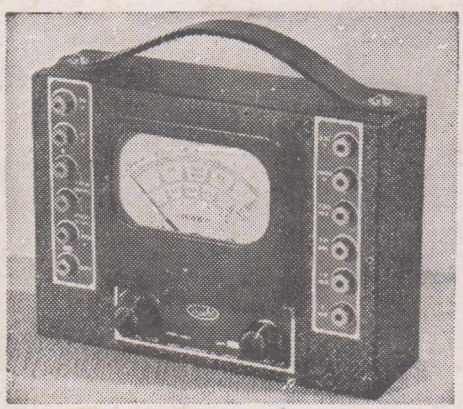
HAS 4" SQUARE METER

The popular 4" square type of meter is used with a clear multi scale. Controls have been kept down to an absolute minimum by the use of tip jacks and a new circuit which does away with the troublesome double circuit tip jack. In this whole instrument only one double circuit tip jack is used and even then that is only on the low ohms scale and can be easily fitted.

The instrument is primarily available as an A.C.-D.C. kit although it can be purchased as a D.C. kit if so desired and the A.C. section added later. In the D.C. kit only one knob is required, being an ohms adjustment to compensate for battery variation as the battery ages. In the A.C.-D.C. version a simple change-over switch allows the operator to change over from A.C. volts to D.C. ranges.

SIMPLE CONSTRUCTION

Construction is simple and all voltage multipliers and shunts are predetermined at the factory to an accuracy of 1% so that when construction is finalised, the whole instrument will give accurate reading on all ranges. This is important because it is very difficult for home constructors to make shunts to enable them to get accurate readings on all current ranges.



COMPREHENSIVE RANGES

The ranges are: 0/10, 0/50, 2/250, and 0/1000 volts D.C., 0/10, 0/50, 0/250 and 0/1000 volts A.C., 0/10, 0/50, 0/250 and 0/1000 output volts, 0/1, 0/10, 0/50, and 0/250 milliamperes D.C., and 0/1000 ohms and 0/100,000 ohms D.C. The 0/1000 ohm range is particularly helpful in checking open circuits and short circuits in coils and I.F.'s. The lowest division on the 0/1000 ohms scale is a quarter of an ohm. Only one standard type torch cell is used, and sensitivity of the instrument is 1000 ohms per volt. All wiring instructions and constructional details are given with the kit and photographs and circuit diagrams make it easy to assemble the instrument. All parts are prefabricated so that fitting is easy and everything is supplied including the wire, panels, solder, lugs, etc.

When the construction of the instrument is finished, no calibration is necessary because of the pre-determined resistors and shunts being made to accurate standards. If the instrument is wired correctly it is available for immediate use and will give many years of accurate service.

Price £8-0-0 Plus Tax

University

INSTRUMENTS

Made by RADIO EQUIPMENT PTY. LTD.

5 NORTH YORK STREET, SYDNEY. PHONES B3678, B1960

Printed by Bridge Printery Pty. Ltd., 117 Reservoir St., Sydney, N.S.W., for the Proprietor of the "Australasian Radio World," Balcombe St., Mornington, Vic.