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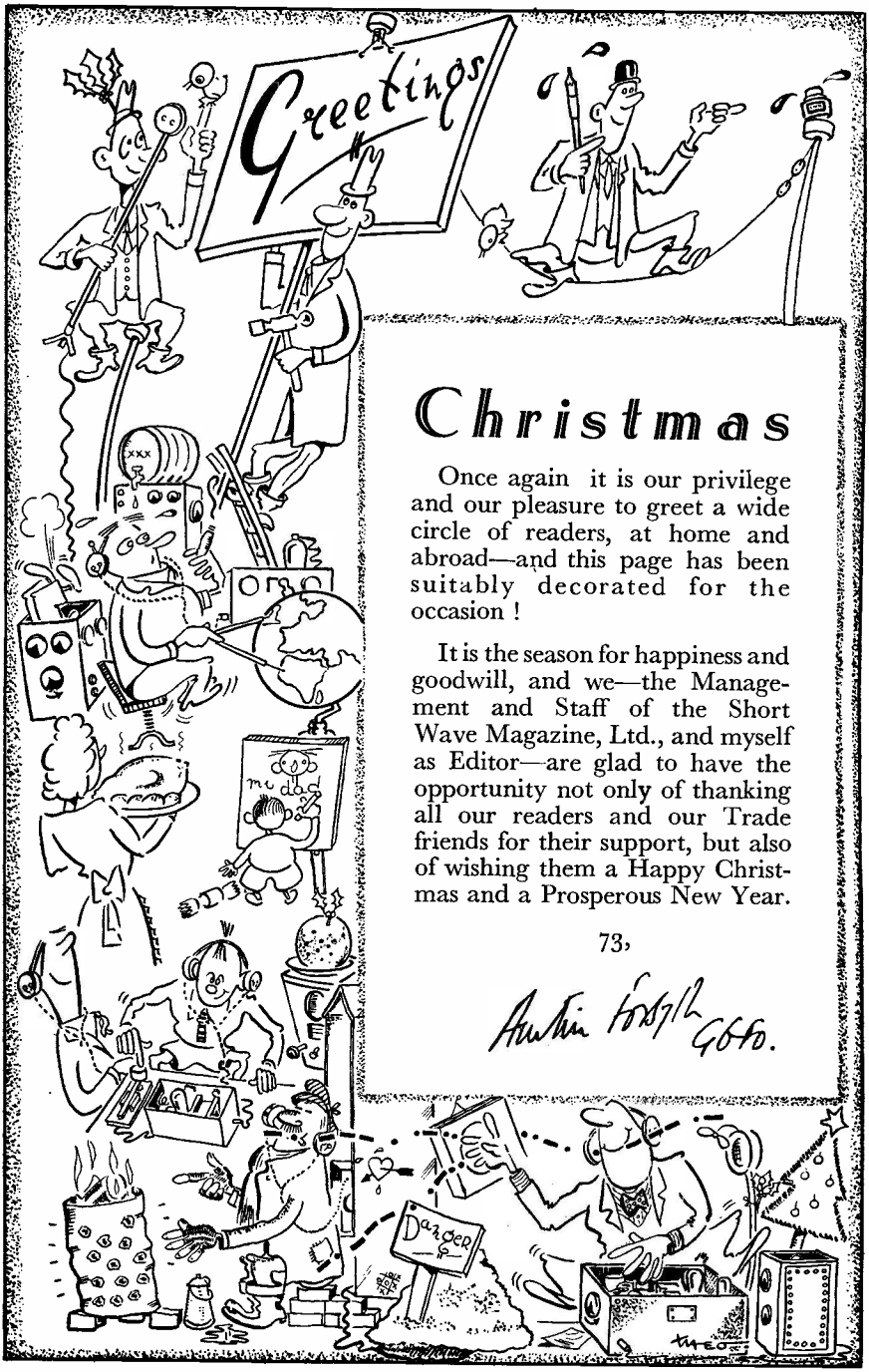


Christmas

Once again it is our privilege and our pleasure to greet a wide circle of readers, at home and abroad—and this page has been suitably decorated for the occasion !

It is the season for happiness and goodwill, and we—the Management and Staff of the Short Wave Magazine, Ltd., and myself as Editor—are glad to have the opportunity not only of thanking all our readers and our Trade friends for their support, but also of wishing them a Happy Christmas and a Prosperous New Year.

73,

Austin Forsyth G6FO.

The ZB3 Converted for Two Metres

Modifying a Surplus Unit

By E. DANDY, A.M.I.R.E. (G3BJB)

(The ZB3 (AN/ARR-1 Homing Adaptor) was designed to work with equipment tuning over the range 234-258 mc, and so it is easily modified to operate as a 2 RF-mixer-oscillator converter on our 2-metre band. This article shows how. For those who may look for the circuit diagram, it was not thought necessary to give one in this case, since the photographs are keyed, the text is fully explanatory and the disturbance to the existing unit as wired is relatively slight.—Ed.)

THIS piece of ex-Service gear can now be obtained very cheaply on the surplus market, and is easily modified for working as a converter on the 145 mc band. The unit was used as a "homing adaptor" in conjunction with standard aircraft receiving equipment, and operated in the frequency range 234-258 mc.

General Description

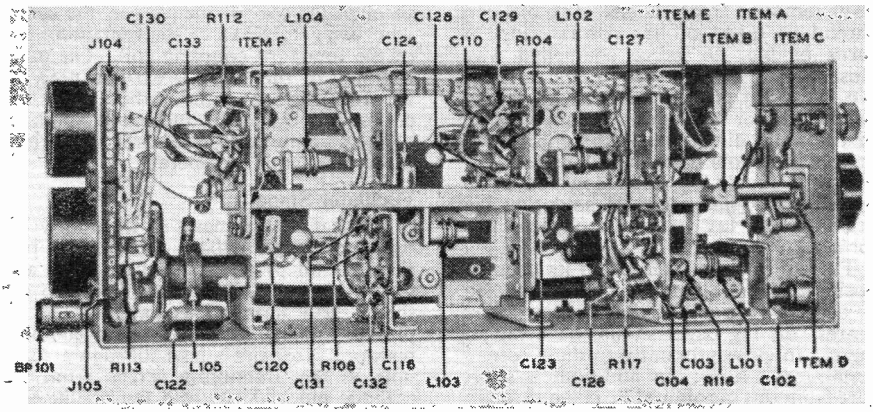
Electrically, the adaptor consists of three stages of inductively tuned RF amplification and a grid leak detector, all the valves being 954 acorns. The three RF amplifier stages—V101, V102 and V103—are coupled by means of four circuits, each consisting of a tuning coil and a trimmer condenser. The four circuits are tuned by means of four silver-plated cores which are moved simultaneously in and out of their respective tuning coils by means of a rack and worm arrangement driven from the main tuning dial. The aerial is connected through a co-axial plug and condenser C101 to the tuning coil L101 (*see* keyed photographs). The condenser C102 is adjustable from the front panel and is used to align the input circuit. The resistor R115 provides a means of furnishing extra bias for V101, and can be shorted in and out by means of an external switch. The plate and screen voltage supplies of this valve are quite conventional and coupling to the next stage is *via* C106 to the tuned circuit L102-C108. The circuits for the second and third RF amplifier stages are identical with V101, except that no provision is made for varying their bias.

Condensers C102, 108, 114 and 118 are trimmers used to align all circuits at the middle of the frequency range covered by the adaptor. The detector circuit V104 is designed to demodulate the HF signals which are modulated by frequencies in the range 540-830 kc. The detector is of the grid leak type, and the plate of the valve is connected through R115, L105 and C125 into a low-capacity concentric transmission line, which is taken to the aircraft receiver through an external switched relay. A condenser C115 is provided from the plate of V104 to earth which, in combination with R115 and the distributed capacity of L105, serves to remove the carrier component from the output of the detector. When the switch S102 is connected to 24 volts, the four valve heaters are in series; with S102 thrown to the 12-volt position, they are connected in series-parallel. HT is fed in on pin 41 of the plug J105.

Modification for Two Metres

Now that the normal service operation has been outlined, proposals can be made for modification of the unit to work on the 145 mc band. It is suggested that V101 and V102 remain as RF amplifiers, with V103 as a mixer and V104 an oscillator, utilising a 10-mc IF.

First, remove the top cover of the instrument, by giving a half-turn to the two Dzus fasteners. Next, take off the bottom plate by withdrawing the six screws (three on either side) holding it in place. The adaptor is now fully accessible and is ready for attention. As it is extremely difficult to obtain sockets to fit the plugs on this unit it is suggested that the three-pin plug J104 be removed and an octal valveholder fitted in its place. This is done by taking off the three connections to the plug, then severing the other ends of these wires from pins 42, 49, 52, and the earth tag on plug J105. In addition, also remove L105, C115, 122, 125 and R115, to facilitate the modifications to the plug wiring. The coil former will be required later for rewinding as an IF transformer. Due to the fact that the connecting wires are



Internal bottom view, with all parts identified ; see text and table of values.

twisted around each soldering tag several times, it is advisable to use a very hot iron—one of the miniature types with the element in the bit is preferable, if available.

Now proceed to modify the heater connections. Turn the adaptor so that the tuning coil side is uppermost, with the tuning dial facing. Take out the black tracer wire from the left-hand heater pin of V103, and reconnect it to the right-hand pin. Now connect the left-hand pin by a short wire to the nearby earth tag. Cut off the plain white wire going to the right heater pin of V102, and locate the other end of this wire (which is attached to a terminal of the heater change-over switch), cut off, and withdraw from the cable form. Remove the black tracer wire from the same heater terminal of V102 and take it to the left-hand heater terminal. Now connect the right-hand tag to earth by a short lead. A brown tracer wire will be noticed going to the left-hand heater tag of V101 ; cut this and locate the other end at the change-over switch, disconnect and withdraw it from the cable-form. All that remains is to run a short wire from the left-hand heater pin of V104 to pin 2 of the new octal socket. Pin 7 of this socket should be connected to a convenient earth tag, and pin 5 by a short wire to pin 41 of socket J105.

This all *sounds* rather complex, but in fact these modifications can be carried out in a matter of a few minutes !

In order to wind new tuning coils it is necessary to take out the sliding tuning bar, which can be done by removing the two small end-plates holding the bar in position ; it then comes out easily.

First RF Stage

The following alterations should be carried out to the first RF stage. Remove coil L101 and replace it with a three-turn coil (tapped at one turn from the earthed end) of the same wire diameter, gauge and spacing as the original. Connect the valve grid to the top end of the coil, *i.e.*, take the grid flying lead to the metal plate to which one end of the condenser C134 is connected. The aerial coupling condenser C101-1 is connected to the tap on the coil ; this should be about right for a 70-ohm input match from the aerial. Finally, short out R116 by means of a wire to a nearby earthing tag. Moving on to the second RF stage V102, replace L102 by a three-turn coil identical to that in the first stage but with no tap. Now replace L103 and L104 by similar coils to that fitted to the second RF stage ; make sure, incidentally, that all the coils are very rigid so that they will be unaffected by vibration.

Mixer Conversion

The next step is to convert the mixer stage V103 ; disconnect the suppressor grid from earth and fit a 47,000-ohm resistor to ground. Remove the condenser C112 from the anode of V103 and reconnect it to the suppressor grid of the same valve. There should be just sufficient wire on the condenser to enable this to be done. Take out the 30,000-ohm resistor R110 ; this leaves the anode of V103 free of all connections. Now change the bias resistance R108 to a half-watt 6,800-ohm resistor. The next stage is the rewinding of L105, which has already

been removed from the set. The old coil should be taken off the former, and 28 turns of No. 26 gauge enamelled wire close-wound in its place. Four turns of No. 22 gauge plastic-covered wire should be wound over the top of the main winding in the same direction, at the end of the main coil remote from the tag panel. The windings should be stuck down in place with Durofix and an extra soldering tag fitted to the tag panel attached to the former.

The coil is now replaced in its original position in the adaptor, and reconnected as below: The end of the main winding nearest the tag panel should be wired to the tag in close proximity to the screened aerial input lead; in addition, a short wire from this tag should be taken through a small hole in the aluminium screen, and the other end connected to the anchoring point for the anode flying lead of V103. The other end of the main winding of the IF coil is then taken to the tag on the coil former opposite the one which has just been joined to the anode of V103. The resistor R110 (the other end of which is connected to pin 41 of plug J105) should also be soldered to this tag.

The 0·006 μF condenser C122, which was previously removed with the coil, should now be reconnected between the above-mentioned tag and an adjacent earth point. A 3-30 $\mu\mu$F trimmer should also be connected, with stiff wire, across the main winding for tuning the IF transformer. The end of the four-turn winding nearest the chassis is now connected to earth. A screened lead of a low-capacity type should be led out through the rear of the chassis, the centre wire being soldered to the remaining end of the four-turn coupling coil. The outer braiding of this cable is earthed near the IF transformer; the other end will connect to the aerial and earth terminals of the communication receiver with which the converter is to operate.

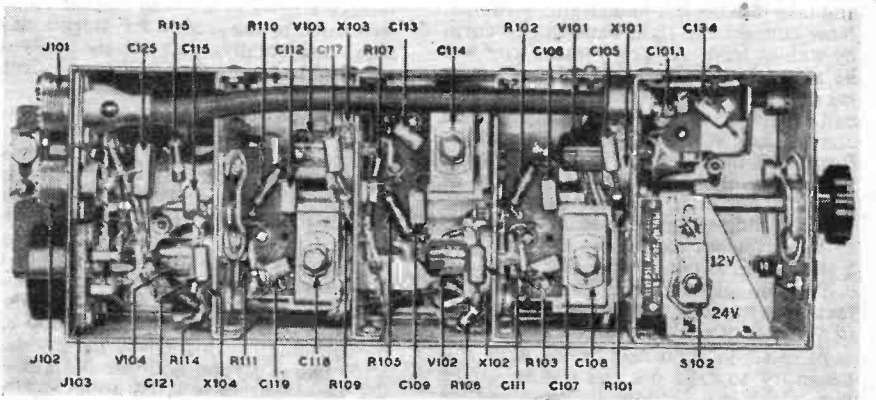
Oscillator Stage

All that now remains is to modify the oscillator stage V104; remove the bias resistor and by-pass condenser R112 and C133. Connect the anode direct to the screen grid terminal. Change R114, at present 200,000 ohms, for a 30,000-ohm resistor. Now run a lead through a small hole in the aluminium screen from the cathode pin of V104 to a tap on the new three-turn oscillator coil, at a point one turn from the earthed end. This lead must be of at least 18 gauge wire and very rigid.

Now replace the tuning rod and holding plates, taking care that these plates are screwed up so that there is no side-play on the tuning rod. Also see that all four coils are positioned approximately the same, so that when the four slugs are fully withdrawn from the coils the front edges of all the slugs are the same distance from the nearest edges of their associated coils.

Alignment

All the necessary alterations are now completed and for alignment purposes it only remains to connect up the octal plug at the rear of the chassis to a power pack. The connections to the plug are as follows: 6·3 volts at 0·6 amps, pin 2; 250 volts HT+, pin 5; and a common



Top view of the ZB3 unit, which can be modified to work as a 145 mc converter.

Table of Values

ZB3 Conversion for 145 mc

Refer to keyed photographs

C101 = 2 μμF ceramic.
C102 = Variable trimmer.
C103 = 30 μμF ceramic.
C104 = 30 μμF ceramic.
C105 = 30 μμF ceramic.
C106 = 5 μμF ceramic.
C107 = 5 μμF ceramic.
C108 = Trimmer, air.
C109 = 5 μμF ceramic.
C110 = 30 μμF ceramic.
C111 = 30 μμF ceramic
C112 = 5 μμF ceramic.
C113 = 5 μμF ceramic.
C114 = Air trimmer.
C115 = 20 μμF ceramic.
C116 = 30 μμF ceramic.
C117 = 30 μμF ceramic.
C118 = Air trimmer.
C119 = 5 μμF ceramic.
C120 = 30 μμF ceramic.
C121 = 30 μμF ceramic.
C122 = 0·006 μF mica.
C123 = 30 μμF ceramic.
C124 = 30 μμF ceramic.
C125 = 0·006 μF mica.
C126 = 30 μμF ceramic.
C127 = 30 μμF ceramic.
C128 = 30 μμF ceramic.
C129 = 30 μμF ceramic.
C130 = 30 μμF ceramic.
C131 = 30 μμF ceramic.
C132 = 30 μμF ceramic.
C133 = 5 μμF ceramic.
C134 = 2 μμF ceramic.
L101 = Aerial coil.
L102 = Second RF coil.
L103 = Third RF coil.
L104 = Detector grid coil.
L105 = Detector output coil.
R101 = 200,000 ohms, ½ watt.
R102 = 30,000 ohms, ½ watt.
R103 = 50,000 ohms, ½ watt.
R104 = 1,000 ohms, ½ watt.
R105 = 30,000 ohms, ½ watt.
R106 = 200,000 ohms, ½ watt.
R107 = 200,000 ohms, ½ watt.
R108 = 1,000 ohms, ½ watt.
R109 = 200,000 ohms, ½ watt.
R110 = 30,000 ohms, ½ watt.
R111 = 20,000 ohms, ½ watt.
R112 = 10 ohms, ½ watt.
R113 = 30,000 ohms, ½ watt.
R114 = 200,000 ohms, ½ watt.
R115 = 50 ohms, ½ watt.
R116 = 100,000 ohms, ½ watt.
R117 = 1,000 ohms, ½ watt.
J101 = Coaxial input socket.
J102 = Coaxial output socket.
J103 = 4-terminal plug.
J104 = 3-terminal plug.
J105 = 8-terminal plug.

earth connection from HT— and the other side of the 6·3-volt supply to pin 7. The screened output lead should be connected to the aerial and earth terminals of the communication receiver, which must now be tuned to 10 mc.

Adjust the trimmer across the IF coil for maximum noise. The next step is to get the oscillator going on 135·5 mc. It is suggested that a small calibrated absorption type wavemeter be used for this purpose. First of all check with the trimmer C118 half-way out; if the frequency is too high, close up the turns of the oscillator coil, if too low open them slightly. Final adjustment can be made on the trimmer. Now, from the signal generator feed a signal at 145·5 mc into the aerial input socket of the converter. (The output impedance of the generator should be about 70 ohms.) Adjust the trimmers C102, 108 and C114 for maximum output, using the communication receiver S-meter as check for this. If it is not possible to go through a maximum on either of these trimmers proceed as follows: If the greatest signal is obtained with the trimmer unscrewed, open out the coil spacing slightly; if the maximum signal is found with the trimmer fully screwed in, then the coil turns need closing up a little. When these adjustments have been made to all three stages, the ganging should hold across the amateur band.

A very suitable signal generator, now available on the surplus market, is the Type I-130A, which is part of Test Equipment IE19A.

THE NEW WIRELESS BILL

At the moment of writing, this is still being debated; it is, however, of great interest from the Amateur Radio point of view, since in round terms it seeks to impose on all who cause interference with radio the same obligations as have rested on amateur transmitters for the last 25 years—that of avoiding interference with broadcast reception. Much attention is also being given to that part of the Bill which permits entry to private premises—but here again amateurs have always had to accept this as one of the licence conditions; indeed, the ordinary BCL licence already permits such entry!

It may well be that if the Bill goes through in the form proposed by the Government, amateurs will for the first time be able to obtain legal protection against those who have for years so freely interfered with them! On the subject of the Bill itself, so far as one is able to judge from the reports appearing in the Press, there are probably not half-a-dozen Members who really understand the issues involved.

Differential Condensers in Circuit Design

Balance Adjustment in Transmitters, Receivers and Aerial Tuners

By J. N. WALKER (G5JU)

The old differential condenser made its original appearance over 20 years ago and was one of the first methods of obtaining smooth control in the "hot" reaction circuits of those days. The modern version of the differential condenser has many valuable practical applications in our amateur band equipment. This useful and interesting article will not only show what they are, but will also help in the curing of some of the more obscure faults encountered in certain types of transmitter.—Ed.

MANY readers will remember, in pre-war days, a component known as a differential condenser. It consisted of two sets of opposing stators, with a single rotor section, arranged so that, as the capacity of one side decreased, that of the other side increased by an equal amount. The dielectric was usually of some solid material, the vanes thin and flexible, and the losses were probably by no means negligible. This latter did not matter much, as the condenser was generally used for reaction control on medium frequencies.

The modern differential condenser, as typified in the Eddystone examples, is a very different component. The capacity per section is quite small, the dielectric air and the insulation ceramic. The condenser can be used in any circuit without introducing additional losses. This obtains even at the very high frequencies (*e.g.* up to 150 mc), and when high RF voltages are present, as in circuits associated with a transmitter.

The chief application of a differential condenser is for balancing a circuit. Stray capacities can be equalised, each side of the circuit then becoming symmetrical (referred to zero potential) and the RF potentials are equal in amplitude but opposite in phase.

The capacity of a differential condenser has to be considered in a somewhat different way from that of a split-stator type. With the latter, if each section has a value of 25 $\mu\mu$F, the effective capacity, assuming a balanced circuit with the rotor at earth potential, is 12·5 $\mu\mu$F maximum and between 1 $\mu\mu$F and 2 $\mu\mu$F minimum, giving a total swing of, say, 11 $\mu\mu$F.

A differential condenser is rated on the basis of the capacity, at full mesh, between the rotor and one stator. Previous to final adjustment, the rotor will be set at half mesh, each side then having a value equivalent to half of one section, *e.g.* in the case of the Eddystone Type 719 25/25 $\mu\mu$F condenser, this would be 12·5 $\mu\mu$F. The effective capacity placed across the whole circuit would be half again, say 6 $\mu\mu$F. Rotation of the condenser results in capacity simultaneously being added to one side of the circuit and subtracted from the other. The effective capacity across the circuit *as a whole* will remain much the same at any adjustment, provided the rotor is grounded.

Similarly, in the case of a 100/100 $\mu\mu$F differential condenser, the effective additional capacity introduced is 25 $\mu\mu$F.

Transmitter Applications

It is important to ensure correct balancing of the input circuit in a transmitter using valves in push-pull. Otherwise, one valve will be driven harder than the other, giving rise to the following faults :

(*a*) One valve will take more than its proper share of the load and the anode dissipation may easily be exceeded, without it becoming immediately apparent.

(*b*) In pentodes and tetrodes, the screen current of the over-driven valve is likely to be unduly high and the screen dissipation exceeded. This is, if anything, more serious than excessive anode dissipation, as the control grid will become unduly hot and secondary emission may occur.

(*c*) In triodes, and possibly tetrodes also, neutralising adjustments will be more critical.

(*d*) Grid current will be unequal.

(*e*) The valve life will be shortened.

(*f*) Even harmonics will not be cancelled out to the degree possible in a well-balanced circuit.

A small differential condenser placed across the grid circuit, as shown in Fig. 1, provides a simple enough means of effecting a balance but it is not quite so simple to determine the proper adjustment.

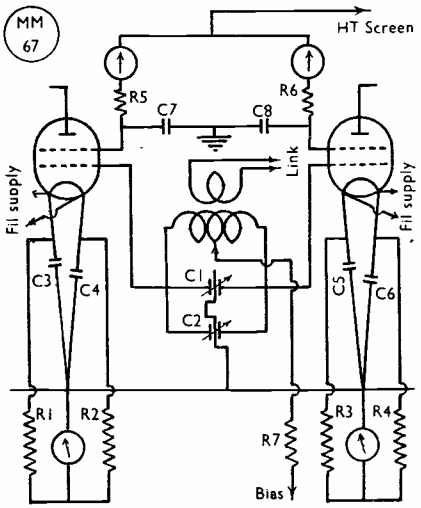


Fig. 1. Methods of balancing a push-pull RF amplifier, C1, split-stator tuning condenser ; C2, differential condenser ; C3-C8, normal by-pass condensers ; R1-R4, 100 ohms, 1-watt ; R5, R6, 470 ohm, 1-watt ; R7, 1000-ohm decoupler, or higher value if used for bias.

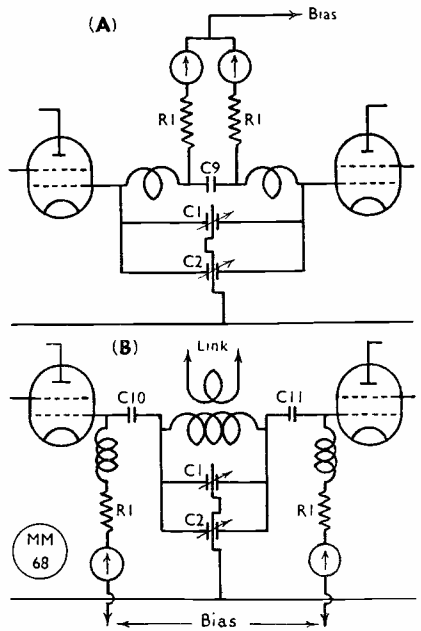


Fig. 2. Measuring individual grid currents. (A) split grid coil arrangement; values as in Fig. 1, with C9 ·002 to ·0003 μF. (B) Shunt-fed bias circuit, with C10, C11 of 100 μμF.

In the case of tetrodes, a convenient and also a very reliable method is to equalise the screen currents of the two valves. In Fig. 1 two separate meters are indicated, R5 and R6 being decoupling resistors of low value (470 or 1,000 ohm). This feature is a worth-while permanent refinement, particularly if the transmitter is employed on various bands and possibly with different couplings and aerials. But, in the majority of cases, it will be satisfactory to insert the meters as a temporary measure, tune up the transmitter for normal operation, rotate the differential condenser C2 for equal screen currents (adjusting the tuning condenser C1 as necessary) and thereafter leave C2 strictly alone.

A method, suitable for triodes, is to measure the individual cathode currents. In valves with indirectly heated cathodes, this is a simple matter. The only precaution necessary is to ensure that the meters are properly by-passed to RF currents. Where directly heated valves are used, from a common transformer winding, a temporary transfer of one filament to a separate winding is necessary. If the windings are centre tapped, so much the better—the meters are inserted between CT and chassis. Otherwise, the centre-tapped resistor network shown in Fig. 1 should be used.

A third method, but one difficult to apply in practice, is to measure and equalise the individual grid currents. It involves either splitting the grid inductance, as shown in Fig. 2(a) or shunt feeding, as in Fig. 2(b). In some transmitters, this latter method may already be in use and it will be good practice permanently to insert the two meters.

Balancing Feeders

When RF ammeters are inserted in tuned feeder lines, as in Fig. 3, the currents indicated should be approximately equal. If this is not so, it means that the feeder wires are not balanced with respect to ground, and the standing wave ratio is likely to be high. It follows that considerable radiation will occur off the feeders and the directional effects of the aerial system as a whole may be quite different from what one would expect—or hopes.

The addition of a differential condenser (in this instance, of the transmitting type) enables the symmetry of the feeders to be restored. It should be noted that the differential condenser remains across the feeders, both with series and parallel

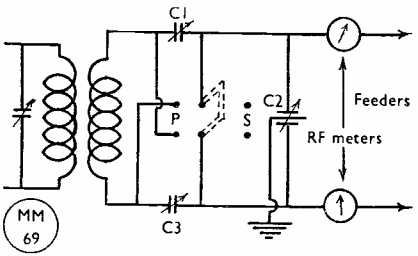


Fig. 3. Balancing tuned feeders. C1 and C3 are the normal tuning condensers, and C2 the differential balancing condenser (Eddystone 725).

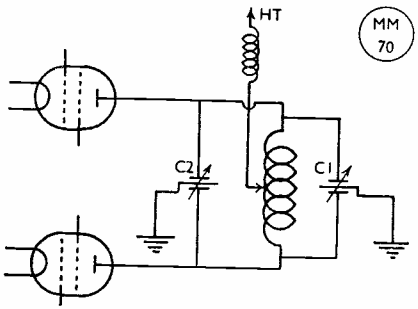


Fig. 4. Balancing a push-pull output stage ; C1 is the normal tuning condenser, and can be single-section ; C2 is the differential balancing capacity.

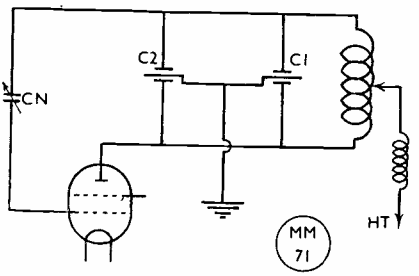


Fig. 5. Balancing a neutralised single valve PA ; C1 and C2 as in Fig. 4. (*Both variable*)

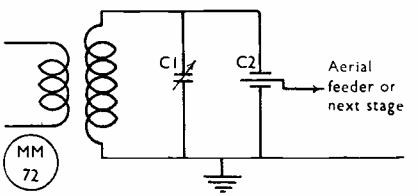


Fig. 6. Capacitative variation of coupling. C1 is the usual tuning condenser, C2 the variable differential capacity, with one stator earthed.

tuning. Fig. 3 indicates the relative position of the differential condenser C2, which remains across the feeders, irrespective of whether series or parallel tuning is employed. Switching arrangements are also shown. It will be found that, at one setting of C2, the meter readings will be identical, and only minor adjustment should thereafter be necessary.

Balancing an Output Stage

A skeleton circuit for a push-pull RF power amplifier is shown in Fig. 4. The rank circuit finds its earth through the rotor of the split-stator tuning condenser C1, and the balance will be satisfactory, provided C1 is not near minimum capacity. If, however, C1 is near minimum, the valve and other stray capacities form the major proportion of the capacity in the circuit and the balance may not be so good. Incidentally, practically the whole of the circulating current will flow through the anode seals, which, in some valves, may not be advisable, particularly at high powers and high frequencies.

The addition of a differential condenser C2, ensures that an adequate minimum capacity is in circuit, properly balanced to earth. C2 will normally be left set at the half-way position—that is, with the rotor engaging the stators to an equal degree. A slight variation either way can be made to take up any unbalance, such as may arise if C1, the tuning condenser, is a single-ended type, the rotor and frame of which may have greater stray capacity to earth than the stator.

Now consider a single-ended stage, as in Fig. 5. Although a split-stator tuning condenser (C1) is employed, the circuit can hardly be called balanced, since that side of the tuned circuit connected to the valve anode has much more capacity across it (the capacity of Cn can be ignored). For example, if the valve is an 813, the anode/earth capacity amounts to about 20 $\mu\mu$F.

The addition of the differential condenser C2 enables a good balance to be secured. The vanes on the side away from the anode will be engaged to a greater degree than on the other side, dependent on the type of valve used.

Impedance Matching

We now come to an application of a somewhat different kind—one of impedance matching or variation of coupling, as opposed to balancing.

An energised single-ended tuned circuit, with one end held down to earth (Fig. 6),

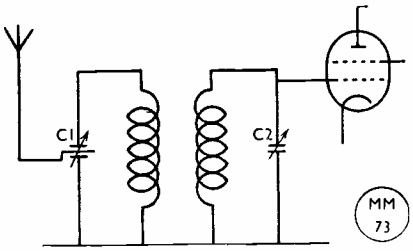


Fig. 7. Variable aerial coupling through C1. a small differential condenser.

such as is commonly used for aerial coupling, exhibits high voltage and high impedance at the free end and low voltage and low impedance at the earth end. Potential and impedance gradients exist across the circuit and a good match into any external impedance (*e.g.* an end-on aerial) can be made by tapping on to the coil. This latter operation is not always convenient and also is somewhat rough. A better way is to use a capacitative potentiometer, easily provided in the form of a differential condenser. In effect, the rotor is the variable arm. The impedance (and the voltage) varies from maximum when the rotor is fully engaged with the stator connected to the "hot" end of the circuit, to practically zero when fully meshed with the earthed stator. The rotor spindle should be fitted with an insulated coupling. The usual tuning condenser is required to maintain exact resonance.

This coupling system is applicable to almost any length of single wire aerial and also to other parts of a transmitter. For example, a good match into an 80-ohm coaxial cable can be secured, the outer screen being connected to the earthed stator and the inner conductor to the rotor of the condenser.

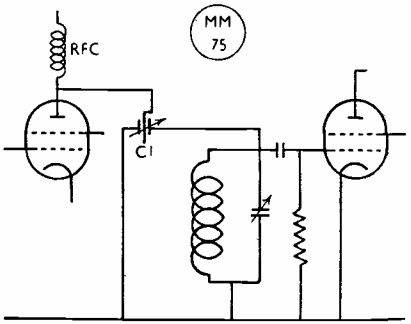


Fig. 9. Illustrating variable inter-stage coupling, with a differential condenser C1 between an RF and detector circuit.

Receiver Applications

The same principles outlined earlier apply also to receivers, although possibly the applications are not so obvious. A few examples will illustrate methods of improving receivers in minor ways.

Fig. 7 shows a differential condenser used for variable aerial coupling to the input circuit of a receiver. The two stators are connected across the coupling winding, the aerial being taken to the rotor. If a coupling winding is not used, the differential condenser may be connected directly across the tuned circuit.

This little refinement is of particular advantage in a TRF type of receiver, and

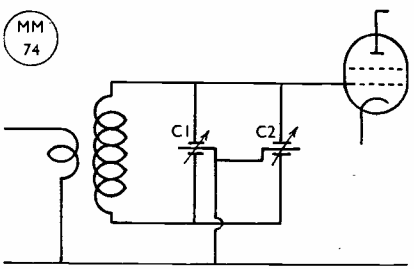


Fig. 8. Balanced input circuit, most suitable at VHF. C1 is the normal tuning capacity and C2 the differential condenser, with which perfect balance can be obtained.

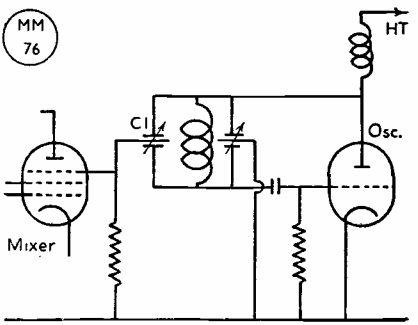


Fig. 10. Varying the oscillator injection voltage in a VHF converter by means of a small differential condenser C1.

enables good results to be secured from any length of aerial. It is also suitable for use with co-axial cable, the centre conductor of which is connected to the condenser rotor.

Fig. 8 is the receiving version of Fig. 1. The differential condenser C2 allows compensation to be made for the input capacity of the valve and ensures a good overall balance.

The inter-stage coupling between two RF stages can be varied smoothly by adopting the circuit in Fig. 9. It has the advantage that the capacities in the circuit change less when C is adjusted than if a single variable condenser is used for coupling purposes.

Smooth control of the oscillator injection voltage is possible in an HF or VHF converter with the circuit arranged as in Fig. 10. The rotor of the differential condenser is shown connected to the suppressor grid of the frequency changer valve but it may equally well be taken to any other electrode used for injection. With the differential condenser at half-mesh, practically no oscillator volts will be transferred. Rotating C1 in either direction will increase the voltage. An adjustment can be found which gives maximum conversion efficiency and maximum signal-to-noise ratio.

VFO Driver with NBFM

Clapp Oscillator Incorporating Phase Modulator

By **R. H. WEBB (G6XY)**

The Clapp oscillator was first discussed as such in the May, 1948, issue of our American contemporary *QST* though, as they have since pointed out, an identical circuit also appeared as far back as November, 1941. What has come to be called the Clapp looks like the ultimate in VFO circuits—till the next new one comes along ! Here is a design based on this circuit and incorporating a narrow-band FM unit.—Ed.

THE great popularity during recent years of the Variable Frequency Oscillator as a means of transmitter control for amateurs has resulted in the presentation of many and varied circuits and mechanical layouts, mostly of increasing complication but all directed towards the common goals of all designers and constructors of VFO's, *viz.* Stability, both electrical and mechanical, freedom from frequency drift or creep on warming up, and last but not least, ability to be keyed for break-in operation.

In view of this increasing complication of design it is not surprising how great is the interest aroused by an oscillator circuit designed by J. K. Clapp (General Radio Company, America) which not only possesses the desirable qualities mentioned above but which is also just about as simple as it is possible for an oscillator circuit to be.

Simplicity is an essential factor in the design and construction of amateur gear of all kinds as it gives the average constructor without extensive workshop and testing facilities a better chance of duplicating the results obtained by the designer from the prototype.

It is not intended, here, to enter upon a detailed discussion of the Clapp circuit as this has been amply covered in *QST*; suffice it to say that the circuit does all that is claimed of it and does it very well indeed.

Although a carefully designed and most satisfactory VFO, comprising a very high-C and temperature compensated ECO (6SK7), followed by a 6V6 isolator/doubler stage, had been in use at the writer's station for two years it was immediately decided to make up and try a Clapp oscillator as a basis for a new VFO. At this juncture it was suggested by G5BJ (who had done a great deal of work on FM) that while building a new VFO it was a simple matter to incorporate provision for narrow-band FM which could be switched out of circuit when not required. It is to G5BJ that the credit must go for the phase modulator circuit appearing in this design.

The circuit given is almost self-explanatory and if this and the suggested layout are followed no difficulty should be encountered.

Construction

The writer's unit is constructed in an Eddystone cabinet, but any metal container of similar size may be used so long as it is ventilated. The power pack

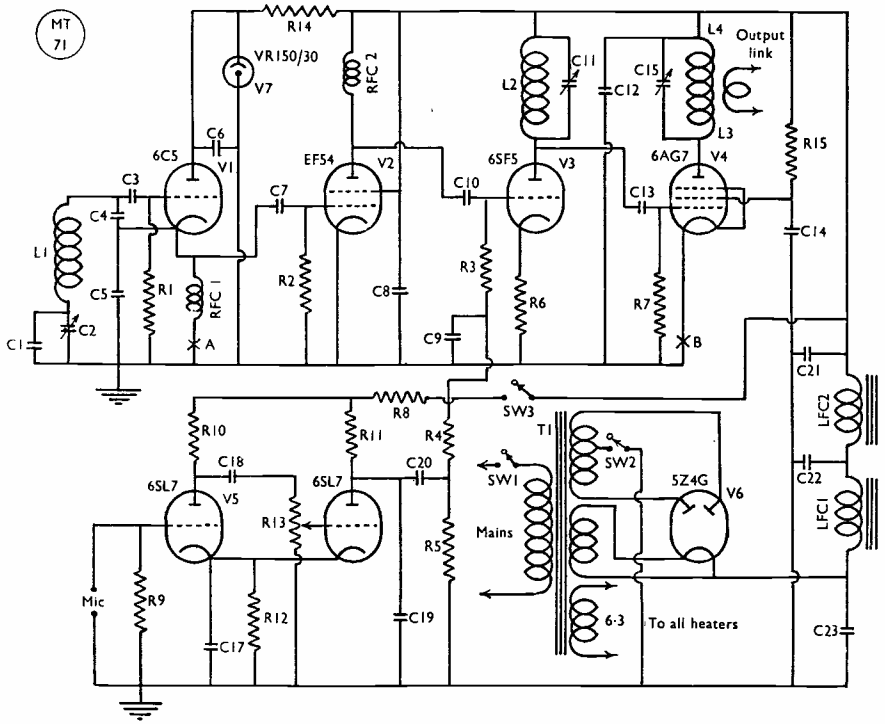


Fig. 1. The Clapp oscillator with the addition of a narrow-band FM unit, as described by G6XY in the accompanying article. The oscillator can be used in either mode by throwing the appropriate switch ; R13 is the deviation control.

Table of Values

Circuit of VFO/NBFM Driver Unit

C1 = 300 $\mu\mu$F silvered mica
C2 = 160 $\mu\mu$F Eddystone 1131
C3 = 100 $\mu\mu$F
C4 = ·001 $\mu\mu$F, silvered mica
C5 = ·001 $\mu\mu$F, silvered mica
C6 = ·01 μF
C7 = 300 $\mu\mu$F, silvered mica
C8 = ·01 μF
C9 = ·01 μF
C10 = 300 $\mu\mu$F
C11 = 3-30 $\mu\mu$F ceramic trimmer
C12 = ·01 μF
C13 = 300 $\mu\mu$F
C14 = ·01 μF
C15 = 60 $\mu\mu$F air dielectric trimmer, Eddystone 581
C16 = 100 $\mu\mu$F
C17 = 25 μF, 25v electrolytic
C18 = ·01 μF
C19 = 300 $\mu\mu$F
C20 = ·01 μF
C21, 22, 23 = 8 μF, 500v electrolytic

All resistors are 1 watt type unless otherwise stated

R1 = 100,000 ohms
R2 = 100,000 ohms
R3 = 50,000 ohms
R4 = 25,000 ohms
R5 = 250,000 ohms
R6 = 20,000 ohms
R7 = 100,000 ohms
R8 = 40,000 ohms
R9 = 5 megohms
R10 = 100,000 ohms
R11 = 100,000 ohms
R12 = 1,000 ohms
R13 = 500,000 potentiometer (small preset type)
R14 = 2,000 ohms, 5 watts
R15 = 30,000 ohms
RFC1 = Eddystone 1010 RF choke
RFC2 = Eddystone 1066 RF choke
LFC1, LFC2 = LF chokes, 10 henrys, 80 mA
SW1, SW2, SW3 = SPST toggle switches
T1 = Receiver type transformer, 325-0-325v, 5v, 6·3v
V1 = 6J5, 6C5
V2 = EF54
V3 = 6SF5 or half 6SL7
V4 = 6AG7
V5 = 6SL7
V6 = 5Z4G
V7 = VR150/30

components and all valve-holders are mounted first and the power pack and heater wiring installed, taking care to tuck the latter into the corners of the chassis where possible to reduce the AC field. The remaining components may then be fitted and the wiring carried out, commencing with the oscillator circuit, followed by the EF54 buffer stage, phase modulator and speech amplifier and finally the 6AG7 doubler stage. The oscillator coil (L1) is mounted on small pillars so that the centre line is about 1¼ in. from the chassis, the lead from the "cold" end of this coil being taken through the chassis *via* a feed-through bushing to the stator vanes of the tuning condenser C2. The condensors C1, C4, C5 and C7 must be of the silvered mica variety, otherwise slight drift may occur. The disposition of the minor components is not critical. Each stage has its own earth point—a soldering tag under one of the nuts securing the valveholder to the chassis—to which all earth returns in that stage are made. The dimensions of L2 and L3 should be adhered to, otherwise difficulty may be encountered in getting uniform output over the band.

With the constants shown, the oscillator operates on 160 metres, the 6AG7 output stage doubling, output being available from 3·5 mc to 3·8 mc with a small margin at either end of the scale.

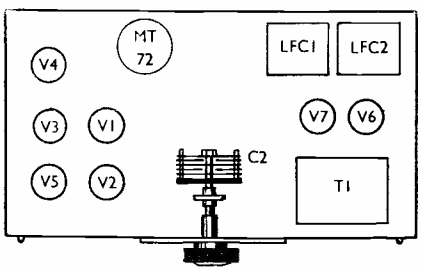


Fig. 2. A chassis layout for the NBFM VFO.

Setting Up

To tune up the unit, set C2 and C15 at mid-scale, connect a 6 volt 0·3 amp bulb across the output link L4, and adjust C11 for maximum output. Next adjust C15 for maximum output, and it should now be found that C2 may be set anywhere in the band with little or no variation in RF as indicated by the bulb.

The speech amplifier circuit is designed

Coil Table

L1 45 turns of 24 SWG enam., close-wound on 1 in. polystyrene former
L2 105 turns of 24 SWG enam., close-wound on 1 in. polystyrene former
L3 45 turns of 26 SWG enam., close-wound on 1 in. polystyrene former
L4 3 turns hook-up wire over cold end of L3.

for a crystal microphone, but more sensitive types may be used with a corresponding reduction of the deviation control (R13). This control is pre-set and should be adjusted at or near maximum for crystal microphones and between half and three-quarter gain for carbon or m/c types. This unit may be used to frequency modulate any transmitter provided that such transmitter is in itself stable and has no tendency to spurious or parasitic oscillations. The FM signal may be monitored on the station receiver by setting the selectivity control to the broadest position, switching off the AVC and tuning to one side of zero beat in the normal manner.

The unit may be keyed at point A or point B, the former giving complete break-in and the latter allowing a weak signal to be heard in a receiver tuned to one's own frequency. If desired to key permanently at point A, it is desirable to incorporate cathode bias in the output stage. One half of a 6SL7 may be used in

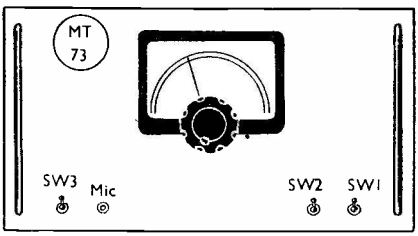
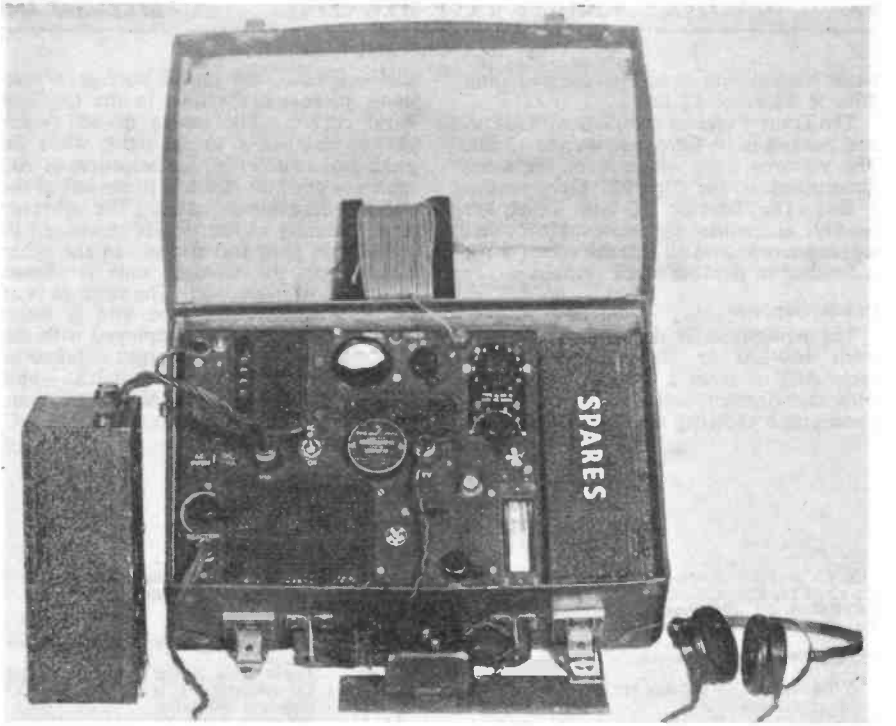


Fig. 3. Panel arrangement corresponding to Fig. 2.

place of the 6SF5 phase modulator if desired.

The Eddystone slow-motion dial used in the original provides, in addition to an arbitrary 0-100 scale, space for individual calibration from an accurate frequency meter such as the BC221.

In actual use on the air, the change from AM to FM simply requires the normal modulator to be switched off, the microphone plugged into the input jack of this unit and the switch SW3 closed. There should be no movement of any meter in the transmitter under modulation.



The Type A Mark III Trans-Receiver

Low-Power CW Tx/Rx for 3·5 and 7 mc

By J. N. ROE, M.I.R.E. (G2VV)

THE opportunities now available to amateurs to purchase ex-Service apparatus of suitable type finds us better equipped to prepare for portable work than at any time in the past.

One of the most compact and efficient Trans-Receivers is the Type A Mark III. The writer hopes that the information given here will be of interest, and assistance, to those fortunate enough to possess one of these excellent little-units, while also serving to furnish ideas to those amateurs wishing to build their own equipment for outdoor work when the season for such activities comes round again.

This item of surplus equipment was designed during the war for a particular purpose calling for the simplest possible operation, good frequency stability and the utmost portability. As it stands, it can be used as a transceiver for QRP CW operation on 40 and 80 metres. It is an attractive proposition for the low-power operator, as a stand-by in the main station, or for field-day activities.—Ed.

Technical information on the Type A Mark III has not been readily available ; the details given are of a general nature and are not intended as a complete technical description. Most of the observations are the result of experiment and operation at the writer's own station.

General Description

The complete equipment—excluding the Vibrator Unit—is contained in a strong fibre case measuring 13 in. × 8¼ in. × 4 in. When not in use, the aerial, key and headphones are stowed in the "spares" compartment. Also contained in this box are spare fuses, assorted mains plugs, large crocodile clips, and spare valves comprising one each of 7H7, 7Q7 and 7C5. It is really quite amazing to see all these

parts packed into a case measuring only 7 in. × 3½ in. × 2½ in.!

The Trans-Receiver complete with spares and packed in its fibre case weighs 13 lbs. The vibrator unit, which is of the same dimensions as the "spares" case, weighs 4 lbs. The interior of both units are readily accessible by removal of self tapping screws and all exterior metal work is finished in durable black crackle.

Power Supplies

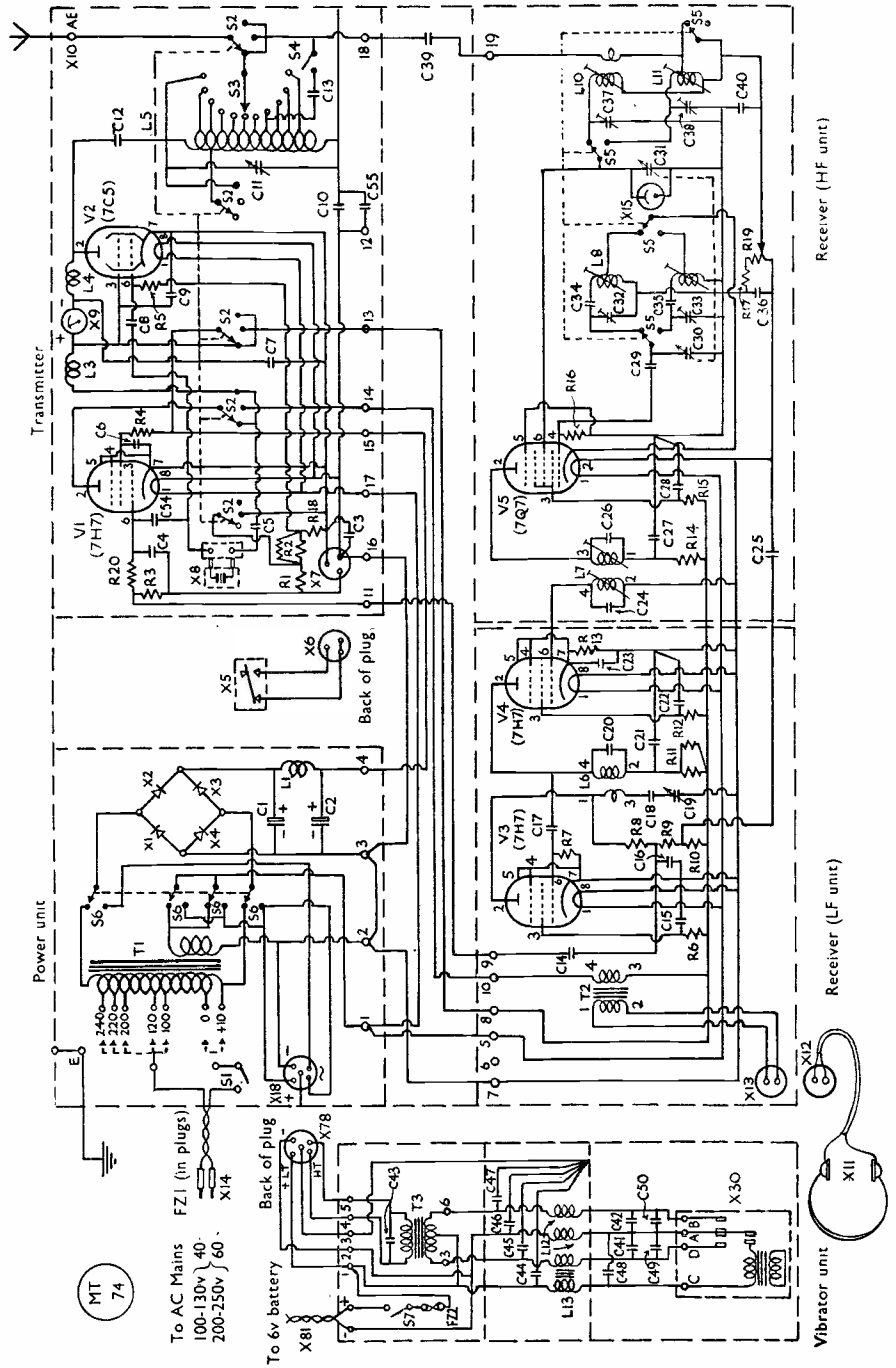
The equipment is designed to operate from 100-130 or 200-250 volts 40-60 cycle AC, or from a 6-volt accumulator with the vibrator unit. Referring to the photograph showing the equipment in its carrying case, the mains voltage adjustment sockets are visible in the top left-hand corner. The mains on-off switch (S1) is just below to the right, while the push-pull switch (S6) for selection of AC mains or vibrator input is to the left of the voltage adjustment panel. The vibrator unit, standing at the left, is connected in by a 5-pin plug and socket. In the other photograph the vibrator unit is shown with the cover removed. The vibrator is of the non-synchronous type and is fitted with AC filters. When employed with the Trans-Receiver the AC output is taken to the selenium rectifiers—*via* switch S6—and rectified and smoothed in the same manner as when the supply is taken from an AC

Table of Values

The Type A Mk. III Trans-Receiver

C1, C2 = 8 x 8 μF 450-volt working, electrolytic
C3, C6, C15, C21, C25, C36, C40, C44, C45, C46, C47, C48 = 0·1 μF 350-volt DC working, tubular
C4, C13 = 100 μμF 350-volt DC working, moulded mica
C5, C7, C9 = ·001 μF 350-volt DC working, moulded mica
C8 = 200 μμF 350-volt DC working, moulded mica
C10, C49, C50 = ·01 μF 350-volt DC working, moulded mica
C11 = 300 μμF ceramic air spaced (PA tuning)
C12 = ·001 μF 2,200 volt test, moulded mica
C14 = ·01 μF 350-volt DC working, tubular
C16 = ·002 μF 350-volt DC working, moulded mica
C17 = 20 μμF 350-volt DC working, silvered mica
C18 = 500 μμF 350-volt DC working, moulded mica
C19 = 50 μμF max. ceramic air spaced (Reaction)
C20 = 300 μμF 350-volt DC working, silvered mica
C22, C23, C27, C28 = ·02 μF 350 -volt DC working, tubular
C24, C26 = 200 μμF 350-volt DC working, silvered mica
C29 = 50 μμF 350-volt DC working, moulded mica
C30, C31 = 90 μμF max., each section, twin-gang receiver tuning
C32, C33, C37, C38 = 3-17 μμF ceramic trimmers
C34 = 600 μμF 350-volt DC working, silvered mica
C35 = 400 μμF 350-volt DC working, silvered mica
C39 = 500 μμF 350-volt DC working, moulded mica
C41, C42 = 0·5 μF 50-volt working, tubular
C43 = ·01 μF 2,200 volt test, moulded mica
C54 = 20 μμF 350-volt DC working, silvered mica
C55 = ·01 μF 350-volt DC working, moulded mica
R1, R17 = 330 ohms, ½ watt
R2 = 2 x 10,000 ohms in parallel, ½ watt each
R3 = 68,000 ohms, ½ watt
R4, R5, R12, R15 = 47,000 ohms, ½ watt
R6, R7 = 1 megohm, ½ watt
R8, R11, R14, R16 = 22,000 ohms, ½ watt
R9, R10 = 100,000 ohms, ½ watt
R13 = 100 ohms, ½ watt
R18 = 1,000 ohms, ½ watt
R19 = 10,000 ohms, miniature variable (Rx gain control)
R20 = 22,000 ohms, ½ watt
L1 = LF smoothing 3 H. at 60 mA, DC resistance 200 ohms
L3. L4 = HF chokes 3 mH., DC resistance 45 ohms
L5 = PA anode coil, 25 turns 20 SWG DCC
L6 = 2nd Stage IF coil unit
L7 = 1st Stage IF coil unit
L8 = Oscillator coil, Red Range
L9 = Oscillator coil, Blue Range
L10 = Aerial coil, Red Range
L11 = Aerial coil, Blue Range
L12 = Vibrator unit chokes, 24 μH
L13 = Vibrator unit dist-core choke
S1 = Mains ON-OFF switch, SPST toggle
S2 = Transmitter 2 Range and "Receive" switch 5-pole 3-way wafer type
S3 = PA anode/aerial tap switch, single pole 11-position wafer
S4 = Neon indicator push switch, SPST
S5 = Receive frequency selection switch, 4-pole 2-way wafer
S6 = AC mains or vibrator input switch, push-pull type, 4-pole 2-way
S7 = LT 6-volt input to vibrator unit, SPST, toggle switch
FZ1 = Mains fuses (in plugs), 1 amp tubular glass, 1¼ in. long
FZ2 = LT input to vibrator unit fuses, 10 amp, tubular glass, 1¼ in. long
X1-X4 = Selenium Rectifiers
X9 = 0-75 mA/meter
X15 = Neon indicator
X30 = 6-volt vibrator (non-synchronous) "W & W" type NS/6
T1 = Miniature mains transformer
T2 = Output transformer 1-8, primary inductance 17 H.
T3 = Vibrator transformer, 6 volt imput 260 volt at 50 mA output
V1, V3, V4 = 7H7 Loctals
V2 = 7C5 Loctal
V5 = 7Q7 Loctal

Circuit of the unit complete, as described in the text. This equipment can be operated as it stands on 3·5 and 7 mc for low-power CW working.


Transmitter
Power unit
Receiver (HF unit)
Receiver (LF unit)
Vibrator unit
Back of plug
To AC Mains
100-130v 40-
200-250v 60
To 6v battery
MT 74
V1 (7H7)
V2 (7C5)
V3 (7H7)
V4 (7H7)
V5 (7Q7)
T1
T2
T3

mains source. In the same photograph a general under-panel view of the Trans-Receiver is given. The four selenium rectifiers are mounted lower right with the miniature mains transformer and main HT condensers (C1, C2) immediately underneath (the latter are not visible in the photograph). The complete power section measures 3½ in. × 3½ in. × 3 in. !

DC output from the AC mains power unit is about 275 volts at 50 mA and from the vibrator supply 260 volts at 50 mA. Under normal operating conditions the LT consumption of the vibrator is 5 to 6 amperes.

Frequency Ranges

Two ranges are available on the transmitter and receiver. Blue and red indicating discs are fitted by the respective switches. The receiver tuning dial—which is of the thumb control type, visible in both photographs—is engraved in the two colours. The Blue Range covers roughly 3,200 kc to 5,200 kc (blue scale on tuning dial 107 to 197 deg. approximately). Red Range is 5,300 kc to 8,500 kc (red scale on tuning dial is 10 to 96 deg. approximately). The following spot frequencies were prepared against a Class D No. 1, Mk III wavemeter, and are given as a guide :

Red	8,000 kc =	18½ degrees on receiver dial
	7,000 kc =	36½ degrees on receiver dial
	6,000 kc =	64½ degrees on receiver dial
Blue	5,000 kc =	191 degrees on receiver dial
	4,000 kc =	157 degrees on receiver dial
	3,200 kc =	107 degrees on receiver dial

Selection of either Blue or Red Range on the receiver is controlled by switch S5—seen in the top panel photograph—just to the left of the drum tuning dial. Switch S2, situated to the right of the mA/meter, selects Blue or Red on the transmitter. This switch also has a central "receive" position.

Receiver Circuit

As will be seen from the circuit diagram, the receiver is a superhet with a 7Q7 in the first stage followed by a 7H7 IF amplifier and a further 7H7 with regenerative control, by means of C19—top panel photograph, extreme left-hand knob. The output is taken from this 7H7 *via* a transformer (T2) to low resistance headphones. The 7H7 in the transmitter is employed as an LF amplifier in the "receive" position.

The receiver section can be seen in the under-panel view and occupies the left half of the complete assembly. The three valves are immediately under the IF transformers—bottom left. The miniature volume control, R19, which is only ½ in. diameter, can be seen near the tuning dial. The complete receiver section measures 9 in. × 2½ in. × 3 in.

Transmitter Circuit

Designed for CW operation, in the frequency ranges already discussed, the transmitter employs a 7H7 as an oscillator in a Pierce type of circuit, the output of which is capacitively coupled to a 7C5 power amplifier. Keying is in the cathode return of both valves. No variable tuning is provided in the oscillator stage, the frequency being set by the crystal which is inserted into sockets on the top panel. Two tuning controls are provided in the PA stage : The tank tuning condenser (C11)—which, by the way, is a very nice air spaced ceramic job—and switch S3 for variable loading in the anode-aerial circuit. These two controls can be seen at the extreme top right in the full equipment photograph.

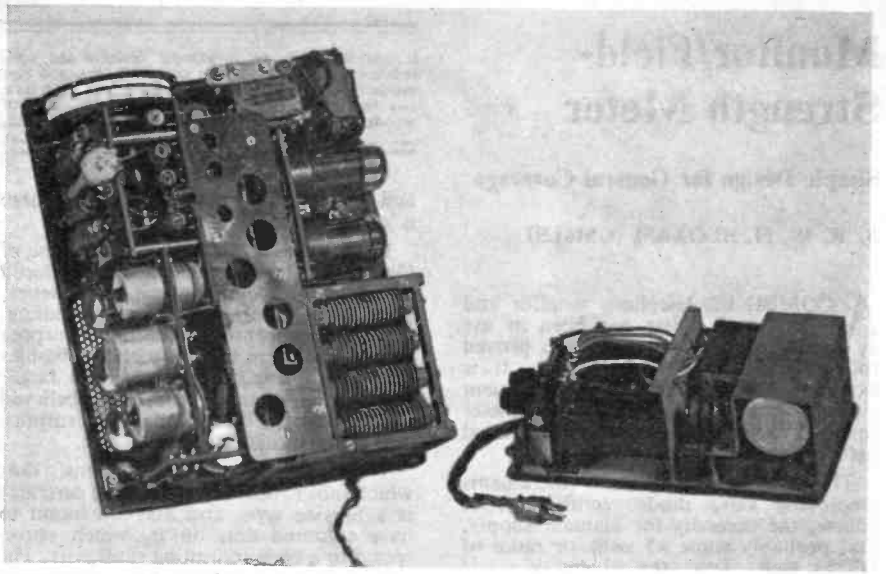
The anode coil (L5), together with the 7C5 PA and 7H7 oscillator valves, is located at the top right section in the under-panel photograph. This section measures 6 in. × 5 in. × 3 in.

A useful checking neon lamp (X15) is provided and may be brought into operation by pressing a small switch S4. Both can be seen in the top view photograph. The neon is just to the left of the receiver drum tuning dial and the press switch is between the mA meter and switch S2 knob.

Operating Notes

As the reader will by now have realised, the equipment is capable of covering the 7 and 3·5 mc amateur bands without any modifications. With the appropriate crystal in circuit and the transmitter and receiver switches set to the desired range, the set is ready to go. For portable work a 68-ft. length of flexible covered wire—wound on a former and seen in the equipment photograph—is thrown over a convenient tree and can be made to work quite well on both 7 and 3·5 mc. A longer aerial for 3·5 mc work would probably give even better results. As the 1½ in. diameter mA/meter is not too easy for checking small current changes in aerial loading an aerial meter, or neon, is a useful addition for tuning up the transmitter.

Under normal operating conditions—with either AC or vibrator supply—the current indicated on the mA/meter will be about 45 mA. In fact, a red line is drawn



The equipment removed from its carrying case. It is a complete 3·5/7 mc CW transmitter and receiver

on the meter face at this figure and it is recommended that the current does not exceed this. This average input to the 7C5 is 10 to 12 watts.

As a rough guide in tuning the PA, it will probably be found that anode tappings between studs 5 and 8 will give the best output ; but these settings will, of course, vary with different aerial systems.

The position of the transmitter frequency may be checked against the receiver dial settings by pressing the check switch S4 and rotating the receiver tuning dial until the check neon lamp (X15) lights up.

Given average conditions, the sensitivity of the receiver is very good and the majority of stations can easily be copied with the headphones on the table.

Conclusion

Although designed for crysta operation the transmitter works quite satisfactorily when the crystal is replaced with a VFO. Using this Trans-Receiver at the writer's station and a Hartley oscillator as driver, T9 reports are usually obtained. The output from the Hartley is taken, *via* a suitable capacity, to one of the crystal holder sockets. With this arrangement and a 68-ft. aerial about 42 ft. high most of Europe has been worked on 7 and 3·5 mc with the stated 10-12 watts input.

If G2VV has been heard on these bands with a /P call, it was with this Trans-Receiver, operated exclusively with the vibrator supply.

WINDSOR 35A FREQUENCY METER

They have recently produced an amateur-band frequency meter, covering all bands to 60 mc, with an accuracy better than 0·1 per cent. A stable VFO calibrated 1·7-2·0 mc is referred to a 100 kc CC oscillator, the trimmer adjustment being on the panel. The Windsor Model 35A Frequency Meter may be used to measure transmitter frequency ; to calibrate receivers ; as a transmitter monitor ; and as a check on drifting in either receiver or transmitter. The necessary power supply is incorporated and the dimensions of the unit complete are 12-in × 8-in. × 6-in. Taylor Electrical Instruments, Ltd., Montrose Avenue, Slough, Bucks.

Monitor/Field-Strength Meter

Simple Design for General Coverage

By **R. W. H. BLOXAM (GM6LS)**

If you have not an instrument designed and constructed on the lines of that described here, and you are active on the communication bands, it is high time you had one ! And once having used it you will wonder how you were ever able to do without it.—Ed.

A COMBINED telephony monitor and field-strength meter has been in use at GM6LS for some time and has proved to be both useful and reliable. It is extremely simple and yet very efficient either as monitor or as a sensitive meter to check aerial lobes and to make general field-strength measurements.

The drawback of all such instruments employing valve diode rectifiers is, of course, the necessity for filament supply, and probably some 45 volts or more of HT as well. True, the advent of metal rectifiers rendered the construction of valveless monitors possible, but unfortunately the efficiency of metal rectifiers falls off rapidly at high frequencies, so that the sensitivity is low. In consequence, the use of this type of detector as a monitor on 14, 28 or 58 mc generally necessitates rather tight coupling to the Tx in order to produce sufficient signal in a pair of headphones. The signal level for effective monitoring must, of course, be fairly high in order to check quality, hum or extraneous noise whilst modulating.

As a field-strength meter the arrangement is useless unless one is prepared to complicate matters by the addition of RF amplification, since measurements to be effective must be made at least a few wavelengths away from the aerial, and the meter deflections obtained are then too low for accurate readings.

Crystal Detectors

Obviously, a sensitive rectifier is required, particularly for field-strength checks, and the good old crystal-detector-with-cat's-whisker fills the bill in this respect ; but, unfortunately, it fails in regard to maintenance of sensitivity, since this varies widely with the "spot" chosen, oxidisation of crystal and cat's-whisker surfaces, contact pressure, and, of course, vibration-producing movement or change of pressure.

The "semi-permanent" crystal detector of the pre-war era, in which the crystal and contact wire were enclosed in a tube, is not satisfactory either.

During the war, however, a new type of Germanium crystal detector was produced which really does approach permanency, and cannot be upset by normal handling. These are eminently suited to the purpose in mind, and are relatively cheap, besides being exceedingly compact—little larger than a quarter-watt resistor. It is believed that some have been available as surplus, and they are also to be had new.

There are two general patterns. One which looks something like a ·22 cartridge is a Service type, and may be found to have coloured dots on it, which correspond to a code indicating sensitivity. The other type has wire ends, like a resistance. The body in both cases is ceramic.

These detectors are quite efficient, and were used both as detectors and as resonant-cavity mixers on centimetre-wave

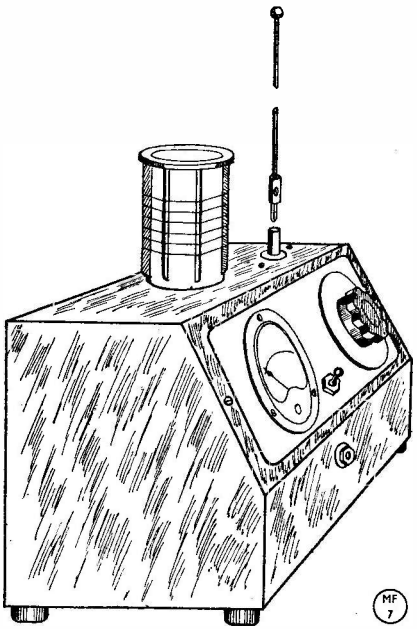


Fig. 1. The instrument as constructed by GM6LS.

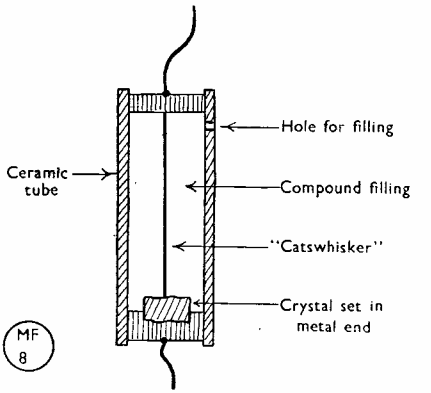


Fig. 2. A germanium permanent crystal detector. Actual size is $\frac{5}{8}$-in. long by $\frac{1}{4}$-in. diameter.

radar equipment at 3000 mc and higher !

The general construction is shown in Fig. 2. The whisker is positioned upon a sensitive spot during manufacture, after which the body is filled with a special compound which holds it in place permanently. Obviously the internal capacity is very low, since the electrodes only make point contact.

Great care must be taken not to overheat when soldering into circuit, and in fact only the wire-end type can be attached by this method. Hold with a damp cloth and work quickly. Little else will affect the sensitivity except, of course, excessive current.

The maximum permissible current varies with different types, and ranges from 2 or 3 mA to about 20 mA.

Circuit

The simplest form of 'phone monitor comprises an aerial, tuned-circuit, rectifier and headphones. Provided that the rectifier is good enough, the same arrangement with the addition of a sensitive meter to measure the rectified current will be satisfactory as a field-strength meter, thus replacing aural indication by visual.

The arrangement is shown in Fig. 3. Almost any small metal box may be utilised, which will contain the tuning condenser, the microammeter, a self-closing 'phone jack and the toggle switch used to short out the meter.

A ceramic valveholder to take standard $1\frac{1}{2}$-in. dia. 4-pin coil formers should be mounted into the top of the box, and also a small strip of sheet polystyrene carrying a socket. Various short lengths of stiff wire can be plugged into the socket, which serves as an aerial terminal.

For monitor use an aerial length of about 15 in. is usually sufficient, assuming the instrument is fairly near the Tx when in position on the operating table—6 to 9 ft., say, from a 50-watt transmitter. At 28 mc another "maximum" can be observed at half-wave intervals from the Tx. Wandering around the house and garden with this meter provides quite a lot of interest.

For field-strength measurements a somewhat longer aerial up to 4 or 5 ft. may be required to give sufficient meter deflection at longish range—100 yd. or more from a 50-watt transmitter on 28 mc. It will also be found advantageous to replace the normal tuning dial by an extension spindle comprising a 12-in. length of $\frac{1}{4}$-in. ebonite rod fitted with a knob one end and a $\frac{1}{4}$-in. brass coupler at the other. This will eliminate hand capacity and body "aerial" effects.

The headphone plug should be withdrawn when actually taking F/S readings, otherwise the body and 'phone leads give some variable pick-up.

Microammeter Indicator

A microammeter with a range of 0/200 μA works quite satisfactorily, but a 0/100 meter provides greater sensitivity.

Table of Values

Fig. 3. Circuit of the Monitor-F/S Meter

C1 = ·0001 μF, midget.
C2 = ·001 μF mica by-pass.
L = 80 m. 25 turns 26g enam., close wound.
40 m. 14 turns 24g enam. spaced $\frac{1}{8}$in. between turns.
20 m. 6 turns 24g enam. spaced $\frac{1}{8}$ in. between turns.
10 m. 2 turns 24g enam. spaced $\frac{1}{8}$ in. between turns.
Sw = Toggle switch, mounted close to meter on front of box.

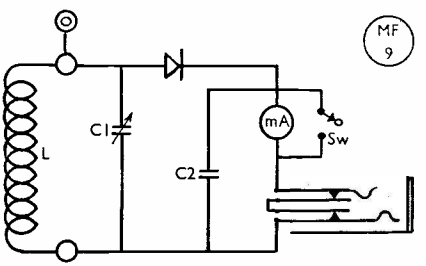


Fig. 3. Electrical circuit of the monitor F/S meter.

It is fortunate that these meters, normally very expensive, can be obtained relatively cheaply as surplus. Try to get one with a dead-beat movement. One such type, war-surplus, is a 0/100 microamp movement, but it is scaled 0/1,500 yd. Since usually only relative readings are required this is not really detrimental, and re-scaling to microamps is easily effected if required.

Needless to say, it is important to keep the meter switch in the "shorted" position when the instrument is in use as a monitor —unless it is well removed from the Tx field or the aerial is much reduced, since the current at resonance will be several times full-scale and would damage the meter.

When not actually in use for monitoring, the circuit should be detuned, avoiding "tiring" the crystal needlessly.

This meter has been used very successfully at a range of 250 yd. to plot the horizontal field of a 3-element 28 mc rotary beam. With the beam turned toward the F/S meter the aerial length and/or distance should be varied until a reading close to full-scale is obtained, after which the beam is rotated in steps of a few degrees and the corresponding readings logged for subsequent plotting on circular graph paper. The Tx input should be held constant, of course, and since the carrier alone requires to be held on for periods of time, the tests are best made when the band is "dead" and with appropriate breaks for station identification as the law prescribes !

Valve Versatility

Changing the Characteristics of Multi-Electrode Types

By E. JOHNSON (G2HR)

MOST of us have from time to time searched through our collection of valves and failed to find the type needed. It is frequently not appreciated that the modern multi-electrode valve may be connected in a variety of ways and will function very efficiently in its new guise.

A useful note showing how one type of multi-electrode valve can be made to perform several different functions. —Ed.

Rectifier Replacement

It will be understood that in many cases the result will be a makeshift, but it will at least keep the receiver going. Any valve with a fairly generous emission (which usually means an output type) will work quite well in emergency as a rectifier. It is only necessary to strap all electrodes to the anode—excepting, naturally, the cathode, which serves its normal purpose. Unfortunately, heater voltages will usually differ with octal types, and this may mean using another heater winding if the transformer is blessed with it ! This snag will not arise with English 4-volt types. Undue anxiety should not be felt at running the valve somewhat above its usual current rating. The strapping of the auxiliary electrodes to anode will considerably lower the equivalent DC resistance. Consequently, the normal current may be increased without exceeding the rated dissipation of the valve.

Normal Electrode Effects

In order to understand the effect of ringing the changes with multi-electrode valves, some knowledge of the physical construction is useful. The nearer the grid is to the cathode, and the closer the mesh, the greater the control over the electron stream. This means a high amplification factor. On the other hand, the greater shielding of the anode thus caused spells a higher impedance. The conflict of these two opposing factors makes the construction of a valve with high mutual conductance a matter of no little skill, requiring as it does a high amplification factor combined with low impedance.

Pentodes and Tetrodes as Triodes

Obviously, the grids of any multi-electrode valve may be connected in a variety of ways, either supplementing the action of the normal control grid or the anode. These remarks apply equally to tetrode and pentode alike, and the former will be taken by way of illustration. It is assumed that the suppressor grid is brought out externally in each case.

Fig. 1 shows a pentode connected as a triode. In the first case screen-grid and

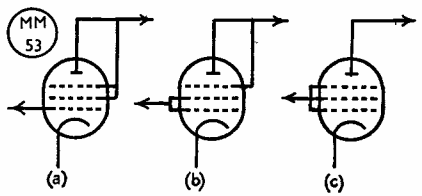


Fig. 1. (a) Pentode connected as triode with medium *mu* and medium impedance. (b) Connected to give high *mu* and high impedance. (c) Still higher *mu* and increased impedance.

suppressor grid are strapped to anode, the control grid serving its usual function. The anode, having increased in size and also being nearer the cathode, will have a much greater effect on the electron stream. We therefore have a triode of low impedance and medium amplification factor. In the second case the suppressor grid is connected to anode, control grid and screen grid being strapped, the result now being a triode with high amplification factor coupled with higher impedance. This effect may still further be intensified by strapping all grids together to act as one control grid, as in Fig. 1c.

Inverted Triode

It is sometimes desirable to control a relatively high current from a high voltage source without imposing any load on the control voltage. This is easily done by changing the roles of plate and grid, the normal anode now acting as control grid, and the grid serving as anode. The basic circuit is shown in Fig. 2, and the arrangement depends for its action on the fact that changes in voltage on the "grid", *i.e.*, normal anode, produce a considerable change in the electrostatic field near the cathode ; this in turn results in a large change of current in the output circuit. The internal dynamic resistance is consequently low, but the amplification factor is very small, being roughly the reciprocal of the amplification factor of the valve used in the normal manner.

Although this survey of unorthodox use of valves is brief, it will be appreciated that a little thought and ingenuity coupled with the knowledge of the fundamental workings of a valve open a wide field for experiment.

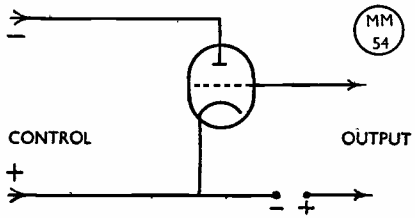


Fig. 2. Inverted triode controlling relatively high current from an HV source with no consumption of power.

CARDS IN THE BOX

Card(s) are held in our Bureau for the callsigns listed below. If we had addresses for them, the cards would have been despatched. If yours is in this list, please let us have a stamped, addressed envelope (large), with name and callsign ; send it to BCM/QSL, London, W.C.1., and the cards will be despatched on the next G clearance. And if you would like your callsign and address to appear in our "New QTH" space, put in a note on a separate slip at the same time.

G2AUK, 2FIP, 2HLM, 2JT, 2OG, 3APO, 3BBM, 3BCH, 3CA, 3CWF, 3CZM, 3CZU, 3DDD, 3DFV, 3DMG, 3DNI, 3DVM, 3DYX, 3ECK, 3EFG, 3EFQ, 3EHG, 3EHX, 3FQX, 3VZ, 6UX, GM3CLW, 3EHI, GW3AL, 3DCY.

BC-453 CORRECTION

With reference to the circuit on p. 457 of the September issue—"BC-453 for Better Selectivity"—some mistakes in this diagram have now come to light. The junction of C7a and C10b should be joined to the base-line, as should C15 and C16a ; a join should also be shown between the HV+ side of R10 and the horizontal line (to R7, R13) immediately above ; the second connection below L9 is a bit unnecessary ; there should be no connection between the bottom end of L13 and C28 ; and L1 and L3 should appear as cored inductances.

We have come to the conclusion that there is in fact no particular need to show the full circuit diagram of equipment which will normally be in working order, and to the wiring of which detail modification is not required. This of course will apply only to surplus conversions where the circuit itself is not an essential feature in the discussion.

DX COMMENTARY

ON CALLS HEARD, WORKED & QSL'd

By **L. H. THOMAS, M.B.E. (G6QB)**

What a month ! We doubt whether DX has ever been better in the history of Amateur Radio. It makes it very difficult for commentators, scribes and the like, because either the DX fraternity don't bother to report their doings, or, if they do, they are so comprehensive that one doesn't know how to boil them down.

At any rate, it is safe to say that practically every piece of DX that has been on the air on the various bands has been worked by those who have listened ; and that in a combined report on the month's activities the only prefixes missing would be those that simply have not been active (AC4YN please note !).

The Four-Band DX scheme seems to have caught on, and what a fillip the *CQ* DX Contest must have given to it ! Quite a number of new faces showed up on 7 and 3·5 mc, and what they found there must have caused them considerable pleasure. If any Contest scores come in, they will be found in "Stop Press" at the end of this commentary. Of course, the contest was just about as hard on single-operator stations as anything could be, because dead periods just did not exist. If the DX stopped coming in at any time (which, by the way, it didn't), you could still pile up an astronomical multiplier by working all the European countries on 7 and 3·5 mc. This obviously meant that any time spent in sleeping or eating represented a clear loss of points which could never be made up.

We still don't know whether the best tactics were to knock off the W's at high speed on 28 mc or to keep scratching around for new prefixes. A combination of the two was what was needed to push the score really high, and so it became a most exhausting business. (After working the W's at the rate of 26 an hour for two hours we noticed a smell of burning in the shack, but it wasn't the gear—only the operator.)

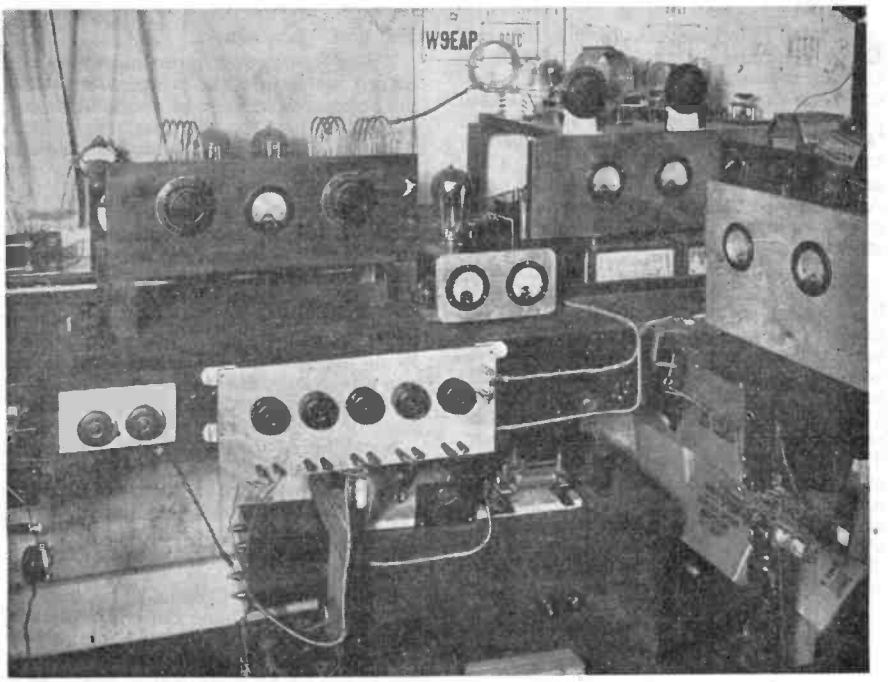
The fact remains that it was an unusually interesting and enjoyable week-end, in spite of the efforts of the Torquemada who invented the scoring system. On the Monday morning at 2 a.m. we said, very definitely, "Quoth the Raven" ; but probably next year will see the gear warmed up again.

To Grouse or Not to Grouse ?

Very few months go by without a Grouse-and-Grievance section, sponsored by one or more readers with very legitimate reasons. After sundry letters imploring us to "cut it out", we did—and with what result ? Why, letters asking for it to be put back again ! ZD4AM (Tafo, Gold Coast) says, " Please don't cut out the grumbles—they make the most amusing reading." And various home readers say, frankly, that the best way for the newcomer to find out whether he is unwittingly causing offence is for him to read the plaints of others. So we will have to take them as they come.

No doubt arising from last month's Editorial, there is a spate of letters this month on the subject of (*a*) inane, (*b*) insane, (*c*) asinine 'phone procedure. From one of them an interesting point emerges : this reader, who wishes to remain anonymous, says, "If you act the fool on CW you just appear as a very bad operator and you find it difficult to make QSO's at all. But no one knows quite what kind of operator a 'phone man is until he has got past the CQ or calling-up stage and really got going. And then it's often too late. But the Phone-Phools seem to congregate together, with the result that on one channel you will hear non-stop drivel, wet-nosed inanity and spotty-faced aggressiveness backed by colossal ignorance until you fear for the future of our hobby altogether." Strong words, but, we fear, necessary from time to time. Well-operated 'phone is such a joy to listen to that it's an awful shame that the bands are so besmirched at times.

And then even a well-operated 'phone can blot his copy-book by operating in the wrong place—witness our friend TA3FAS, who works whole strings of W's with very



Station G6QB, then at Thornton Heath, South London, in 1928/29. Extreme right, 160-metre transmitter ; far right corner, 80-metre CO and two doublers, locking the 20-metre TPTG oscillator (left foreground), with the modulator between the two units. Equipment of this type was representative of the amateur stations of the time.

high-powered 'phone on 28000 kc. A nice DX station, but *how* unpopular !

So away with the grousing, and let us pretend that all is clean and beautiful. Starting with a newcomer, here is G3EIZ (Liverpool) who has worked VE1, W1, W2 and KP4 on 3·5 mc with 25 watts—within a very few weeks of being licensed. He also enters the Four-Band list forthwith. 'EIZ heard, during the Contest, CM7RA, CN8MI, HH2BL, KP4KD and VO2R—all on 3·5. He has also worked OY4F on 14 mc—the OY said he was under cover and could not QSL, so we shall never know !

G2FSR (Chingford) visited "a certain establishment" and had personal QSO's with AP4M, ET3AG, EP3H and EP2BH, which he claims as a DX record of some kind or other. He was unable to transmit during the Contest and says it broke his heart to hear ZC8PM banging in, while not in a position to call him. ZC8PM, by the way, is W2AIS operating from Nablus, in "Arab Palestine" ; though why he uses the ZC8 we can't imagine. But he may eventually count as yet another new country.

G2FZO (Moreton-in-Marsh) is up to 100 watts and has been pushing it into KH6, CR7, KP4, MD4, VK6, VS6, PK5, VE8, ZC8, KL7, J9, OX and VQ8—which seems pretty comprehensive. G3CED (Broadstairs) is getting cards and SWL reports on 7 mc 'phone, which he doesn't use, and adds that he recently heard a station with T6 note signing "UN4LIS" and giving QTH as "NW Europe". A better plan than borrowing other people's calls, anyway. 'CED also tells us that Bob Davis, ex-G3CNU, of Broadstairs, is now in South Australia and hopes to be on soon as VK5XG.

G3EKN (Birmingham) came on the air for his very first QSO and found it was with G3EKM (Truro) ! He was only using a clothes-line aerial and 20 watts to a 6L6 on 7 mc, so was duly elated as well as very surprised. G3DRN (Wimbledon) asks us to state that his only frequency is 7028 and that the station of the same callsign on 7012 is a plate.

G2HIF (Malvern) is leaving for the Oxford-Reading-Swindon area, and is looking forward to operating without the complete cut-off to the west with which all the Malvern stations have to contend. 'HIF comments on the spate of Korean stations and quotes HL1AB, 1AE, 1BB and 1BM; his "bind" is about the Americans in rare DX spots who put out a mighty signal from BC610's and never work anyone but W's.

G8QX (also Malvern) implores us to "preach a gospel of good manners, and less binding about spivs, high power, low power, long CQ's and no CQ's." But it's very difficult to preach good manners without quoting some examples of bad ones! 'QX raised VQ8 for a new Zone and UF6 for a new country, and also worked C8KY in the *CQ* 'Phone Contest. The only "W" he raised was in Shanghai, and the only contact west of Malvern was a PY. And he has received certificates giving him first place among the G8's in the 1947 VK/ZL Contest ('Phone) in the 28 mc, 14 mc and open sections—nice work!

". . . Shocking transmission, OM, but as it's Christmas, can give you S9 plus FB. . . ."

The 1948 Marathon

There is only one more month to run before we decide the winner for 1948; this, of course, cannot be announced until February, because the January issue is prepared while the last-minute struggle is still continuing. The top scorers are G2EC (London, W.1) with 40Z, 163C, and G8KP (Wakefield) with 40Z, 155C; both scores, it will be agreed, represent quite an amount of hard work on the DX bands during one year!

G3FNJ (London, N.W.6) must, however, be the only station on record to work 69 Zones in less than a year; he worked 39 of them as SV1RX, then came home and was inactive for quite some time. Now he appears in the table as G3FNJ with a score of 30 after a very few weeks.

Speaking of Zones (which one simply cannot do without thinking of Zone 23), C8KY was very active during the 'phone half of the *CQ* Contest, and must surely have given very many G's a new Zone. And yet the scores don't seem to have leapt up. . . .

G3DO (Sutton Coldfield) remains at the head of the 'Phone Only list with his fine score of 35 and 108. If some of you CW men don't regard this as an achievement, just try to work 100 countries in a year on 'phone.

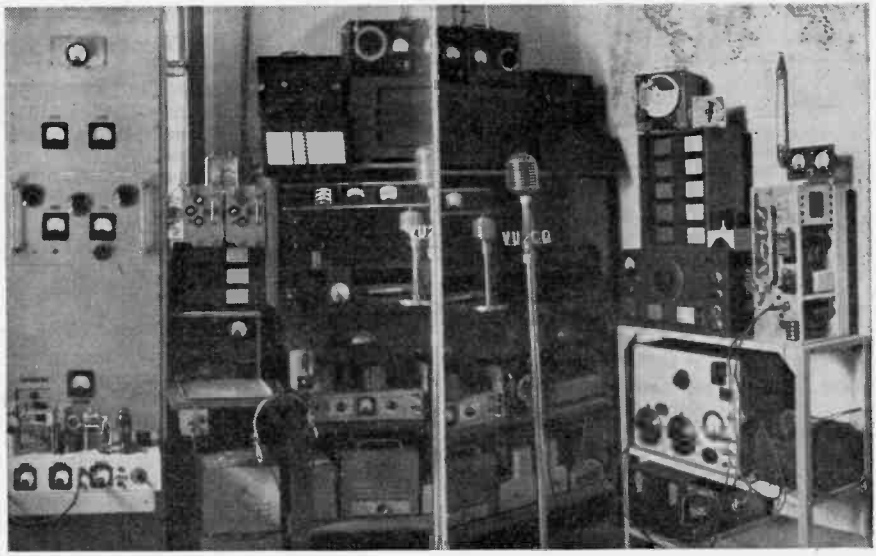
From Overseas

A very strong overseas contingent has shown up in the mail this month, including that rare DX piece MP4BAB (Trucial Oman). He doesn't know, as yet, that he caused a bit of controversy last month, because he tells us that due to the mails he is some months behind with the *Magazine*. He is carrying on the VS9GT tradition by QSL'ing, and sends his nice cards (printed in England!) back through the Bureau. Some idea of the difficulties out there is given by his statement that the aerial is a Windom—but made of barbed wire stripped of the barbs! Judging by the list of QTH's MP4BAB has sent in, he is working practically everything.

VS7BH (full QTH in panel) is G3BHC, ex-VS1BH. He returns home to his G call in 1950, so we seem to be assured of at least one VS7 for next year.

ZD4AM is back at Tafo and receives a few cards for 28 mc 'phone QSO's, whereas he operates solely on 14 mc CW. He is on most mornings from 0630 until 0700 or a little later.

VQ4CUR writes to say that they have a radio club going out there, with classes for beginners, so there may be some more



VU2CQ, Bombay, runs 100 watts to a pair of VT104's on 3·5, 7, 14 and 28 mc, Class-B modulated with a pair of 830B's, one aerial being a Sterba curtain. On 50, 56 and 144 mc, on which bands he is also active, VU2CQ has an 829 PA at 60 watts input. Receivers are AR88, HRO and ex-RAF 1337, 1338, with RF Units Type 26 and 27 ; he also has an SCR-522 converted for 288 mc. Other equipment includes a BC-221 and a wire recorder. VU2CQ has worked 148 countries on 'phone, and is a well-known DX signal.

VQ4's available one day. In his first 41 days in Kenya, '4CUR worked 58 countries. He has put up a vee-beam which should get him into G, but it seems to be omni-directional with a preference, if any, for U.S.A. ! We imagine this to be due to the preponderance of W's on the air and their particular liking for the rarer South Africans. Life isn't all beer and fun down there in Kenya, where 50,000-ohm 2-watt resistors cost 7s. 6d.!

G3AWR reports from the M.V. *Tornus* at Hong Kong and sends some 28 mc Calls Heard. He finds reception a little difficult when in dock undergoing repairs, and underneath electric cranes—to say nothing of the riveting going on in the next cabin.

ZS2AT (ex-G2AT and VQ5NTB) insists on letting off steam. Point No. 1—the squeezing of the CW band on 28 mc by the 'phone stations who insist on creeping lower and lower so as to be the first heard by the W's who tune "from 28 up." No. 2—what does "Your final final final" mean? Why can't some people end a QSO without all this love-and-kisses business? No. 3—pirates ; ZS2AT suggests that 80 per cent. of the cases are due to misread callsigns, and we are rather inclined to agree. No. 4—this stupid business whereby the KA's are not allowed to work foreign stations. If they cannot use Amateur Radio for world-wide communication, the bands should not be thrown open to them. (Feeling better now, 'AT ?)

VQ4RF (Nakuru) is a newcomer, using QRP at present. After several abortive sorties on the bands, he decided that a rhombic was desirable, so they cut down four gum trees and stuck them up again in the right places ! First QSO was with OZ7UU, but VQ4RF's hand was trembling so much he couldn't write him in the log. Since then, however, all has gone well and quite a bit of DX has been worked with *two watts*. 'RF makes it quite clear that some real spivvery goes on in South Africa, too. He names a couple of ZS's who VFO'd on to a G calling CQ on CW, and, while he was actually sending, called him on 'phone and told him to come up on 'phone on the same frequency. (It may be clever, but we don't get it !) Several other ZS's apparently let their 'phone loose well down in the 14 mc CW band.

ZC1CL (Amman) has not been operating quite so much, but he seemed to be pretty active during the contest. He has worked YA3A, but if he's the YA3A we have been

FOUR-BAND DX

Station	Countries Worked					Power
	7	14	28	3·5	Total	
G5FA	68	111	8	7	119	100
G6QB	51	144	103	27	171	150
G5WC	43	112	12	1	114	18/45
G2VD	39	148	64	21	156	150
G3ATU	34	134	35	23	142	10/150
G3AGQ	33	22	5	20	48	?
G8IP	30	109	59	13	125	3/150
G3AKF	30	64	21	22	83	60/150
G3AAE	28	128	38	18	131	75/125
G8VB	28	87	11	38	110	150
G8LO	27	106	10	10	106	150
G3DO	26	134	87	14	163	150
G2AVP	24	138	2	15	147	25/120
G2BJY	24	46	78	4	102	25
G2YS	22	99	14	18	100	150
G4QK	22	70	2	19	74	100
G2AVC	22	55	7	15	?	10/100
G2DHV	21	52	2	12	53	35
G8QX	17	93	61	11	117	150
G3AKU	12	123	11	21	130	'Phone 30
G2VJ	11	56	40	4	79	25/150
G2HIF	9	37	24	6	58	130 'Phone
G3ACC	3	102	2	16	122	150
GW3ECH	2	30	5	6	34	25
G3EIZ	1	24	1	20	30	25

hearing lately, then YA is the prefix for Mittel-Europa. 'CL wonders how many people hold *more than one* DXCC certificate? His cards from MD1D are over at ARRL, being checked, but he expects to send another bunch from ZC1CL before much more time has elapsed. Then, when he comes home next March, he'll be straight out after a third.

ZC1CL recently met GM3AFG, who, he tells us, has held the calls ZD3AF, ZD2T, VQ2JT, VQ3JMT, VQ4JMT, VQ5JMT, VQ4AWH, ZS6OL and ZS9C! Looks as though someone might crop up, one day, who can give himself enough of his own cards for a DXCC!

VS2CQ (Kuala Lumpur) is ex-G2NR and G5MG. He is using CW on 14060 with a B2 only, and says that Amateur Radio with a temperature of 90 and humidity of 95-100 per cent., with violent daily storms, is "a complete change from home"! But there's no TVI trouble.

From ZS5DS, we hear that there is now a Pietermaritzburg DX Club, with 12 active members. Anyone contacting five of them is eligible for a rather nice certificate and for certain privileges "which are secret"!

ZD1BD passes on the information that the only official stations in ZD1 are himself 1SW (14 mc 'phone), 1AS (14 mc CW), and 1FB (14 mc 'phone and CW). They get an extremely heavy mail of (mostly) worthless SWL reports down there in Freetown, where QSL cards "cost the earth," so replies will be few and far between—and certainly there will be none unless IRC's are enclosed.

AP5B (also VU2HS and G3HS) is back in the U.K. on leave, and says that if anyone has not received his QSL for a contact with AP5B or VU2HS, they will be duly fixed on receipt of a line to his home QTH. He remarks that AP4M is also home—for good.

And just as this was being closed for press, in came an airmail, dated October 26, bearing the Gyantse, Tibet, post-mark —from R. W. Ford, AC4RF, ex-AC3SS, giving the following interesting information: He is living in Lhasa, near AC4YN, and will be operating AC4RF in Tibet "for some years" on 14 and 28 mc CW and 'phone; due to power difficulties, the rig will have to be a modified B2 with a 6L6 final only. AC4RF asks us to say that AC4YN and himself are the only genuine amateur stations in Tibet, all other calls being phoneys; they both suffer from their own calls being pirated (about the meanest and most senseless form of piracy there is) and also receive cards for phoneys like "AC3GG", who has never been on in Tibet. AC4RF adds that he is looking forward to G contacts and to renewing old AC3SS acquaintances; if anyone has not had his AC3SS card, he will be glad to forward another, as he has now recovered some lost baggage with his old logs. The full QTH for AC4RF is: R. W. Ford, Lhasa, c/o Gyantse P.O., Tibet, *via* Siliguri, W. Bengal, India.

28 mc DX

Some of the types who think 28 mc is

The Radioman's Shop

Brand New in maker's cartons

Ex.-R.A.F.

R.F. Unit 26 for 65-50 mcs., 5-6 metres. R.F. Unit 27 for 85-65 mcs., 3·5-5 metres. In popular use as convertors.

Each unit complete with 3 valves, VR136's (EF54), VR137 (EC52), S.M. tuning, etc., etc., contained in neat metal case $9\frac{1}{2}'' \times 7\frac{1}{4}'' \times 4\frac{3}{4}''$. Voltages required H.T. 250v, L.T. 6.3v.

Clydesdale's price only **35/-** each Post paid

6-way Jones type flex socket in metal cable entry cover, for R.F. 27, 26, 25, 24, etc. Price: 3/6 each, 6 for 17/6, or 12 for 30/-, post paid.

Circuits available at 1/3 post paid.

Transmitter Tuning Units

For that "Transition V.F.O. Unit"

New, but slightly dented and scratched.

TU5B. 1,500-3,000 Kcs.
TU6B. 3,000-4,500 Kcs.

Clydesdale's price only **19/6** each Carriage paid

TU8B. 6,200- 7,700 Kcs.
TU9B. 7,700-10,000 Kcs.
TU26B. 200- 500 Kcs.

Clydesdale's price only **15/-** each Carriage paid

Brand New

Ex.-U.S. Navy

3" C.R.T. Indicator

Type 3BP1 cathode ray tube, with holder, in tilt-mtg. metal case, which is adjustable to any angle 0-45 degrees, and can be locked in any position. Holder has 5 ft. or 11-core metal braided cable wired to it. Case has telescopic light shield and glare-proof screen. Overall length 24", base 12", finish black crackle.

Clydesdale's price only **45/-** Post paid

Ex.-U.S. Navy

BC-221 Wavemeter

Range 125 kcs. to 20 mcs., Xtal 1,000 kcs., 0·01% accuracy. 3 valves 6SJ7's, 6K8, Vernier tuning, complete for battery operation, slightly soiled externally, less Inst. Bk.

Clydesdale's price only **£9.19.6** Carriage paid

Brand New, Ex.-U.S. Navy

ASB Series
Cathode Ray Indicator

Having a 1802P1, 5" CR.7 in mu-metal shield with 3/6H6, 2/6SH7, 1/6AG7, 1/6AC7 valves, with various condensers, resistors, pot'mtrs, switch, etc., on metal chassis.

Housed in metal cabinet, size $18\frac{1}{2}'' \times 8\frac{3}{4}'' \times 8''$, finished black.

Clydesdale's price only **£4.10.0** Carriage paid

Brand New, in maker's cartons

38 A.F.V. Xmtr/Rcvr. Unit with Power and L.F. Amp. Unit

Frequency 7·3-9 mcs. 6 valves, 3/VP23's, 2/V248A's, SW75 (pen), metal rectifiers, Vibrapack, for 12v in two units. Xmtr/Rcvr, size $10\frac{1}{2}'' \times 4'' \times 6''$. Power Amp. $11\frac{1}{2}'' \times 4'' \times 6\frac{1}{2}''$, plus spares, aerial and Instruction Book (less junction cable).

Clydesdale's price only **79/6** per set Carriage paid

Ex.-R.A.F.

C.R. Indicator Type 62

Containing: VCR97 C.R.T. with mu-metal shield, etc., Xtal unit 10XC/2, 17/SP61's, 2/EB34's, etc., etc. Used good condition.

Clydesdale's price only **67/6** Carriage paid

only good for working strings of W's might be interested in a letter from G8KP (Wakefield). Here are some of his 28 mc doings : XE1KE (1730), PZ1WK (1753), VQ8AD (1200), TG9CH (1500), CR7AD (1627), HR1MB (1905), VP5AR (1955), KZ5EL (1400), FI8ZZ (1340), VP8AD (1630), IS1AEX (1043), VP5AX (1750). There are many more, but those are probably the most interesting. Other good stuff from 'KP is as follows : 14 mc, TI8RB (0607), HH3L (2240), ZD8B (1925), ZP3AW (2300), HC1JW (2250). The latter has been worked three times and QSL'd three times ! On 7 mc, CO2LN (0345), KP4HU (2345), ZC1CL (1945). Don't break down and weep—go out and buy an alarm clock.

Incidentally, G8KP is given as the winner for G in the CW section of the VERON Contest, with 12,528 points ; G8KG was second with 12,420, and 26 G entrants are credited with points. The leading British station in the 'phone section was G8JQ.

G3AKU (St. Ives) waited a year for an XE and then heard three within an hour. Yes, he worked one. He says, " I'm still trying to find out why people like 7 mc . . . never heard such a racket."

G2DFR (Newbury) collects new ones nice and fast, and during the Contest grabbed CZ2AC and ZC8PM, whose Zone number he didn't get. It's 20, 'DFR. G3ATU (Sunderland) says the notorious "AC4AK" has reappeared, saying the name is Joe, he is English, and uses a BC-610. This puts him right outside Tibet at one go ! 'ATU wonders what the D2's and D4's thought of the mob of DA and DK stations operating in the *CQ* Contest and getting away with it. We shall probably know by next month.

GM3CSM (Glasgow), whose score has leapt up since his QRO, just missed his century in the first year, which he finished with 95, in 35 Zones. He tells us that GM3RL and GM6MD have both made the DXCC. G3DCF (London, E.C.1) has worked TU2LO, but had his card returned (from where, we wonder ?). He was also told by KL7GF that the station of that call on 14 mc CW is a pirate. The real KL7GF has not yet worked G.

G2AVP (Stradishall) has rebuilt and now has 120 watts on four bands, switched. GW3ECH (Trecwn) had a "brief encounter" with VQ8AD until the spivs came along. After 8AD called him (in answer to a CQ !) his frequency was sub-

ZONES WORKED LISTING

POST-WAR

(Starting Figure : 30 Z)

Station	Z.	C.	Station	Z.	C.
'Phone and CW			'Phone and CW		
G8KP	40	186	G6BB	36	100
ON4JW	40	172	GM3CSM	36	98
G6QB	40	171	G2BXP	36	95
G8IH	40	168			
G2AJ	40	167	G3DAH	35	111
G4CP	40	164	G8VR	35	104
G3DO	40	163	G2YS	35	98
G2WW	40	163			
G2AVP	40	147	G5WC	34	114
G3AAE	40	131	G8PL	34	106
G8IP	40	125			
			G3ACC	31	102
G2FSR	39	160	G2BJY	32	102
D2KW	39	158			
G2VD	39	156	G3BNE	31	76
G3BI	39	146			
G4AR	39	131	'Phone only		
ON4MS	39	130			
G5CW	39	126	G2ZB	39	144
G3AAG	39	124			
G5MR	39	109	G3ZI	37	136
G6PJ	39	85	G3DO	37	130
G3ATU	38	142	G2BXP	36	81
G3AKU	38	130			
G5FA	38	120	G8QX	35	117
G8KU	38	116			
G2AO	38	114	G3DAH	33	99
G8LO	37	104	G2VJ	30	79

1948 MARATHON

Station	Z.	C.	Station	Z.	C.
'Phone and CW			'Phone and CW		
G2EC	40	163	G2BJY	30	95
G8KP	40	155	G3BNE	30	72
G3AAE	40	113	G3FNJ	30	67
G4CP	39	143	G2AO	29	80
G2VD	39	127	G8LO	29	73
G3DO	39	126			
G3BI	39	126	G2BXP	28	66
G2AVP	39	118			
			G6XX	26	52
G3ATU	38	125			
G2AJ	38	110	G2SO	25	62
G8IP	38	97			
ZC1CL	37	122			
G5FA	37	112			
GM3CSM	36	89	'Phone only		
G3AAG	36	103			
			G3DO	35	108
G2WW	35	112			
G3DAH	35	110	G3DAH	33	94
G8KU	35	97			
G2DC	35	92	G3ZI	32	81
G8PL	34	97	G2BXP	28	65
G4AR	33	97	G8QX	27	86
			G2VJ	27	64
G2DFR	32	72			
G5MR	32	45	G6CB	25	54

merged by about 40 W's, some calling CQ DX and some just swishing VFO's about. Collective spivvery now, it appears.

G2SO (Leigh-on-Sea) mentions the idea of CQ-less periods, but finds that when using crystal it is actually best to call CQ, and has had come-backs that way from TI2, KB6, KH6, VS1, KL7, CE and C6.

G3ACC (London, S.E.22) has had a visit from one of the operators of MB9BJ, who says they *will* QSL all contacts but haven't yet managed to acquire any cards. 'ACC found that a DX Contest needs "nerves of steel" and admits that it was a shattering experience for her. With MB9BJ at the key, she did work YA3A, though. She adds that K2UN came up with five long CQ calls right on top of ZD9AA, and though he was called every time, didn't come back until the last one, and then to a ZS.

G5FA (London, N.11) has returned to his old love, "forty," and has collected FA, UA9, UF6, KP4, PY7, EK1, CO, VE7, W6 and lots of smaller fry. 'FA heads the Four-Band DX list this month, since we have given 7 mc the place of honour, and his score of 68 countries on that band should be enough to give anyone a run. (We ourselves creep up second with a humble 51, and 17 countries difference represents so much loss of future sleep that we doubt if we'll ever make it.) Congratulations, 'FA, and Long-Live-Forty.

Stop Press

Here is such of the Contest news as has arrived to date. G2VD (CW) scored 117,624, with a multiplier of 169 ! He doesn't state whether he was in the one-operator section or not, though. G5CW (CW with three operators) scored 96,509 ; multiplier 119. G2PU ('phone) scored 90,628 and a sore throat. He heard just beforehand that he had won the ARRL 1948 'Phone Contest, so that good news goaded him on. We should say there is little doubt that he will be the winner of the *CQ* 'Phone section. DX included C8KY, ZS3F, ZD1BD, C1CH, VP2GB and lots more. Fine work, 'PU.

Other CW scores to hand are G6QB (one operator), 69,300 ; G8IP, "over 60,000" ; G4AR, 33,197 ; GM3CSM, 14,750 ; G2AVP, 7,800. The Contest, looked at in retrospect, was fun—but writing up the log was *not*.

Greetings

This is the last time we shall meet before those cryptic signs "Mri Xmas" start creeping into all our QSO's, with the 73 and things. So may we take the opportunity of wishing all our DX correspondents and readers the very Merriest of Christmases, with as much Good Cheer and Good Will as there is available. And may the Amateur Spirit not be overshadowed by other types of spirits during the coming season. May, also, the Good Will of the season not cease with the end of the holiday, but continue throughout next year and all years to permeate our hobby.

Deadline for next month will be first post, December 14. So forward all your letters and news, with the postcards full of figures, to DX Commentary, *Short Wave Magazine*, 49 Victoria Street, London, S.W.1, by that date and *not* two days later, please.

And now, once more, 73, BCNU, and "Mri Xmas."

DX QTH's

AR1RJ	Box 35, Damascus, Syria.
AR8BC **AR8BM**	Box 1119, Beirut, Lebanon.
C3ET **C3KC**	Box 193, Canton, South China.
C7OO	C. H. Sun, Box 52, Peiping.
EA8CO	C. Olias, Apartado Postal, Las Palmas, Canary Isles.
FE8AB	Ivan Pastre, Base Aviation, Douala, French Cameroons.
HL1AY	APO 235, c/o PM, San Francisco.
HP1LR	H. Luria, Box 91, Panama City.
HR1MB	M. G. Brashear, c/o U.S. Embassy, Tegucigalpa, Honduras.
KZ5CE	Box 1460, France Field, Panama Canal Zone.
MD4BPC	S.Q.M.S. W. H. Caunter, c/o P.O., Hargeisha, British Somaliland.
RV2/FO8	R. d'Assignies, Raivavae Island, *via* Tahiti.
VE8MA	Eureka Sound, Ellesmere Island, N.W.T., Canada.
VP8AP	c/o F.I.D.S., Port Stanley, Falklands.
VS7BH	Capt. R. T. R. Cocks, R. Sigs., Ceylon High-Speed Wireless, c/o G.P.O., Colombo.
VU4AC	Minikoi, Laccadive Islands, Indian Ocean.
ZD1SW	Box 99, Freetown, Sierra Leone.
ZD4AH	Box 287, Sekondi, Gold Coast.
4X4AA	J. Baer (ex-ZC6LA), Box 4150, Tel-Aviv, Israel.

Aerial Design— Further Suggestions

Consideration of 14 mc Systems

By I. E. HILL (G6HL)

This article will suggest a new line of approach for those wishing to install an effective 20-metre radiating system. Our contributor's discussion will in any case show how much time, thought and attention can (and should) be given to the problems of aerial design generally.—Ed.

AFTER some thought the writer decided that DX operation on 7 and 3·5 mc was not a serious requirement for him and that any odd bit of wire *plus* the water pipe would make an adequate ¼-wave Marconi aerial system for his occasional forays on these bands. A considerable proportion of the air space available round the house was already occupied by three 28 mc Lazy-H arrays, so adoption of a similar scheme for 14 mc was out of the question. The requirement was, therefore, an aerial system which would occupy the minimum space, give something approaching omni-directional performance, and at the same time improve on the general-purpose aerial previously in use (Fig. 3B, p. 385, *Short Wave Magazine*, August, 1948).

Vertical Half-Wave

If an aerial is to be omni-directional in the horizontal plane it must be vertical and the difficulty is then to obtain the right radiation angle in the vertical plane if the aerial is to be high enough to avoid losses in local obstructions. Also, as it will give approximately equal radiation in *all* directions, much of the available power is being radiated in quite the *wrong* direction at the time of any one specific contact. Obviously, an approach would have to be made with a horizontal aerial erected at the right height to give useful vertical angle radiation and means found to change directivity.

Horizontal Half-Wave

A single half-wave aerial radiates a maximum in the horizontal plane broadside to the run of the wire (Fig. 1A). Two half-waves fed in phase give increased broadside directivity and a narrower lobe (Fig. 1B). The same two half-waves fed out of phase (as with a full-wave Zepp.) give a four-leaf clover pattern (Fig. 1C). Between the two arrangements of feed an almost complete coverage is obtained with an average increase of 3 dB over a single half-wave aerial.

Tuned Feeders

The problem is how to feed the two half-waves and have a quick switched control of the phasing. Several methods are fairly obvious. First, one may use a three-wire tuned feed to the centre of the aerial, as at Fig. 2A. By suitable connection of the three feeders to the aerial matching unit, the tuned feeders will give "in phase" feed with connections shown in Fig. 2B and "out of phase" as in Fig. 2C. This method is quite effective but has the disadvantage of giving standing waves on the feeders and the necessity for slight readjustment of the aerial tuning unit after switching. It has the added advantage, however, that the aerial can be used on harmonics or half frequency.

Low Impedance Feed

Method No. 2 is somewhat simpler and entails two equal lengths of low-impedance twin feeder, each connected

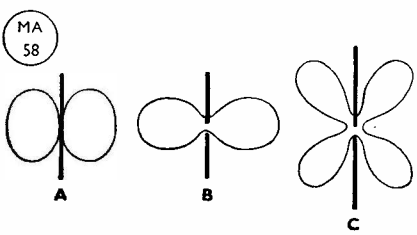


Fig. 1. Horizontal radiation patterns with differing wave formations on the aerial.

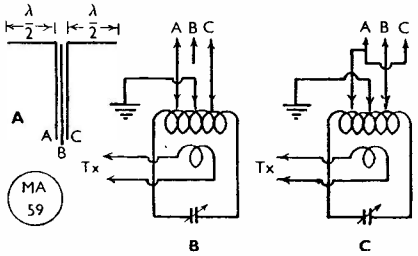


Fig. 2. The use of tuned feeders.

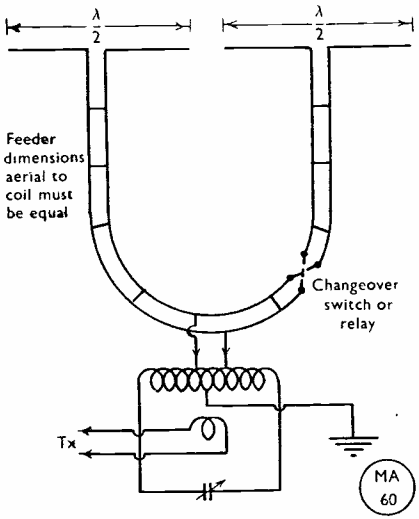


Fig. 3. Low-impedance feeder system.

to the centre of one half-wave aerial (Fig. 3). At the transmitter end one feeder is taken to the aerial tuning unit *via* a DPDT switch and the other direct. Changing over the DPDT switch will alter the phasing of the feed and thus the horizontal radiation pattern of the whole aerial. Aerial tuning is not affected and a small remote-operated relay will do the change-over job very neatly.

But 150 ft. or so of low-impedance twin feeder costs money and in these hard times . . . . so we pass on to Method No. 3 !

600-ohm Line Feed

A three-wire folded dipole with a reasonable number of spacing insulators makes a job guaranteed to impress the local population and, strangely, it also works. The impedance at the centre point is increased such that a 600-ohm open wire line can be directly connected. A 600-ohm line can be made from the junk box and still be reasonably low loss. The set-up now develops as at Fig. 4. Spacing between the adjacent elements of the aerials, each of which was made by twisting strands of various gauge wire rescued from scrapped power transformers, should be 5 or 6 in. Spacing between the feeder lines was fixed at 4 in. The change-over switch or relay becomes a little more cumbersome and must be insulated for high voltage. The feeders can be of any reasonable length but must be equal and join at the aerial tuner unit.

Results.

With a pair of half-wave folded dipoles fed by 600-ohm line results were quite encouraging and one considerable advantage was noted over low impedance feed, and to a lesser extent, tuned feeders. The frequency range over which the aerial would load satisfactorily was considerably greater *and easily covered the* 14 *mc band.* Results were good and numerous DX contacts made with satisfactory reports. However, in the broadside direction the difference between in- and out-of-phase feed was not marked and the maximum difference on signal reports averaged two S points. In fact, during

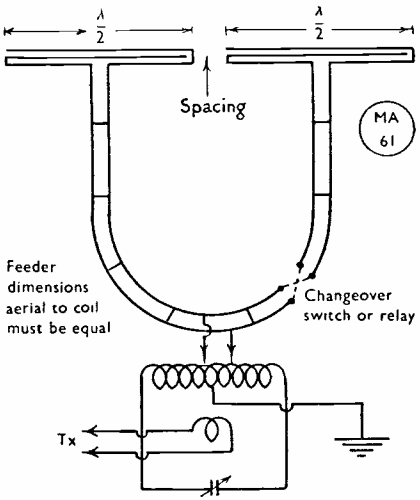


Fig. 4. Folded dipoles with 600-ohm open-wire feeders

most of the operating time, the out-of-phase position was selected and a change made to in-phase only if a contact "broadside on" was desired.

Increasing Directivity

The obvious next move was to try to increase the directivity. By spacing the two half-wave aerials up to one half-wave, still in line, the horizontal pattern is sharpened up both when fed in phase and out of phase. This improved the comparison and produced a relatively "dead"

ADVANTAGES	DISADVANTAGES
(1) Somewhat tricky to construct, but not difficult, and junk-box material can be used.	(1) Not much help in reducing interference on receive except in the "in-phase" position. Even then, it is bi-directional.
(2) On receive and switched "out-of-phase" it is almost omnidirectional ; signals are therefore heard from all directions.	(2) Maximum horizontal plane gain over a single half-wave is only about 4 dB with in-phase feed and slightly less with out-of-phase feed.
(3) Frequency response broad enough to cover amateur bands without loss of loading.	(3) Christmas tree appearance.
(4) Feeder adjustment and aerial loading relatively simple.	
(5) Directivity switching at "flick of a switch."	
(6) Radiation is at low angle and, therefore, *effective* gain over a half-wave dipole is more than the 4 dB quoted as a disadvantage.	
(7) Can be slung up between any two supports and does not involve rotary mechanisms.	

area broadside with out-of-phase feed. Additionally, the out-of-phase coverage more nearly approached the line of the aerial. In fact, satisfactory reports were obtained from KL7 and ZS within 10 degrees of the aerial direction.

Stacking Two-Over-Two

The spaced two-half-wave aerial was erected at a height of 40 ft. and was used on 14 mc long enough to get reasonable confirmation of the anticipated horizontal coverage. The next stage was to get the aerial higher and to keep the vertical radiation angle low. To stack two-over-two a height equal to full-wave (66 ft.) is required, but the maximum height available was 44 ft. It was decided, therefore, to stack two-over-two and to space the lower elements in the half-way position at 22 ft. The interconnecting feed line,

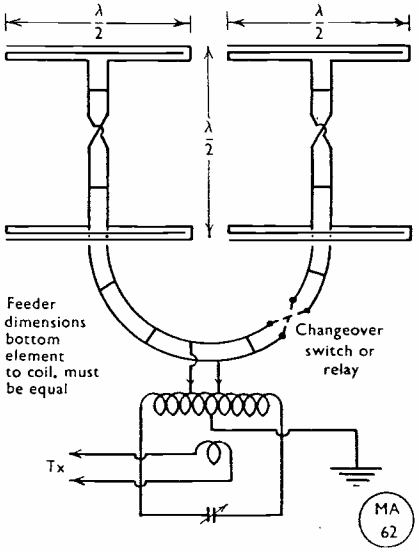


Fig. 5. Stacked folded dipoles with 600-ohm feed ; the merits of this arrangement are argued in the text.

connected cross-over, was cut to half-wave and kept taut by being pulled to one side (Fig. 5). The additional lower elements were there primarily to affect vertical radiation angle but they did also add to horizontal directivity. It was accordingly decided not to space the elements as done with the two-element aerial. From trials to date it does, however, appear that even with two-over-two a better defined coverage would be obtained by retaining the spacing. In either form the writer would strongly recommend this array for 14 mc and more particularly 21 and 28 mc operation. It might, however, be profitable to summarise the advantages and disadvantages for consideration by other prospective constructors. (*See table above.*)

CARDS ONLY, PSE !

Will readers using our QSL Bureau please note that they should send *cards only* to BCM/QSL, London, W.C.1. If correspondence on other matters is included in the packet, delay is inevitable since our QSL Bureau does not handle any correspondence. Incidentally, "BCM/QSL, London, W.C.1." is a full and sufficient address from any part of the world, and will ensure speedy clearing of your cards.

POINT ON BCI

G3DLD writes : "A neighbour of mine complained of interference from my transmitter (knowing I had one). I investigated thoroughly and, with the assistance of the GPO, suppressed key-clicks, screened the transmitter, altered the aerial and put in mains suppressors—but still he complained. When I earthed the bit of my soldering iron all my troubles ceased." The moral is, of course "Look for the easy ones first."

CRT Modulation Monitor

Application of the Cathode-Ray Tube for 'Phone Checking

By W. R. JOSS (G2AJ)

The cathode-ray tube, now readily available, can be used in the amateur station for a wide variety of monitoring and checking purposes. Here is one of its simpler and best-known applications. This article will serve to introduce many readers to an electronic device of the greatest importance in radio work, for which many new uses have been found in the past few years.—Ed.

THE VCR139A cathode-ray tube has for some time past been available on the surplus market, and its equivalent is also obtainable from several well-known valve manufacturers. It is around this tube that the instrument which is about to be described has been built, and although it is not possible to obtain measurements of extreme accuracy, the monitor is a valuable piece of test equipment and a useful asset to any 'phone station.

The monitor can be employed to provide both "trapezoidal" or "wave-envelope" patterns, the latter being possible owing to the fact that provision is made for obtaining a horizontal time-base by feeding a small amount of AC on to the horizontal plates. These methods are considered in greater detail below.

Construction

Most of the mechanical features of the design are clearly seen in the accompanying photographs. The entire unit is built on a standard 3½-in. rack panel, this being the most convenient method at the writer's station. There is no reason, however, why the monitor should not be housed in its own cabinet, and some readers will no doubt adopt this method of construction.

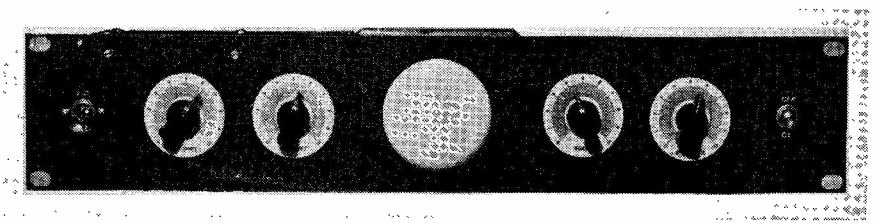
The cathode-ray tube is mounted in a 3½ in. × 4-in. channel-piece which is securely bolted to the front panel. This channel is made of mu-metal, so as to afford a certain amount of screening around the tube, and hence reduce the effect of stray fields. The front end of the channel carries a wooden block with a 3½-in. hole, around the inside of which there are four small pieces of Sorbo rubber acting as resilient supports for the front of the tube. The base of the tube is supported by another block which is split in the form of a clamp, and this again is lined with Sorbo rubber.

On the left-hand side of the channel-piece (viewed from the front) a sub-panel is mounted 4¾ in. from the front panel. This is supported by a piece of ½-in. angle fixed to the side of the channel and lengths of steel rod at the outer end. The space between the front and sub-panels is enclosed by a further piece of metal. This compartment houses the mains transformer and the potentiometers for shift control. The sub-panel carries the rectifier and smoothing components, together with the co-axial sockets for inputs to the horizontal and vertical plates.

On the right-hand side of the channel is a ¼-megohm potentiometer—the time-base width control—and all the resistors associated with the HT network. The 0·1 μF condensers which feed the horizontal and vertical plates are mounted on the inside of the channel near the base of the tube.

Circuit

The circuit, shown in Fig. 1, is perfectly straightforward, and many readers will have become familiar with similar circuits during the past few years. The transformer used, a surplus item, is of the



Front view of the oscilloscope unit on its standard rack mounting panel.

receiving variety, having a 400-0-400-volt winding rated at 60 mA and also suitable 4- and 5-volt windings for the tube and rectifier filaments. Several positions were tried in order to find one in which the transformer field had no effect on the electron beam. This was achieved with the transformer mounted on its side such that the axis of the core was in the vertical plane. As only half-wave rectification is used it is possible to employ a normal full-wave receiving type rectifier valve with the anodes connected in parallel. A type 80 rectifier was used in the writer's case, and this handles the 800 volts quite nicely; any other similar valve will be equally suitable. The smoothing components consist of a 100,000-ohm 2-watt resistor and a double-section ·05 μF condenser. The time-base width control is wired between the centre-tap of the transformer and the earthy end. The moving arm of this control is connected through the SPDT switch, S2, to the horizontal plates of the tube ; S2 is on the extreme right of the front panel and provides a means of selecting either the internal time base or an external one fed into the unit through the coaxial socket on the sub-panel.

The HT network does not require a description, except to say that the 2-watt resistors used in certain instances are purely for convenience, being the only suitable ones available at the time of construction. One-watt resistors will be quite adequate in positions R3, R4 and R9.

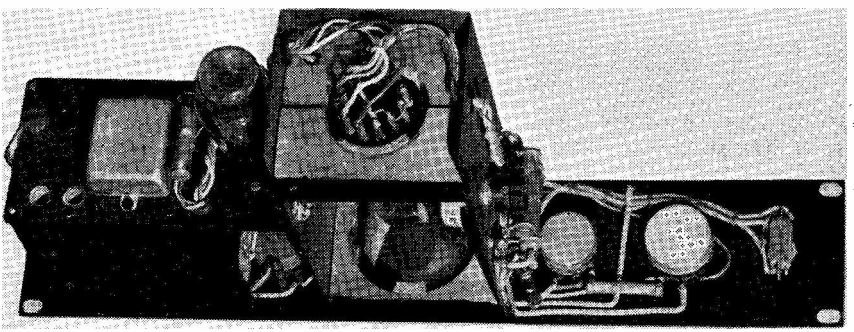
Originally, the unit was built without the shift controls and the final anode and the X1 and Y1 plates were grounded at the bottom end of the resistance chain, while the resistors R12 and R13 were also earthed down. It was felt, however, that the provision of the necessary shift controls was very much a worthwhile refinement, and the extra components involved are not expensive.

Base connections for the VCR139A are shown in Fig. 2 and for those who do not possess this tube it is pointed out that the Cossor 23D, GEC 4101 and the Mullard ECR30 are similar.

Operation

There are two different pattern shapes which can be obtained with the monitor, known as the "wave-envelope" and "trapezoidal." The wave-envelope pattern is an exact picture of the wave emanating from the transmitter, while the latter is the actual plotting of the modulation characteristic of the modulated stage.

The connections for obtaining a wave-envelope pattern are given in Fig. 3, together with the patterns which will be obtained under various conditions of modulation. Although an internal horizontal sweep is required in order to get a wave-pattern the external connections are simpler, as only an RF pick-up loop is needed. A small loop should be lightly coupled to the RF amplifier and connected by means of a short length of cable to the vertical (or Y) deflection plates. The position of the loop should be varied until a reasonable "width of carrier" is obtained on the screen, whilst R1 should be adjusted to make the width of the pattern about



A rear view of the unit, which is completely self-contained, to the circuit of Fig. 1.

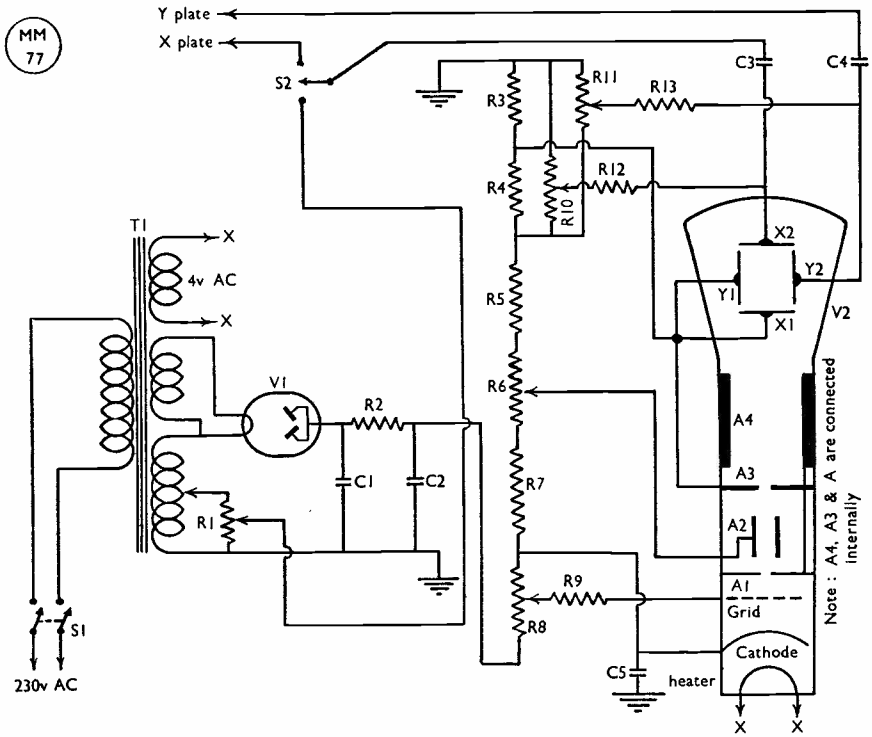


Fig. 1. Circuit of the simple oscilloscope unit, with power supply. Neither time-base nor amplifiers are included, but an X-sweep can be obtained off the 50-cycle AC supply and is useful for several purposes.

half the diameter of the screen. Some sources suggest that a small resonant circuit tuned to the transmitter frequency be connected between the Y plates and the RF amplifier as a means of reducing RF harmonics in the pattern. The writer, however, did not find this necessary.

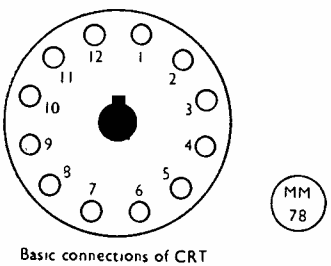


Fig. 2. Base connections of the CR tube used. 1, cathode; 2, grid ; 3, 4, heater ; 5, Anode 2 ; 6, blank ; 7, Y2; 8, X2; 9, Anodes 1, 3, 4 ; 10, X1 ; 11, Y1 ; 12, blank.

Table of Values

Fig. 1. The CRT Monitor Unit

C1, C2	=	·5 μF, 800-volt DC working, paper
C3, C4, C5	=	·1 μF, 500-volt DC working, tubular
R2	=	250,000 ohms potentiometer
R2	=	10,000 ohms, 2 watts
R3, R4	=	270,000 ohms, 2 watts
R5	=	56,000 ohms, 1 watt
R6	=	50,000 ohms, potentiometer
R7	=	27,000 ohms, 1 watt
R8	=	10,000 ohms, potentiometer
R9	=	75,000 ohms, 2 watts
R10, R11	=	500,000 ohms potentiometers
R12, R13	=	1 megohm, ½ watt
S1	=	DPST switch, toggle type
S2	=	SPDT switch, toggle type
T1	=	Mains transformer, 400-0-400 volts, 60 mA, 5 volts 3A, 4 volts 1½A
V1	=	Type 80 rectifier
V2	=	2½ in cathode-ray tube, Type VCR139A

When the transmitter is modulated the screen pattern varies in amplitude according to the depth of modulation. When the maximum height of this pattern is just twice that of the carrier alone then the transmitter is reaching 100 per cent.

modulation on peaks. This state of affairs is illustrated in Fig. 3(C). Over-modulation is shown by a gap in the pattern on the line of the X-axis, and a line appears along the trace at that point. It is possible, when dealing with voice waveforms, for over-modulation to take place in only the upward direction or the downward direction, without doing so in both directions at once; however, assuming that the modulation is symmetrical, then the actual percentage of modulation can be determined directly from the screen by measuring the height of the carrier alone (Fig. 3A) and the maximum height of the carrier with modulation applied. Thus, modulation percentage can be given as:

$$\frac{B-A}{A} \times 100 = \text{per cent. mod.}$$

where B = maximum height of carrier with modulation, and A = height of carrier alone. For 100 per cent. modulation, therefore, B must equal 2A.

In Fig. 4 the method of connection for a "trapezoidal" pattern is shown, together with the patterns themselves. The vertical plates are coupled in a similar manner as for the wave-envelope pattern, but the horizontal plates are taken to the output of the modulator itself. The horizontal plates are fed through a voltage divider RfRv, with Rv providing a means of controlling the amount of audio voltage fed to the plates, thus permitting adjustment of the pattern to a convenient size. The blocking condenser C should be about ·5 μF and should have a working voltage of twice the DC voltage on the modulated amplifier in the case of anode modulation. The values of Rf and Rv were found by experiment and were as follows: Rf=500,000 and Rv=200,000 ohms. These will of course vary according to different transmitter inputs and modulator outputs, but a rough guide is given in one of the handbooks, which states that the total resistance of Rf and Rv should be 250,000 ohms for every 150 volts of modulator output.

The various trapezoidal patterns are shown in Fig. 4. The carrier with no modulation is a straight vertical line, the length of which can be controlled by means of the RF pick-up loop. When modulation is applied a wedge-shaped pattern appears and the deeper the modulation the more pointed the pattern becomes. At 100 per cent. modulation the wedge comes to a perfect point on the X-axis and any further modulation re-

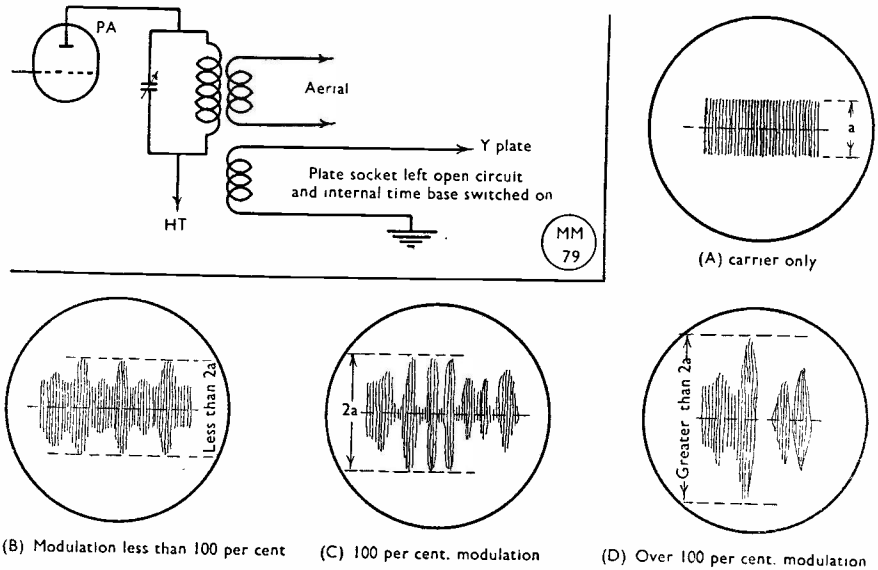


Fig. 3. To obtain wave envelope patterns, connections should be made as shown here. A, B, C, D are the patterns to be expected under the varying depths of control discussed in the text.

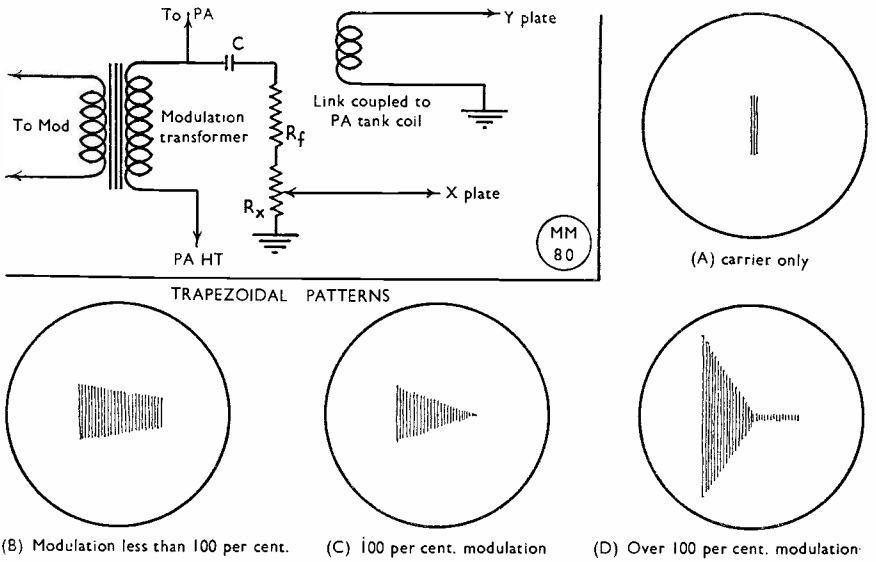


Fig. 4. Connections for the trapezoidal patterns, where the carrier voltage is applied across one set of plates and the audio output from the modulator across the other.

sults in the extension along the axis as shown in Fig. 4(D), or an increase in the overall height of the pattern beyond that of twice the carrier alone. The modulation percentage can be measured in the same manner as for the wave-envelope pattern, *i.e.*, by measuring the modulated and unmodulated heights of the carrier.

Other Uses

Several other uses for the monitor will come to the reader's mind. The author has found it extremely useful when endeavouring to cure hum which was being picked up directly in a moving-coil microphone owing to its proximity to the field of a power transformer. The hum could be detected in the monitor and the microphone moved around in order to determine its best position.

The all-round usefulness could be greatly increased by the addition of a suitable linear time base and of amplifiers for the X and Y plates. The writer intends at some future date to incorporate these circuits in another 3½-in. panel, which will be mounted in the rack above the monitor. The two units combined would thus constitute a very useful and versatile instrument with many applications beyond the scope of this article.

VHF POWER TETRODE

The Mullard version of the 829B is their QQVO7-40, capable of giving 83 watts RF output at 200 mc with only 500 volts on the plate, for a grid drive under Class-C conditions of but 0·7 watt ; neutralisation at VHF is not usually necessary with a good layout, as the grid-anode capacity is only 0·1 $\mu\mu$F. The QQVO7-40 can be taken up to 250 mc at reduced inputs. Mullard Electronic Products, Ltd., Century House, Shaftesbury Avenue, London, W.C.2.

THE VERON DX CONTEST

Though this "First All-European DX Contest" took place a year ago—it was announced in the October, 1947, issue of the *Short Wave Magazine*—final results have only just been published. Entries were received from 38 countries, the highest scorer being OK1FF with 30,710 points ; HB9AW was second with 25,704. G8KP led the British CW entry with 12,528, being five places behind the leading PA entrant, PAØRE with 23,485 points.

Amateur Radio Show

RSGB's Second Annual Exhibition

SEVEN THOUSAND VISITORS

Magazine Review

FOLLOWING the success of the 1947 Exhibition, the Radio Society of Great Britain early decided to organise a similar undertaking this year. And so a four-day show, supported by a number of firms operating in the Amateur Radio field, was opened at the Royal Hotel, Woburn Place, on Wednesday, November 17, by Dr. R. L. Smith-Rose, D.Sc., Ph.D., M.I.E.E., Director of Radio Research, D.S.I.R.

That an Exhibition of this kind is of the greatest value and interest to the world of Amateur Radio is undeniable, and it is probable that both for Trade support and the number of visitors (the public in this case being those directly interested in Amateur Radio) this Exhibition is of its type without equal anywhere in the world —the United States not excepted.

It is not intended here to offer a stand-by-stand survey, but rather to give some general impressions of the show, with brief comments on what we thought were the outstanding features of the Exhibition as a whole.

The equipment now on offer to the British amateur may be said to be well adapted to his needs, and to be well designed and built. However, there is still not enough mechanical ingenuity displayed in general design, and there are too many half-empty black crackle cases. The modern VFO, for instance, not only needs to be a sound job electrically, but also calls for the skill of a mechanical engineer in its general design. We have seen *amateur-built* equipment which surpasses, both electrically and mechanically, much on the commercial market both in this country and the States. It is quite true that apparatus of this kind cannot be built by the average amateur, but it should be a possibility to any manufacturing concern able to get away from the "standard box" idea.

An outstanding exception to these generalisations was the range of manufactured equipment to be seen on the stand of Tele-Radio (1943), Ltd., to whose own products no such criticisms could be applied.

Receivers

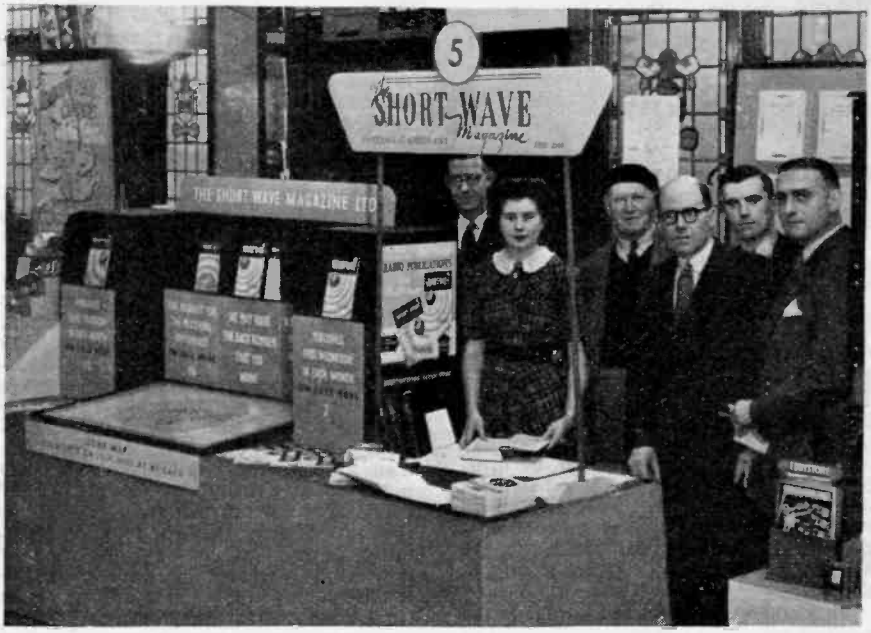
In this field, and in the face of great discouragement, certain manufacturers have gone out for the market in amateur band communications receivers—notably Stratton's "640", Radiovision's "Commander", Denco's "DCR 19", the G.E.C.'s "BRT 400", and the new E.M.I. design. Though the dice are loaded against them by the general availability of lower-priced ex-Service receivers and the average British amateur's extraordinary faith in anything in the receiver line that comes from America—for instance, few G's seem to realise that practically every HRO in this country today was obsolete in 1937 —all these new British receivers are, in their several ways, very good and representative of modern circuit technique ; if they fail, it is where American designs are strongest—in dial mechanisms and similar mechanical features, and this is a point which calls for much more attention by British designers.

Valves

As to valves, British types are available for practically every American counterpart, and in some types which the Americans have not yet got. But the real market for British valves in the amateur category must remain small while it is still possible to buy American equivalents at a third of the price. Amateurs buy valves in not inconsiderable quantities (we estimate the consumption at about 100,000 a year), but due to this price difference and the quantities available from surplus sources, it is doubtful if the "clean" sales of British valves of the same type exceed one per cent. of this total. There is nothing that anyone can do about it—unless some enterprising manufacturer cares to produce a multi-electrode vari-purpose 50-watt valve that can be used in all positions and for every application in a transmitter by changing the base connections (and is prepared to sell the first 10,000 at a loss) !

Facts

Excluding publishers' and non-Trade stands, there were 19 different firms actually showing equipment and parts of direct interest to every amateur ; it should be noted that all these concerns are British, that they were exhibiting apparatus mainly



The *Short Wave Magazine* Stand at the Exhibition, where we were glad to meet a number of our readers ; many well-known callsigns figure in our Visitors' Book which has become a very interesting record of personal contacts made this year and last. G2NM (in beret) happened to be at the Stand when this was taken.

of their own manufacture, and that it was a condition of trade appearance at the Exhibition that no "ex-Govt. surplus" was to be shown. Still on the same theme, of these 19 firms no less than ten are specialists in the Amateur Radio field, either as designers, manufacturers or suppliers, and do a large part of their business in the amateur market.

These facts, no less than the attendance at the Exhibition itself, are solid proof of the strength and importance of the Amateur Radio market, and augur well for the future, both of amateurs themselves and of the trade catering for them. Amateur Radio is a scientific hobby of the utmost importance to the country, and it calls for a specialist approach on the part of those who seek to supply the needs of amateurs. Much has been said and written on the *penchant* of amateurs to buy cheaply and "make do." This is as it should be and, since many of the keenest amateurs are not-so-old and still have their way to make in the world, is only to be expected. But as in every other trade there is always a good market for the best—and with the steady development and expansion of Amateur Radio as an absorbing scientific hobby, that particular section of the market will also expand and develop.

In the field of Amateur Radio, the British manufacturer has a great number of difficulties and discouragements to face. But as we see it, from a long experience of Amateur Radio in all its aspects and manifestations, the amateur wants to be able to provide himself with the best equipment he can afford—whether parts from which to build his gear, or finished apparatus which he can put straight on the air—and he is always prepared to spend where he gets the best value. There are enough of him now (and the potential development is about five times the number of amateurs at present licensed) to make it well worth the while of all manufacturers to study the Amateur Radio market with care and attention for the future.

THE VHF BANDS

New VHF Records—
Six-Metre DX—
VHF Propagation—
Contest Comment—
Improved Conditions—

By **E. J. Williams, B.Sc. (G2XC)**

ONE is never sure whether to blame activity or conditions when the VHF bands are quiet. Undoubtedly, the latter affects the former and this was very noticeable in the second week of November. After a prolonged poor spell, conditions improved markedly on November 9—but it was several days before the news spread and all the VHF men got back from 10 metres and the other DX communication bands to which they had migrated !

Outstanding days were November 10 and 12. On the former, G6DH worked F8OL (Paris) for the first G/F 2-metre QSO. This brings G6DH up to 4 countries worked on 145 mc. The F8OL contact, which was S9 both ends, was made at 2030 GMT and the circuit covers a distance of about 230 miles.

The same evening (November 10), F8OL worked G3DEP (Ryde) and heard signals from G2XC. Further contacts were made with F8OL and F8ZF on November 12.

It is unfortunate that under the Contest rules contacts with stations outside G do not count in the score. Had we had any idea what was to happen on that memorable first night of the Contest we might have arranged things differently—though the present rules are fairer to the up-country stations, out of range of the Continent even under the best 2-metre conditions.

Most competitors on 145 mc were torn between working continental DX or adding to their Contest score. At least three Dutch stations—PAØAD, PAØPN and PAØZQ—were putting in good signals, the last named calling "CQ Contest" and exchanging numbers with G's, on the Friday.

A new 2-metre DX record for a British station was established when G5BY worked PAØZQ, near The Hague, just before 2200 GMT on November 12. The contact was on 'phone, the PA being Q5S4 at Bolt Tail, South Devon, and the distance (which as yet we have only been able to measure approximately) is 390 miles. So G5BY is there again—well done ! Three weeks earlier G3CQC (Newton Abbot, Devon) had increased the 5-metre tropospheric record to 460 miles by working F8YZ (Nancy), narrowly beating G3HW/A (Teignmouth) who worked the same station. This particular spell of good conditions appeared to be confined to the South Coast G stations and northern F. A ridge of high pressure extended across this area on October 23 and 24, the days in question. The R.E.F. had a 58 mc contest of their own under way and numerous F stations were worked. Unfortunately, no information regarding this affair was sent to us.

Returning to the subject of the *Magazine* Contest, just for once we picked the right date for conditions. Signals on the Friday night were generally described as amazing. In addition to the foreign contacts reported above, 2-metre signals from northerners like G2IQ, G3APY, G5JU and G6OS were being received on the South Coast. G5BY described the first half-hour as "just like the ARRL 'phone contest." He worked 8 stations in 30 minutes, all on 'phone and all over 130 miles !

Two-Metre DX Working

Worked	Station
Over 350 miles	G5BY
300 to 350 miles	G2BMZ, G6WT.
250 to 300 miles	G2XC, G6OS, G8DM
300 to 350 miles	G2AJ, G2CIW, G2IQ, G2OI G3DEP, G5MQ, G5TZ, G6DH,
150 to 200 miles	G2MV, G2NH, G3AEX, G5US G6LK, G6PG, G6VX
100 to 150 miles	G3EJL, G3RI, G8DV

Due to an unfortunate and unforeseen combination of circumstances G2XC could not be on 5 metres during the opening hours. But from reports already received there was reasonable activity and good conditions on that band as well. G3WW (Wimblington), with his beam on top of the famous scrap-metal tower, was roaring in at G8LY, Lee-on-Solent, nearly 150 miles away.

Six Metres

Outstanding 50 mc news is a QSO between G5BY and ZS1P, two-way on 50 mc on November 1, 1418-1504 GMT. Strength was S7 both ends with fades to noise level. Contact was made initially on 28 mc, when ZS1P reported 50 mc open to Europe. G5BY immediately went on 6 metres and was heard at once in Cape Town. ZS1P then switched over to the higher frequency, but no trace of his signal could be found at Bolt Tail. A rapid investigation revealed that the filaments of ZS1P's remotely controlled 50 mc Tx were not on ! By 1418, all was in order and contact made. Signals were good from 1418 to 1439, then followed a weak period during which a return was made to 28 mc, further 50 mc signals being exchanged between 1454 and 1504, when both operators called CQ ; but no other signals were heard at either end. G5BY last received ZS1P at 1509. G5BY tried two different beams, one a 4 ele-c.s. delta-matched, and the other a w.s. folded-dipole type, the latter giving best signal-noise ratio. During the last 10 days of October the MUF to USA was up to 45/46 mc almost daily and peaked over 47 mc on October 22, 25 and 27.

G5BY is using a Type 26 converter with slugs to tune 40-52 mc for these MUF checks. The aerial is a 420-feet-per-leg rhombic, and the FM stations on 45-47 mc nearly lift the 'phones off his ears ! Altogether, G5BY now has *eleven* aerial systems in use for the various bands, and once again is going great guns on them all.

TWO METRES
COUNTIES WORKED

Worked	Station
20	G2AJ
16	G5BY
14	G2NH, G6LK
12	G2CIW, G2IQ, G2XC, G5TZ, G6PG

Propagation Notes

Several readers have written on the points made last month. G2BMZ (Torquay) and G8QX (Malvern) have both confirmed our observations on DX reception of TV on 48 mc and amateur signals on 145 mc. G8QX also mentions that there is very marked agreement in "ground-wave" conditions on all frequencies from 30 mc to 145 mc. When TV is good in Malvern, he can work London stations on ten-metre 'phone. As is generally known, a duct sufficiently wide to propagate a 30 mc signal would have to be very large and hence this is further proof that the mechanism of working DX on our VHF bands (at least over land paths) is by reflection at an air mass boundary caused by an inversion or humidity contrast. Ducting, which is the accepted cause of most of the long-distance radar reflections, is possibly in the picture when the paths are over sea ; indeed, that may explain the exceptionally long tropo-paths across the English Channel and North Sea, already reported this month.

Correspondence has also been received on the "location" theory. G2HDU (Oakham) whose N.G.R. is 43/860088, has had similar experiences to ours on 5 metres and sends a very detailed analysis of his results, viewed in the light of the local topography. Some tests with G2HDJ (Thrapston) showed that raising the beam at Oakham by 10 ft. increased signals from S4 to S8, yet in other directions little or no difference was noticed. The answer seems to be that in the Thrapston direction raising the aerial 10 ft. gave a line-of-sight path, while in other directions the outlook was either already clear or else too obstructed for a rise of a mere 10 ft. in aerial height to make any real improvement.

The high level of activity during the evening of November 12 enabled some extremely interesting observations to be made. In particular, it became very noticeable that stations located within a mile or so of each other were frequently hearing and working a completely different set of stations. G3EJL and G3RI, both in Southampton, were each working stations in the London area that the other couldn't hear at all ! This is probably due to local

VHF CENTURY CLUB

NEW FULL MEMBERS

G2HDY	J. Ballard (Roehampton)
G2KI	G. Spencer (Walton-on-Thames)
G3CGQ	F. W. Tyler (Luton)
G3WW	R. F. G. Thurlow (Wimblington)
G4AP	J. G. Rooke (Swindon)
G6MN	E. Martin (Worksop)

NEW ASSOCIATE MEMBER

G5MR	V. Mellor (Bognor)

Total : 39 Full Members

screening and would most likely disappear if the aerials were raised clear of local obstructions.

Receivers

G8QX (Malvern) criticises the choice of 140 mc for the oscillator frequency in 145 mc converters, suggesting that with the unavoidable low Q of the RF input circuits, the RF stage will be swamped by the local oscillator. He suggests that the IF must be of the order of 30 mc if an RF section is to be used. We should be interested to have readers' views on this, or to hear from anyone who has made comparative tests using various IF values.

Station Reports

In the Channel Islands, GC2AWT (Jersey) says that he and GC5OU, fired by the results they have had on five metres, are busily preparing for two, and will be on the look out for G's.

G2ADZ (Oswestry) is actively engaged in preparing for 145 and may be active by now. A 4-ele w.s. beam will probably be in use. G2AJ (Hendon) has been doing some excellent work on 145, with the Tx described in the November issue of the *Magazine* and a CC converter ; this uses two 6AK5 RF stages, 6AG5 mixer, and 6C4 CO followed by 6J6 doubler/quadrupler.

In Essex, G2CIW (Brentwood) with an improved converter (6J6 cathode-coupled RF-EC52 mixer-9002 osc.) has been hearing and working much on 145 mc, and points out how much better he receives the Isle of Wight stations than he does G2XC. (Yes, we know !) However, he sends a card at the last minute to amend his comment after hearing us under the conditions of November 10 !

G2CIW has worked the Devon stations; he is also one of several who have written regarding failure to sign on CW after a 'phone contact. Well, G2XC is trying to set an example in this and G2NM, G3EJL and G3RI, near neighbours, are doing likewise. Can we all get into the habit ? One or two people have let their CW get rusty (shall we say !) but are endeavouring to make CW contacts. Please assist them by going slow when asked to QRS. Complaints that requests to QRS are ignored are also received quite frequently. This only discourages someone who is making an effort to work Morse. So a spot of co-operation all round would be to everyone's advantage. Sign frequently and not too fast on CW, and go slow when requested.

G2KI (Walton-on-Thames) still on five, has found a "deathly hush" there for the past month. We hope he found it alive on November 12. He will be on 145·008 in due course, but is becoming a temporary deserter while he builds the main Tx for the lower frequencies. G2NH (New Malden) doubts if he will come on five again and sends his final scores for the tables. On 145 mc he has worked Torquay and mentions an interesting aerial experiment. To assist in wider coverage while searching on the Rx he has coupled a long wire very loosely (*via* 1 $\mu\mu$F) to the RF stage, in addition to the normal connection from the beam. An odd result is that when G5MA has his beam so that it presents a null to G2NH, adding the long wire (at G2NH) brings G5MA's signal up by 2 or 3 S-points, but when G5MA points his beam at G2NH the long wire makes no difference to the signal strength. This has been noticed on other stations as well as G5MA. G2NH requests those who use the SCR522 transmitter to increase their modulation above the usual 20 per cent. ! G2NM (Bosham) continues to make some fine contacts from a location which leaves much to be desired. Another who stresses the need for slow CW signing after all contacts is G2WS (Beckenham). He has an 815 PA and a 5-ele beam.

British VHF Records

58 mc	GDX (Tropo), G3BLP/GM3OL, 296 miles.
	GDX (Aurora), G5MA/GM2DAU, 363 miles.
	Tropo (European), G3CQC/F8YZ, 460 miles.
145 mc	European, G5BY/PAØZQ, 390 miles.

G3BPM (Southgate), using 15 watts to 832 on 145·248, has an acorn Rx (2 RF, mixer and osc.). In Beds. G3CGQ (Luton) is active on both 5 and 2 and adds his support to the CW signing campaign. Using a BC-1235 *wavemeter* as Rx G3CWW (Hendon) has had his first QSO on 145, by working G2AJ at a hundred yards or so ! He keyed the wavemeter HT to reply—well, it is one way of doing it ! G3CWW is still active on 58 mc and wants West Country contacts. G3CQC (Newton Abbot) used a B2 Tx with an RK34 PD for his record contact with F8YZ. His 5-m receiver is Type 27 unit into R.107, and a 4-ele c.s. beam is in the roof.

G3DEP (Ryde) has a nice site 150 ft. up

VALETE

Readers of " VHF Bands" will hear with the deepest sorrow of the death, on October 22 last, of Raymond Waite, G3PZ, of Gloucester, who was one of our keenest 5-metre operators. A message of sympathy to his widow has been sent by the secretary on behalf of fellow-members of the Fiveband Club.

looking out over Spithead. A 2-valve Rx with 6J6 regenerative mixer and 6C4 osc. is in use. The IF is tuned on the main Rx from 24 to 26 mc. The Tx on 145·08 has QQVO4-70 PA, and the beam is 4-ele. G3ELT (Salford) at N.G.R. 33/785993, hoped to be on two metres by November 12, using P/P W316A's on 145·68 or 145·92 mc ; reports requested. The two Southampton stations G3EJL and G3RI have been spending much time on convertor design. Both are in poor locations but have been obtaining encouraging results. G3RI has two 6AK5 RF's, 954 mixer, and 955 osc. on 59 mc with cathode injection ; IF is on 27 mc into an SX28. G3EJL has a CC convertor in operation.

G4KD (Edgware) is still regularly active on five, while G4LX (Newcastle) is now ready for two as well—but is hearing nought on either band. He has a modified SCR-522 for Tx on 145·116, and a R1132A, likewise adapted.

G5BD (Mablethorpe) has worked G2IQ with 8 watts to 832 and a long-wire. G5BY (Bolt Tail) has been doing some excellent work, as already mentioned. He has succeeded in getting CC injection into an ASB8 and tunes the first IF from 60 to 80 mc. This appears to provide a better signal than did the previous 955 oscillator. G5MR (Bognor) is still active on five and has been working the French ; he has the Compact Beam described last month ready for the 145·35 transmitter.

G6VC (Northfleet) is preparing for 145, while in Torquay G6WT has a *twenty-four* element phased array for two metres ! This is a Chinese copy of W2NLY's beam as recently described in *QST*. This erection, with its top element at 36 ft., produces signals which are *inaudible* on a 3-ele beam at 60 ft.

G8QX (Malvern) has 6AK5 RF, 6AK5 mixer, 6C4 osc. with 30 mc IF, and two 3-ele c.s. beams spaced one wavelength side-by-side. The Tx is 10 watts to an SCR-522.

The Clubs

The second Club Circular was despatched to all members in the second week of November, together with the membership certificates for the Fiveband and VHF Century Clubs. Any member who has not received these should let us know at once.

For the benefit of newcomers, we should mention that our Fiveband Club is open to all transmitters who are actively interested in VHF and who undertake to encourage and support all forms of VHF activity. Members of the Fiveband Club are eligible for membership of the VHF Century Club on production of 100 QSL's confirming two-way contacts on frequencies above 50 mc. The rules were published in the May 1948 issue of the *Short Wave Magazine*, and amendments have appeared in the Club Circulars. The Club Committee consists of G3APY, G5RP, G5YV and G6VX, who are always glad to hear from members. A club for VHF SWL's, on the lines of the Fiveband Club, is sponsored by our *Short Wave Listener*.

Activity Reports

We should like more reports from the North for the 2-metre Activity Summary. Of the 14 lists this month no less than 5 are from the South Hampshire and I.o.W. area. We should like to give you a more representative selection—but it is up to you to send the lists. Will all who are sending such lists please note the following simple rules. Set the calls out exactly as they are to appear in the *Magazine*, that is, (*a*) your own call, (*b*) your QTH, (*c*) your NGR, if possible, (*d*) calls worked in alphabetical and numerical order, arranged horizontally and not vertically, and no separation of 2 of 3 letter calls. For stations over 100 miles the distance may be added in brackets, (*e*) calls heard. Further, only include calls heard during the month covered by your report. Next month this should be November 11 to December 15. This keeps things up to date and avoids useless repetition of old news.

These Calls Heard lists are of great value and also serve to encourage others to get started on VHF—but please set them out properly. It saves hours of our time and keeps the Editor's blood pressure down if everyone does this.

Late Flashes

Several items arrived just as we were about to close for the month. G2WS (Beckenham) wants schedules on 420 mc with anyone within 10 miles of him . . . . G6UW (Cambridge) is on 145·225 with SCR-522 and points out that only AM

is permitted on two (is this a crack !) . . . . G3FD (Southgate) has made some good Northern and South-Western QSO's using 829 PA and a 5-ele beam 30 ft. up . . . . G2FLC (Newmarket) is on 145 nightly 2100-2200 and wants reports . . . . G2IQ (Sheffield) has done further tests with triodes and pentodes as mixers and still finds triodes at least 6 dB better on signal-noise ratio . . . . A very interesting letter from G3CU (London, S.E.24) ; he and G2FKZ have been active on 70 cm. since the 420 mc band was opened, using CC with 8 watts into a pair of CV66's operated as power triplers, feeding a multi-element vertically polarised beam ; receivers are R.1294, covering 500-3000 mc in the original version, but modified for 420 mc. G3CU/G2FKZ are on a regular nightly schedule over about one mile, and are S8 to one another, on a spot frequency of 436 mc ; they even push out CQ's at 2005, 2105 and 2205 and listen for 5 mins. past each hour ! G3CU reports that other stations known to be active in the area are G2RD and G2VJ, and they hope to run a South London Net on 436 mc ; schedules are requested with others interested in 420 mc, and cross-band co-operation can be arranged on 2, 5 or 160 metres—well ! There is evidently far more business on 70 mc than we had thought, and we are very glad to add G3CU and G2FKZ to the others known to be tussling with this band . . . . F8OL (Meudon, S & O) reports 145 mc contacts with G3DEP, G5TZ, G6DH and PAØZQ, being F/G and F/PA "firsts" on two metres ; he runs 30 watts to a

TWO-METRE ACTIVITY REPORT

G2AJ, Hendon, Middlesex.

WORKED : F8OL (225), 8ZF (108), G2AXG, 2BMZ, 2BRH, 2CIW, 2IQ (134), 2MR, 2NH, 2NM, 2WS, 2XC, 3APY (111), 3BXN, 3DEP, 3EJL, 3FD, 3RI, 4AP, 5AA, 5BY (180), 5CD, 5IB, 5JU, 5KH, 5MA, 5NF, 5OO, 5RP, 5TP, 5XA, 6CB, 6LK, 6NB, 6NF, 6OH, 6OT, 6PG, 6WT (160), 6VX, 8KZ, 8SK, 8TS, 8WV, PAØPN (160).

HEARD : G3ABA, ON4FG.

G2CIW, Brentwood, Essex.

WORKED : G2AOK/A, 2BMZ (190), 2IQ (144), 3AUA, 3DEP, 4RO, 5BY (208), 5MA, 5OO, 6OH, 6PG, 8KZ.

HEARD : G2NM, 3FD, 5DF, 5KH, 5NF.

G2IQ, Sheffield, 10.

WORKED : G2AJ, 2CIW, 2MA, 2NH, 3AEX, 3APY, 3AUA, 3DA, 3DEP, 3DMU, 3DYZ, 3FN, 3MY, 4DS, 5BD, 5BY (246 m.), 5GX, 5TZ, 5WP, 6DP, 6PG, 6OS, 6VX.

HEARD : G2AJ/P, 2AOK/A, 2AXG, 2NM, 3ABA, 3OS, 5BM, 5JU, 5MA.

G2MA, Rotherham, Yorks.

WORKED: G2IQ, 2OI, 3AEX, 3APY 3DA, 3DTK, 3DMU, 3MY, 5BD 5GX, 6BX, 6DP, 6LC, 6OS, 6VX. PAØPN. ØZQ.

HEARD: G2CIW. 3OS, 5CP, 6DH, GW5UO, PAØAD.

G2XC, Portsmouth, Hants (N.G.R. 41/670069).

WORKED : G2AJ, 2BMZ (110), 2CIW, 2MR, 2MV, 2NH, 2NM, 3AUA, 3BPM/A, 3BXN, 3DEP, 3EJL, 3FD, 3RI, 4CG, 5BY (132), 5IB, 5NF, 5OO, 5RD, 5RP, 5UM, 5US, 6DH (116), 6NB, 6OT, 6WT (110), 8DM, 8KZ, 8TS, PAØPN (210), ØZQ (255).

HEARD : F8LO, G2AOK/A, 2AXG, 2WS, 3APY, 5JU, 5TP, 6OS, 6UW. 8WV, PAØAD.

G3DEP, Ryde, Isle of Wight (N.G.R. 40/585924).

WORKED : F8OL, G2AJ, 2AXG, 2CIW, 2MC, 2MR, 2MV, 2NH, 2NM, 2WS, 2XC, 3AEX, 3BXN, 3EJL, 3FD, 3RI, 5BY (130), 5MA, 5NF, 5RP, 5TP, 5TZ, 5US, 6DH (120), 6LK, 6NB, 6OS (215), 6OT, 6PG, 6VX, 6WT (105), 8DM, 8TS, 8WV.

G3EJL, Southampton, Hants (N.G.R. 41/415154).

WORKED : G2AJ, 2BMZ, 2MR, 2NM, 2WS, 2XC, 3DEP, 3RI, 4CG, 5BY (119), 5MA, 6WT.

HEARD: F8OL, G5TZ, 5US, 6LK, 8DM, 8KZ.

G3FD, Southgate, N. 14 (Herts).

WORKED: G2AAN/A, 2AJ, 2AXG, 2BMZ,, 2CIW, 2MR, 2MV, 2NH, 2XC, 3DEP, 5BY, 5KH, 5TP, 5TZ, 8KZ, 8SK.

HEARD : G2NM, 3BPM, 3BXN, 5IB, 5MA, 5NF, 5UM, 6OT, 6VX, 6WT, 8TL.

G3RI, Southampton, Hants (N.G.R. 41/431145).

WORKED : G2AJ, 2MR, 2NH, 2NM, 2XC, 3DEP, 3EJL, 5BY (120) 5OO, 5TZ, 8KZ, 8TS.

HEARD : G8DM.

G5BY, Bolt Tail, Devon. (N.G.R. 20/688388).

WORKED : G2AJ (180), 2AOK/A (148), 2AXG (180), 2CIW (208), 2MV (182), 2NM (140), 2XC (132), 3AEX (186), 3AUA (198), 3EJL (119), 6OT (190), 6VX (186), 8WV PAØZQ (390).

HEARD : G3DEP, 5NF, 5TZ, 8KZ, 8WV.

G5TZ, Newport, Isle of Wight, (N.G.R. 40/497891).

WORKED : F8OL, G2AJ, 2AXG. 2BMZ, 2IQ, 2MC, 2MR, 2MV, 2NH, 2NM, 2WS, 2XC, 3AEX, 3AHB, 3BXN, 3DEP. 3EJL, 3FD, 3RI, 4AP, 5BY, 5MA, 5NF 5OO, 5RP, 5TP, 5UM, 5US, 5WP, 5XA, 6BN, 6DH, 6LK, 6OS, 6OT, 6VX, 6WT, 8DM, 8GX. 8KZ, 8TS, 8WV.

HEARD : G2AOK, 2CIW, 2FMF, 2OI, 2UJ, 3APY, 3CQ, 4CG, 5BM, 5KH, 5MQ, 5RD, 6ON, 6PG, 8DV, 8SK, PAØPN.

G6PG, Dartford, Kent (N.G.R. 51/524736).

WORKED : G2CIW, 3AUA, 3DEP, 5IB, 5TP, 5UM.

HEARD : G2XC, 4AP, 5NF, 5OO, 5RP, 5WP. 6WT.

G6UW, Downing College, Cambridge.

WORKED : G2CIW, 2IQ (115 m), 2MR, 2XC (110 m), 3APY, 5IG, 5NF, 6PG, 6VX.

HEARD : G2AJ. 2AXG, 2MV, 2WS, 2XV, 3DEP, 4AP, 5BY, 5MA, 5TZ, 8SY.

G8QX, Malvern, Worcs.

WORKED : G2AOK/A, 3BMY, 4AP, 5BM, 5TP, 6ZQ.

HEARD : G2NM, 6VX, 8DM.

The above refer, in general, to the four weeks ending November 11.)

4-ele. beam . . . . G6DH (Clacton) says that F8OL looks for G's at 1930-1940, and ON4FG and PAØPN are there for the same purpose at 1840-1845 GMT nightly. . . . . G4LU (Oswestry) reports reception of 2-metre signals from PAØPN on November 12, RST-579 ; on that same evening, G2MA (Rotherham) worked PAØPN and PAØZQ on 145 mc, at distances of over 300 miles, another very creditable performance ; G2MA says that he is getting more kick out of 145 mc than he has had in 22 years of 14 mc working, and that these PA contacts were as thrilling as his first W in the old 45-metre days ! . . . . . Another very interesting 2400 mc report : G8DD (Nottingham) with the co-operation of John Curnow, G6CW/P, has had a 44·9-mile cross-band contact 2400/3·5 mc, with John at the Rx end ; the locations were Beacon Hill, 3 miles SSW of Loughborough, and Burbage Moor, 5 miles WSW of Sheffield, these points being 800-ft. and 1,392-ft. a.s.l. respectively ; a remarkable feature of this reception was that it was apparently only possible during a period when the low cloud lifted at the receiving end and visibility increased to several miles (the weather generally was very bad during the period of the test) ; G8DD asks for data on Wx effects at these frequencies, as the cloud formations appeared either to absorb or present a barrier to signals—and so some further noteworthy progress is being made on 13 cm.

. . . At the last moment, a letter from PAØZQ (Voorburg, The Hague) with a list of nine G's worked on 145 mc during our Contest ; he gives the following PA's active on two metres : ØAD, 144·72 ; ØDT, 144·18 ; ØPAX, 144·12 ; ØPN, 144·9 ; ØVHF, 145·00 ; ØZQ, 144·96—Tnx, OM. . . . Similarly, F8GH (Glatigny, Oise) comes up with a full report on 11 Contest G's worked on two metres.

VHF Gathering

On the evening of Friday, November 19 (during the Amateur Radio Exhibition) an impromptu dinner was organised for those who, having visited the *Magazine* Stand to talk VHF, were able to join the party at what was for many of them the shortest notice. This was a most successful and interesting event, no less than 24 VHF operators being present : G2AJ, 2HDU, 2MR, 2NH, 2QY, 2XC, 3BLP, 3CWW, 4IG, 4RO, 5BD, 5JU, 5MA, 5RP, 5TH, 5TP, 6KB, 6FO, 6SC, 6VA, 6VX, 8GX, 8KZ, 8MG. It is hoped that this will be the forerunner of many such gatherings.

In Conclusion

Final date for next month's news is December 17, and to help us keep clear of the Christmas post rush (which always introduces an unavoidable delay factor) may we ask you to send off your reports to reach E. J. Williams, G2XC, at the *Short Wave Magazine*, 49 Victoria Street, London, S.W.1, by the first post on that day ? And your earnest conductor hopes the Editor will allow him this small space to send Christmas greetings and New Year good wishes to all the readers of "VHF Bands," at home and abroad. If 1949 is as good as 1948 has been, VHF men everywhere have another wonderful year to which to look forward.

FREQUENCY CALIBRATION SERVICE

At a charge of 5s. per crystal, Salford Electrical Instruments, Ltd., are prepared to undertake the frequency calibration of all types of quartz crystal units, irrespective of make. Measurement will be to 5 parts in a million on frequency, and to 5 per cent. on activity. Repair or regrinding can *not* be undertaken. Charges must accompany the order and no responsibility can be accepted for loss, but the crystal and its calibration certificate will be returned by registered post within one or two working days of receipt. This should be a very useful service—send your rock to Salford Electrical Instruments, Ltd., Q.C. Department, Birch Mill, Birch-in-Hopwood, Heywood, Lancs.

SPEECH-CLIP FILTERS

With a filter having a cut-off frequency of 3,500 c/s, no loss in intelligibility need be feared, and a 'phone station so equipped will occupy the minimum band-width with satisfactory quality. A low-pass filter is considerably more effective than any top-cut system using R/C networks. Such a 3·5 kc cut-off filter is the Aysgarth Type LP/35/1, applicable both to the speech-amplifier and to the receiver, where it will improve signal-noise ratio and eliminate all beat notes above 3,500 c/s. Write Aysgarth Manufacturing Co., 5 Aysgarth Road, Wallasey, Cheshire, for fuller details.

Two-Metre Preselector

Interesting Circuit

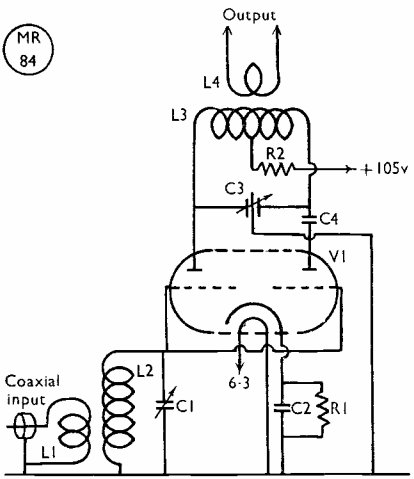
By G. M. KING, B.Sc., M.B. (G3MY)

USEFUL pre-mixer amplification is extremely desirable, but is rather difficult to attain in the design of a sensitive receiver for the 145 mc band; it seems all too easy to build RF stages which amplify signal and noise to very nearly the same extent.

Earthed grid triodes have certainly improved this state of affairs on 145 mc, but it is generally agreed that probably the best gain and signal-to-noise ratio are given by a neutralised triode operated in the normal mode with the cathode at earth potential, at least as far as RF is concerned. With this thought in mind, experiments have been carried out using a number of different valves, both triodes and triode-connected pentodes, as neutralised RF amplifiers, in an attempt to improve receiving facilities for the new band.

The circuit described is offered as a novel and simple way of constructing an amplifier of this type, either as the front end of a new receiver, or to improve the performance of an existing one. It consists of a single 6J6 double-triode, one half of which acts as an amplifying stage whilst the other half simply functions as a neutralising capacity. Circuit balance is provided by tuning the plate coil with a butterfly type split-stator condenser. The two control grids are strapped together.

The circuit is quite straightforward and needs no further explanation.



Circuit of the VHF preselector described by G3MY.

Table of Values

Two-Metre Preselector Unit

C1 = 3-30 $\mu\mu$F trimmer
C2 = 0·0005 μF midget mica condenser
C3 = 10 + 10 $\mu\mu$F butterfly
C4 = 50 $\mu\mu$F Erie Cerimicon
R1 = 100 ohm, ½ watt
R2 = 470 ohm, ½ watt
L1 = 2 turns 18 SWG, bare copper, $\frac{5}{16}$ in. diam.
L2 = 5 turns 18 SWG, bare copper, $\frac{5}{16}$ in. diam.
L3 = 7 turns 18 SWG, bare copper, $\frac{5}{16}$ in. diam. centre tapped.
L4 = 2 turns 18 SWG, bare copper, $\frac{5}{16}$ in. diam. wound over the centre of L3 and insulated from it.
V1 = 6J6

NOTE FROM HUNGARY

Our comment on p. 579 of the October issue of the *Magazine* has provoked an official rejoinder from the M.R.R.E. ("Hungarian Short-Wave Radioamateur League"). As they complain of a "certain lack of objectivism" on our part, we think it fair to give the substance of the letter. It is that the Hungarian conception of freedom is liberty for all honest men, but not for war criminals, which they say is the reason we no longer hear some of the old HA stations. Since the end of the war a number of HA's have been on the air, with or without licences, many of whom opened QSL bureaux only to get their own cards; cards for other stations were not always delivered.

The M.R.R.E. hopes that with their organisation they will be able to "eliminate the greatest of this disorder."

With us, readers may well feel that there might still be a little difficulty about the definition of certain phrases in this statement—but there is no point is saying more on the subject.

FALL CALL BOOK

The Fall (Autumn) issue of the *Radio Amateur Call Book* carries nearly 40 columns of G listings, and covers all those appearing in "New QTH's" up to and including our issue for September last. This represents an addition of nearly 300 G callsigns to those given in the previous (Summer) edition of the *Call Book*.

NEW QTH's

This space is available for the publication of the addresses of all holders of new callsigns, or changes of address of transmitters already licensed. All addresses published here are automatically included in the quarterly issue of the Call Book in preparation. QTH's are inserted as they are received. up to the limit of the space allowance. Please *write clearly* and address on a separate slip to QTH Section

G2ARW W. Brockbank, 156 Greystone Road, Carlisle, Cumberland.

G2BKW B. McGomish, 30 Lord Street, Miles Platting, Manchester, 10, Lancs.

G2COH H. Helm, 292 Audley Range, Blackburn, Lancs.

GW2CSX D. L. McNeil Williams, Clwyd-y-Wylan, Menai Bridge, Anglesey. (*Tel. :* 103.)

G2HKR J. R. Hamilton, 30 Kings Avenue, Greenford. Middlesex.

G3ABG C. J. Morris, 58 Union Street, Bridgtown, Cannock, Staffs.

G3AZW A. S. Bates, Heath Bank, Huddersfield Road, Stalybridge. Cheshire.

G3BAA A. H. S. Bridgman, Kingstone, Kingswinford, nr. Brierley Hill, Staffs.

GB3JR D. G. Hopkins, 15 Wadham Gardens, Sudbury Hill, Greenford, Middlesex.

GW3BJZ T. Richards, Penrhiw, Aberggwd Road, Mountain Ash, Glam.

G3BVZ G. D. Neale, 15 Woodbank Road, Bromley, Kent.

GM3CCT W. Miller, 74 Pilmuir Street, Dunfermline, Fife, Scotland.

G3CQQ J. H. Greasby, 63 Hallcroft Road, Retford, Notts.

G3CSB F. W. Lewis, 70 Wolverhampton Road, Warley, Birmingham, 32.

G3CUY E. F. Paul, A.B.I.R.E., 56 Whitley Road, Eastbourne, Sussex.

G3DBG R. H. Price, 52 Winifred Street, Swindon, Wilts.

G3DLF H. I. Crofts, 68 Kings Lane, Higher Bebington, Wirral, Cheshire.

G3DLG H. G. Curtis, 338 Poole Road, Bournemouth West, Hants.

G3DLG/A H. G. Curtis, *H.M.S. Hornet*, Gosport, Hants.

G3DPS J. Cooper (*ex-D2IZ/GM3DPS*), Nairobi, Cairo Avenue, Peacehaven, Sussex.

G3DSZ A. F. C. Kent, 221 Freeman Street, Grimsby, Lincs.

G3DXJ S/Sgt. T. Holbert, c/o Raven, The Bakery, Northolt, Middlesex.

G3DYN A. C. Bradbrook, 37 Ash Road, Gravesend, Kent.

GM3EAK R. Macfarlane, Moness, Robertson Terrace, Forfar, Angus, Scotland.

G3EAR H. A. Drake, 59 Maple Road, Horfield, Bristol, 7.

G3EBP P. E. R. Courcoux, 68 Edgeware Road, Milton, Portsmouth, Hants.

G3EBP/A P. E. R. Courcoux, P.O.'s Mess, *H.M.S. Ariel* (East), Warrington, Lancs.

G3ECA A. H. Koster, 36 Martley Drive, Ilford, Essex.

G3ECE A. R. Tweedale, 16 Coronation Road, Wold Road, Hull, Yorks.

G3ECL H. A. Farrow, 136 Wembley Hill Road, Wembley, Middlesex.

G3EDC B. C. Couch, 1 Regent Road, Crosby, Liverpool, 23.

G3EDD B. D. A. Armstrong, 67 Coggeshall Road, Braintree, Essex.

GW3EEU W. H. Jones, 27 Ael-y-Bryn, The Hill, Beaufort, Mon.

G3EFP J. C. Pennell, 10 Cecil Park, Pinner, Middlesex.

G3EFR F. Simpson, 101 Barrington Avenue, Hull, Yorks.

G3EGB A. H. Hooper, 105 Chiltern Road, Dunstable, Beds.

G3EGD S. G. Harmer, 54 Stoneleigh Avenue, Enfield, Middlesex.

GM3EGW J. F. Shepherd, 12 Park Place, Dunfermline, Fife, Scotland.

G3EHE K. J. Mather (*ex-VU2AB*), 120 The Headlands, Northampton, Northants.

G3EHO W. G. Walton, 116 Pennine Drive, Cricklewood, London, N.W.2.

G3EHS D. Cairns, 3 Richmond Road, Barnoldswick, Via Colne, Lancs.

G3EHY L. Boedo-Yanez, Arundel, Knightcott, Banwell, Somerset.

G3EII R. M. Baierlein, Rostherne, Wood Lane, Aspley Guise, Bletchley, Bucks.

G3EIT E. A. Read, 28 Matfield Road, Upper Belvedere, Kent.

G3EIX P. J. Naish, 103 The Mall, Swindon, Wilts.

G3EIZ C. S. S. Lyon, 15 Ullet Road, Liverpool, 17.

G3EJA R. G. Nash, 9 Holybook Road, Reading, Berks.

G3EJF J. E. Hodgkins, 43 Hawthorne Avenue, Bury, Lancs.

G3EJL S. Green, 17 Bassett Crescent West, Bassett, Southampton.

G3EJN J. Newth, The Lodge, Bristol Mental Hospital, Manor Road, Fishponds, Bristol.

G3EJT C. A. Hogley, Rose Cottage, Holmfirth, Huddersfield, Yorks.

G3EKB W. A. L. Brundle, 187 Ramsay Road, Forest Gate, London, E.7.

G3EKD A. A. H. Sparrow, Janarth, Farmhill, Stroud, Glos.

G3EKK C. Whalley, 40 Beresford Road, Blackburn, Lancs.

G3EKP J. E. Whittle, 2 Church Terrace, Darwen, Lancs.

G3EKQ K. E. Wade, Houseley, Church Lane, Marple, Cheshire.

G3ELC R. B. Jones, 199 Tamworth Road, Newcastle-upon-Tyne, 4.

G3ELF F. W. Malpass, 3 Glenview Cottages, Butterrow Hill, Stroud, Glos.

G3ELP J. R. Tyzack, 101 Birchington Avenue, South Shields, Co. Durham.

G3EWE A. Carrington, 131 Saffron Platt, Worplesdon Road, Guildford, Surrey.

G3FAB A. Bowman, 73 Queen Victoria Road, Coventry, Warks.

CHANGE OF ADDRESS

G2ANP W. Faulkner, 15 Northfield Terrace, Grimble, Slaithwaite, Huddersfield, Yorks.

G2ASY B. T. Chapman, 27 Loxley Road, Wandsworth Common, London, S.W.18.

G2KC N. L. Avery, 12 Trevose Crescent, Chandler's Ford, Eastleigh, Hants.

G3ABG/A The Morley Radio Club, 35 Butler Court, Teachers' College, Wymondham, Norfolk.

G3BYV Lieut. J. Crerar (*ex-D2HJ*), Newlands, Marley Road, Harrietsham, Kent.

G3CFN R.S.M. H. A. Edwards, W.O.'s Mess, No. 1 Training Regt., R. Signals, Catterick Camp, Yorks.

G3CGE R. Gardner, 42 Norham Avenue, Southampton.

G3COY V. J. Reynolds, University of London Air Sqdn., 48 Princes Gardens, London. S.W.7.

GM3DNQ D. H. McLean, Derran, Bonnymuir Place, Aberdeen, Scotland. (*Tel. : AB.* 7653.)

G3DWL W. B. Horner, Flat 11, 13 Queens Gardens, Paddington, London, W.2.

G5XV R. Y. Parry, 3 The Bungalows, Cowbridge Hill, Malmesbury, Wilts.

Here and There

The Club Contest

The *Short Wave Magazine* Third Annual Club 1·7 mc Transmitting Contest—to give it the full title—has attracted an entry much bigger than last year, and promises to be a very lively affair. More than 30 Clubs are now entered and the period of the Contest is December 4-12 ; a total of not more than 30 hours' operation is allowed during this period ; Clubs taking part will identify themselves as competing by calling "CQ MCC" (Magazine Club Contest) ; and each G prefix, with the European countries which may show up on 1·7 mc, counts as a Zone for scoring purposes ; the final score is points obtained multiplied by zones worked.

As Club stations can score not only by working one another but also by QSO'ing other stations on the band, it is hoped that there will be a high level of activity on the part of operators who will join in the fun by giving the Clubs more stations to work. It is only necessary to exchange RST and QTH in the usual way, and operation will be CW only. A list of Club calls already entered appears on p. 742 in this issue—look out for them on 1·7 mc during next week.

"Pse QSL"

Readers wanting SWL reports on their transmissions are reminded that "Pse QSL" is still a very strong feature in our *Short Wave Listener*. Give us your times of operation ; band(s) used ; frequencies if CC ; whether CW or 'phone ; distance, area or direction from which reports are required ; particular points to be reported upon ; and QTH for reports. It is a condition of appearance in "Pse QSL" that all useful SWL reports so received will be QSL'd by card, either direct or *via* the Bureau.

Boobery Section

Yes, "Error Crep' In," drat him, though he only managed a couple of small ones this time. On page 620 of G2AJ's article last month, the condenser marked C24 in the circuit diagram should be terminated to earth ; and in the table on page 621, L2 should be 14 turns, or 7 each side of the centre-tap. The photograph just above on that page shows 5 turns each side of centre for L2—this was subsequently increased to the 7 turns, as G2AJ found it worked better that way.

Xtal Xchange

There are only two bidders this month, as below :

G3AW, 94 Burlington Avenue, Oldham, Lancs.

Has Salford 7402 kc crystal, holdered. Wants frequency at LF end 7 mc, or offers ?

G8KU, 31 St. John's Avenue, Scarborough.

Has 14345 kc crystal, mounted. Wants frequency 7000-7400 kc.

Though this little feature has been running now for over 18 months, we have never had the slightest clue as to whether anyone has derived any benefit from it ! So a word from those who may have used this service recently would be welcome.

Licence Qualifications

Technical and Morse qualifications obtained by service in certain trades and specialised duties in the Armed Forces during or since the war are at present accepted by the G.P.O. as giving exemption from parts of the Amateur Radio examination.

The G.P.O. now gives notice that with effect from January 1, 1949, these qualifications will only be accepted for such exemptions if applicants have obtained their experience (by service in one of the specified trades) *within two years* of their application for a licence.

In effect, this means that if you apply for an amateur transmitting licence after January 1 next, you cannot rely on any Service experience for examination exemptions if your release date is prior to January 1, 1947. Fair enough, we say.

Nice Catalogue

We have recently received the latest issue of the Woden catalogue, a well-produced 28-page publication listing a very wide range of transformers—not only for amateurs and the radio trade generally, but also for many specialised applications. Full details are given of all types available, and the catalogue is free on request of Woden Transformer Co., Ltd., Moxley Road, Bilston, Staffs.

THE MONTH WITH THE CLUBS

FROM REPORTS

Everyone seems to be keyed up for "zero hour" on December 4, when the Top Band will come to life with calls of "CQ MCC" as the biggest entry yet takes the air in the *Short Wave Magazine* third annual 1·7 mc Club Contest. The full list of clubs known to be participating in the Contest, as at November 13, is given herewith. Any other entries accepted up to December 3 will identify themselves by calling "CQ MCC."

Baldock (G3EAJ), Beaumanor (G3BMR), Belfast (GI6YM), Bovingdon (G3DGS), Brighton (G3DJD), Burton (G2DAN), Catterick (G3AKF/A), Cheltenham (G3CEG/P), Coventry (G3FAB), Darlington (G8IA/A), Derby (G3ERD/P), Edgware (G3ASR/A), Grafton (G3AFT), Grays (G3DLC), Harrow (G3EFX), Kirkcaldy (GM3CVL), Mansfield (G2DTQ), Merseyside (G3DPZ), Nottingham (G3EKW), Petersfield (G3DDM), Rhigos (GW3FFE), Scarborough (G8KU), Spen Valley (G2CSJ), Wanstead & Woodford (G3BRX), West Bromwich (G3BWW), West Kent (G4IB), West Somerset (G3SB), Stoke-on-Trent (G3UD), Warrington (G3CKR/A), and Wirral (G2AMV)—

making a grand total of 30 Clubs who will be there to do battle during the period December 4-12. We look forward to a very interesting and sporting event, and are quite sure all who take part will enjoy the Contest. May we draw the particular attention of secretaries of participating Clubs to Rules 7-9, as it is most important that we have the results in by the date given and in the prescribed form.

Next month's deadline for reports is first post on December 14, addressed to Club Secretary, *Short Wave Magazine*, 49 Victoria Street, London, S.W.1.

And now follow this month's reports from 28 Clubs.

Stourbridge & District Amateur Radio Society.—At the November meeting the Secretary reported on an enjoyable visit to the GPO station at Rugby and outlined plans for visits to the BBC studios and Daventry. Then followed talks on Home Recording and Disc Recording, with illustrations.

Liverpool & District Short Wave Club.—During October, Mr. J. H. Brierly demonstrated his lightweight gramophone pick-up and lectured on the design of pick-up heads. All members present had the unusual experience of hearing a 14 kc note from a test record. In November the lecture covered condenser testing processes and was given by Wingrove & Rogers, Ltd.

Merseyside Radio Society.—Morse classes now take place on Mondays, in addition to the regular Thursday sessions. The technical course is proving popular, and the talks are usually given on Wednesday and Friday evenings. The AGM will be on December 11.

Enfield Radio Society.—This pre-war club is starting up again and will hold its opening meeting on January 12, 1949, at the King's Head Hotel, Enfield Town, 8 p.m. All prospective and interested members should get into touch with the Hon. Secretary, whose QTH appears in the usual panel.

Stotfold & District Radio Club.—A newcomer welcomed to our pages, they meet every Monday at 7.30 p.m., in the ATC Hut, Stotfold, Beds. Constructional work and Morse classes are organised and members will be welcomed. See panel for Secretary's QTH.

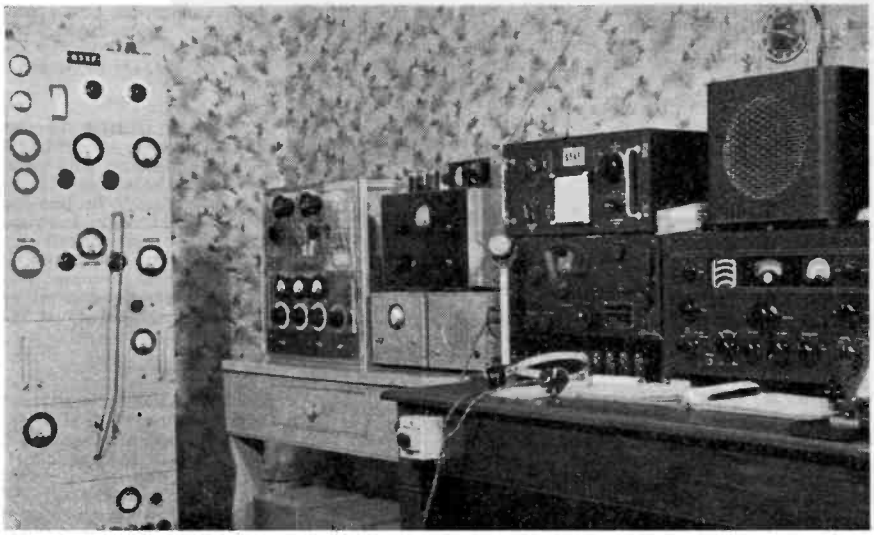
Scarborough Short Wave Society.—The new session has commenced and meetings are now being held at the Chessington Hotel, The Crescent, Mondays at 7.30. Permanent premises are not yet available, and the club suspends activities during the summer, but it is hoped that the winter season will attract more new members.

West Middlesex Amateur Radio Club.—Lectures are attracting good attendances and many fresh faces. Future lectures will be on the Electron Microscope, Negative Feedback and the Stroboflash. The search for permanent premises continues, and a "Hut Fund" has been inaugurated for the purchase of a portable building. For the present, meetings are held at the Labour Hall, Uxbridge Road, Southall, on the second and fourth Wednesdays at 7.30.

Hawick Radio Society.—This club has commenced the new season at the High School, Hawick, after two years at Wilton School. Membership is 25, with four licensed members, and a club licence is awaited. Meetings are on Thursdays at 7 p.m., and anyone passing through the town will be heartily welcomed, as will new members.

Brighton & District Radio Club.—This club has recently been formed as a successor to the old "Brighton & Hove Group," and it meets every Thursday, 7.30 p.m., at the St. Mary Magdalene Hall, Bread Street, Brighton. It has its own transmitter and application has been made for a club licence; Morse classes and constructional work are in full swing. Hon. Secretary's QTH in panel.

Gravesend Amateur Radio Society.—Welcome to another newcomer, inaugurated in October. The club meets on Wednesdays, 7.30 p.m., at 30 Darnley Road, Gravesend, and lectures by members have been arranged. There is also to be a junk sale in the near future. Prospective members will be welcomed at the Clubroom any Wednesday evening.



The other man's station G5XF

This station, owned and operated by J. Butterworth at 1088 Manchester Road, Castleton, Rochdale, Lancs, is a 25-watt-only layout, but employs three separate transmitters.

These are: For the 160-metre band, VFO-801 PA; for 80 and 40 metres, VFO-6V6 BA-6V6 FD-807 PA; and for 20 and 10 metres, VFO-6V6 BA-6V6 FD-6L6 FD-807 FD-834 PA. All three transmitters are entirely home-constructed and are relay-operated from the receiving position; a safety circuit of interest, incorporated in the control-line system, is that a thermal delay switch is fitted in the grid bias unit; this controls the energising current to all relays, so that nothing can be switched on until full bias has been applied to all stages.

On the speech side—though the station is operated mainly on CW—a crystal microphone is used with a 6SJ7-6C5-6F6-KT8c speech amplifier/modulator assembly, which modulates either of the three transmitters by choke control.

The aerial in use at present is a 66-ft. end-fed Zepp, suitably coupled for the band required. Receivers are an AR88D and a BC-348L. It is of particular interest to add that G5XF has been on the air since 1926, and he therefore qualifies as an Old Timer. Like many experienced operators, he is quite satisfied with a 25-watt outfit—though we do not propose to raise the QRO/QRP controversy in this space!

Reading Radio Society.—October activities included a summing-up of the D-F Contest, a junk sale, a visit to the Admiralty Compass Observatory, a Brains Trust, and a Hamfest. The latter attracted about 170 people, and G2DX lectured on the early days (1912 onwards); there was a display of amateur-built equipment; and the President gave a demonstration on the subject of "Bubbles" for the children (and others).

Wanstead & Woodford Radio Society.—Attendances are improving with the onslaught of winter, and new members are turning up at the Tuesday meetings. The transmitting members hold a Club Sked on the Top Band every Monday, 2100, and would like to contact other clubs on these occasions.

Warrington & District Radio Society.—Meets alternate Mondays, 7.30, in the Sea Cadet Headquarters. At the

November 15 meeting a member gave a talk on Workshop Practice, and arrangements are being made for future visits to Speke Airport and to a local automatic telephone exchange.

Bradford Amateur Radio Society.—This society now has a membership of over 50 and extends a welcome to any more who are interested in any aspect of radio. On December 28 there is an "Exchange and Mart." All meetings begin at 7.30 p.m., Cambridge House, Little Horton Lane, Bradford.

Edgware & District Radio Society.—This club is busily preparing for "MCC," and as no member has a garden long enough, a site has been borrowed next to Mill Hill School (from which the first G/ZL contact was made by G2SZ). Future events include: December 15, Judging of entries of home-constructed gear; December 22, Judging the best piece of converted surplus; December 29, Junk sale; January 5, AGM. Headquarters are now at St. Michael's School, 41 Flower Lane, Mill Hill.

West Kent Radio Society.—Membership is growing, and meetings are held on the first and third Wednesdays, 7.30 p.m., at Culverden House, Tunbridge Wells. The club is fortunate in having its own projector room, and the well-known BTH film on Electronics was recently shown. Forthcoming: December 15, Notes on Soldering, and raffle of radio gear; December 22, Informal get-together at the Hand and Sceptre, Southborough; January 5, Talk and demonstration on Transmitter Design, by G2UJ.

Surrey Radio Contact Club (Croydon).—A very sad event during November was the death of the Club's much respected President, Mr. H. Bevan Swift (G2TI). No club meeting has been arranged for December, but the Annual Social will be held on the 14th at the Purley Hall, Banstead Road, Purley. Next ordinary meeting is on January 11 at the Blacksmith's Arms, Croydon.

South-West Essex Radio Society.—This club, a newcomer to our pages, meets every Tuesday, 8 p.m., at 367 Rush Green Road, Romford. A roomy "shack" is available with a transmitter for 7 and 3·5 mc, and a top-band transmitter under construction. New members will be warmly welcomed by the Hon. Sec. (QTH in panel.)

Kingston & District Amateur Radio Society.—Fortnightly meetings continue, with membership on the increase. Owing to the difficulty in booking professional lectures, members are giving a series of talks for beginners, and it is hoped to hold a social evening very shortly. Next meetings are on December 15 and 29 at the Kingston Hotel.

Harrogate Radio Society.—A recent lecture by G3LB was on the subject of a home-built communications receiver, complete with Q5-er, noise limiter, speech clipper, AF filter and top lift. This gave the members many subjects for serious thought.

Bovingdon Airport Club.—This club is installing a station and a show of equipment at an Arts and Crafts Exhibition at Hemel Hempstead in January, and looks forward to acquainting the general public with the work and activities of Amateur Radio. It is also taking part in MCC.

NAMES AND ADDRESSES OF CLUB SECRETARIES

BARNSLEY. R. Hickling, 179 Barnsley Road, Wombwell, Yorks.
BOVINGDON AIRPORT. J. D. Lord, Police Station, Bovingdon, Herts.
BRADFORD. W. S. Sykes, G2DJS, 287 Poplar Grove, Great Horton, Bradford.
BRIGHTON AND HOVE. F. Harrop, G3DVL, 12 Park Street, Brighton 7.
COVENTRY. J. W. Swinnerton, G2YS. 118 Moor Street, Coventry.
CLIFTON. W. A. Martin, 21 Brixton Hill, London, S.W.2.
EDGWARE. R. H. Newland, G3VW, 3 Albany Court, Montrose Avenue, Edgware, Middx.
ENFIELD. B. C. Lowing, 98 Middleton Road, Hornsey, London, N.8.
GRAVESEND. R. E. Appleton, 23 Laurel Avenue, Gravesend, Kent.
HAWICK. W. McMahon, GM3CV, 10 Drumlannig Place, Hawick, Roxburghshire.
HARROGATE. A. Wilson, 16 St. George's Road, Harrogate.
KINGSTON. A. W. Knight, G2LP, 132 Elgar Avenue, Tolworth, Surrey.
LIVERPOOL. W. G. Andrews, G3DVW, 17 Lingfield Road, Liverpool, 14.
MERSEYSIDE. C. M. Johnstone, 6 Flawn Road, West Derby, Liverpool.
MIDLAND. W. J. Vincent, G4OI, 342 Warwick Road, Solihull, Birmingham.
READING. L. Watts, G6WO, 817 Oxford Road, Reading.
SCARBOROUGH. P. B. Briscombe, G8KU, 31 St. John's Avenue, Scarborough.
SOUTHEND. J. H. Barrance, M.B.E., G3BUJ, 49 Swanage Road, Southend.
SOUTH-WEST ESSEX. L. G. Barratt, 367 Rush Green Road, Romford.
STOTFOLD. L. Rivett, G3CPJ, 115 Church Road, Stotfold, Beds.
STOURBRIDGE. W. A. Higgins, G8GF, 35 John Street, Brierley Hill, Staffs.
SURREY (CROYDON). L. C. Blanchard, 122 St. Andrew's Road, Coulsdon, Surrey.
WARRINGTON. W. R. Murray, G3CUB, 56 Crow Wood Lane, Widnes.
WANSTEAD. R. J. C. Broadbent, G3AAJ, Wanstead House, The Green, London, E.11.
WEST KENT. R. L. Pluck, G4AY, 9 Prospect Road, Southborough, Kent.
WEST MIDDLESEX. C. Alabaster, 34 Lothian Avenue, Hayes, Middx.
WEST SOMERSET. T. C. Bryant, G3SB, 29 Lower Park, Minehead.
WIRRAL. B. O'Brien, G2AMV, 26 Coombe Road, Irby, Heswall, Cheshire.

Southend & District Radio Society.—The club transmitter is now on the air from the Municipal College, Southend, using the call G5QK. It only operates on the top band at present, and is on every club night (Friday) from 7.45 to 10 p.m. Next meeting, December 10, 7.45, in Room 1, Main Building, Municipal College.

Clifton Amateur Radio Society (S.E. London).—Meetings are held every Friday in a spacious clubroom at New Cross Gate, and the club has its own canteen. Morse sessions are held at every meeting, and recent events have been a field day, a junk sale and a lecture on frequency measurement. Full details from the Hon. Sec. (QTH in panel).

West Somerset Radio Society.—At the November meeting members inspected captured German receivers, transmitters and other equipment, and were able to compare them with several types of British radio gear.

Barnsley & District Amateur Radio Society.—An experiment was tried at a recent meeting and a "Cross-Fire Questionnaire" was held, with transmitting and receiving members on opposite sides of the floor. Questions flew numerously and frequently, and so successful was the idea that it will be repeated at a future date. Another recent event was a lecture by the Chairman (G2BH) on UHF propagation. Next meeting, December 10, 7.30 p.m., at King George Hotel, Peel Street.

Midland Amateur Radio Society.—At a recent meeting there was a talk by Mr. C. Naylor Strong, F.R.C.S., on "A New High-Stability Oscillator." An important new feature is the adoption of weekly classes for the RAE—full details available from the Hon. Sec. Meetings every third Tuesday, Imperial Hotel, Birmingham.

Coventry Amateur Radio Society.—"Induction Heating" was the subject of a recent lecture by Mr. J. Bridle, and members showed keen interest in the effects of QRO at thousands of amps! The *CQ* Contest also gave members some fun—one of them was called by a W while testing his transmitter, after he had only been on the air for ten seconds!

Wirral Amateur Radio Society.—Recent events have included a lecture on Converters, and a visit to the Liverpool Police radio station. The Friday night "Top Band Net" continues with great enthusiasm. December meetings are on the 8th and 22nd, YMCA, Whetstone Lane, Birkenhead.

SMALL ADVERTISEMENTS

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R.C.A. AR77, ·54 mc to 31 mc, S-meter. Offers over £25.—Andrews, 6 Pysons Road, Ramsgate.

R1359 Nine-valve superhet, 130-520 mc, £14. BC348, wired 6·3v, £16. R1155, £7. R3170A, £4. 1147A chassis, 10/6. Add 5 per cent. for carriage. Box No. 419.

HRO Senior, 7 coils, perfect, offers? HRO coils ·48 to ·96, ·9 to 2·05 mc, 50 to 100, 100 to 200, 180 to 430 kc. Also HRO 6v vibrapack, unused. Modern AC broadcast Rx considered part exchange.—Box No. 418.

EXCHANGE. New boxed 813's for 6C4's, 6J6's, 6AK5's, 7193's or any other VHF Rx valves. Offers to Box No. 417.

EDDYSTONE 5/10 convertor, £6. Eddystone 2-valve preselector, £4. Class-C wavemeter, needs re-aligning, AC, Offers? 32-ft. dural mast *plus* guy wire, £2. Buyer collects.—Barton, 13 Brangwyn Drive, Brighton, 6, Sussex.

HRO receiver, with coils for four wavebands. Splendid condition. First £20 secures. Carriage paid.—G3CQ, High Beacon, Havering, Essex.

1359 receiver in perfect order, continuous coverage, 130 mc to 520 mc, £9. Carriage paid.—G3CQ, High Beacon, Havering, Essex.

AMATEUR selling up. HRO with complete set of 9 coils, including amateur bandspread, £40. Panoramascope, £15. Long list of transmitting and receiving valves and components, all cheap, but no junk.—Box No. 423.

TRANSFORMER 230/50, outputs, one 3,000v, two 300v 25 mA, one 6·3v 3 amp, one 4v 1·2 amp, one 4v 24 amp, with three rectifiers, £3. T.1154M, latest model, covering 16 mc, with two rotary power units, all brand new, with all valves and meters, £8. CNY1 with control unit and extra transmitter units, VFO and crystal, 1-9 mc, 230v 50 c. input, spare valves, bargain, £20.—Box No. 422.

AMATEUR selling up—40-watt CW/phone transmitter, 80, 40, 20m, 2 packs, 600v-350v, £14. 1155A receiver, £7. B2 receiver, modified, power pack and speaker built in, aluminium cabinet, £6. Crystal calibrator, 100/10 kc. 50/-. Numerous other items.—Write Box No. 424.

SMALL ADVERTISEMENTS
READERS'—*continued*

QUARTZ Crystals, 7006, 7009 mc, mounted, 15/- each. 3615, 3572·5 mc, unmounted, 10/6 each. All guaranteed perfect.—Hobley, 109 The Drive, Wellingborough.

AR88D or HRO Senior wanted. In FB condition. Swop AR77 in part exchange.—Barnes, 4 Victoria Road, Hale, Cheshire. *Altrincham* 4464.

BC348R unmodified, good working order, less case, £9. Or exchange R1116 battery Rx in good order.—Hills, 13 Brigmerston, Durrington, nr. Salisbury, Wilts.

R1155 as new, power pack, 6V6 output, speaker in cabinet, £15/10/-. R109, 2 volt, 120 HT, 'phones, 5 spare valves, 70/-.—93 Stag Lane, Edgware. *'Phone: Colindale* 5836.

SALE. 60-watt transmitter and communications receiver, both AC operated, mounted with accessories in 6-ft. rack. Details and photograph from Bretherick, 37 Hillcrest Road, Romford.

SALE. HRO, excellent condition, coils 3·5-14 mc, 10-in. speaker, best offer secures.—Bass, 155 Green Lane, New Eltham.

R103A 250 AC mains, £5/10/-. MCR1, £5. R1147, 30/-. *RSGB Bulletins*, Vols. 9-21 (1933-1946), 5/- vol. 2¼-in. speaker, 15/-. Crystal, 8020 kc, 5/-. S.A.E. please.—Shankland, BM/SHANK, W.C.1.

1000V-750v-0-750v-1000v, 250 mA, Labgear power pack. Little used. List £14. Sell for £8. Carriage paid.—Box No. 425.

TR1143: £3. R1481, new, £5. All carriage paid. Wanted—metal housing case for BC221.—G3CNB, F.W.T.S. Hostel, Stoney Cross, Hants.

AR88D, new, large matched speaker in cabinet. S-meter, manual, etc. £55 or offer.—22 Acland House, Stockwell Road, S.W.9.

CR100 receiver and speaker, excellent condition, £20.—H. Ryder, 1 Harefield Road, Sidcup, Kent.

AR88LF, cabinet model, excellent condition, £35. CR100/7, latest model, with noise limiter, perfect, £25. HRO Senior, coils, power pack, overhauled, £30. Buyer collects above or carriage extra. Could deliver Birmingham area Christmas. 50-watt CW transmitter, 6L6, 807, RK11, with switched meter and filament transformer, needs HT only, coils for 10 and 20, £15. 832 (for 145 mc), new, 25/- each.—R. H. Webb, G6XY, Bigbury-on-Sea, Devon. *'Phone* 337.

HRO Model MX, with coils and power pack. Transmitter, 100 watts, 14 and 28 mc 'phone, in steel floor rack with VFO. Line up: PT15, PA-807-Det 19; Mod., 6L6-6L6-6V6-6J5-6J5-S30, Power pack, U23, U23, U18/20, U18/20, 5Y3. All Woden transformers and chokes used in this Tx. A superior job, ready to operate. £187 the lot.—Barker, Bermuda, 87A London Road, Maidstone. *'Phone: Maidstone* 2276.

WANTED.—BC610 and AR88, give full details and price. For sale, B2 Tx/Rx and power pack, very good condition; also BC342 unmodified. £30 the two.—Box No. 427.

BC342 for sale, good condition, complete auto transformer, reasonable.—G3DYA, 129 Moseley Road, Bilston, Staffs.

100 1000 kc Labgear crystal calibrator, in excellent condition. Highest offer, or exchange for Tx gear.—Box No. 426.

SMALL ADVERTISEMENTS

READERS'—*continued.*

PANORAMIC adaptor/oscilloscope, Type ID-60/APA-10, 3 BP1 and 19 tubes, requires external 400-0-400 at 150 mA and 6·3v twice transformer for immediate use. Offers (covering carriage) to Box No. 431.

SELSYNS, miniature, American made, ball bearings, 12v 50 c s, 12/6 per pair.—Smith, 38 Bury Avenue, Manchester, 16.

COMPLETE B2 in suitcase, unused, £15. Oscilloscope, £5. *Frequency Modulation*, by Hund, new, 15/-. 220/1104 kVA transformer, £3/10/-. QCC 7073 Xtal, 12 6. Valves, HV gear. Amateur clearing. S.A.E. list.—21 Milner Road, Morden, Surrey.

SALE.—CR100 receiver in excellent condition. No reasonable offer refused.—151 Stanwell Road, Penarth, Glam.

'PHONE jacks and sockets, boxed, brand new, 1/6 per pair. RF27 unit, 20/-. TU8B and 10B, 8/6. —H. Holmes, 24 Castle Lane, Bedford.

PRESELECTOR—Eddystone 2-valve, 3 sets coils, unused, £5.—2HLW, 9 Roils Head Road, Halifax, Yorks.

FOR sale.—New Hallicrafters HT14 Rx/Tx, complete power pack, manual, etc. Offers? Super-Pro, as new, with power pack. Offers? Exchange either for Hallicrafters SX28A or SX28, as new, in perfect condition. Frequency meter, BC-906, new, £3. 25-watt PA, complete with self-contained power pack, four-band turret coils, BC-221AJ manuals.—Box No. 428.

FILAMENT TRANSFORMERS, 230/250V INPUT, 6·3V 2 AMPS OUTPUT, 8/9 EACH. POST PAID. —ANGLIN, G4GZ, 233 WELHOLME ROAD. GRIMSBY.

ONE Hallicrafter Panadaptor Model SP44, as new (please note, this is not "surplus" equipment), as advertised in *QST*, £30, carriage paid. One R.C.A. ribbon mike, with push-to-talk switch, £5/15/-. carriage paid. One Trix speech amplifier, as new (output, pair KT66), £15, carriage paid.—Box No. 430.

G2OO'S announcements now appear in the Trade Small Advertisements column and on page 754.

18 SET Mark III Walkie/Talkie, 6-9 mc, complete, as new, microphone, key, 2 headphones, aerials, instruction book, in original case and A1 working order. Best offer over £10 secures.—Caunter, 28 West Grove, Walton-on-Thames.

NATIONAL 8IX for sale. 1·715 to 30 mc, Xtal gate AVC, BFO, 10-valve Rx with auto transformer, U.S. Navy 45-watt 'phone/CW Tx, CRV52233, 3 to 9 mc, 1625 to 815 PA, 6N7, 6N7, 815 Mod.; A.M.1196 Tx/Rx. 29 copies *Practical Mechanics*. 95 copies *Practical Wireless* and 37 copies *Wireless World*. Offers to Box No. 429.

CR300 8 wave-bands, AC 200-250, with speaker, £14/10/-. Also Super-Pro. good condition, £30. Wanted—SX28, AR88, HQ120 or similar, any condition.—Taylor, 75 Edgehill Road, Winton, Bournemouth.

HAMBANDER complete with speaker £18. M.C.R.1. and power pack, etc., £7. Ferranti 0-1 ma. Meter in cabinet with rectifier, etc., 30/-.—Jones, 63 Barcroft Street, Cleethorpes, Lincs.

EXCHANGE. Wavemeter, BC221T adapted for 200-240 AC 50, for Western, Taylor or similar good make signal generator, 125 kc-80 mc.—Box No. 433.

FOR sale, Canadian type 43 mark two transmitter, brand new, with valves, without power unit. Offer. —Write Box No. 434.

SMALL ADVERTISEMENTS

READERS'—*continued.*

11 valve communication receiver. National NC-156-1, mains 3-17 mc 'S' Meter. Xtal. Noise Limiter, B.F.O. Excellent condition, £30.—Siebert, 57 Cambridge Drive, Lee, S.E.12.

QRT Complete Station for sale S. London. 150-watt Transmitter. Clapp Osc.-6V6-6L6-807-807-PP/PT15's. Power supplies 1500/1000/500v ; 500v : 350v : 150v, stabilised. Bandswitched, metered, in rack. AR88D Receiver, genuine brand new condition. Also Frequency meter, 3/valve, 1000/100 kc. Q-Max Absorption wave-meter. Triplett Test-meter (including 5000v AC/DC range). Spare transformers, chokes, valves, condensers, resistors, etc.—Nearest £120. Part offers considered. Box 435.

FOR Sale ; 4 element close spaced rotary beam for 10 and 20. Magslip recording, beam rotated through 360 degrees in 60 secs. by 200v DC motor, power for which is obtained from built in rectifier in main power unit. Elements constructed of extra strong aluminium tubing 1 in. dia. Control unit for mounting on wall fitted with remote control buttons. Magslip driving 12 in. sweep hand on map. Automatic stop and start, etc. 80 ohm co-axial included to allow of beam being 50 yards from house, all other gear plus two field telephones for tuning included. Will pay delivery costs to any part U.K. What offers over £100?—Box 436.

WANTED—HRO bandspread coils. State condition and price. Sell 1200-0-1200v 200 mA transformer. Offers—GM2FVV, W. Girvan, 20 Murray Place, Stirling.

832A boxed, new. Ideal for 145 mc 22/6 post free. Unrepeatable offer.—Kean, 46 Castletown Road, London, W.14.

DISPOSAL Ham Gear Type 53 Tx complete, £80. 1131 Tx complete valves modified 7, 14, 28 mc £65. T1154's, two, complete, £3/10/-, each. Woden Transformer 1200-0-1200, 1000-0-1000, £4/10/-. Class D Wavemeter £3. 1132 Rx and Power Pack converted 28 m/c new, £5. Sky champion perfect, £18. Buyer collects.—G2FM, 176 Manor Drive North, Worcester Park, Surrey. Derwent 3122.

WANTED.—B.C.610 for cash, please state price and condition, or would consider exchange 610 and cash for American sound projector, 16 mm.—Offers to Box 397.

A MK III perfect £8, R103 new complete 6v pack, spare valves, speaker, etc., £8 or exchange both for No. 12 transmitter or 'HRO less coils.—G2LI, 19 Cardinals Walk, Hampton, Middlesex.

BC348R NEW, pack £22/10/-. 145 VFO/392 pack £10,CR100 perfect,£30. HRO/M, six coils, pack £35. Commercial 3½ in. scope, new £15. Westinghouse PPI new, complete, 7 in. tube £25. 25 watt amplifier £15 or exchange any items for 150 watt Tx complete or AR88.—Box 437.

SALE.—1116A receiver, good condition recently revalved, in working order £7. carriage paid. Also Class D II Wavemeter modified for 6v A.C. needs re-aligning.—Offers, G3CBI, 1 Crookhays, Shaftesbury, Dorset.

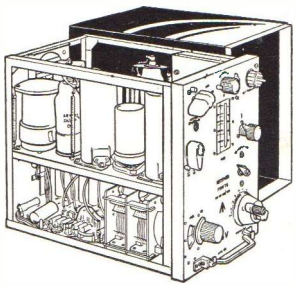
FOR sale.—R1155. 75 kc-18 mc. Complete with power pack and output stage, excellent condition. Best offer secures.—4 Bruce Castle Road, Tottenham, N.17. TOT 6902.

H.R.O. NINE coils, P/P, excellent condition, buyer collects or arranges carriage. Offers ? Five spare coils £6/10/- or 30/- each.—Frearson, 66 Wheelwright Road, Birmingham 24.

5-VALVE CRYSTAL CALIBRATED RECEIVERS

These BRAND NEW receivers are complete with 5 valves, 100 kcs plug-in Crystal and Desynn trimmer. Each one is packed in a transit case and weighs 10¼ lbs. Size 6½″×8½″×10½″. Frequency coverage on 2 bands—2·4-13 mcs, with illuminated dial. Valve line-up: EF39, ECH35, EF50, EA50, 6J5G. Add 5/- for carriage and packing.

for only **35/-**



INDICATORS

A much improved version of the type 6 made in U.S.A. Valve line-up: 4 6AC7 and 3 6H6 and includes 5BPI CRT which is equivalent to the VCR97. An excellent foundation for a high gain 'scope or T.V. receiver. Interior brand new. Only **£4/10/-** (carriage and packing 7/6).

SCR 522 POWER UNITS

We have available both British and American-made power units for the well-known SCR 522. Input 24v D.C. Outputs 300v D.C., 260 m/a; 150v D.C., 10 m/a; 14·5v D.C., 5 amps. The British version is despatched in a transit case and is brand new. The U.S.A. version is as new and less transit case. Both types are fully voltage regulated and contained in sound-proof cabinets. Both may be used as D.C. battery chargers or converted to D.C. mains fractional horse power motors, apart from their original purpose.

U.S.A. type, **15/-**
British type **£1**
} Add 5/- carriage and packing

R1155 SPARES

A kit of spare components for this famous receiver including IF transformer, output transformer, tuning coils, chokes, etc., etc. All brand new. **25/-** per kit (add 1/6 postage and packing).

INTERCOMMUNICATION AMPLIFIERS

Suitable for use with electro-magnetic microphones, and with sufficient output for 6 or more pairs phones. Size, 6¾″×4½″×6″. Weight under 5 lbs supplied in transit cases. Power supply 2v L.T., 120v H.T. Complete ready for use or adaptation. The amplifier incorporates two audio frequency stages consisting of a Class A voltage amplifier and a QPP power amplifier.

Circuits supplied.

With valves **12/6**
Less valves **7/6**
} Add 2/- carriage and packing.

MARCONI OSCILLOSCOPES

A console type equipment standing 2′ 6″ high and with 12″ electrostatic CRT, includes 11 valve time base and amplifier and also 230v A.C. power-pack. Valve line-up 4 L63, 2 H63, 2 MU14, 2 6JSG, and 1 KTZ73. As new. A chance to obtain a £100 equipment for only **£25** (carriage and packing paid).

RADAR TRANSMITTER T3237

This fine equipment operates on 223 mcs and includes modulator TX, and power supply. Valve line-up: 2 of CV63, 1 of CV72, 1 of CV73, and SU2150A. The modulator consists of blocking oscillator and driver valve; the TX is a push-pull oscillator, and the tuning is controlled by shorting bars on grid and cathode LECHER bars. The R.F. output to aerial is controlled by position of matching taps in cathode lines. Weight 21 lbs. Size 18″×9″×8″. The equipment is the TX for MONICA Mk. 3C. Only **£3** (carriage and packing 10/-).

RADAR PULSE CALIBRATORS

This compact equipment contains a very useful 240v A.C. power pack, using a 5ZHG full wave rectifier. It also has provision for use on 80v 1,000 c/s. Other valves supplied are 4 SP61 and 1 EA50. It was originally used for the calibration of indicating units on Radar installations. Only **35/-** (5/- carriage and packing)

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A 3-valve R.C. amplifier, complete with three miniature IT4 valves. In weatherproof case with battery compartment. Brand new. Only **22/6.** Post free.

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30 assorted wire-wound and carbon potentiometers of good usable values. Brand new and unused. **15/-** per kit (post and packing 1/3).

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30 assorted valveholders; ceramic, amphenol and paxolin types from 3-pin to 9-pin. New. **7/6** per kit (post and packing 1/-).

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550-450-175-0-450-550v 230 mA, 6·3v 5A, 5v 3A **82/6**
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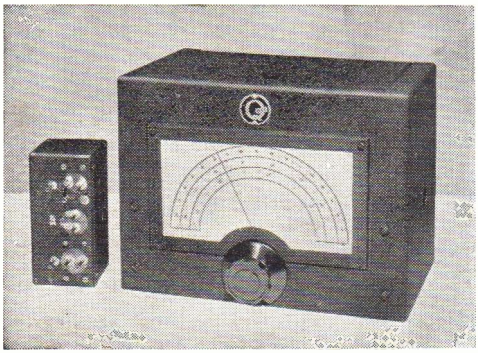

For 2, 5, 6 or 10 metres (with power pack) (Incl. any one coil unit) **17 GNS.** (Extra coil units 30/- each)

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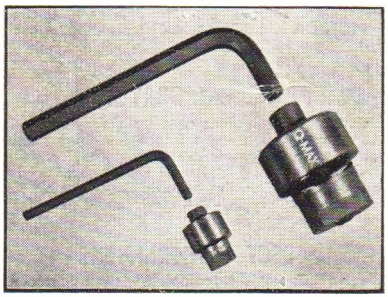

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- 'S' Meters for AR88... ... ... 63/-
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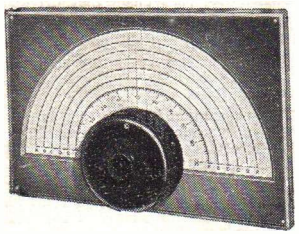

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EL91	Output Pen.	6·3v	15/3
EY51	H.W. Rect.	6·3v	24/4
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EC91	Earthed G. Triode ...	6·3v	30/6
ECC91	Double Triode... ...	6·3v	30/6
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