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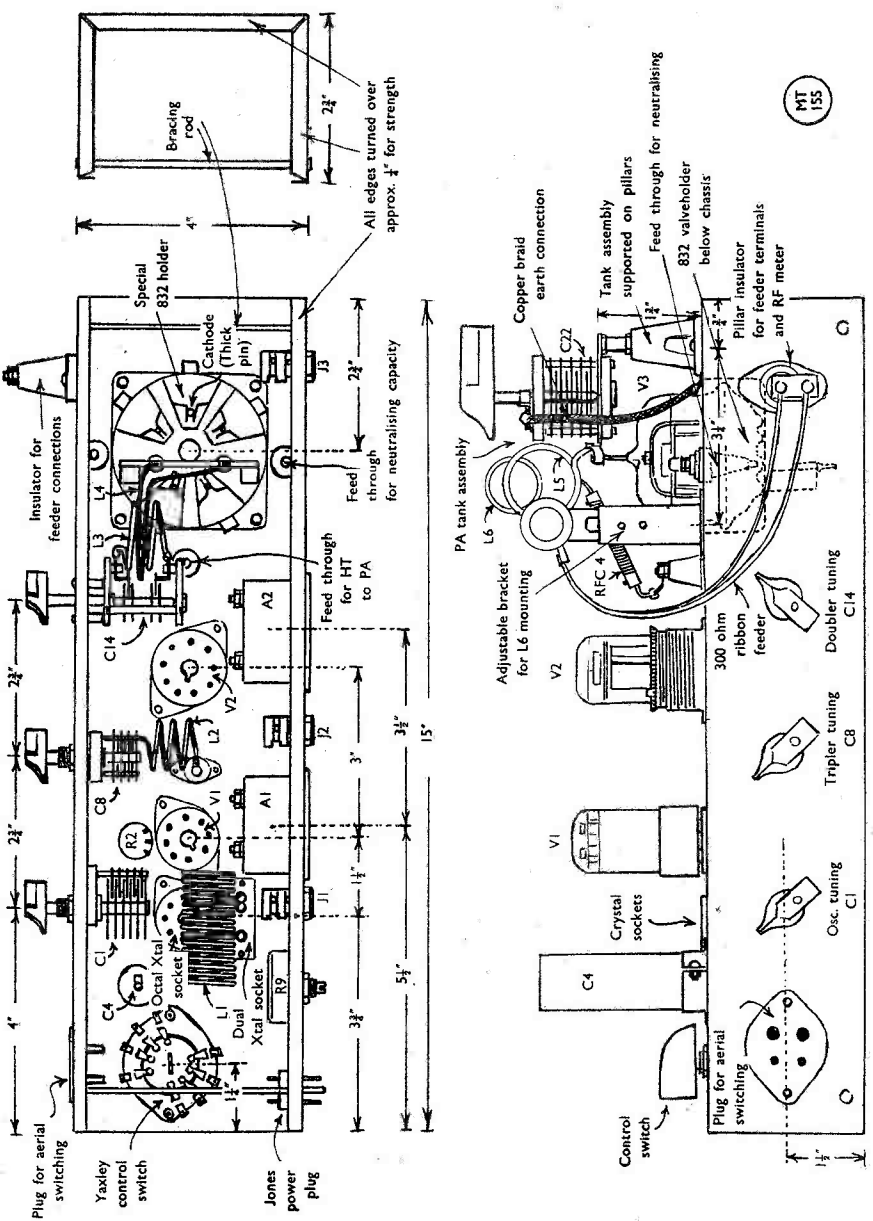


Fig. 2. Sketch showing the general layout of the transmitter.

use of the 6J6 is the fact that it has a common cathode for both triode sections, and so the output of the CO side cannot be controlled by the separate cathode resistor R2. Separate control is possible on the 12AT7, however. A 7N7 has not been tried for V1, but should give a good performance, having similar characteristics to the 6SN7, with the advantage of the loctal pressed-glass base, more suitable for VHF.

Different specimens of 6SN7GT seem to vary in their performance, possibly due to the type of construction used by different manufacturers. Of the several makes tested, those made by Tung-Sol and R.C.A. gave the best results.

Some 6 mc crystals can be induced to work on 18 mc using the same coil and condenser assembly as already specified, by tuning near the top end of the scale (C1 about 40 $\mu\mu$F). The second section of V1 then acts as a quadrupler. A few crystals will, in this way, give nearly as much drive to the PA as the 8 mc type. Some 7 mc crystals can be made to take off on their 5th harmonic at 35 mc, but this mode of operation has not been investigated. In such a case, a few turns should be removed from L1 to enable the circuit to resonate at the higher frequency, and the bias should be reduced on the second section of V1, which would operate as a doubler on reduced drive. The recently announced Q.C.C. harmonic crystals, type FO, could also be tried, but then the CO voltage should be lowered to 150.

Points to Watch—CO Stage

When designing this transmitter a number of snags arose which were not pointed out in the *QST* articles. With about 250 volts on the plate of the CO, using a 6SN7 in the original 6J6 circuit, the grid current with an active crystal is 3 to 4 mA. This causes a noticeable heating of the crystal and may cause frequency drift, especially with quartz plates which are not of the zero temperature-coefficient type. Signal chirp may also occur when keying the transmitter, partly due to overloading of the crystal and partly due to jumps in the supply voltage. The frequency of the oscillator is slightly affected by the voltage applied to it. These troubles were eliminated by introducing the variable bias resistor R2 in the first cathode of V1. The oscillator bias was not then entirely derived from the grid current in R1, which need not be more than 1·5 mA. There was a corresponding reduction in crystal current and heating. R2 also serves to maintain a steady RF output, which tends to vary considerably with different crystals and individual valves. The 32 μF condenser C4 in the CO HT supply helps to prevent sudden changes in voltage when keying, and also gives additional smoothing. Reports on the final design of the transmitter give T9 with no frequency drift or chirp.

It should be noted that the *QST* designs say nothing about keying, which, with the 6J6-832 combination, can only take place in either the CO or the PA. Keying in either of these positions is generally undesirable, and this is especially true with this harmonic-type oscillator. The keying in the 3-valve transmitter described here takes place in the cathode of V2, which is thus effectively isolated from the crystal oscillator.

The Doubler Stage

This uses a Mullard QVO4/7 beam tetrode. The output from the tripler feeds the grid of V2 *via* C10. The combined output capacity of V1 and input capacity of V2 result in a low value of inductance for L2, which consists of three turns of 0·8 in. diameter, length of winding 0·8 in. (*See* Coil Table). No increase in available power was obtained by trying to

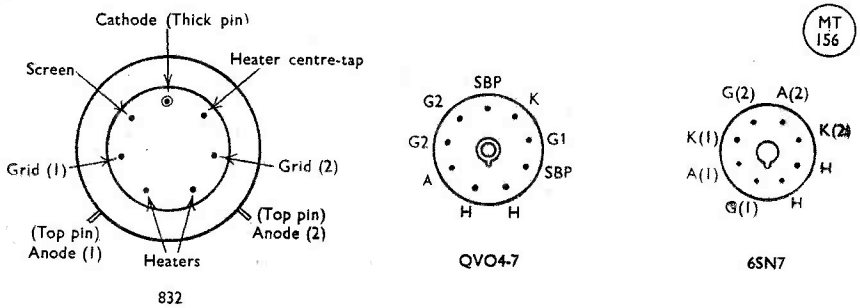


Fig. 3. Base connections, looking at the underside, of the valves used in G3FMO's 144 mc transmitter.

match the input impedance of V2 to the tuned circuit, by increasing the size of L2 and tapping C10 down the coil. Bias of about 55 volts is applied to the grid *via* the RF choke, from the voltage divider R7, R8 across the bias supply. This value was found to give the best RF output under operating conditions. Output falls if the bias is increased, while if it is decreased, the anode current rises but is not accompanied by any increase in RF output. R6 has an optimum value in the region of 100,000 ohms. The anode of V2 feeds a balanced tuned circuit L3/C14 making use of a split-stator tuning condenser. A small condenser C15 of 5 $\mu\mu$F is used to balance the circuit against the valve output capacity. This balancing improves the doubling efficiency of the stage. L3 consists of 2 turns of 1 in. diameter, 0·8 in. long.

The Power Amplifier

The coil L4, feeding the grids of the push-pull tetrode sections, consists of one turn of about 1·2 in. diameter closely coupled to L3. The tight coupling gives the best energy transfer, and results in such a close interaction between L3 and L4 that no separate tuning condenser is required for the grid circuit; C14, L3 and L4 behave, in fact, as one tuned circuit.

Bias is applied to the centre tap of L4 *via* the RF choke, and a small amount of self-bias is produced by the resistor R10 of 3,000 ohms and part of the bias potentiometer R9. The self-bias provides a certain amount of automatic adjustment, which is useful when the 832 is being modulated. Under working conditions the bias is about 50 to 55 volts. The screen dropping resistor R11 of 20,000 ohms gives a screen voltage of nearly 200 under driven conditions. C20 by-passes R11 for plate and screen modulation. It is necessary to by-pass the centre tap of L4 to the cathode pin of the 832 *via* C17 of 300 $\mu\mu$F, and also to by-pass the centre tap to a point on the earthing system through a larger condenser C16 of 0·001 μF, in order to prevent a tendency for parasitic oscillation of low frequency involving the choke RFC5. Neutralisation is required to make the amplifier stable on 145 mc. The neutralising condensers C*n* are of very low capacity, as the anode-grid internal capacity of the 832 is only ·05 $\mu\mu$F. A split-stator condenser with grounded rotor is used in the PA tank circuit C22, L5. L5 consists of two turns of about 1¼ in. diameter. L6 is a link coil, two turns of ⅜ in. diameter, which is swung into the centre of L5 until maximum RF output is obtained to the feeder system, as indicated by the RF thermocouple meter A3.

A 0-100 mA meter A2, in the anode circuit of the PA, reads the actual plate input in conjunction with the supply voltage reading. Other current readings are taken by a 0-30 mA meter, which can be plugged in the jacks J1, J2 or J3. The key is plugged into J2 and Fig. 1 also shows the keying filter, which is used to prevent key-clicks and consists of the usual LF choke-condenser-resistor circuit. The meters are shorted for RF by the condensers C23 and C25.

In the circuit of Johnson and Bernstein, the 6J6 section is used to drive an 832 as a straight amplifier with no intermediate stages. The input to their doubler or tripler section is about 250 volts at 15 mA, which drives the PA to a grid current of about 1·5 mA, and an anode current of 55 mA at 300 volts, with an RF output of about 10 watts. Experiments made to try to make the 6SN7 drive an 832 were not very successful, probably due, in part, to its low efficiency at 145 mc. However, the output from the QVO4/7 doubler is only just sufficient to drive the 832 to full power, and considerable trouble was taken to adjust all the circuit values to the optimum to reach this degree of efficiency. It seems that the 6J6-832 combination obtains some of its drive by feed-back in the PA. Feed-back is almost certain to occur, as no neutralisation is mentioned in the article. Tests with an un-neutralised 832 showed that it was fairly unstable and tended to give parasitic oscillation, especially at bias voltages below 65 volts.

Construction

Detailed constructional information, with all dimensions, will not be given, as most amateurs like to arrange their gear according to the parts they have on hand. A general outline with any important points will be given, however, for those who might like to construct a similar transmitter. The chassis is 15 in. long by 4 in. wide by 2¾ in. deep and made from sheet aluminium. The depth is sufficient to accommodate all the coils and tuning condensers, and associated components of the driver stages below the chassis. These are therefore screened from the PA tank circuit, which is mounted above the chassis, beside the 832. One side of the chassis carries the three tuning condensers of the driver stages and the opposite side the two meters and meter jacks. An 8-way Jones plug is provided at one end of the chassis for power supplies, and the connections to this are shown in Fig. 1. The control switch is mounted with the knob projecting from the top surface of the chassis, this being a very convenient position for operating. The switch is a 2-pole 5-way Yaxley with two wafers, only one of which is used. The second wafer is available

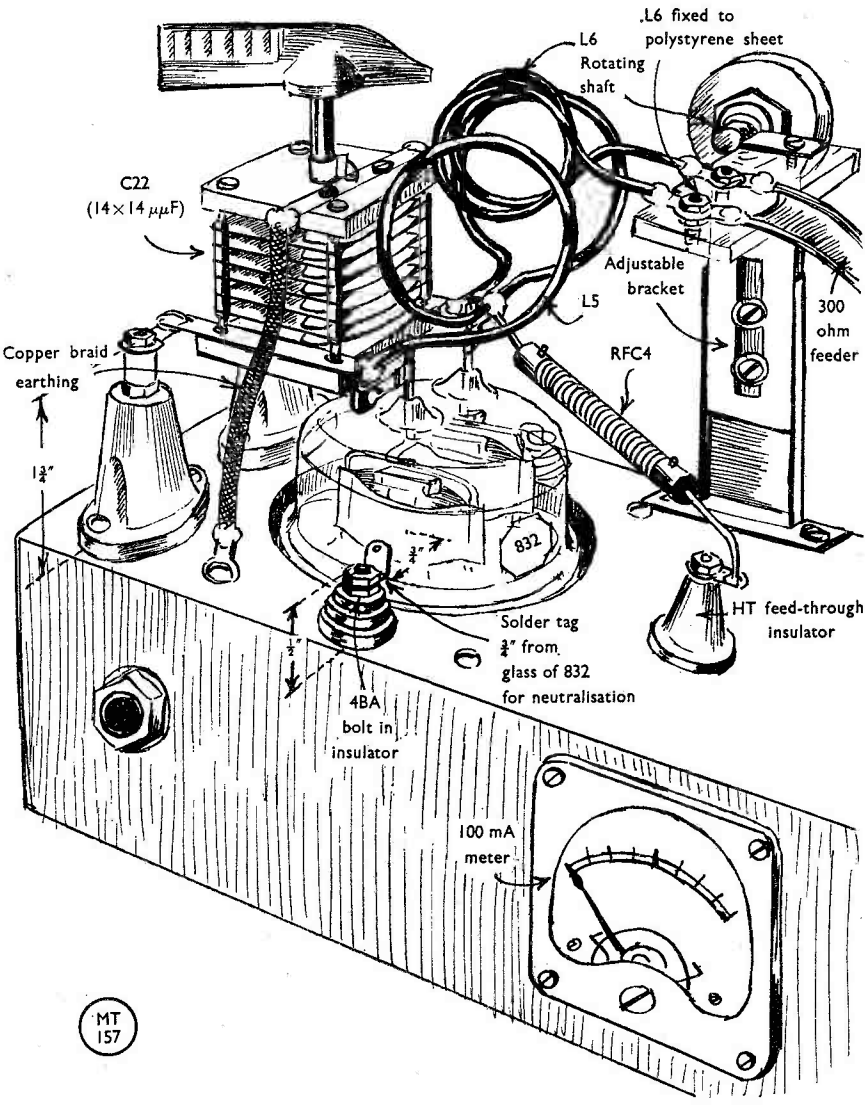


Fig. 4. The author's own sketch of the assembly at the PA end, showing mechanical arrangement ; note the neutralising capacity.

to switch an external circuit, such as a low voltage supply operating an aerial relay, *via* a socket provided on the chassis.

In the present installation, the current feeding the receiver is used to actuate an aerial relay for send-receive *via* the same socket. The connections to the control switch are shown in Fig. 1. In position 1, the power pack feeds the receiver only ; in position 2 (Stand By) no power is supplied to either transmitter or receiver ; in position 3 the transmitter works on CW ; in position 4, the HT supply to the plate and screen of the 832 is bypassed through the modulation transformer secondary

for phone operation ; in position 4, which is used for tuning up, the HT is fed through a dropping resistor R12 of 2,000 ohms, to the whole circuit. The assembly of the main components on the chassis, with a few dimensions, is illustrated in Fig. 2.

L1 is mainly self-supporting and wired directly on to the valve and crystal sockets, but is braced by pushing a sheet of perspex, cut to just the right size, through the axis of the coil. This prevents vibration of the windings. A suitable coil former with a thinner wire, say 20 SWG could be used for L1 if desired, although the self-supporting coil is quite stable. Sound mechanical construction in the circuit L1, C1 is desirable, as detuning shifts the crystal frequency slightly, and so the circuit is slightly sensitive to vibration. The valve holder for V1 is a ceramic type to ensure low loss. The crystal sockets are mounted as close as possible to V1, and to provide for the use of crystals with different pin-spacings, a double purpose socket (taking units with $\frac{3}{4}$-in. pin spacing or $\frac{1}{2}$-in. spacing) is mounted next to an octal socket (for U.S. miniature FT4 crystal holders with $\frac{1}{2}$-in. spacing). These sockets are connected in parallel. The potentiometer R2 is a midget screw-driver adjustment type and is mounted close to V1 on the top of the chassis.

One end of L2 is wired directly on to a terminal of C8, the other end being carried on a small stand-off insulator. The cathode condenser of V2, C12, should preferably be duplicated, one condenser being wired directly across the cathode and centre earthing tags of the valveholder and the other between the jack terminal and earth. If this is not done, some reduction in RF output is observed when plugging in the key or meter circuit, due to changes in inductance. The earthed terminals of the V2 valve holder are all connected together with one length of wire, one end of which is returned to an earthing tag, bolted to the chassis by the valveholder retaining screw. It seems best to return one wire from this tag to the main earthing line and also another wire, from the opposite end of the valveholder wiring, to the same earth line, but at the point to which C9 is attached. This gives the best drive on V2. Obviously lead inductances are important on these frequencies. It should be noted that while the earthing of each stage in the transmitter is taken to a single tag, bolted to the chassis and appropriate valveholder, the chassis itself is not used as the earth connection. For this purpose a bus-bar of 12 SWG wire is run through, to which the earth wire of each stage is connected. The anode circuit of V2 comprises the midget split-stator tuning condenser C14, which has the coil L3 soldered directly across its terminals. Care should be taken, when soldering heavy gauge wire to these midget condensers, to avoid unsoldering the vanes and/or loosening the stator assembly from its ceramic supporting pillars. If the ends of the coil and condenser tags are pre-tinned, and work is done rapidly with a hot iron there should be no trouble. The stator vanes of C14 connect to the common earth point for V2. The coil L3 is mounted with its axis perpendicular to the side of the chassis, and to avoid loss of power from currents induced in the metal, the tuning condenser C14 is set back from the side about $\frac{1}{2}$ in., using spacers and long fixing screws. C14 is a 3-hole fixing type with a fairly long spindle. If it is intended to use the type of condenser which is held by a single lock-nut and has a short spindle, it may be necessary to make a small mounting bracket and extend the spindle with a shaft-coupler.

The base connections to V3, and the other valves can be seen in Fig. 3. L4 is supported round the centre of L3 and wired directly to the grid tags of the V3 valveholder. The holder for the 832 is a special type with built-in by-pass condensers for the screen, heater and cathode terminals. The main body of the holder is of metal. The base pins of the 832 project through holes and make contact with spring clips on the underside of the holder. The clips are rivetted to the holder through insulating eyelets, the body of the clip forming a by-pass condenser with the metal shell of the holder, using a sheet of mica as dielectric. The clips for the grid pins are supported on an insulating holder of ceramic or Mycalex, standing off from the metal shell. The holder is of the recessed type and completely shields the lower half of the 832 and enables short connections to be made to the grid pins below and to the PA tank circuit above. This can be seen in Fig. 4, which shows the PA assembly above chassis. When using this type of holder instead of the usual ceramic variety, there is no need to worry about the by-pass condensers C19 and C21, which are taken care of by the holder itself. In addition, the 832 has an internal by-pass condenser between the screens and cathodes. The capacity of the neutralising condensers C*n* is very small. Connections from the grid tags are crossed below the chassis and brought out to small feed-through ceramic insulators. The long sections of the insulators are below the chassis. The short insulating sections above the deck bring the terminals just about level with the 832 anodes. In the arrangement used by the author, with the insulators about $\frac{3}{4}$ in. from the side of the 832, an ordinary solder tag, bent at right angles and fixed to the terminal, was sufficient to produce complete neutralisation. This is shown in Fig. 4 (For neutralising adjustments

refer to the section on neutralisation given later).

The PA tank assembly C22, L5 consists of a small butterfly split stator condenser, transmitting type with wide vane spacing, with the coil soldered directly to it, the whole being supported over the 832 by two large pillar insulators. Contact with the anode pins of V3 is made by very small loops of thin copper strip and standard diode clips. The terminals of C22 are almost directly above V3, the anode pins of which are only about ¼ in. away. This gives very short connections to the tuned circuit and eliminates the possibilities of UHF parasitics, which are sometimes produced by long leads. A feed-through insulator carries the HT+ feed to the choke RFC4, which is soldered directly to the centre of L5. The condenser used for C22 had a floating rotor, with no provision for earthing. It was modified by using an ordinary octal top-cap connector to give a sliding contact on the condenser spindle, the connector being soldered to the centre of a brass strip, which was bolted to the ceramic end-plate. Each end of the brass strip was connected to the chassis by copper braid. With this assembly, in order to insert or remove the 832, it is necessary to unscrew the fixing nuts on the supporting ceramic pillars and on the feed-through insulator carrying RFC4, then lift the whole assembly away, sliding the diode clips off the anode pins of the 832. This may be a little trouble, but is well worth while in order to get short connections, and in any case one hopes that the 832 will not need to be replaced very often! The swinging link coil L6 is supported on a strip of polystyrene, which is fixed to part of the rotor assembly of an old condenser. The whole is carried on an Eddystone adjustable insulated bracket. Thus the link coil can be swung in and out of the centre of the tank coil by rotating the spindle, and its vertical position can be altered by the adjustable bracket. A short length of 300-ohm feeder runs from the link coil down to the side of the chassis to a pillar insulator. This insulator carries the RF thermo-ammeter and a strip of polystyrene with terminals for the aerial feeder.

(Part II of this article follows next month, giving final details of Construction and Operation, with the Coil Table.)

SCREEN CONTROL MODULATOR

Two-Stage High-Gain Unit for 100 Watt Carrier Powers

By **H. J. BEACH (GM8BO)**

The material already published on screen modulation aroused considerable interest, and up and down the country the possibilities of SAM are being probed. Here are details which will take the guessing out of the design for a suitable modulator.—Editor.

AS a result of successful initial tests with a very simple audio amplifier for screen modulation of two 807's in push-pull (*Short Wave Magazine*, January, 1950), the writer decided to re-design the modulation unit completely to fulfil more exacting requirements, which can be briefly summarised as follows :—(*a*) To provide sufficient audio gain from a relatively insensitive microphone having a good frequency response characteristic, (*b*) to give audio output sufficient to screen modulate carrier powers up to approximately 100 watts, and, (*c*) to maintain a linear frequency response over the range of 50 cycles to 10 kc.

It was stated in the earlier article on screen modulation that considerable economy both in power and equipment could be effected by feeding the modulator from the PA power pack. Bearing this point in mind, data sheets were perused for a valve which would develop approximately 5 watts of audio power, whilst restricting the DC dissipation to a reasonably low figure.

Inasmuch as the conditions laid down for economy must be adhered to if a good overall efficiency is to be maintained, the speech amplifier and modulator must be limited to two valves, such that their total current drain is of the order of 45 mA. This, of course, pre-supposes a power pack which will just do the job in hand, as one which is very liberally rated rather tends to offset the efforts at economising!

Having decided upon a two-valve arrangement, a further essential requirement is that the modulator chosen should have a reasonably high slope, in order that the available voltage

swing from the anode of V1 (*see* circuit), even if small, creates a relatively large current change through the anode load of V2.

The valve finally decided upon for the function of modulator was the 6V6 ; this has a Gm of the order of 6 mA/V, and will deliver, under Class-A conditions, approximately 4·5 watts of audio.

The Voltage Amplifier

It was stated in the summary of requirements that an insensitive microphone having a good frequency characteristic was to be catered for, and therefore V1 must be selected to provide as high a voltage amplification as possible—but again, in the interests of economy, the cathode current of this valve must be small.

The foregoing requirements are fulfilled adequately by the Mullard EF37, which, with the component values and operating potentials indicated herewith, will provide a voltage gain of the order of 180, the cathode current being 1 mA under these conditions. Notwithstanding the fact that the EF37 employs a 300,000 ohm anode load, the frequency response for the audio spectrum is good, and the glass envelope is metallised, a very important factor from the point of view of stability.

Where the microphone is a low impedance dynamic or carbon type, the transformer used should be of good quality, having a ratio to match the input impedance of V1 to the microphone.

In the circuit diagram, the transformer has a ratio of 130 : 1, the microphone at present in use at GM8BO being a low impedance twin-cell carbon type. Its design is such that it has no diaphragm, nor has it any box form enclosure, therefore spurious resonances due to cavity and diaphragm natural frequency are removed, providing an even response between approximately 100 cycles and 10 kc. (This point is mentioned to substantiate the need for designing an amplifier having a flat response over the audio range.)

In a multi-stage amplifier, one can usually afford to employ negative feedback to improve the frequency response of the upper register, but in the arrangement shown in the circuit here, careful choice of component values and good physical layout must be relied upon to achieve these desiderata, as most or all of the available gain will be required.

Having regard to fidelity of reproduction, one cannot do more than to ascertain that the inter-stage coupling capacity (C4) is of such a value as to permit the lowest audio frequencies to pass without serious attenuation, and also to ensure that V1 and V2 are biased to the mid-point of their Ia/Vg curves under static conditions.

Given a microphone of known sensitivity, the gain control should be used at such a setting as to provide just sufficient voltage swing under normal speech conditions to limit the use of the Ia/Vg curve of V2 to the linear portion, otherwise harmonics generated will give rise to over-accentuation of the top register.

Choice of Modulator Valve

An important point which may conveniently be made at this juncture concerns the choice of the modulator.

Some readers may be tempted to use a valve having a much higher slope (Gm) than the 6V6 specified; at first sight this may appear to be a good point, but does not always work out that way in practice.

Pentodes and tetrodes suffer markedly from curvature of the characteristics, and, indeed, sometimes vary considerably from valve to valve of the same manufacture.

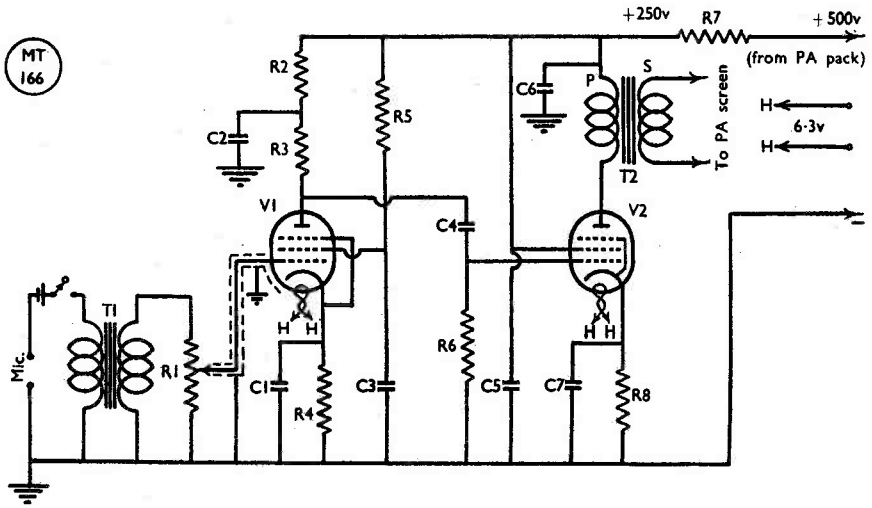
Some types having a high mutual conductance at a specified control grid voltage suffer from the disadvantage that this value of Gm changes quite suddenly with a small change of negative grid volts, apart from the change normally encountered as anode current cut-off value is approached. Now, it will be appreciated that in order to maintain a low percentage distortion when operating the valve under Class-A conditions, the change of anode current should be a linear function of a change of control grid voltage over a limited excursion, usually about 12 volts R.M.S. in a 6V6. In this connection, therefore, it will be found advantageous to plot a family of curves for Ia/Vg and Ia/Va for the valve to be used, so that the optimum biasing point for a linear swing of Vg_1 can be ascertained. Furthermore, power output and harmonic distortion content can be derived from a load line drawn across the Ia/Va curves.

Matching the Load

For good audio quality it is essential that the modulator valve V2 be matched accurately to the screen impedance of the PA, and to this end the writer has substituted a Woden UM1 modulation transformer for the AF5 originally specified. Although the connections shown in the circuit are the optimum for this particular set-up, it should be borne in mind that in the case of a single 807 PA, the screen impedance will be approximately twice the figure for two in push-pull. The safest plan is to measure the actual screen current and voltage of the PA valve or valves in use under operating conditions, and calculate the impedance to satisfy that condition.

Results

Using the values given in the table, and laying out the components so that wiring is as direct and short as possible, tests show that the



Although this speech amplifier-modulator follows normal practice, its successful operation for screen grid control is dependent upon careful design and layout. The modulation transformer connections would need to be varied to suit PA working conditions (*see text*).

frequency response *versus* gain curve is practically linear from 30 cycles to 15 kc. (An audio oscillator of the beat frequency type and an oscilloscope were employed for the tests.) When it is certain that the percentage distortion of the speech amplifier and modulator is as low as possible for maximum power output, care should be exercised in ensuring that the PA screen voltage excursion due to modulation does not exceed the value at which distortion due to non-linearity of Ia/Vg_2 becomes evident.

This latter point is rather dependent upon the efficiency at which the PA is being operated, and with efficiencies of the order of 60 per cent, 75 per cent. modulation is about the maximum permissible without distortion.

Numerous contacts with stations on 14 mc indicate that the modulator described herewith is not only adequate for 100 per cent. contacts, but also gives high audio quality.

Table of Values

Speech Amplifier-Modulator designed by GM8BO for Screen Control

C1 = 50 μF, 12 volt working electrolytic
C2 = 16 μF, 350 volt working electrolytic
C3 = 0·25 μF, 500 volt working paper
C4 = 0·005 μF, 1,000 volt working mica
C5 = 0·25 μF, 500 volt working paper
C6 = 16 μF, 350 volt working electrolytic
C7 = 50 μF, 50 volt working electrolytic
R1 = 1 megohm potentiometer, 1 watt
R2 = 25,000 ohms, ½ watt
R3 = 300,000 ohms, 1 watt
R4 = 4,000 ohms, 1 watt
R5 = 0·8 megohm, ½ watt
R6 = 0·6 megohm, ½ watt
R7 = 5,000 ohms, wire wound, 20 watts
R8 = 250 ohms, 1 watt
T1 = Microphone transformer 130 : 1
T2 = Modulation transformer (Woden U.M.1)
Connections (T2): Primary, join 3 and 4, connect to 1 and 6
Secondary, join 9 and 10, connect to 7 and 12
V1 = EF37
V2 = 6V6

AVOIDING BCI

An article in our issue for June 1948 explained how it was possible for transmitters operated on particular frequencies in the 1·7 and 3·5 mc bands to produce beats in domestic BC receivers using the normal IF of 465 kc. A number of such frequencies was given to avoid local BCI. Consequent upon the BBC's recent changes in the medium-wave band, G2DHV has re-calculated these frequencies, which he gives as : 1759, 1778·5, 1795, 1816, 1838 and 1911·5. In the London area, it is a fair assumption that operation on any of these frequencies, and probably the appropriate second harmonics in the case of QRO transmitters in the 3·5 mc band, will produce QRM on BBC transmissions in the medium-wave band, due to IF mixing. If you are troubled by apparently ineradicable BCI, this may give you a clue, even if you never saw the original article in the *Magazine*.

VOICE SWITCHING CIRCUIT

Simplified Control System

By **E. A. KNIGHT (G3BNZ)**

This is another very interesting discussion on the problem of voice-controlled telephony working ; the circuits suggested are practical, they should be effective, and are quite easy to try.—Editor.

HAVING read the excellent material on "Voice Controlled Transmission," by G3AAT, (*Short Wave Magazine*, October-November, 1949), the writer recalled a system that in 1938 worked effectively on the 7 mc band. The transmitter was entirely controlled by voice operation ; that is, it was only necessary to speak to switch on the transmitter, and to switch off the receiver. No relays were used and the whole control was effected by the addition of only one extra valve. In the first instance, the idea came as a possible method of duplex operation with another station similarly equipped, with both using a common frequency. In actual fact, many such QSO's were enjoyed with G4BH in those days, who had the same voice control built into his equipment.

Early Equipment and Results

In the pre-war transmitter, the control valve was an MH4 and this acted as a relay in the screen supply to a 6F6G crystal oscillator ; conducting on modulation, and "opening" when the modulation ceased. The crystal oscillator drove a buffer stage (6L6G), which had a certain amount of cathode bias, and the final valve was an HY25. This is a high *mu* triode, and without bias and without drive, only drew a small anode current, so that the transmitter was quite safe when the crystal oscillator was not running. The HY25 was anode modulated by two triodes in push-pull. The receiver was muted when the transmitter came on, and operated with a separate aerial to avoid change-over complication. All one had to do was just talk, and in the pauses listen for any comment from the other station. So much the better if the other station was also equipped with similar control, or could operate rapid break-in. Bad receiving conditions, due to interference or fading, could be instantly reported with a request to stand by, if necessary. A switch was fitted to cut out the control valve, so that a normal signal could be emitted for initial tuning-up purposes (constant carrier) at the beginning of a contact.

Such, then, was the pre-war equipment at the station of G2LP, and it performed very well. It was sensitive, and yet not critical to adjust.

Some Working Circuits

Now for some suggestions for adapting an existing transmitter. It can be seen from the circuit diagram, Fig. 1, that few parts are required ; any medium impedance triode can be used, and the adjusting procedure is as follows : With no modulation apply sufficient bias to the triode V2 to effect complete cut-off, and as a consequence, stop the oscillator stage from working. Next, apply modulation and vary the series resistance R3 until the transmitter will switch itself on at about a 10 per cent. modulation level, and is "clean" in switching ; that is, no undue hesitation in coming on or going off, as is likely to happen if the bias is not quite enough, or too much audio is being fed into the grid circuit, which

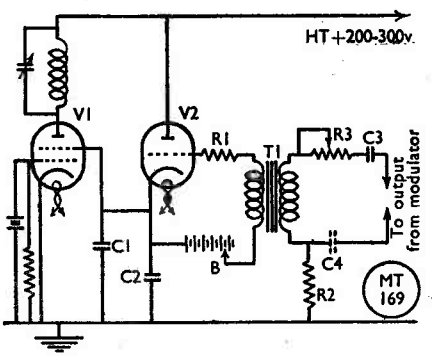


Fig. 1. The basic circuit for the voice-control system suggested by G3BNZ. A triode control valve V2 operates on the CO stage.

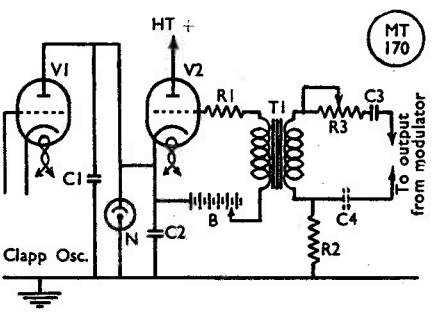


Fig. 2. Controlling the oscillator V1 in a VFO unit, as described in the article. In this case, control is applied to a Clapp oscillator.

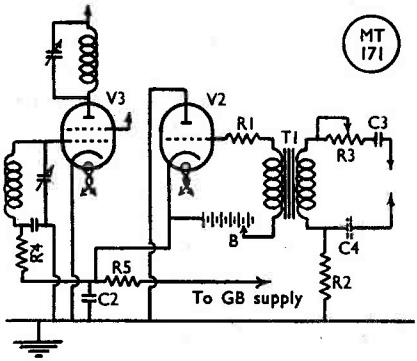


Fig. 3. Voice control applied to the buffer stage in a transmitter. Unless different transmitting frequencies were used by the parties in a QSO, this arrangement would require that there should be no receiver pick-up from the early stages of the transmitter.

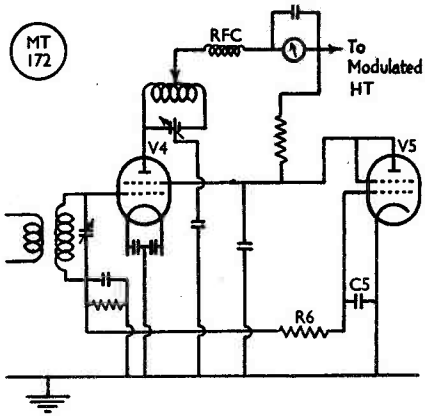


Fig. 4. Circuit for limiting HT surges on the screen of the PA in a voice-controlled transmitter (*see text*).

would mean that resistance R3 requires setting to a higher value. It should be possible to strike a balance for one's normal operating voice, not requiring undue shouting to bring the Tx on and yet not be so sensitive that the station clock ticks and other noises off "tease" the transmitter.

The condenser C2 is to by-pass the audio to earth and to effect a time constant which prevents a rapid variation or surging effect to occur. The actual time delay is dependent on the circuit conditions, *i.e.*, HT supply voltage and the screen current, also at what voltage the oscillator valve V1 commences to function. In general the capacity is optimum at around the values given. Any audio that is fed through into the screen circuit of the oscillator is of little consequence, provided it does not cause any frequency modulation. Increasing the value of condenser C2 should prevent this effect occurring, so long as the time constant is not excessive.

The audio power absorbed by the control valve is very small, and in a QRO outfit can be ignored completely. The transformer T1 is mainly to give isolation from the modulator feed and to provide a useful step-up of the audio voltage at the same time. A midget type could be utilised but due care must be taken with the insulation between the primary and secondary windings if the audio feed line is at a high voltage above earth. Alternatively an additional condenser can be included in the feed line as shown dotted (C4) in Fig. 1. This condenser, and that in series with the potentiometer R3 must be safely rated. A resistance of about one megohm (R2) should in this case be connected from one side of the transformer primary winding to earth, to prevent any stray leakage from building up a voltage charge relative to earth at this part of the circuit.

The transformer step-up ratio can be anything from about a 1·5 : 1 to 7·5 : 1 and the primary impedance about 50,000 ohms. Frequency response does not matter for practical purposes, and an antique component can be put to this service.

It is necessary to use telephones when operating a voice-control system such as this, because a motor-boating effect will occur if the loudspeaker is left connected to the receiver. The receiver, by making a noise, will start the

Table of Values

This table gives values for all circuit elements marked in Figs. 1-4, 6 and 7

C1 = ·01 μF, RF by-pass
C2 = 2-4 μF (*see text*)
C3 = ·005 μF
C4 = ·01 μF (*see text*)
C5 = ·001 μF, Mica
R1 = 22,000 ohms, ½-watt
R2 = 1 Megohm, ½-watt (*see text*)
R3 = ½ megohm pot
R4 = 10,000 ohms, approx.
R5 = 100,000 ohms, approx.
R6 = 100,000 ohms, ½-watt
R7 = 680,000 ohms, ½ watt
T1 = Audio coupling transformer, 1·5 : 1 to 7·5 : 1 ratio (*see text*)
T3 = Audio coupling transformer, 1 : 1 ratio (*see text*)
J = Monitor headphone jack
N = Stabiliser
V1 = Osc. valve
V2 = Control valve. 6J5,6C5 or similar medium-impedance valve
V3 = Buffer amplifier valve
V4 = PA valve
V5 = 6Y6, 6V6 or 6F6, or similar "power" type
V6 = Buffer or PA valve (*see text*)
B = Battery : Two 9-volt GB batteries

transmitter, which in turn switches itself on and in so doing switches off the receiver, but as there now is no further noise forthcoming from the loudspeaker to keep the transmitter on, it goes off, and so on and so on . . . amusing, but not very useful.

Fig. 1 refers to the control valve as fitted to a crystal oscillator and using a battery. A few alternative arrangements and possible applications of the system with VFO and all-mains operation may be found useful.

Table of Values

Fig. 5. Circuit complete of the Control Unit.

C1 = 4 μF, paper or elect.
C2 = 2-4 μF, paper (*see text*)
C3 = ·005 μF 1,000 volts (voltage rating as required)
C4 = ·01 μF (voltage rating as for C3)
C5 = 8 μF, elect, 150 volts
C6 = 8 μF, elect, 250 volts
R1 = 22,000 ohms, ½ watt
R2 = 1 megohm, ½ watt
R3 = ½ megohm pot.
R4 = 4,700 ohms, ½ watt
R5 = 50,000 ohms pot. 2 watt
Rn = Resistance of suitable value (*see text*)
T1 = Audio coupling transformer, ratio 1·5 : 1 to 7·5 : 1 (*see text*)
T2 = Mains transformers, supplying suitable LT and 40 to 100 volts at 10 mA
D = Selenium or copper-oxide rectifier, capable of 100 volts output at 10 mA
V = 6C5, 6J5 or similar medium-impedance valve
S1 = Single pole switch

Fig. 2 shows a control valve fitted in the anode of a Clapp oscillator. It is not believed that there will be much shift in frequency with change in anode volts, although the writer has not had the opportunity of trying this out. Any neon stabiliser that may already be fitted can be left in circuit with advantage, as it will limit the maximum HT swing—as well as acting as a visual indicator when the transmitter is on. As the control valve current is limited to a few mA, it is essential that V1 does not consume more than some 3 or 4 mA—it may perhaps require higher HT to allow for the voltage drop through the control valve.

The circuit in Fig. 3 shows how the same sort of control can be applied to the bias supply to a buffer stage, assuming that the oscillator is sufficiently screened to prevent it being heard in the receiver at R9 plus. It can be seen that the buffer stage is biased to cut off and that the control valve reduces the bias on modulation, so bringing the stage into operation. Adjustments of the control valve are carried out in just the same manner as before.

PA Considerations

Now, a few words concerning pentode and tetrode PA stages, particularly those that are not neutralised. If one is in the habit of keying in the final stage and the screen voltage is

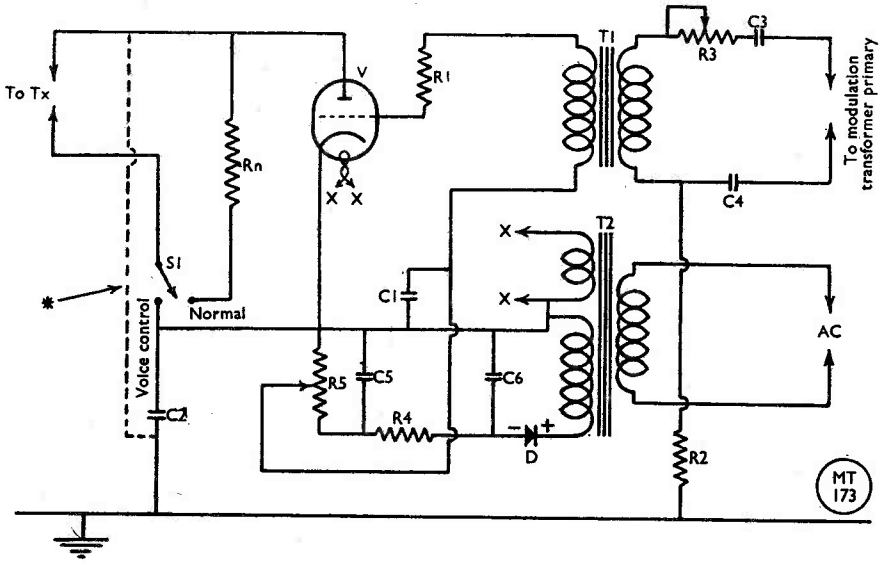


Fig. 5. Circuit complete of the control unit suggested by G3BNZ for voice-operated transmission. It is a complete equipment in itself and can be built into a small box. The connection marked * is required if the unit is used for GB control (*see* Fig. 3).

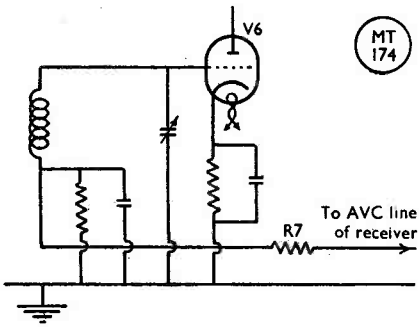


Fig. 6. For muting the receiver, bias voltage can be drawn from the PA stage and fed to the Rx AVC line through R7 ; by such an arrangement, muting action can only take place when the PA is live, which is the desired condition.

fixed (or semi-fixed such as by a potential divider), this arrangement would be satisfactory for voice operation. But if as is usual for phone operation, the screen is fed through a series resistance from the modulated HT, it becomes vital to provide some means of preventing the screen voltage from going high when the drive is cut off. An easy means of achieving this is the use of an additional valve which draws current from the screen circuit only when the drive is cut, but does not in any way affect the PA stage when the drive is on. Fig. 4 shows how this can be done. In addition, this extra valve can save one the bother of having to supply any additional grid bias if the bias derived from the grid current is sufficient for normal working, and in most cases this can be arranged to be so. Incidentally, this circuit is given in later editions of the *ARRL Handbook*, and it does prevent voltage surges which in the case of an 813 stage (with 1,200 volts HT supply), can reach 950 volts under certain conditions. It will be appreciated that voltage swings of this magnitude could be the cause of much splatter and spurious radiations.

Practical Control Unit

We come now to the design of a compact control unit that can be complete in itself. Fig. 5 shows such an arrangement, and by using small components it can be assembled into a very small space. It might well be an advantage to make the unit up into a metal box, which could be mounted in the transmitter rack, the various leads coming out of the box and going to the different sections of the transmitter. A switch may be fitted so that the control unit can be switched into use when required—for this purpose, a resistance of the optimum value being merely substituted for the control valve.

Use of the control valve for remote operation has not been mentioned but it is only necessary to extend the microphone leads to the operating position to be able to do this. A press-switch arranged to short or open the microphone line would enable the loudspeaker to be left in circuit for ordinary operation purposes.

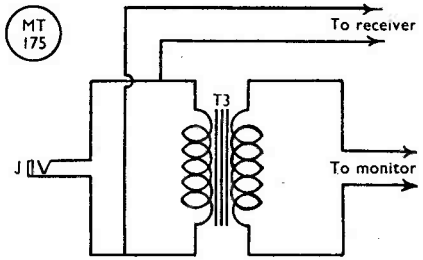


Fig. 7. One way of mixing receiver and monitor outputs so that the transmitted signal can be continuously checked without switching the headphones.

Receiver Muting

The receiver can be muted by using some of the grid current from a stage in the transmitter. Probably the most convenient point at which sufficient voltage is developed is the PA stage ; this voltage can be fed into the AVC line of the receiver, inserting a resistance in the line to keep out any possible RF—see Fig. 6.

For monitoring purposes, and for receiving, it is convenient if the headphones do not have to be switched—also it would be difficult and tedious, to say the least, to do this when voice operating. The writer prefers to monitor every transmission and a mixing arrangement can be employed whereby both receiver and monitor outputs are fed through to the phones. This can be done by employing a transformer (1 : 1 ratio) connected as shown in Fig. 7.

DATA ON RCA PRODUCTS

Many readers are the possessors of RCA equipment of various types, on which they are without the necessary technical literature. Messrs. RCA Photophone, Ltd., 36 Woodstock Grove, London, W.12, are in the position of being able to supply various publications and to give technical advice on RCA products —but they *cannot* provide replacement parts.

MODULATION-LEVEL INDICATOR

For Direct Connection

By **H. BARNETT (G2AIQ)**

FOR the amateur who has neither time, inclination, knowledge nor cash with which to build himself a cathode ray oscilloscope for modulation checking—and for those who have, but who would like a visible indication of modulation depth at all times without the need to rig up the oscilloscope—the simple circuit described here is offered.

The few components required, which can be found in the average junk box, consist of one ½-watt resistor, one variable potentiometer, a changeover switch, a rectifier and an 0-500 μA meter.

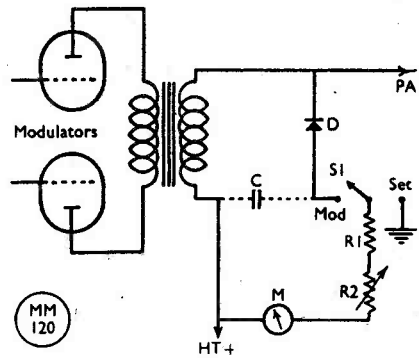
Referring to the circuit diagram it will be seen that when S1 is in the SET position, the micro-ammeter will act as a DC voltmeter, and the degree of deflection may be controlled by R2. If the meter is set at 400 μA and this point taken as the 100 per cent. modulation mark, it follows that 200 μA will indicate 50 per cent modulation.

Action and Adjustment

When S1 is put over to MOD, the meter, in conjunction with the rectifier, will act as an AC voltmeter, and will measure the audio volts appearing across the secondary of the modulation transformer. When this AC voltage is the same as the DC volts on the plate of the power amplifier, 100 per cent. modulation will be effected. Thus, once set up as shown above, the meter will, at all times, give an indication of the depth of modulation being obtained.

For those who possess a CRO, the meter can be adjusted, with S1 in the MOD position, whilst observing the carrier envelope on the oscilloscope. But for all practical purposes, setting up the meter by this method, or by using the DC voltage on the power amplifier anode, will not result in any appreciable differences. As a refinement, the scale can be marked up in red at the 50 per cent. and 100 per cent. levels.

The circuit as described has the disadvantage that the meter needle is continually "flapping" over the scale as one speaks into the microphone. This may be overcome by inserting a condenser C, as shown in the dotted lines on the circuit diagram. With this condenser in circuit, the needle will rise rapidly on peaks of modulation, but will return to zero more slowly, thus giving a more average indication of modulation. With the circuit shown, a paper tubular condenser 0·25 μF, rated at 500 volts, was used.



Circuit of the indicator described by G2AIQ. Intended for voltages around 500, suitable precautions would have to be taken in the interests of safety (and to prevent damage to the rectifier itself) at higher operating voltages.

Table of Values

Circuit of the Modulation-Level Indicator

C = *See text*
R1 = 120,000 ohms, ½-watt
R2 = 1 megohm, variable
D = Crystal Rectifier
M = 0-500 μA meter

The values shown in the circuit diagram are for use with a PA anode voltage of 350 volts and a 0-500 μA meter. With other anode voltages and different meter scaling, R1 and R2 would have to be made suitable values and rating, and precautions taken to prevent damage in cases where high voltages are involved. The method of operation, however, remains the same.

MAIL ORDER CATALOGUE

Coulphone Radio, 53 Burscough Street, Ormskirk, Lancs, offer a comprehensive 50-page catalogue (with a 12-page monthly stock list supplement) covering a very wide range of equipment and parts. The catalogue is well illustrated and laid out in such a way as to be of the utmost assistance to the postal buyer, since Messrs. Coulphone specialise in a return-of-post service for mail order customers.

SOME TV FREQUENCIES

It is reported that the following frequencies have been paired for the new television services: No. 1, 41·5 mc S and 45 mc V (London); No. 2, 48·25 mc S and 51·75 mc V; No. 3, 53·25 mc S and 56·75 mc V; No. 4, 58·25 mc S and 61·75 mc V (Sutton Coldfield); and No. 5, 63·25 mc S and 66·75 mc V.

DUAL PURPOSE MODULATOR

Construction of 100-Watt AF Stage, and Testing Units

PART II

By J. N. WALKER (G5JU)

The first part of this article appeared in our March issue and described the preamplifier and driver stages in detail. The units combined give audio output at two levels, 30 or 100 watts as required, and incorporate the latest circuit techniques for good phone transmission on the amateur bands.—Editor.

ALTHOUGH inevitably somewhat bulky, the high-power unit is of straightforward construction, much of the "works" already being provided in the first chassis. (*See* Fig. 7.)

The unit consists of two output valves with the necessary output transformer, and two rectifier valves, with their associated mains transformer and smoothing components.

The layout of the various parts is given in Fig. 5 (Chassis "B"). As before, the drawing is based on the chokes and transformers being mounted for sub-chassis connections—the mains transformer has connections at the side and leads for the primary and for the panel light are taken down through holes in the deck. The high-voltage terminals connect direct to the valve top-caps.

Further details of the construction can be gleaned from the photograph of the top deck of the chassis. The components beneath are few in number and size and a picture would give but little aid to the constructor. Tag strips are used to hold the junction of R32 and R33 and the junction of R34 and R35. Lead-through insulators, close alongside C19, carry HT through the chassis from CH4 and back from the meter to the modulation transformer. The EL31 anode leads are insulated with two lead-through insulators, and another pair in the rear wall of the chassis form the audio output terminals.

A point here—the mains supply should be connected across the *whole* primary (*i.e.* the 250-volt terminals) to reduce the secondary HT voltage during initial tests.

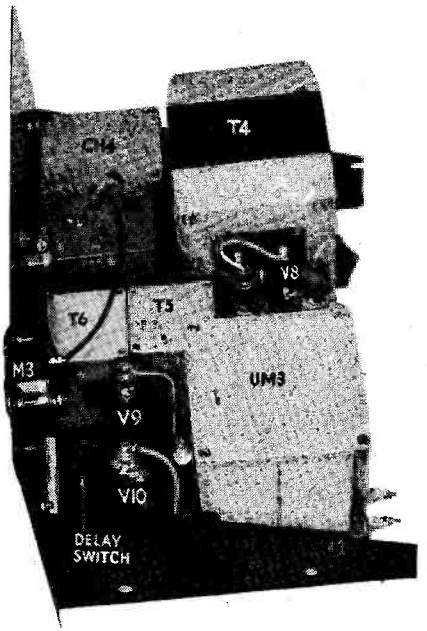
Output Transformer Matching

With the Woden modulation transformer is supplied a chart giving the connections representing various input and output impedances. The input impedance is set by the conditions under which the output valve(s) operate—in the present equipment, the QQVO4-20, with about 400 volts on the anodes, closely matches into 6,200 ohms and the EL31 valves, with 800 volts, match into 10,000 ohms.

The secondary impedance depends on the resistance presented by the PA valve(s). In the writer's case, the modulator is used with a transmitter running at 500 volts 100 mA, which, using Ohm's Law, gives a value of 5,000 ohms, and the transformer tappings are wired accordingly. The actual connections are: Valve anodes to tags 8 and 11, with HT to 9/10 (connected together), output terminals to tags 2 and 6, with 3/4 connected together. Other secondary connections may be necessary, according to individual requirements.

Turning to the EL31 valves, the working figure for the PA valve is 6,666 ohms (1,000 volts, 150 mA) and the connections to the UM3 transformer are as follows: Primary; anodes to 1 and 6, tags 3/4 connected together and to HT. Secondary: 8 and 9 with 7/12 joined.

Two points arise. If modulation is applied to both anode and screen of the PA, the screen current must be added to the anode current



General view of the high-power chassis, with main components identified.

to obtain the correct load resistance. For example, in the first case above, there is possibly a screen current of 20 mA, making the total drawn by the PA valve 120 mA. The value then becomes 4,166 ohms. (The writer generally uses the system in which the screen is fed from a separate HT supply through an audio choke, allowing the screen to follow the changes of audio potential applied to the anode.)

The second point is that when it is not possible to obtain an exact impedance match (and such is usually the case unless the PA current is adjusted very accurately) it is always wise to choose secondary tappings which reflect a lower impedance than the one called for.

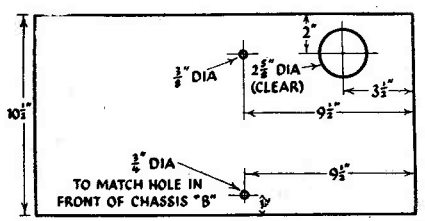
PRELIMINARY TEST OF LOW-POWER UNIT

On switching on, the VR 150/30 stabiliser (V5) will glow almost immediately and as the valves warm up, the larger meter will indicate a current. As mentioned earlier, this current is the total of anode and screen feeds to V4 and of that through V5. The combined stabiliser and screen current remains constant at 35 mA and the anode current should be adjusted to 20 mA—a total meter reading of 55 mA—by rotation of the bias control R26. The grid bias voltmeter should then indicate a value near 15 volts.

On full output, meter M1 will kick up to approximately 175 mA, representing an increase of anode current to 120 mA.

The extent to which preliminary tests can be carried out depends on the amount of equipment available for the purpose. During and after construction of the modulator, extensive tests were made with the aid of an audio oscillator and oscilloscope to check such points as the introduction of distortion and hum, parasitic oscillation and overall frequency response. Provided the detailed design is followed, the constructor can rely on obtaining results equal to the original equipment.

The simplest test is to connect an ordinary 25-watt lamp (200/230-volt type) across the output terminals (ideally, the transformer



Panel layout for high-power unit.

tappings should be altered to give an output impedance of about 2,000 ohms, but this is not important). On speaking into the microphone with both gain controls partly advanced, the lamp should glow brightly on sustained syllables. (This is simply the familiar RF test lamp but in the audio application.)

The performance can be assessed much better if the test circuit given in Fig. 8 can be assembled. R1 is a 5,000-ohm wire-wound resistance of at least 10 watts dissipation. The amplifier gives up to 30 watts output but this power is not constant or maintained over a lengthy period and there is no necessity to use a resistor of equivalent rating.

R2 is 100 ohms, 1 watt, and across it is wired a loudspeaker (with matching transformer) or a pair of telephones. If an oscilloscope is available, the leads can also be connected across R2.

Across the output terminals is placed an AC voltmeter reading to 500 volts or more—any reasonably accurate testmeter with a suitable AC range can be used in this position.

It is desirable to have available a constant and controllable voltage, which is injected into the microphone socket through a resistor simulating the impedance of the microphone to be used—about 1 megohm for a crystal type and 50 ohms for a moving-coil.

Potentiometer R7 controls the gain following the microphone and R17 the voltage applied to the driver valve. The maximum value of this voltage is fairly constant because of the action of the clipper circuit and R17 has to be adjusted so that the voltage applied to the driver valve, and hence to the output valve, produces the correct amount of audio power for full or nearly full modulation of the PA stage.

It is difficult to give brief instructions about setting R17. In general, this control should be well advanced, and retarded when indications of over-modulation are evidenced — for example, by variations of PA grid or anode current.

R7 is adjusted to give full modulation when speaking in a normal voice. The peaks in speech waveform will be cut off without introducing noticeable distortion but advancing R7 too far (dependent on the microphone sensitivity) will result in appreciable distortion.

Using an oscilloscope and a sine-wave input in the test circuit, advancing R7 will result in the picture on the screen building up faithfully until a point is reached at which the peaks commence to square off. Just below this point is the one for correct operation.

The power output can be assessed from the voltage shown on the meter, using the formula

$$\frac{E^2}{R} = W,$$ R being 5,000 ohms.

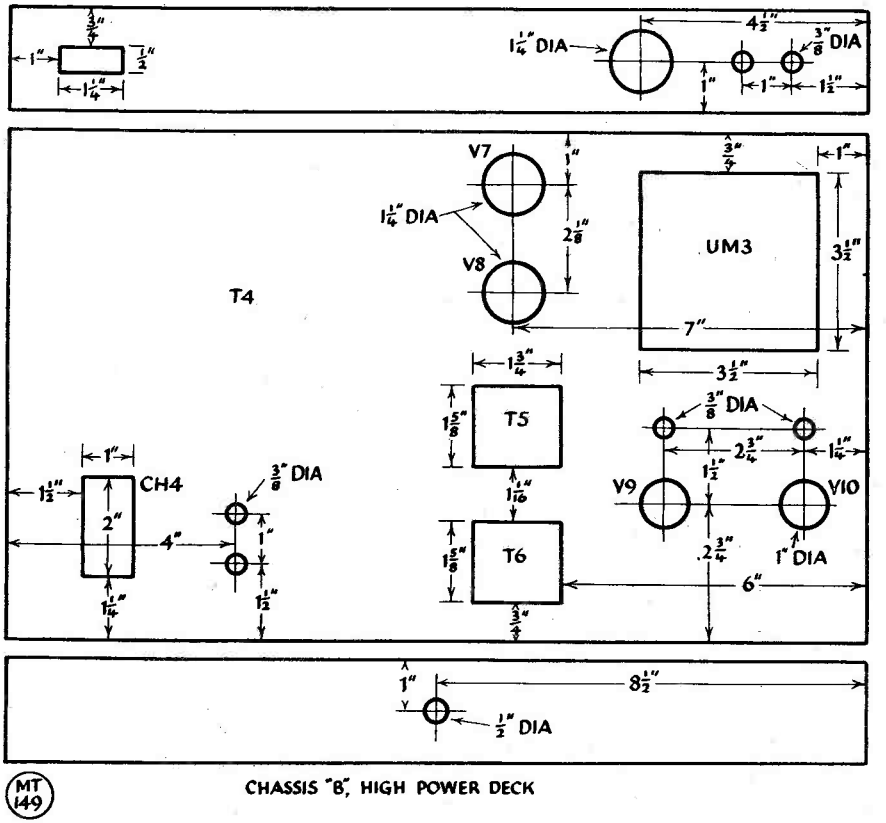


Fig. 5. Drilling details for Chassis B, the high-power unit.

A voltage of 300 represents 18 watts input and 400 volts (about the maximum possible with low distortion) 32 watts.

The speaker or telephones will enable the quality to be judged and will also show up any hum—a very slight amount will probably be heard in this way but can be considered entirely negligible in proportion to the total output power developed.

TESTING THE HIGH-POWER UNIT

Before testing the high-power unit, the RG1-240A mercury vapour rectifier valves must be run for 30 minutes without HT applied, which means that one primary lead to T4 must be disconnected.

The adjusting screws on the Varley thermal delay switch should be set so that, during subsequent operation, a delay of one minute occurs after switching on before T4 becomes energised. The panel light will not glow until the primary circuit of T4 is closed.

The bias required by the EL31 valves is 26 volts with 800 volts applied to the anode and 400 to the screen. The bias control R28 should be adjusted accordingly when the anode current meter M3 will indicate a standing current of about 60 mA. Meter M2 measures the screen current but, under static conditions, this will be very small.

The same procedure outlined above is used for testing the high-power unit. The resistor R1 in Fig. 8 must be increased both in value and wattage rating—6,000 ohms (possibly, two resistors in series) and 40 watts will be suitable. R2 is reduced to 47 or 50 ohms. A much higher output voltage is developed (100 watts output corresponds roughly to 750 volts) and

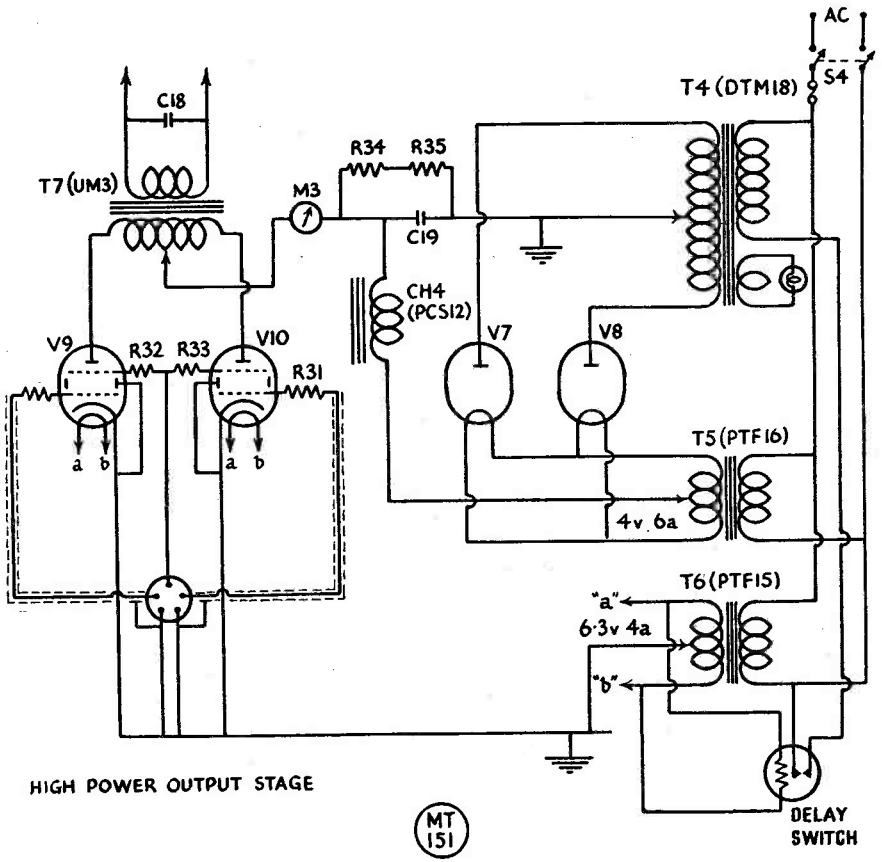


Fig. 7. Circuit of the high power section of the modulator, as built on Chassis B (*see drawing Fig. 5*).

it may therefore be necessary to measure the voltage across part of the resistor and not across the whole. In this case, it is well to use two equal resistors for R1, so that the power measured in one can be doubled to arrive at the total output.

Since the grid swing required by the EL31 valves is less than that called for by the QQVO4-20, it will usually be necessary to retard R17 when changing over to the high power stage.

On application of the modulating signal, both meters will kick up—M3 to 200 mA or more, M2 to 50 mA or so. This relationship of about four-to-one should be maintained with the modulator adjusted to give varying degrees of power output. Should the screen current rise to higher values, accompanied by a reduced degree of increase in anode current, it is a sign that the output impedance is not correctly matched. The transformer tappings should be altered, probably in the direction of obtaining a lower secondary impedance.

When operating satisfactorily, the primary connections to T4 (the high voltage transformer) can be altered to suit the local mains voltage (it was earlier recommended that the whole 250 volt primary be utilised during testing) but this will not be necessary unless the full output of which the modulator is capable is required.

Putting the Modulator into Operation

The cable connecting the two chassis

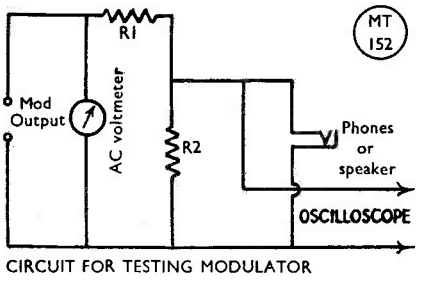


Fig. 8. Circuit arrangement for testing both sections of the modulator ; details are discussed in the text.

together may either be made up with flexible wire, using screened leads for the two grid runs or a screened three-way cable may be used, the outer screen being used as the common earth connection. The fact that one of the three wires carries HT will have no deleterious effect, since it is virtually at zero audio potential.

The two chassis occupy a fair amount of space when laid side by side and it is suggested that fitting them into a rack (large or small) with or without other equipment is the better method to adopt.

The modulator as described is completely stable and any signs of instability arising when the equipment is put into service will be due to RF pick-up reaching the modulator by one way or another. Difficulty of this type is most unlikely on the lower frequency bands and precautions have been taken to prevent RF entering *via* the microphone leads. Nevertheless, it is wise to keep the latter short and out of the RF field.

If trouble is encountered, it is probable that the RF is reaching the modulator through the mains leads or *via* the lead connecting the modulator to the transmitter. Such stray RF may be caused by direct leakage from the transmitter or by the leads picking up radiated RF.

In these cases, ·002 μF condensers (mica type) rated at 500 volts working should be connected from each side of the mains input socket to chassis. Condenser C10 in the low-power stage should be removed from across the output terminals and two similar condensers wired from each output terminal to chassis. RF will then be by-passed but the "building-out" effect maintained. C18 in the high power stage should be altered similarly.

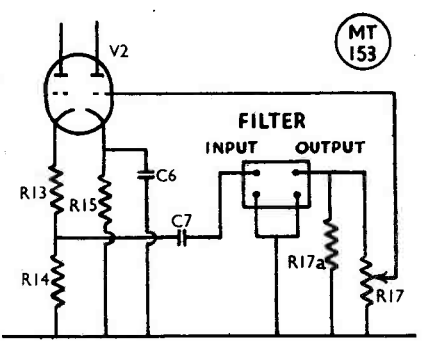
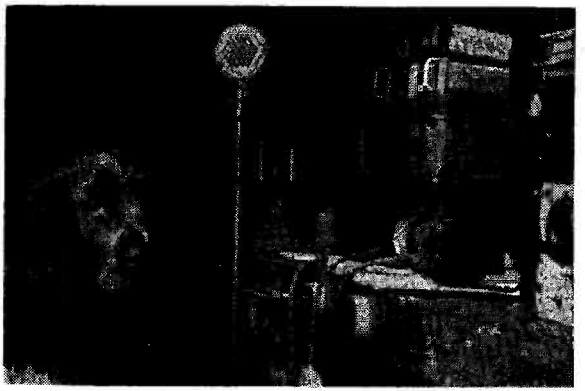


Fig. 9. The circuit round V2 modified for inclusion of the low-pass audio filter (*see text*).

NOTE TO BEAM USERS

The following interesting information was received from David Mitchell (ZL1MP): "When using a great circle map centred on London for the purpose of directing beams at New Zealand, most people are under the impression that the cape at the top of the map, jutting out towards the meridian, is the North Cape of New Zealand. This is not so ; actually it is East Cape, which is at the eastern end of the Bay of Plenty and many miles from North Cape.

"Of the three other capes in the North Island of New Zealand, the first, 'nearest Auckland,' is North Cape, the second Cape Egmont, and the third, 'near Wellington,' is Cape Palliser. Few azimuthal projection maps ever name these points and this can result in a bearing error of over 15 deg. in the case mentioned. It is suggested that amateurs should mark these points on their maps to avoid confusion."



DX COMMENTARY

CALLS HEARD, WORKED & QSL'd

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

WE frequently come across people, both on the air and off it, who like to go out of their way to let us know that *they* don't work DX. Furthermore, they affect to regard an interest in DX as an adolescent enthusiasm which has always been beneath the dignity of a real amateur. It's all very well, they say, to work New Zealand just *once*, but having done that, of course you know that your signals are covering pretty well the whole world, and there's no point in continuing with such childish nonsense.

The only real clue we have ever been able to get on this outlook is "sour (or, at any rate, slightly acid) grapes". The genuine experimenter either keeps to himself, or lets his baser nature indulge in an occasional week-end of DX ; the real all-rounder knows what's what in most branches of his hobby, including DX ; the QRP fellows or the self-confessed poor operators rather wistfully say "I find it very hard to raise the good ones", but they go on trying just the same. And that leaves the types we have already mentioned ; the pity of it is that there seem to be so many of them.

Our private opinion is that *they* are the adolescents. They have worked their W's, VE's and VK's early on in their amateur life, and assumed from that that they are fine fellows who can raise everything they call (after all, their signals *must* be getting there, and so on) ; and when they find that rare pieces of DX crop up, are worked by the hungry pack, and pass on without leaving even a clue for them, they become extremely snooty and take that line about "Anyone can work DX—it's only the childish ones who bother."

Why Work DX ?

Now this argument is bunk of the first order, nor can it be accepted that anyone really believes it. Certainly, anyone can build a 150-watt transmitter, put up a good aerial, and then say "My signals cover the world—they *must*, because this morning I got S7 from New Zealand." Agreed ; but one of the main objects of Amateur Radio is not merely to *cover* the world, but to establish communication (two-way) with several parts of it. To do this you need to be an operator—and under present conditions on the bands, a good operator.

We have never argued that working DX is anything but a test of operating ability (having taken it for granted that there is sufficient technical knowledge there to build equipment that works). These DX-deriders can be quite right when they say that the ability to work DX doesn't show that one is a technical wizard ; but who has ever claimed that it does ?

Apart from all this, it would be folly to belittle the importance of the *operating* side of our hobby ; it can fairly be said that it is one of the main reasons why our licences are

granted at all. So let us see some of those who call DX work a childish pursuit demonstrating that it is child's-play to *them*, and then we may believe it.

In leaving this subject let it finally be said that we would be the last to claim that the keen DX-man is the salt of the earth ; but he does represent one very important aspect of the hobby of Amateur Radio. So glance at the title of this feature, and you will see who it is intended for. If you're not interested, please don't read on !

Top Band Section

We could almost run a full-scale Commentary on the Top Band news received this time. The DX plums of the month have been HZ1KE, EK1AO and ZB1AR, and we have heard from all of them direct—as well as hearing from practically everyone who has worked them ! Let us settle with Asia first.

Ken Ellis of H1ZKE had never logged an amateur signal of any kind on the Top Band until 0240 on March 5, when he received GM2HIK (Forfar) at 229/349. He raised him and got a 569 report. Forty minutes later he heard GD3UB at 239 and worked him too, with another 569 report back. Ken adds that he noted several G stations calling him on his own frequency, although he stated QLM. He was using 50 watts to a one-eighth wave vertical with capacity top, and the receiver was an S.640. Ken thinks these contacts were the first post-war QSO's between Asia and the U.K., and would like to hear of any pre-war contacts of the same kind. (ZL1MP tells us he worked Asia when he was GW6AA, but we don't know who the other station was). Very fine work on Ken's part, proving that persistence does it in the end.

EK1AO (Tangier) sends a card to say that he worked 5 G's a GD and a GM on February 19, and 18 G's, a GI and a GM on February 26. Very nice, again.

Next comes ZB1AR (Malta), who was persuaded into Top Band activity by G3NT (Northallerton). The funny thing is that 1AR says it was G3NT who introduced him to Amateur Radio ten years ago, but the first QSO he has ever had with him was on the Top Band on March 12 at 0100. This is believed to be the first ZB-G contact yet made on 1·7 mc. Certainly it must be the first post-war. ZB1AR then went on to knock off several other G's and, at 0400, GM3ATV and GM2HIK. Thus he collected the first ZB/GM as well.

G3NT has a further distinction ; when G3AKU's card arrives from Hunts (as it certainly will), he will have All English Counties confirmed, though not, of course, in our private Marathon which started on August 1.

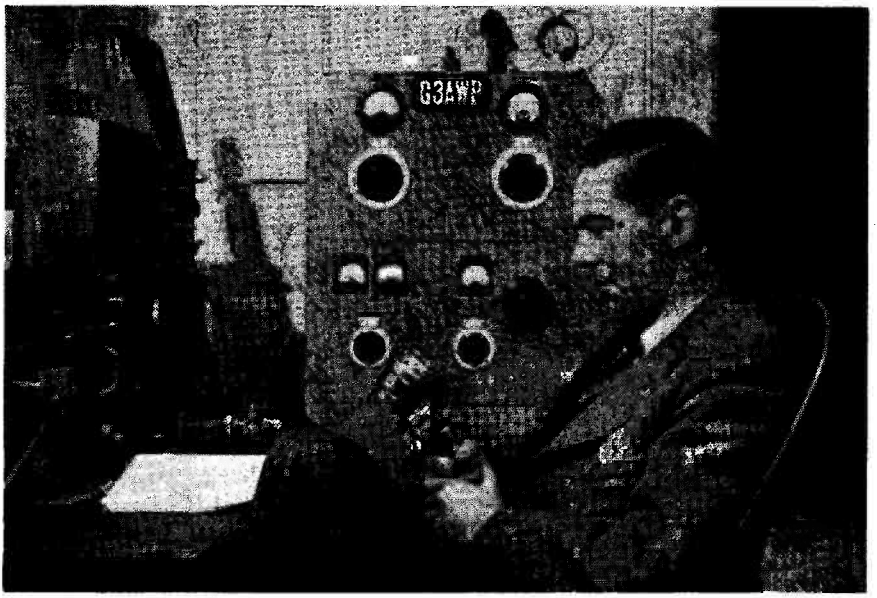
TOP BAND LISTING
Starting August 1, 1949

Station	Counties	Countries
G2YS	58	14
G6AB	56	13
G4LX	56	10
G6ZN	53	10
GM2HIK	52	13
G2AJU	52	12
G6HD	51	11
G2AOL	49	10
G3FZW	47	8
G3GDW	46	8
G5XF	46	8
G3AGQ	44	9
GW3CBY	43	10
G3EJF	43	7
G3BTP	42	11
G8NF	38	10
G3ATU	37	8
G3BEX	37	7
G3NT	36	8
G2ABT	36	6
G3FGT	34	8
G2CZU	34	5
G2BON	33	7
G3ALE/A	28	4
G6OM	21	5
G3GGN	14	5
ZB1AR	12	4

On the same night that HZ1KE first broke through, a wonderful seven-country contact took place on the band. Participants were G, GC, GD, GI, GM, GW and EI ! GC2BMU (Alderney) had to pull out of it at midnight, because the island's mains cease to function at that hour.

Incidentally, by the time you read this there will no longer be a station on Alderney—so you've had that one. GC2BMU is moving to *Westmorland*, so he will still be in great demand on the Top Band.

G3ALC (Oakham) is putting Rutland on the map on 1813 kc ; the main snags now appear to be Cumberland and Westmorland. G2YS (Chester), whose score since August 1 is now 58 (and top of the list) has WAEC except Cumberland. 'YS suggests that HB2IW must be classed as a phoney, since



G3AWP (Winton, Bournemouth) runs a pair of 807's in push-pull modulated by p/p 807's in AB-2. The receiver is a BC-342 with a converter for Ten, on which band the station is mainly to be heard ; a 3-element c.s. beam completes the outfit, and by early February the score was 123C in 37Z, with 95C confirmed.

nothing more has been heard of him and the call was, to say the least, peculiar.

G4LX (Newcastle) is among several who nave heard KV4AA on the band, but he says that when such DX as W1BB, VE1EA, KV4AA and HZ1KE have been available, the behaviour is pretty thoughtless. He does add, though, that it is not deliberately obstructive as on other bands, and that the Ham Spirit still exists.

G3AKU (St. Ives, Hunts), asks G3EJF to note that it was the latter's remark in this column that got him up on the band. Many of his contacts have been duly grateful. G6OM (Manchester), has made a fresh start on 1·7 mc and sends in his score. He has just celebrated his 25th anniversary as G6OM !

G2AJU (Ipswich) has the funniest story of the month. He heard "W7MGI" on phone on 1912 kc (March 5 at 1930), calling CQ DX, with a genuine "West Coast American" voice and all. Surely some joker was receiving him on 28 mc and relaying him on the Top Band ? We can hardly believe any other explanation, especially as the 28 mc band did happen to be full of VE7's and W7's at that time. 'AJU, with his QRP, has raised EK1AO and ZB1AR. Not so bad for 3 watts !

GW3CBY (Swansea) worked ZB1AR on March 13, for what he hopes was the first ZB1/GW contact. G5AB (Holland-on-Sea) also raised ZB1AR, and now asks for some activity from Westmorland and Hereford.

G3FZW (Lichfield) remarks that contacts with Club stations have all failed to produce a QSL, although private stations operated on behalf of Clubs (during MCC) have all come across with one. He has worked four OK's and received two cards back already.

GM3FBA (Helensburgh, Dumbarton) says he gets a queue on him sometimes, but quite orderly. His trouble is Fish-Fone and other maritime mutterings. 'FBA made a 400-mile contact with G2DJP (Herts) as early as 1900 one evening, and he got nicely down into Sussex late one night for his first contact with our delightful county. (Yes, it was G6QB !)

G5UM (Knebworth) asks us to state, for the benefit of certain types who think there is all sorts of honour and glory attached to DX contacts on 1·7 and 3·5 mc, that such contacts are to be expected at the present time, owing to the state of the sunspot cycle. Further, he reminds us that the pioneers did similar work more than 20 years ago. He's quite right ; there is no honour and glory about it, but DX of this sort does give a pleasant warm glow to a lot of people who have *not* done it before ! As we stated right at the beginning, it's one thing to know that it

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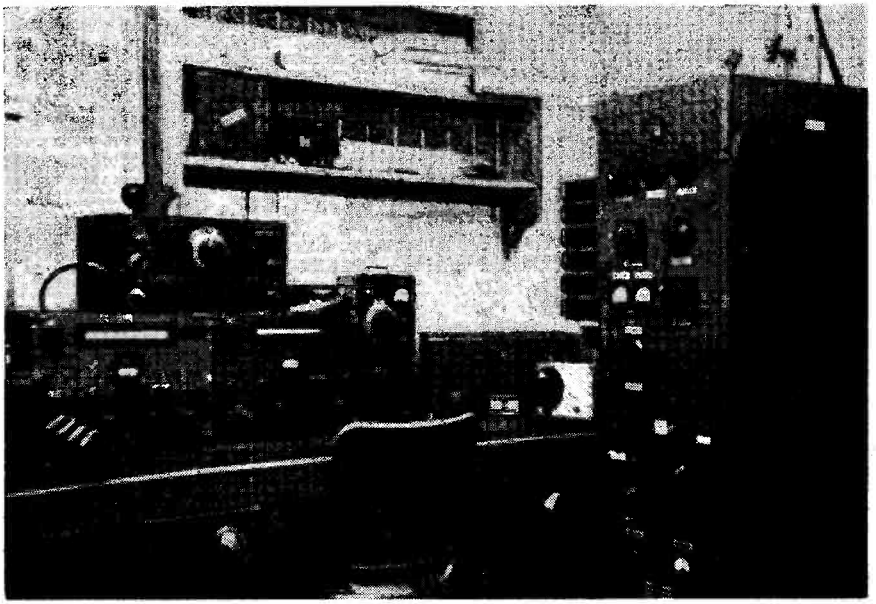


For those who may have worked VP8AK, Falkland Is., this is how the station looked. The operator is now back in England as a G.

can be done and another to *do it* for oneself.

Just as this issue closed for press, a piece of really hot Top Band news (though as yet unconfirmed) came in to the effect that G8OK (Halifax) has been reported heard on 1·7 mc phone in the ZL3 area of New Zealand, on or about March 10. This is by no means impossible, and it is hoped to be able to give further details in this space next month. We are certainly re-discovering the LF bands !

DX on 28 mc

" Ten " has remained mostly a phone band, to the annoyance of the CW enthusiasts, although one or two interesting CW stations have arrived from time to time. G6XS (Ashton-under-Lyne) tells us that he has gleaned his WAS and more than 100 countries on Ten CW, but has now migrated to 14 mc for the first time in his life ! G3FXB (Hove) also protests about the CW shortage; on one occasion the phone band yielded SV, MP4, ZC6, VP4, ZD4, PY, LU, HC and the like, while CW showed up with a CO, an FA8 and W's—nothing else.

G3AKU (St. Ives) collected HH2W and HZ1AB for new ones, plus W7's and the like ; G2BJY (West Bromwich) mentions AP4A, AP5B, VQ5DES (using 6 watts), YU1AA, FF8JC, ZD4AB, and W's in Delaware and Idaho.

G2WW (Penzance) worked PK5HL, some PK3's, HC's, VE7 and VS6 on phone, plus KR6DL on CW. He remarks that it is nice to find the band opening so early in the morning —time for a " quick one " before going off to work. At those times, as he says, a CQ call pays dividends ; when the band is obviously open, but not full of signals, it may be that they're all like you—just listening.

G3AWP (Bournemouth) mentions that HC8GRC is the call allotted to the Guayaquil Radio Club's Expedition to the Galapagos Islands. A little bird suggested the frequency of 28430 in this connection. 'AWP has found Central Americans very good, and mentions a QSO with HP1HW, who was using 10 watts to a folded dipole (we happened to work him as well, and he was doing fine). FM7WE was heard at S9 plus, and seems genuine enough. DX from G3AWP was CR4AC, HC, HK, HP, OA, PK, PZ, VP2GG, VP5FR, VS6, XE and YN—all 28 mc phone.

G2HIF (Wantage) had a nice bag including OX3BD, VE7's and W7's, TF3MB, VS6's, CR7, PK4, CX and finally CP1JK and HI6EC—all phone. OX3BD explained the rarity of OX-G contacts by saying that most of the OX boys are Americans who have put

up fixed beams for USA. In any case rotaries don't survive the gales up there. 'HIF asks if anyone has collected SV5UN yet? The answer is distinctly yes—we worked him on a Tuesday and received his card direct on Saturday morning! The present operator is Swedish, and much keener on Amateur Radio than the last one, who stuck to his commercial job and didn't use the amateur rig at all. SV5UN should be regularly on the air from now on, but probably on Ten phone only.

Other small pieces of news gleaned over the air: the KR6's are often excellent between 0930 and 1200, above 28·5 mc; for those who still want Iwojima (we did!) KG6IE may be found in among them; and ZD2FAR has been very active on CW. VE7's and W7's have roared in, quite in the old style, on rare occasions. When there *is* a West Coast party they all soar up to S9 or better.

FOUR BAND DX

Station	Countries Worked					Power
	7 mc	3·5 mc	28 mc	14 mc	Total	
G6BS	109	28	4	175	185	150
G5FA	95	19	67	127	144	35/150
G6QB	76	40	133	176	201	150
G3ATU	70	26	100	177	185	150
G3AKU	66	31	58	136	152	100
G2VD	60	29	98	161	168	150
G8PW	60	14	49	100	113	25/100
G6BB	57	25	48	108	125	10/85
W2QHH	56	67	93	182	188	35
G2AVP	55	28	32	162	169	25/120
G8VG	54	22	26	107	122	60/75
G5WC	50	1	12	120	122	45
G2WW	46	21	100	168	178	150
G3FNJ	45	24	71	114	135	150
G8KU	43	9	65	131	145	50/120
G6TC	43	11	17	88	97	20/75
G6AT	43	20	1	86	91	100
G8IP	42	13	66	115	132	3/150
ZB1AR	41	30	43	94	106	130
G3FXB	40	20	12	47	61	25
G3DO	37	23	103	158	189	150
G3FGT	33	28	41	85	102	25
G2YS	32	23	34	113	127	150
G2FYT	31	5	30	119	127	150
GW3CBY	28	18	10	46	60	15/30
G3BOC	25	17	70	34	81	50/60
G6QX	25	16	39	103	116	30/150
G2BJY	24	4	103	89	138	25
G3EIZ	23	36	15	39	54	25
G2DHV	21	19	4	83	88	25/60
G3ACC	13	21	6	104	113	150
G6CB	6	1	94	42	112	20/150
GM6IZ	2	5	32	110	114	100

The 14 mc Band

G3ATU (Roker), always informative about this band, has worked two new ones (ZS3Q and KX6BA) but has heard the following: KC6WC, KJ6AH, FB8XX, ZS7B, ZS6DO/ZS7, VP5BF, VS5KEA, CR5AM and CR4SS. He was amused to hear the latter putting out long CQ's, which seemed to be completely ignored. What a wonderful thing is publicity! And he adds that FB8XX listens either HF or LF without saying which, and is frequently blotted out by crowds on his own frequency who just haven't a hope.

New ones for G2FYT (Bristol) were GD, KG6, PJ5, UP2, VR2 and YV. 'FYT adds that FM7WR appeared, but sounded a bit suspicious and may well have been phoney. G3FXB has a Zepp., NNE by SSW, which works VK and ZL excellently but still gives great difficulty with South America. However, he called a KP4 and TI2PZ came back, so he keeps cheerful. He thinks 14 mc is still a very good band but the competition is getting a bit hot.

G2WW collected phone contacts with EA8HS, VQ5AI, OQ5DZ, KH6, VE7 and VS7, and CW with UF6, FF8, CR7 and VE7. G2BJY was pleased to work ZS3Q, YI2UW (who is G2UW), MI3ZZ, VS6BL, OX3MF, CR6AQ and M1B.

Coming in for special mention by G6TC (Wolverhampton) are CX6AD (2125), UAØKFD (0910), KH6IJ (0730), VU2RX (1940) and KX6BA (1930). G3AKU weighs in with a formidable list including F9QV/Corsica, KM6AP, EA6AF, CR5AM, YI3DYN, TI2PZ, TA3GVU and others. In 30 minutes' listening he logged VR4AA, ZS7B, FB8AN, KX6BA, KP6AH, KM6AP, CR5AM and FM8AD—a mouth-watering list for you, and typical of Twenty round about dusk on a good day (if you have a receiver!)

G6QX (Hornchurch) still has his doubts about C8FP, who gave quite a few G's a

Christmas QSO, supposedly from Zone 23. Even the arrival of a card hasn't dispelled his suspicions, although *CQ* accept it for WAZ. (This strikes us as a bit hard, seeing that they won't accept our own card from AC4RF because they think he was operating from outside Tibet !) 'QX has also had his card from FM8AD (*via* W4AZK). Contacts he mentions are with VK6DJ, F9QV, IS1AHK and PJ5CW.

G8PL (London, N.W.3) has worked HP9FS/M three times, and he is genuinely a Panamanian ship, but he does *not* QSL. W7EJU/AC turned out to be an aircraft over the Red Sea (QSL *via* W7EJU). SM8AZX was a Swedish op. on a ship in the Persian Gulf, and SV1VS/MM is pretty well known by now. Best QSO for G8PL was with ZD6HJ (see panel for QTH), who came across promptly with a card.

G3FLO (Norwich) reports for the first time ; after ten months with 18 watts input, all on 14 mc CW, he has collected 48 countries and all continents. Recent ones were VK3VJ (2115), VE8OE (1525) and VQ4KRL. 'FLO considers QRP a lot of fun. G3BNE (London, N.W.3) has found the band exciting, and at one single sweep at 1500 one day he heard CR1OAA, PK1, PK2, VK9, VS1, 2 and 6. An hour later he found KX6BA and a KJ6. He remarks on the way conditions vary—to such an extent that dusk on one day will bring in the Asiatics, next day the South Africans, and next W's and South Americans. 'BNE wants an HC or OA for his fortieth Zone, before moving to a QTH where there is a ban on aerials.

G6XS struggles along on 14 mc with a dipole 10 ft. high one end and 16 ft. the other, and an input of 35 watts. He sadly remarks, " I don't stand a smell when the gang rounds up on one I've found for myself ! " But he managed VS6 and ZS3 one evening, and has a lot of fun doing it the hard way and losing no sleep. 'XS is not sure that CR4SS and FM1SS are the same phoney ; he has a hunch that one drifts and the other doesn't.

G5WC (London, S.E.19) continues to wield his indoor dipole and it caught VS6AC, FK8AC, CR9AG and UA9KOH. He asks for the QTH of ZD4AV—see list.

DX on Forty

Not so much 7 mc news this month, from which it would appear that Forty is getting difficult. G3AKU has collected VK, Trieste, YU, 4X, Corsica, SP and W's, but says the band is not so hot. G6ZN (Horbury) forsook the Top Band with his QRP and found a quiet spot on Forty. His CQ brought back VE1GU, followed by VE1CY, VE3BBR and W1HXC—all on his customary 3 watts.

ZONES WORKED LISTING

POST WAR

Station	Z	C	Station	Z	C
Phone and CW			Phone and CW		
G3DO	40	189	G2AKR	35	123
G3ATU	40	185	G6QX	35	116
G2WW	40	178			
G2AVP	40	169	GW3AHN	34	129
G2VD	40	168	G2FYT	34	127
G3BI	40	162	G3ACC	34	113
G3AKU	40	152	G3FDV	34	100
G3FNJ	40	135	G6TC	34	91
G8IP	40	132			
G5MR	40	124	G3FGT	33	102
			G6AT	33	91
ON4AZ	39	156			
G3DCU	39	148	GM3CVZ	31	93
G8KU	39	145	G2DHV	31	88
G5FA	39	144			
GM3CSM	39	139			
G6BB	39	125			
G3BNE	39	120			
G3CVG	38	124			
GM6IZ	38	124			
G2BJY	37	138			
G3AWP	37	131			
G5WC	37	122			
G3BDQ	37	120	Phone only		
G3AIM	37	120			
G8PW	37	113	G3DO	37	151
			G6WX	37	125
G2YS	36	127			
ZD4AM	36	118	G2WW	36	126
G6CB	36	112			
ZB1AR	36	106	G2HIF	32	111

Since then he has snagged Trieste, YU, UQ2, KP4, 3V8 and other W's and VE's. Wouldn't it be lovely if we *all* used 3 watts ?

G3FXB worked YU3FMG (QTH in list) and " the usual stuff." G6AT (Hampton Hill) also collected Trieste (seems popular up there) and PY8MG—the first PY he had ever heard on 7 mc. He is busy gunning for a ZD or ZS as his only African on the band is an EK. 'AT asks for information on FKS8AA ; all we know is that he says he is in " the French zone of Vienna."

Exit Eighty ?

No news of 3·5 mc at all except from G3EIZ (Liverpool), whose 25 watts have now raised ZL3GQ and EK1AO. He also had a 40-minute QSO with HA5B, which 'EIZ thinks must be a record penetration of the Iron Curtain. He heard KP4KD, KZ5DE, PY1GJ and VP5BF, and VP6SJ was being called on the band. We know that quite a lot of DX is still being worked on Eighty, and our top scorer is now W2QHH with 67 countries, 62 of them confirmed. Some of his rarer ones are YS, FM8, all the brands of VP5, TA3, ZS, VK, OH and SP—all with a maximum of 35 watts to an 807. Howy says

DX QTH's

EA6AF	Bartolomé Pina, Casa de Espana 2, Palma, Majorca.
EA6IM	Box 324, Palma, Majorca.
EA8HS	Box 16, Tenerife, Canary Is.
EA8RK	Box 215, Tenerife, Canary Is.
FF8JC	Box 209, Dakar, French West Africa.
FM7WE	Box 281, Fort de France, Martinique, F.W.I.
HC7KD	Box 340, Quito, Ecuador.
HS1SS	King, c/o American Embassy, Bangkok, Siam.
MP4BAO	Box 333, Awali, Bahrein Island, Persian Gulf.
SP1KM	Box 320, Poznan, Poland.
ST2SP	Posts and Tels. Dept., Malakal, Upper Nile, Sudan.
SV5UN	Radio SV5UN, United Nations, Rhodes, Greece.
TI2SA	Box 1266, San Jose, Costa Rica.
VP6RJ	Box 92, Barbados, B.W.I.
VU2BK	H.Q. Eastern Command, Karachi.
YU3FMG **YU1AA**	Box 48, Belgrade, Yugo-Slavia.
ZB1IH	Cdr. (L) G. C. Turner, R.N. (G5IH), Metropole Hotel, Sliema, Malta, G.C.
ZD1KO	Sierra Leona Signal Squadron, Freetown.
ZD4AC	Box 933, Accra, Gold Coast.
ZD4AV	Capt. H. M. R. Mallock, Gold Coast Signal Squadron, Giffard Camp, Accra.
ZD6HJ	H. H. Jones, P.O. Dowa, Nyasaland.
ZE3JF	Box 596, Salisbury, Southern Rhodesia.

he feels sure that 100 countries on 3·5 should be within the bounds of possibility.

Stop Press

The following 3·5 mc news comes by radio from ZL1MP. ZL2AIT heard G2PU (Cambridge) on phone on the morning of March 12. G2PU was S5, and ZL2AIT asks G stations to listen for his phone at the HF end or near their own frequencies. ZL1HM has worked LU3EL, and heard F9IZ, F9RA, G8JR, HB9CT, HC1PL and PK6AL.

Miscellany

On the QSL subject, lots of people have thought EA9BB to be phoney but have been pleased to receive his card. G4FN (Westcliff-on-Sea) seems to be about the unluckiest one for QSL's that we've ever heard of. He sends a long "black list" and although he has worked 178 countries he can't yet produce 100 confirmations. On the subject of "bugs" and keying in general, he suggests that the dislikers of bugs should listen to OZ4FT, OZ7BO, W2KEZ, W4OPG, KV4AA, TA3FAS, ZS5YF, ZS6KK or F8EO (which gives them a fairly wide choice). Of course, some of these use electronic bugs, on which you *can't* send badly without being practically unintelligible! 'FN has a big moan about G stations who call CQ excessively, and says that long period listening and waiting for the DX have revealed the colossal waste of time and power put in by some of the CQ-ers, who usually end up with nothing. (Strangely enough we have raised five new countries this month, *all* on CQ's; ZS7C, among others, is so fed up with the treatment meted out when *he* calls CQ that he just sits and waits and then calls someone he likes the sound of. At least he gets *one* QSO that way without being called by 500 W's.)

G3ID (Dawlish) has had 100 per cent. replies from his LX contacts, and also a card from M1B; he remarks that it is very often the suspected phoney who comes across with a card and dispels one's doubts. G3CRK (Southall) has had a 7 mc card from UAØAA, who states that he is on the East Siberia Expedition. He asks for the QTH, which we have as Krasnoiarsk in Zone 18.

The Sussex Top Band League, organised by G3DRC (Worthing), is publishing a duplicated League Table showing the entrants' scores in counties and countries, confirmed and unconfirmed. County Leagues might be a good idea, but don't let's have any Pools, please! G6CB (Wimbledon) wants HZ1KE to listen for him on 28 mc, as 'CB is still using one of Ken's old transformers! He takes OX stations off his black list, having had a card from OX3UF, rather belatedly.

G3GAT (Workington) asks whether AG2AG is genuine. We imagine that he is. But the operator in question comes in for some slanging, as he apparently makes a contact and then does a QSY, as soon as he has received a report, and proceeds to make another QSO, leaving the first one unaware that the door has been slammed in his face. 'GAT has only been on for three months' intermittent work, but has notched up 35 countries in 4 continents, all on 14 mc.

G2HKU (Sheerness) removes himself from the ladders, and from the air, for a while. Studies are the reason. . . Requests for a "Worked All English Counties" certificate come from places as far apart as Swindon (G3EIX) and Tauranga (ZL1MP) . . . This WAEC will have to come! G5MR (Hythe) forwards another of these comic cards from a Bulgarian receiving station, which, of course, doesn't check . . . G3FWE (Sandown) asks whether Cyprus counts as Asia for WAC. Alas! no . . . we call it Europe.

From G5UX (London, S.W.18) we hear

that W6LRU is concerned with the formation of an International DX Club open to everybody but with the stipulation of 100 watts maximum. The Southern California boys very much want the reactions of the G operators to this scheme, which might even be responsible for bringing some of the W6's down from their full gallon to a mere pint or so. If you approve and are really interested, drop a line to G5UX or W6LRU.

Overseas News

VK3IL (North Balwyn, Victoria) is ex-G3NP and wants to be remembered to the Southend chaps, who are asked to look for him on 14 mc CW. His first G was G3BDS (Worcester). SVØAL sends his "obituary notice" and is departing from Greece. He says that all his past QSO's will be QSL'd, so don't be anxious. OZ2NU (Aalborg) is very interested in the WAEC idea, and already has 50 of them confirmed. By January 1 this year he found that he had worked 1,700 U.K. stations in 3,000 QSO's. He says "Thanks, boys, for many hours' unforgettable work across the North Sea."

VS6JH (G2FSR in Hong Kong) says "Watch out for a phoney AC4RF, AC4SQ and other calls, all the work of a Chinese communist in Peiping." 'JH says it's wonderful to hear and work CR1OAA at S9—also HS1BY. His proposed trip to VS4 and VS5 seems very remote, but he still has hopes. He may be on as CR9JH for a few hours.

4X4BF (Tel-Aviv) is leaving Israel and hopes to be on from Croydon as G3CBF. He adds that ZC6JA is already home, and their QSL situation will be dealt with jointly. ZD4AV (see list for QTH) has a receiver problem but hopes to acquire an AR88 shortly. On 14 mc he never heard a G, but ZD4AU sold him the idea of 28 mc, on which he now works. He will probably return to 14 mc when he gets a good receiver.

HC2JR (Guayaquil) reports that about April 12-15 he will be going to the Galapagos Islands for a fortnight or so, and will be on Ten and Twenty phone, signing HC8GRC. He will be genuine, he will QSL and in particular he will be looking for G contacts.

G2NW, writing from R.A.F. Habbaniya, says that there are good hopes of official YI activity quite soon, martial law having been rescinded in Iraq. ZB1IH (G5IH), operating from a "bed-sitter" in a Sliema Hotel, is on with a QRP rig for Twenty, Forty and Eighty, and says that often 3 or 4 stations come back to his CQ's; most of them say he is their first ZB1 and press the QSL aspect, whereas Geoff himself is looking for contacts with (1) Old friends, (2) G stations, (3) Anyone who wants ZB1IH, and (4) DX for DX sake. He has had several amusing experiences since starting up again, including having been suspected as a pirate by a local ZB1; and a long contact with an R.N. friend in Corsica signing a /P ZB1 call also led to things being said. ZB1IH can be found rock-bound at 3534, 7010 and 14080 kc.

ZD4AX has moved from Elmina Castle to Kumasi/Ashanti, which is not such a good location. He is on the air with juice from a petrol-driven generator, and hopes to keep on the air as long as the said "genny" lasts. Look for him between 28300 and 28390.

From VQ3SS (Dar-es-Salaam) comes a comment on the note in the February issue regarding EA9AI; 3SS has his card and thinks the EA9 is after new countries for DXCC. Others worked or heard at VQ3SS have been KX6BA (QSL via W6PZ), KR6DH, FF8JC and CR6AQ on 14 mc, who is suspected of having a poor receiver. VQ3 cards are being handled by VQ3SS (P.O. Box 457, Dar-es-Salaam, Tanganyika, East Africa) and the stations active on Twenty in those parts are (on CW) VQ3AK, 3BNU, 3JTW, 3SS, with VQ3AA also on phone.

And that's the lot for now. Please note that next month's deadline is earlyish again—**first post on April 11.** Let us have all the news by then, addressed "DX Commentary," *Short Wave Magazine*, 53 Victoria Street, Westminster, London, S.W.1. And for the benefit of our overseas clan, the closing date for the June issue will be May 16.

Your logs for the "DX Dozen" Contest should have reached us on April 4, before you read this (see rules last month !), but we hope you all had a good time and shall be glad to hear what you thought of it all. We'll be doing another one soon. Until next month, 73 and BCNU.

PIRACY CORNER

GW3CIJ (nr. Neath, Glam.): suspects illicit use of his call on 14 mc., from which band he has been absent for some time until very recently.

G2ACI (Ulverston): was licensed in April 1949, but has been receiving reports dating back to 1947 and 1948. G2ACI QSL's all genuine contacts, so those who have not had a card have worked the pirate.

G3FIO (London, S.E.26): is receiving 7 mc cards; he never works on that band and is mainly on 1·7 mc. Further, his name is not "Ken."

FIRST CLASS OPERATORS' CLUB

Thanks to his knowledge of Morse and his ability to read "blinker," one of the more senior members of the Club was recently instrumental in helping to save the lives of the entire crew of a Norwegian ship which, having lost her rudder in a gale, drifted in on a lee shore. The local lifeboat could not reach the ship, and eventually contact was made by breeches buoy. To quote from the official account : "The only contact with them now was being maintained by a local amateur, S. Young, who kept sending and receiving lamp signals from the ship." The crew of the s.s. *Rask*, after eight hours' exposure to the storm, have a very high opinion of amateurs in general and of G2YY in particular.

DX Contacts

The membership list of the F.O.C. shows a wide dispersion of callsigns. A member of the Club claims to be the only one to have worked all but one of the F.O.C. DX stations. Is there any member who can contest that ?

The March issue of the *Magazine* shows that, once again, members continue to uphold the honour of the Club in all spheres of amateur activity. In the achievement tables in "DX Commentary," G2YS takes first place on the Top Band, W2QHH and G3ATU are first and second in the Four-Band Table, and G3ATU is also second in Zones Worked. In the VHF section, members are likewise there, even if not in the lead. And in the new "Portrait Gallery" feature, we are glad to see that the first to appear is also an F.O.C. member.

On another theme, the Club has evidently been getting wide publicity from a not-so-young G3 who is saying that members of the F.O.C. are the only operators who will QRS when he asks for it, and at a speed with which he can cope. This is no more than is in accord with the standards of the Club, but it is interesting to know that it is being appreciated. This might be a suitable opportunity to ask each and every member to re-read his copy of the Rules and By-rules. There are some small but important additions and amendments in the latest sheet issued. As many changes of address and new members' QTH's have been notified in Circular Letters, all concerned are urged to keep the master membership list up-to date, and to consult it before writing other members.

Circular Letters

It is still the object to make this as rapid and as certain as possible, and the rota system is constantly being revised. In theory at least, every C/L ought to be back to G5PS with comments within three weeks. Any member who has not seen a C/L by the last week in each month is asked to notify G5PS, so that the delay can be investigated. This is rather important in order to ensure proper circulation of the monthly outpourings on F.O.C. matters.

Election Notice

In accordance with the Rules of the Club, the following are declared elected to the active membership list of the F.O.C. :

M. Smit, PAØLR (Santpoort) ; J. C. White, VS7NX (Colombo) ; E. J. R. Cowles, G2AJU (Ipswich) ; T. C. Bone, G3DTF (St. Albans) ; S. A. G. Cook, G5XB (Sonning Common) ; E. Pethers, G6QC (Loughborough) ; F. J. Lubach, VK4RF (Dalby, Queensland) ; and E. Doran, GI3DQE (Belfast).

All communications respecting the First Class Operators' Club should be addressed direct to Capt. A. M. H. Fergus, G2ZC, 89 West Street, Farnham, Surrey. (*Tel : Farnham Surrey* 6067.)

K2UN

We hear from Peter Lovelock, our New York correspondent, that K2UN, after being completely overhauled, has been tested on the air a few times. Otherwise, progress towards getting back on a regular schedule seems painfully slow, discussions on reactivating the station having been started last August.

MATCHING FEEDER LINES

Discussing the Use of 300-Ohm Flat-Twin

By **F. TILLOTSON (G6XT)**

We are all concerned with aerial efficiency and making the best use of the available RF. In many cases, this involves the problem of matching at the aerial end and some means of checking on the SWR in the feeder line. This article suggests a practical approach to the business of matching and feeding where 300-ohm line is being used in current-fed systems.—Editor.

THIS article is written in the hope that it will interest and help the many amateurs who are experimenting with aerial systems and methods of feeding them. Perhaps it will induce some to study the various excellent text-books on the subject and start from rock-bottom in radio, that is, AC theory, so that greater advantage can be taken of recent advances in the study of propagation.

Feeder lines with polythene dielectric have come into prominence in recent years and it can be safely said that many present-day amateurs are using this in some form or another, particularly on the higher frequency bands.

The old order changeth and technique has to be adapted to meet the modern innovations. The resonant feeder line with its tuning condensers and lamp indicators is giving way to the so-called Flat Line. Unfortunately, it seems to be taken for granted that this moulded pair feeder can be hitched on anyhow and that matching becomes an automatic certainty.

This is *not* so, and if the operator hopes to get the best out of his equipment a little thought and a few hours' work will vastly improve matters. The following method of matching is applicable to moulded pairs and is suitable for beams, doublets or folded dipoles.

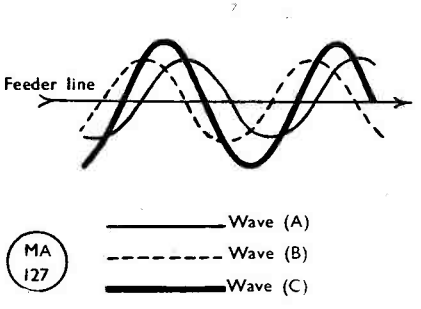


Fig. 1. Standing wave produced on one wire of a twin feeder line, assuming low loss material and open wire termination.

Wave-form on the Feeder Line

Briefly, the idea is to utilise the Standing Wave Ratio (SWR) as an indication of match or mis-match, so perhaps it will be better to run over, very simply, the production of a standing wave on flat line feeder so that the reader can follow the argument and see what it is all about.

The generation of an RF wave produces a current which is alternating in character and is expressed in diagram form as the familiar sine wave. That is, cyclic variation horizontally and amplitude variation vertically.

To simplify matters, only one leg of the feeder will be shown, it being understood that the other feeder leg will have the same wave-form, only opposite in phase.

There are three waveforms to consider—all have the same frequency but differ in their amplitude and phase.

(*a*) The generated wave, travelling towards the aerial.

(*b*) The reflected wave, coming back.

(*c*) The standing wave, which is the addition of the first two.

How near the standing wave approaches a "flat" form depends on the amplitude and phase difference of the reflected wave. This phase difference may be anywhere between 0 deg. to 90 deg. and is the result of matching at the impedance of termination. The diagram (Fig. 1) will explain further.

It cannot be stressed too much, and the reader must be clear in his own mind, that the feeder line with an insulant as dielectric is *not* tuned to resonance, and furthermore, the aerial itself or "top" IS a resonant line and carries a standing wave or waves, depending on cut length.

The purpose of this matching of impedance is to put the standing wave on the aerial itself and not on the feeder line, which should be considered as nothing more than an RF pipe. As frequency is involved in impedance formulae and resonance, it is essential that the aerial resonant frequency be known with certainty and that all adjustments and readings be made at that frequency. This will then ensure that a complete waveform or half-wave, as the case may be, will appear on the "top" so that our calculations will not be upset.

Fig. 2. The adjustment is to alter the length of feeder from point X until Ammeter 1 registers maximum reading. *(See text.)*

A grid dip meter is a useful auxiliary piece of equipment in this respect. Do not rely on the accuracy of formulae for cutting your aerial length ; they are very near, but quite easily upset by local conditions and material used for construction. Use these as a starting point, but check after erection and use the resulting figure, after measurement with the grid dip meter, even if the figure is not the frequency you intended. Anyway, it won't be much out.

Reverting to our standing wave—we can now concentrate on reducing this to a minimum on the feeder line and thus produce maximum energy in the aerial, where it is wanted.

The method advocated is easily carried out and needs no elaborate apparatus or involved mathematics. Just plain common sense and a few hours' work will produce good results.

Method

Items required are : Two thermo ammeters, preferably same make and type. Scale to be suited to your maximum input, so that the readings will not be confined to a small portion at the front end of the calibration. Another requirement is sufficient excess feeder line to enable you to carry out considerable cut-and-try adjustments. This excess will depend on the frequency you are using, but if you have at least a half-wave spare, this gives you some latitude. A field strength meter is not essential, but is a valuable aid in checking results as you go along and if your aerial is a beam, it is invaluable in lining up. Pencil and paper should be handy so that results of your stage-by-stage matching can be put down in chronological order and you really see, in figures, what you are achieving.

One word about moulded feeder lines before going further with our matching method. Owing to the insulating material separating the two wires not being air, the expression Velocity Factor comes into the picture. This is due to the combination of capacity and inductance and alters the distribution of the waveform on the feeder line as distinct from the aerial line. In order to make our task easier we will base our explanation on 300-ohm flat line which has a VF of 0·85. Therefore, if your half-wave results in a length of, say, 16 ft. for a frequency of approximately 29 mc, then a half-wave of feeder would be 0·85 of that length. So, when you start to "cut and try" this must be borne in mind.

The SWR, expressed as a figure, is the result of comparing two figures. In our case, maximum current and minimum current on the feeder line. If the figures are widely different the SWR is high, such as—14 to 2 is a SWR of 7, while 4 to 2 is a SWR of 2. The perfect result of unity, or SWR of 1, can only be achieved at the resonant frequency. It will be seen that if we have a SWR of 1, the line will be absolutely flat and, acting only as an RF pipe, current indication will be equal at all points up the line. One says indication, because in actual fact our generated wave has still the same amplitude but matching alters the disposition of waveforms and the addition resulting determines our indication on the meters.

Points to Watch

Referring to the diagrams it must be emphasised that accuracy in determining the quarter-wave section separating the two ammeters affects the result. The VF must be considered here, but cut on the long side

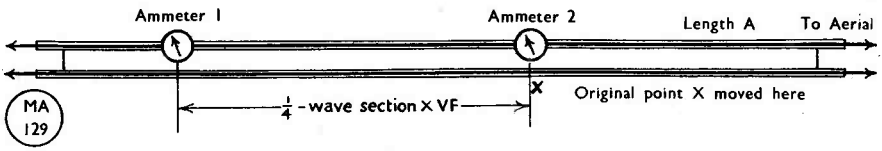


Fig. 3. Ammeters 1 and 2 placed at ends of a quarter-wave section, taking the velocity factor as 0·85.

and then adjust by cut-and-try. This length when accurately worked out remains constant, but only at the resonant frequency. The starting point for all these adjustments is thus the resonant frequency, which indicates the use of a VFO as control.

Set the transmitter on the resonant frequency and tune to your maximum input, that is, in PA plate mA. This is after you have made the set-up as indicated in Fig. 2. The spare feeder line which is attached to point X is now used to obtain the wave shift on the feeder so as to bring the maximum reading on to Ammeter 1. Short lengths are cut off until the maximum reading is obtained, not forgetting to retune each time because the loading will alter. It might be necessary to adjust the link, so that you maintain your maximum input.

You will eventually come to a point where the reading starts to reduce instead of increase. You will have now reached the crest of the waveform and the correct length of feeder to keep the reading at a maximum will be known. As we progress and start to adjust the matching device, slight alterations to this length will have to be made, so bear this in mind.

Now that we have got a maximum point, we can insert our quarter-wave section and second ammeter which has to read a minimum. If this has been too long, we can reduce gradually until the point is reached, remembering that minimum does not mean zero but "lowest figure under the circumstances." The setting of transmitter input need not be altered now, because as the section comes to its proper length we shall see the original readings on the input meter and Ammeter 1. ONLY when these ammeter points are determined correctly can we be sure of accuracy when we commence adjusting the matching device. Fig. 4 may explain more clearly how the SWR can be incorrectly interpreted if our two points are wrongly spaced.

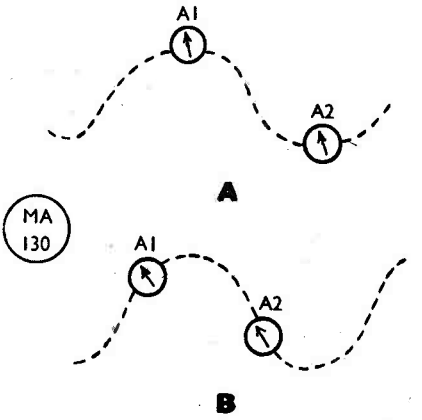


Fig. 4. (A) Ammeters correctly placed for taking readings. If Ammeter 1 reads 12 and Ammeter 2 reads 4, then the SWR is 12/4, or 3. (B) shows incorrect placing of ammeters from which it is evident that a true indication of the SWR could not be obtained.

Final matching can now be attempted. If the aerial is a beam, then the lining up for maximum gain should have already been done by means of field strength meter, because alterations in spacing and lengths of elements affect the centre impedance.

If the beam is pointed at the FS meter and a reading taken at the commencement of matching, it will be very clear whether progress is being made, and this is where your paper record begins. Make a record like the one indicated and carefully fill in after each adjustment. The final set of figures will prove that correct matching does pay.

The height of a beam does not affect the matching to a great extent, so place it at a

Table of Results

INPUT mA	A1	A2	FIELD STRENGTH READING	REMARKS
150	1·2	·2	80	Commencement of adjustment, "T" match 24 in.
160	1·3	·18	70	"T" opened to 28 in.
145	1·1	·3	95	"T" closed to 22 in.
130	1·0	·45	150	"T" closed to 21 in. evidently correct direction of movement.
120	·9	·6	200	Nearing match. Space now 20 in.
110	·85	·75	250	Space now 19 in.*
115	·87	·7	220	Now going back. Point * seems nearest.

Note : These figures are for guidance only. Having obtained the correct adjustment for matching, alter length "A" to regain maximum current reading in Ammeter 1, and then re-check the SWR.

convenient height for reaching the matching device. Assuming this is a "T" match, this should be opened out about 2 in. either side and the reading of the two ammeters checked with the reading you commenced with. If you are moving in the correct direction the readings will be nearer (lower SWR) and your input lower. If the readings indicate higher SWR it will be obvious that your matching space wants decreasing and not increasing. So up the ladder again and reduce by 4 in., taking further readings and recording them. Once started in the proper direction the amount moved each time should not be large because you may pass the point of correct match. When you approach this point it will be shown quite clearly in your figures because your two ammeters will get nearer together in readings.

When you get to this point, your table should indicate lower input, lower SWR, but increased field strength.

General Observations

If there was considerable mis-match to commence with, the length of feeder will have to be readjusted, because the waveform will have moved on the feeder line and our maximum position will have been displaced. It may mean an extra length to be inserted or a small portion taken out. Following the same procedure as before, bring Ammeter 1 to the correct place on the feeder line and take readings. Make a final adjustment to the "T" match and record the results.

Depending on how far you were originally mis-matched, your table of figures will be a revelation, especially if you have the F/S readings as well. It must be emphasised again that accurate results can only be obtained if the ammeters are correctly placed. This means ALL the adjustments at the resonant frequency and correct length of quarter-wave section between ammeters.

If you take readings either side of the resonant frequency and record the apparent SWR your readings will become more and more faulty because of the distribution of waveform on the feeder and consequent wrong placing of the two ammeters. This will be easily seen if you compare the feeder length at 28 mc and 29 mc, taking into account the VF and your overall length of feeder, which may contain a number of half waves.

It is recommended that the ammeters be permanently included in the feeder line so that you can see when mis-match occurs due to any displacement of elements during bad weather. The losses that may occur in the metered portions cannot be great at amateur frequencies and they will prove their worth.

CARDS IN THE BOX

As we would like to get them into the mail, if your call appears below, please send a large S.A.E., with name and call-sign, to BCM/QSL, London, W.C.1. If you wish it, your address can also appear in "New QTH's" and subsequently in the *Radio Amateur Call Book*.

G2BHA, 2FOW, 3ACZ, 3AQ, 3CAR, 3EXQ, 3EYY, 3EZT, 3FAD, 3FDU, 3FKR, 3FSH, 3FVP, 3FZD, 5QG, GM3BGM, GW3FEJ, 3GLC.

XTAL XCHANGE

This space is available free for the convenience of those readers who may wish to exchange crystals—but buy-or-sell notices can *not* be accepted for insertion here. Offers should be set out in the form shown below, on separate slips marked "Xtal Xchange—Free Insertion," and all negotiations conducted direct.

GI2ARS, Ballyveamore, Ballymartin, Co. Down, N.I.

Has QCC type P5 3506 kc crystal, mounted and certificated. Wants similar crystal 1755-1770 kc.

G2FCA, 26 Northolme Gardens, Edgware, Middlesex.

Has QCC type P5 certificated crystals 1809·5, 7027, 7069, 7185 and 7278 kc, all mounted. Wants 8 or 12 mc crystal of same type for harmonic operation to 145 mc band.

G3AAJ, 385 High Street North, London, E.12.

Has crystals 5110, 5880, 6280, 6510 and 6550 kc in ½-in. holders; 3465, 4190, 6497·9, 6522·9, 6457·9 and 8050 kc in ½-in. holders. Wants crystals in 1·7 and 3·5-mc bands, two of above for one.

G3FHL, 34 Wharfage, Ironbridge, Salop.

Has mounted 3510, 3515, 3540, 3545 kc crystals and so on in sequence. Wants crystals in 8300 kc sequence.

G3GEN, 3 Kitchener Avenue, Gloucester.

Has several crystals 6005-6050 kc, ½-in. pin spacing, for multiplying to 145 mc; state frequencies required. Wants crystals 3500-3550 kc, ¾-in. mounting.

SWL, 5 Hitherbrown Road, Hayes, Middlesex

Has 7055 kc crystal, ¾-in. mounting. Wants any frequency 1800-1900 kc, or 14010-14100 kc, similar mounting.

SWL, 5 Highwood Road, Parkstone, Dorset.

Has 3720 and 8100 kc crystals, ½-in. mounting. Wants frequency 7010-7040 and/or 12000-12166 kc, any spacing, with or without certificates.

VHF BANDS

By E. J. WILLIAMS, B.Sc. (G2XC)

GDX on Seventycems—
G3EJL/G5BY work 119 Miles,
Sunday March 5, Fixed QTH—
Conditions and Activity—
VHF Season Opening

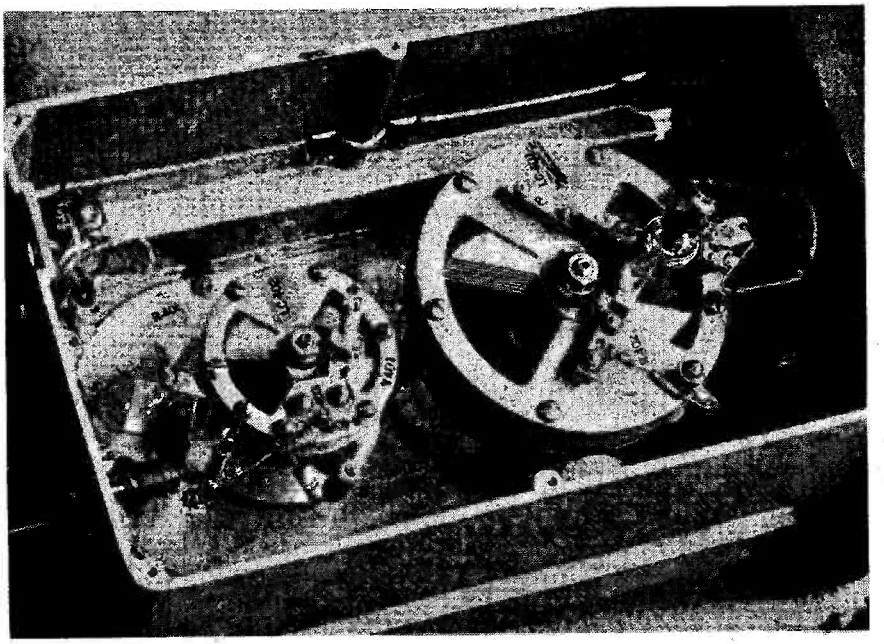
AT last comes the news for which many of us have been hoping for months past—tropospheric GDX on 70 cm! Yes, it's happened, 119 miles on 70 cm and between fixed stations! As may be expected, G5BY was at one end of the path, but that G3EJL, operating from a flat in Southampton and therefore under much difficulty, should be at the other, probably comes as a surprise to many. However, those who have followed "VHF Bands" regularly over the past year will know that G3EJL is full of resource, and will also have read of the previous contacts made between his station and G3LV (Southsea); this was when the beam at the Southampton end had to be held out on the window ledge! This present success has been well-earned at both Bolt Tail and Southampton. Heartiest congratulations to G5BY and G3EJL on a momentous achievement, and our sincerest regrets that the good work came to such a sudden end when the 832A tripler at G3EJL succumbed, balking them of an actual two-way QSO. This new result is again a triumph for crystal control and stable receivers, and points the way for future development along the lines so often stressed here. It will serve as a much needed incentive to many of us to get going on 430 mc.

And now for the full story. Contact was made between G3EJL and G5BY on 145 mc just before 1530 GMT on Sunday, March 5, and as signals were running S9 *plus*, G5BY suggested a 430 mc test. The higher frequency equipment was not ready for immediate operation at G3EJL, but by 1545 the receiver was in working order and G5BY called on 435·36 mc on CW. Unfortunately, due to an error in passing the frequency to G3EJL, search was made on 436·36 mc and no signal heard. By 1600 GMT the transmitter was ready at Southampton and G3EJL called G5BY on 436·26 mc. His carrier was heard the moment it came on and was RST 579x. Modulation was R5 S5, clear steady speech out of a dead quiet background. For three minutes the signal was absolutely steady and then for the remaining two minutes of the call there was fading to S3. G5BY replied on 145 mc and crossband contact continued until 1623, when G5BY again called G3EJL on 435·36 mc. This time the Bolt Tail signal was heard, at RST 56/79. G3EJL switched on to reply on 70 cm, G5BY heard his carrier come up, but almost immediately the 832A failed and G3EJL had to return to 145 mc. The contact was witnessed by G3ABH who happened to call at G3EJL just as the fun was starting.

G5BY comments that from 1500 GMT onwards great banks of fog were coming in from the sea and blotting out the sun. At 1600 it was clear sky overhead with a thick black fog bank coming up slowly from the opposite direction from G3EJL. Until the fog enveloped G5BY no variation occurred in the 430 mc signal from G3EJL, but directly this happened, fading took place and the signal never became quite so good again. At 1623 when G5BY managed to get his signal to G3EJL, the latter's transmission had dropped two S-points compared with its original strength at 1600. The weather at Southampton was fine and sunny throughout.

Equipment Notes

The converter at G5BY is on the lines of that described by G3MY in the *Short Wave Magazine* for November, 1949, with certain modifications. Full details of this modified version will be published in the May issue of the *Magazine*. At G3EJL, the converter uses a crystal mixer circuit, employing harmonic mixing from a 955 oscillator on 200 mc, and an IF of 30 mc fed to a Senior HRO *via* an EF91 head-IF amplifier. The converter is tunable. It should be noted by those still flogging the dead horse SEO that with this



The 70 cm. converter at G3EJL ; harmonic mixing from a 955 on 200 mc is used, with a 30 mc IF into an HRO

arrangement self-excited oscillators are completely unreadable.

The transmitter at G5BY is a modified T1131 exciter, driving a 145 mc buffer stage (2 x VT62) enabling the 8012 triplers to be driven hard on 430 mc. The G3EJL circuit includes an 832A buffer amplifier on 145 mc and then another 832A trebling to 436 mc.

The feeders at G5BY are 330-ohm open wire, while at G3EJL, 52-ohm coaxial cable is used, with a Balun section. The beam at the Southampton station is a Yagi with 9 directors and a trigonal reflector, and has a measured gain of 17 db.

The photographs of their gear which we are able to present here give some idea of the fine type of equipment used at G3EJL and G5BY. It is certain that the contact will be repeated many times in the future, and your conductor feels equally confident that as soon as similar equipment is installed and operated from other stations all over the country, 70 cm GDX *will* cease to be regarded as striving for the impossible—or as something reserved for portable operation from mountain tops.

Conditions

There is little doubt that the March 5 contact was the result of an inversion, probably associated with the fog formation which G5BY has reported. Conditions on two metres were also good at the time, and the evening TV from London was well above average strength on the South Coast. Hence, two metres may quite reasonably be used as a pointer for 70 cm conditions. One other factor of interest is that nearly half of the path between Southampton and Bolt Tail lies over the English Channel, and it is a path long associated with exceptionally strong signals on both Five and Two when conditions are good. But there are equally good 2-metre paths in other parts of the country, and we are sure that, following the lead given by G3EJL and G5BY, many of them will be tested for their 70 cm propagation possibilities before many months are past.

Once again, congratulations, both G3EJL and G5BY !

More about Aerials

Further to the comments on aerial gain and directivity which were quoted in this column last month, W2PAU expresses some disagreement with the conclusions which your conductor attempted to draw from them. He points out that the RCA tests to which reference was made were performed under

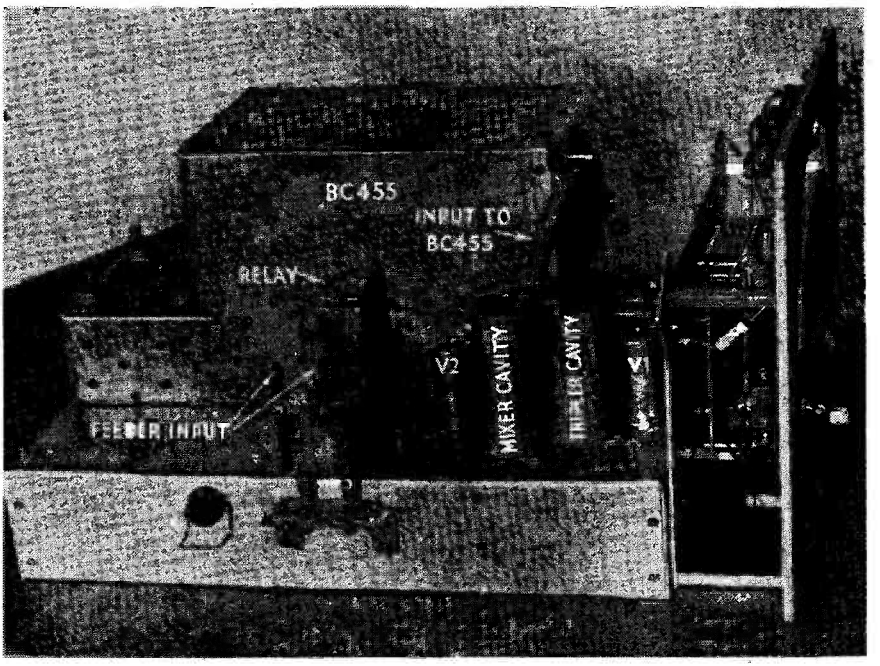
fairly poor receiving conditions, and the high gain arrays used were generally much sharper than those employed on Two Metres by most of us. The reflections on the UHF bands, says W2PAU, were stronger and much less diffused than those encountered on Two, the arrays were sharper, and the receiving sites chosen were not typical amateur transmitting aerial locations. So it seems as though we must look elsewhere for the answer to the *claim* for the abnormal superiority of the colinear stacked array.

W2PAU's own tests with an aerial 50 ft. up in a suburban area, with some possibility of reflections from man-made objects, showed that it did not matter whether gain was obtained by a concentration of the radiation pattern in a horizontal plane or in a vertical plane. All sorts of arrays—some tall and narrow, others short and wide—have been tried, but there is no great advantage either way, except that greater horizontal directivity may reduce ignition noise. His very reasonable conclusion is that gain is gain, no matter how you get it !

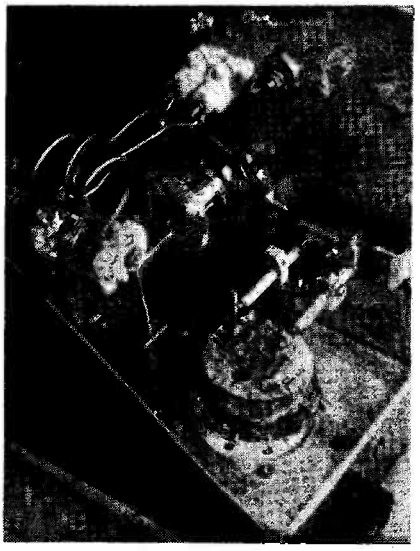
This accords well with the opinion expressed by your conductor during the height of the "Yagi *v* Stack" discussions last year, and brings him once more to doubt whether the difference in performance between these two types of aerial is any greater than orthodox theory suggests. Hence, our continued use of the word *claim* !

Conditions and Activity

There was good response to last month's provocative remarks on activity and conditions and surprisingly enough much of it was in support. G3EHY (Banwell) although somewhat critical, was in accord with the principle that it is dangerous to generalise about conditions as a result of observations made along one path. Such generalisation can only be ventured after consideration of reports from many areas. There also appears to be a general understanding that there may be more activity than that which actually reaches DX locations. GW2ADZ says, "From my QSO's I gather there is quite a lot of activity on the South Coast but very little gets up here."



General arrangement of the G5BY 430 mc converter ; the front end is based on the design by G3MY which appeared in the November "Short Wave Magazine." A BC-455 (also used on 145 mc for the same purpose) functions as IF amplifier, and the converter itself tunes 431-439 mc. The mixer and tripler cavities are from a surplus R89A/ARN5A glide path receiver, and the BC-455 itself has been considerably modified. Details of the G5BY converter will appear next month.



The output end of the Tx at G3EJL, with the 436 mc tripler stage lower right. It was this 832A which went soft at the critical moment ! However, it is abundantly clear that a path has been opened over the 119 miles separating G5BY and G3EJL, and a solid two-way QSO can be expected as soon as conditions serve.

At G2XC, we are frequently told that ours is the only signal getting into London, yet at the same time some six or more other stations in South Hampshire are active. It is just a matter of the more favourable location of G2XC, which enables a readable signal to reach some 70 or 80 miles to the North-East even under poor conditions. When the other Hampshire stations get there, it is not a sign of increased activity, but rather of better conditions.

To judge from letters received this month and observations on the band, there has been regular activity in London and the South-East, along the South Coast from Sussex to Devon, in Somerset and South Wales, in East Anglia, in the Oswestry district, and in South Lancashire. It is also believed there has been some activity in the Midlands, around Leicester and Coventry. Among the better dates for conditions were March 5, especially in the South, March 6, in the Midlands, and March 10, in the South-East. These are quoted after generalising from all the reports received.

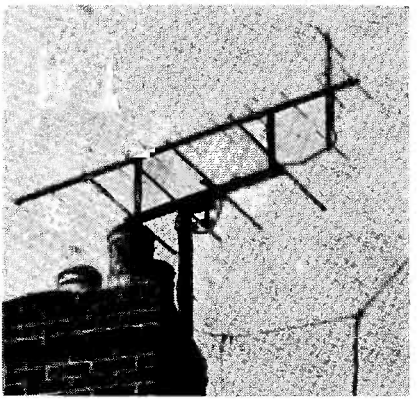
However, in spite of all this there is still plenty of room for more activity ; one or two of the more celebrated VHF callsigns have been conspicuously absent from Two Metres for many months. They were, in general, the stronger signals, and their absence is undoubtedly one of the reasons why the band seems less lively at times.

Around the Stations

G2XS (Kings Lynn) was unfortunately down with bronchitis for half of February, but comments that a year ago he heard only one signal during January and February, namely, G5UD, whereas this year he worked seven in the last two weeks of February. (A similar check on the log at G2XC reveals, during those same two weeks : In 1949, 22 contacts with 18 different stations ; in 1950, 33 contacts with 22 different stations). G2XS is there daily 2000-2030, and 2220-2315. G5UD has also been reported on the band from Kings Lynn.

In Norwich, G3VM, has found things slightly better this month, and has even heard one of those Cambridge stations ! On March 6, both G3AHT (Oswestry) and his neighbour GW2ADZ were putting good transmissions into Norfolk, although no Southern signals were heard. (G2XC received G2XS that evening.) On March 10, G6NB (Aylesbury) was an excellent and steady signal. G3VM still finds schedules with DX stations produce signals on an otherwise dead band, and wonders what the real answer is. Possibly the fact that he usually closes by 2200 may explain some of it. G3GLA is testing on the band and G8QR, also of Norwich, should be heard soon. Some 430 mc tests are planned for the very near future in the Norwich-Lowestoft area.

G2CPL (Lowestoft) has been calling and listening every evening but with little reward.



The 430 mc beam at G3EJL (Southampton) as used for the cross-band 70 cm QSO with G5BY on March 5 (distance 119 miles). This beam, the upper one in the photograph, has a measured gain of 17 dB.

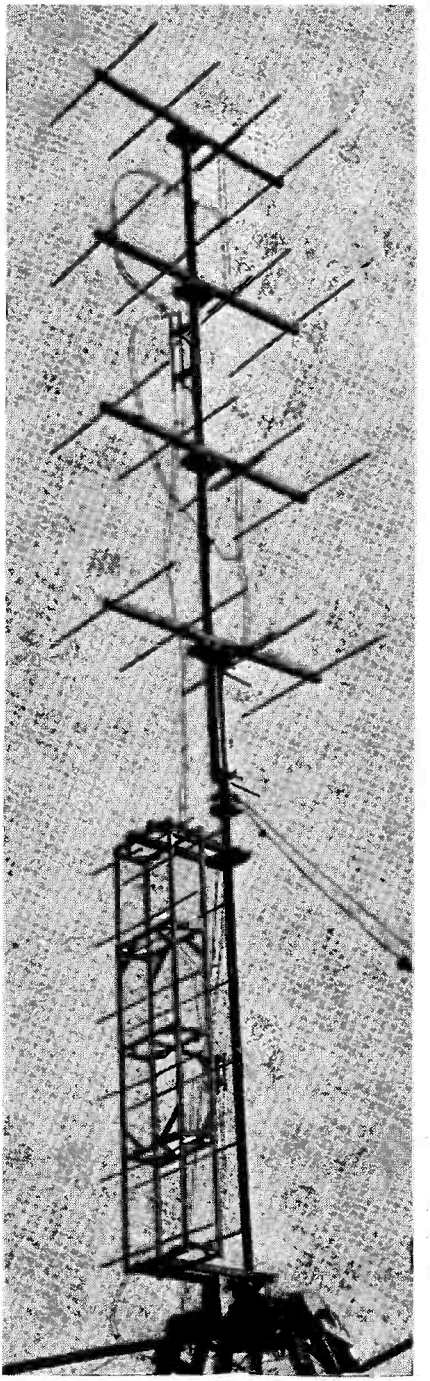
The nightly schedule with G3VM has provided much interesting data which is being compared with meteorological conditions. G2CPL also quotes March 6 as an excellent evening for Western signals. G6WU (London) has been providing a good signal in Lowestoft; a new converter is on the bench using 6J6 as first RF, push-pull EF91's as 2nd RF and again as mixer with EC53 oscillator, IF being 10 mc. A new 4-ele w.s. beam with improved feeder will be up at 60 ft. (14 ft. higher than the present beam) as soon as weather permits. And a 150 watt PA is also under way.

G2CIW (Romford) has been giving his beam an overhaul, a necessity arising from the effects of the winter's gales, but prior to taking the beam down he found March 10, to be an excellent evening, following on several days of above-average conditions. G2CIW has worked GW3EJM to increase his Counties score. He suggests eliminating from the table all those who are not active on the band. That's certainly an idea, and will be given consideration. G3FIJ (Colchester) writes to say he is still searching the band and calling, but getting little response. He also thought March 10, the best night for some time.

G4HT (Ealing) finds the pipe-line to Oswestry and Llanymynech has opened up again and he only missed working G3AHT, or GW2ADZ, or both, on two days during the month. At long last G3EHY has been contacted; but it took 2 hours 50 minutes of calling to do it! In the meantime G3EHY seemed to work every other station in London! GW3EJM was also worked, and now G4HT wants Suffolk! G5LQ (Chiswick) has an improved Rx, with neutralised 6J6 pre-amplifier in front of a much modified RF27. A 6-ele stack is being planned.

G5PY (Clapham Park) finds the path to G2XC of just about the same reliability as it was on Five Metres. He has called GW2ADZ several times, while GW2ADZ also claims to have called G5PY, both without success! The aerial at G5PY is a 12-ele array and the Tx input 15 watts. G3BLP (Selsdon) found conditions peaked around March 5, when G3EHY and GW3EJM were S9-plus signals. They were also good the following day, and G2OI has been heard on several occasions. Regarding DX records on the band, G3BLP feels that the sea paths are the more likely to produce DX, and he is probably right.

G6XM (Farnborough) has been using a pair of 304A's with 100 watts and a 16-ele stack. The Rx is a 6J6 RF, 6J6 mixer and



The 430 mc 24-element beam at G5BY, Bolt Tail, is the "long box" structure mounted below the 2-metre 4-over-4-over-4-over-4. Both are rotated by the same supporting mast, and the send-receive change-over relay is housed immediately beneath the 70 cm beam.

TWO METRES

COUNTIES WORKED SINCE SEPTEMBER 1, 1949

Starting Figure, 14.

Worked	Station
34	G3BLP
31	G2AJ, G2XC
30	G4HT
28	G2OI, G6NB
27	GW2ADZ
26	G2CIW, G3ABA
25	G2XS
24	G3FXG, G6VC
23	G3EHY
22	G3VM
20	G5UD
19	G2CPL, G3EJL
16	G3CGQ, G3FIJ, G8IL
14	G3BHS, G3CWW, G3DCC

Note : *Scoring for this Table is cumulative, and it will run for one year to August* 31, 1950.

CC oscillator with 12 to 14 mc IF. He asks if there is any activity in Hull ? After the comments made above, G2XC hesitates to express an opinion, but actually he thinks not. G6XM has now stripped down the Tx and is rebuilding for 150 watts. G3BHS (Eastleigh) found conditions better than for several months, with March 10, outstanding. G6NB from his new location provides a good signal down at G3BHS.

G4IX (Parkstone, Dorset) is poorly located and is only home for occasional weekends ; he has, however, been on two metres for some time. He puts it forward that there is room for experiment on circular polarisation using helical aerials. This, he says, may well reduce the effects of fading and at the same time enormous gains can be achieved by stacking up helicals. According to his figures, three elements stacked, each consisting of five turns, gives a gain of 57 dB ! G4IX suggests that a couple of clubs, say 150 to 200 miles apart, might care to put up a really big helical array and blaze some new trails. (There is also interest in this type of aerial in USA, according to W2PAU of *CQ*, but the gain figures quoted in certain American periodicals have been shown to be much exaggerated ; the gain for a helix 10 ft. long and 2 ft. in diameter, with a large ground plane reflector, is about 12 dB).

TWO-METRE ACTIVITY REPORT

G6CI, Kenilworth, Warwickshire.

WORKED : G2ATK, 2FWW, 2IQ, 3AHT, 3BLP, 3ENS, 4HT, 4RK, 5ML, 5SK, 6LK, 8QK, GW2ADZ.

HEARD : G2AOK/A, 2OI, 3EHY, 4DC, 4LU, 5TP, 6NB, 6VX, 6XM, 8KL, 8QY. (*January* 8 *to March* 12.)

G2FNW, Melton Mowbray, Leics.

WORKED : G2IQ, 3BLP, 3CGQ, 3ENS, 4DC, 4HT, 6NB, 6VX, GW2ADZ.

HEARD : G6XM, 8SY (*February* 16 *to March* 12.)

G6NB, Aylesbury, Bucks.

WORKED : G2AIQ, 2AOK/A, 2ATK, 2BMI, 2BHS, 2CIW, 2FNW, 2HCG, 2IQ, 2MV, 2NM, 2OI, 2UJ, 2XC, 2XS, 3ABA, 3ABH, 3AEX, 3AHT, 3BHS, 3BLP, 3BOB, 3CGQ, 3CFR, 3CVO, 3EJL, 3EHY, 3ENS, 3FAN, 3FP, 3FXG, 3GBO, 3VM, 4AU, 4DC, 4HT, 4RO, 5BY, 5DF, 5LQ, 5MI, 5PY, 5SK, 5TP, 5UD, 6CI, 6JK, 6OH, 6UH, 6VX, 6XM, 6YP, 8DM/A, 8KZ, 8LG, 8LY, 8QC, 8SM, GW2ADZ, 3EJM. (*Month ending March* 16.)

GW2ADZ, Llanymynech, Montgomeryshire.

WORKED : G2CPL, 2FNW, 2MV, 3BLP, 3EHY, 3ENS, 3VM, 4HT, 5TP, 6LK, 6NB, 6XM, 6YP, GW3EJM.

HEARD : G3EEZ, 5JU, 5RW. (*February* 8 *to March* 14.)

G3EHY, Banwell, Somerset.

WORKED : G2ATK, 2CIW, 2OI, 3ABA, 3AZJ, 3ENS, 3FP, 3YH, 4DC, 4HT, 4RX, 5JU, 5PY, 5TP, 6NB, 6XM, 6VX, 6YP, 6ZQ, 8IL, 8KZ, GW2ADZ, 2HH, 3EJM.

HEARD : G2MA, 5GB, GW3DUR. (*February* 7 *to March* 12.)

G3BHS, Eastleigh, Hants.

WORKED : G2CIW, 2DSW, 2NS, 2XC, 3CGE, 3DEP, 3EJL, 3FAN, 3FD, 3FXG, 4DC, 5BY, 6JK, 6LK, 6NB, 8IL, 8LY.

HEARD : G2BMZ, 3EHY, 4HT, 6UH, 8QC, GW3EJM.

G4HT, Ealing, Middlesex.

WORKED : G2ATK, 2DD, 2FNW, 2UJ, 2XC, 2XS, 2XV, 3ABA, 3ABH, 3AHT, 3BPM, 3CGQ, 3EHY, 3ENS, 3GHS, 4MW, 5HN, 5SK, 5UD, 6CI, 6WU, 8LG, 8NB, 8SY, 8WV, GW2ADZ, 3EJM.

HEARD: G2CPL, 2DSW, 2FWW, 3FAN, 3VM, 5BY, 5MI. (*February* 8 *to March* 12.)

G2CIW, Romford, Essex.

WORKED : G2NM, 2XC, 2XS, 3AHT, 3CFR, 3EHY, 3FAN, 5BY, 5MI, 8IL, 8LG, GW3EJM

HEARD : G2IQ, 2FNW, 3ABH, 5BM, 5UD, GW2ADZ. (*February* 15 *to March* 11.)

G3VM, Norwich, Norfolk

WORKED : G2CPL, 3AHT, 3CGQ, 3FXG, 3GLA, 4HT, 5MI, 5UD, 6NB, 6VX, 8QR, GW2ADZ.

HEARD : G2AIQ, 2XS, 3ANB, 3ENS, 6LL, 6WU, 8SY.

G2XC, Portsmouth, Hants.

WORKED : G2AHP, 2ANT, 2CIW, 2DPD, 2DSW, 2JU, 2MC, 2MV, 2NM, 2NS, 2QV, 2WJ, 2WS, 3ABH, 3AZJ, 3BHS, 3CGE, 3EJL, 3FAN, 3FD, 3FXG, 3GHS, 3QK, 3RI, 4HT, 5BY, 5MA, 5PY, 5UD, 5US, 6JK, 6LK, 6NB, 6OH, 6UH, 6VX, 6WU, 8IL, 8KZ, 8LY, 8QC, 8SY.

HEARD : G2ATK, 2CUA, 3CGQ 3EHY, 5SK, 6WT, 8KL, GW2ADZ (*February* 17 *to March* 17.)

G3EHY (Banwell) found conditions mainly poor most evenings in February, but markedly better during March. March 5 was a very good evening with him, with the band open in all directions. The schedule with GW2ADZ (Llanymynech) continues to be maintained and provides a useful signal for many on its North and South line, and beyond, to check receivers and conditions on the path. GW2ADZ thought March 6, the best day of the month. He now has a 4-over-4-over-4-over-4 for his beam but is not sure yet whether it is an improvement, as conditions have varied so much. His present schedules are 1900 with G3EHY and 2100 (not Fridays) with G2CPL and G3VM.

G6NB (Aylesbury) managed to work 63 stations in 28 counties in a month and thinks his new QTH better than Chertsey. His signal on the South Coast is certainly much stronger, even though he is 20 miles further off. A daily schedule is being run with G2OI (Manchester) at 2300 GMT. G2OI has found conditions very poor indeed for the last 2½ months, and some weeks have given a complete blank. For that period Southern and Midlands stations have been completely missing, so far as G2OI is concerned, but in early March, G2MV and G6VX were heard in addition to a few weak unidentified carriers. He suggests that as many stations as possible should come on Two between 2200 and 2300 to see if the band can be opened again! G5UM (Knebworth) also suggests an "Activity Night" and mentions Thursday. This is commended to you all; it has the advantage of frequently being a "repeat" night on TV and so activity may not disappear between 2030 and 2200.

G2FNW (Melton Mowbray) is using an 829B on 144·45 mc while his Rx is the G2IQ 6J6 type into a B28; a 4-ele Yagi indoors serves as aerial. Due to bad regulation of the supply mains he finds it impossible to operate before 2200. G8QC (Chalfont St. Peter) is running 28 watts to a 522 and has a stack of three pairs of colinear elements.

GM3DIQ (Saltcoats) has his station located at Stevenston which is 400 ft. a.s.l. with no high ground within miles. He is active most nights on 144·26 mc, and has two aerials available, a 4-ele c.s. Yagi and a "City Slicker." A third array of 32 elements is under construction. GM3DDE in Largs is also active, some 12 miles from GM3DIQ.

Other items of interest include a report from G2HIF that TF3MB is on 144 mc and looking for G contacts, while HZ1KE (Saudi Arabia) is also concentrating on our band. HZ1KE has recently worked G on Top Band, so now for it on VHF!

The Tables

This month the "Best Twenty" table makes

TWO-METRE ACTIVITY BY ZONES AND COUNTIES

ZONE A (144 to 144·2 mc)

Ayrshire: GM3DDE, GM3DIQ
Stirling: GM4QV

ZONE C (144·2 to 144·4 mc)

Lancashire: G2OI, G3DA, G3ELT
Yorkshire: G2IQ

ZONE E (144·4 to 144·65 mc)

Cheshire: G5CP
Derbyshire: G5RW
Leicestershire: G2FNW, G3ENS
Staffordshire: G8KL
Warwickshire: G2ATK, G3ABA, G5JU, G5SK, G6CI

ZONE F (145·65 to 145·8 mc)

Glamorgan: GW3DUR, GW3EJM
Montgomery: GW2ADZ
Shropshire: G3AHT

ZONE G (144·65 to 144·85 mc)

Bedford: G3CGQ
Buckinghamshire: G3CVO, G3GBO, G6JK, G6NB, G8QC, G8WV
Cambridge: G2AIQ, G2XV, G3BK, G8SY
Hertford: G3FD, G4RO
Norfolk: G2XS, G3GLA, G3VM, G5UD, G8QR
Suffolk: G2CPL, G5MI

ZONE H (145·25 to 145·5 mc)

Berkshire: G5DF, G6OH, G8LG
Dorset: G3ABH
Gloucestershire: G3YH, G6ZQ
Hampshire: G2DSW, G2NS, G2XC, G3ARL, G3BHS, G3CGE, G3DEP, G3EJL, G3FAN, G3RI, G6XM, G8LY
Oxon: G5TP
Wiltshire: G8IL

ZONE I (145·5 to 145·65 mc)

Devonshire: G2BMZ, G5BY G6WT
Somerset: G3EHY, G4RX

ZONE J (144·85 to 145·25 mc)

Essex: G2CIW, G2WJ, G3FIJ
Kent: G2UJ, G2WS, G3BOB, G6VX
London: G3FXG, G4AU, G4DC, G5PY, G8KZ
Middlesex: G2AHP, G3QK, G4HT, G5LQ, G6UH
Surrey: G2ANT, G2DPD, G2CUA, G2MV, G3BLP, G3FP, G3GHS, G4CG, G5MA, G6LK, G8SM
Sussex: G2JU, G2MC, G2NM, G2QV

Note: *The frequencies shown above are those recommended by the Two-Metre Zone Plan but some stations are not yet conforming.*

TWO METRES

ALL-TIME COUNTIES WORKED LIST

Starting Figure, 14

From Fixed QTH only

Worked	Station
43	G3BLP
40	G2AJ (225), G5MA, G5WP
39	G2OI (132)
38	G2IQ, G2NH (212)
37	G3ABA (112)
36	G5BY
35	G3APY, G5GX, GW2ADZ
34	G2XC (220), G3CUJ, G4DC (188)
33	G3EHY (119)
32	G4HT (177), G8WV
31	G2KG (110), G2XS (130), G4LU
30	G4AU (123)
29	G3DMU, G5RP (114)
28	G2CIW (169), G2HDY, G5BD, G6NB, G6VC (102)
27	G3BKQ, G3DAH, G5JU, G8QX, G8SM (106)
26	G2RI, G3VM, G5MI
25	G2AXG, G6LK, G6PG (109), G6WT
24	G3CGQ, G5NF (111), G3FXG (100)
23	G2CPL (107), G2NM, G3BOB, G8IP (138), G8QY
22	G3WW
21	G3CCP, G6UH (130)
20	G3FD, G8KZ
19	G3EJL, G5ML
18	GM3OL, G6DT
17	G3AUA, G3FIJ
16	G5PY, G8IL, G8KL
15	G2ANT, G2FLC, G3AKU, G3CWW, G4RK
14	GM3BDA, G3BW

NOTE : Figures in brackets after call are number of different stations worked, starting figure, 100.

its first appearance. The generally unfavourable conditions during February doubtless kept down the number of entries for this monthly "contest." The restriction on including any one station more than once in seven days made it impossible for some competitors to make as many as 20 eligible contacts during the month in spite of much time spent on the air. Both G2XS and your conductor were active for only half the month, the former due to illness and the latter due to gale damage to the aerial. G3EHY's best contact was with G2CIW whom he worked twice, while G4HT had contacts with G3AHT and GW2ADZ.

The Activity List is reintroduced this month, and is based strictly on reports which have reached us. This list is compiled anew each month, and the only way to make sure your call will appear in it is to write and say you are active ! Do not leave it to some one else to tell us about you.

Thanks are due to those who complied with the recent request to send their achievement claims and other lists on separate sheets. There are still one or two who include these items in the middle of letters, but if they realised what a large amount of extra work this causes we are sure they would mend their ways ! The GDX season should soon be with us and that means heavier mail each month—but still only one short week-end in which to extract all the information from your always welcome letters. The less extracting it needs, the more efficiently can "VHF Bands" be produced, and that is to everyone's advantage.

From the Netherlands, it is reported that many PA's are getting ready for Two, the emphasis being on high towers and beams—with the idea of working local phone to dodge

TWO METRES

BEST TWENTY

***February* 1950**

Station	Total Miles	Best DX	No. QSO's	Average Miles
G3EHY	1740	132	20	87
GW2ADZ	1330	—	10	133
G4HT	1279	154	20	64
G2XC	1012	75	20	51
G2XS	435	90	7	87

For this Table send details of date, mileage and call-signs of best 20 *contacts made during previous calendar month. No station to be counted more than once per day* (0600-0600 *GMT*).

the QRM on Eighty ! DL1FT and DL1FV in Schleswig-Holstein are coming on to try and bridge the gap PA-OZ/SM, which has for long been attempted by PAØWL, who is well located and has excellent equipment. The prime need among the PA's and DL's is now for 6J6's and 829's, but it is hoped to "organise" some from the DL4 area. The following PA's are getting ready for 70 cm. : ØAJA, ØDX, ØHRL, ØIK, ØJU, ØKD, ØPN, ØZQ. It is also reported that the F's interested in VHF held a meeting near Paris recently to check the calibration of their 70 cm. gear—a very necessary proceeding, as those of us active in the early days of Five will well remember !

Six-Metre Opening

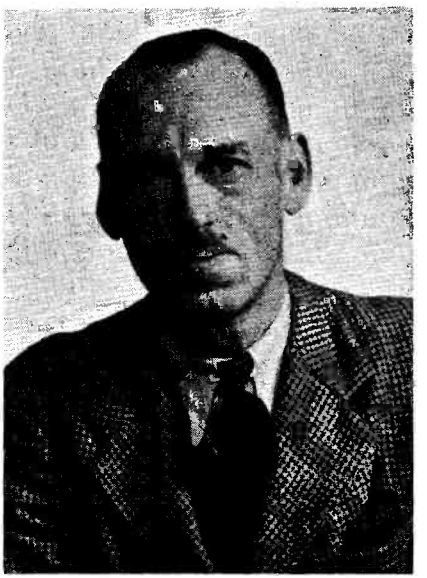
On March 21 at 1637, G5BY had a cross-band 28-50 mc QSO with ZS1P, the latter on six metres. Signals were RST-339, and this is the first reported opening of the season. As ever, all VHF bands are kept under regular observation at G5BY.

In Conclusion

And now to get that 832A tripling to 430 mc. Not too much HT on it though ! It doesn't like it ! The latest date for next month's mail and all the VHF news, including details of your best 20 contacts during the month of March, is **April 13**. But if you break the 430 mc record send us a telegram and we will stop the machines ! The address is, as usual, E. J. Williams, G2XC, *Short Wave Magazine*, 53 Victoria Street, London, S.W.1, to whom all VHF activity reports should be sent for appearance in this feature.

Portrait Gallery

G5RZ



ALAN WOOD of G5RZ is one of those many amateurs who disappeared off the bands for quite a long stretch and then became re-infected, so to speak, by the virulent disease of Amateur Radio. He was first licensed in 1923, although his interest in radio began in 1920.

G5RZ started off with a bang in his first year, running a 250-watt self-excited rig in the Transatlantic Tests of 1923/24—in the days when "rigs" were "transmitters" and valves were "bottles." He was a member of the very active Streatham Radio Society of those days.

G5RZ does not say whether he was actually successful in those tests, but we rather think that he was ; certainly, we remember very well the colossal T1 signal radiated by his 250 watts (or let's call it ¼-kW—it sounds better !) of 50-cycle HT.

Shortly after the "discovery" of the 45- and 32-metre bands (yes, we *did* have a 32-metre band once) G5RZ was operating a lengthy duplex schedule on CW with U2JN, now W2JN, using a remote-controlled transmitter.

For various reasons the bug ceased to bite round about 1930, and G5RZ disappeared from the air. We were delighted to hear him again, however, round about 1946, since when he has again been very active, mostly on 3·5 and 14 mc, but sometimes also on 7 and 1·7 mc—and always on CW.

Alan is a member of the F.O.C. and of the B.O.T.C., as well as belonging to the Luton Radio Society ; his present QTH is Leighton Buzzard, Beds, where he is Director and Works Manager of a firm of leather manufacturers.

Here and There

"HT Without Transformers"

The article in our February issue under this title has come in for a certain amount of criticism on the grounds of (*a*) Safety, and (*b*) Regulations. It is, of course, quite true that due precautions must always be taken when apparatus of any kind is connected direct to the mains. Even the usual 500-volt power pack can be lethal, and we know of a well-authenticated case of a human marauder who was killed on contact with a guard-wire energised from a 60-volt HT battery. It is perhaps fair to say that the article in question did not stress the safety factor sufficiently, nor was it made clear that there are regulations (which do not have the force of law, but are designed to absolve the supply authority from any responsibility) prohibiting direct connection of apparatus to the mains. In this sense, the ordinary "universal AC/DC receiver" of commerce, designed for BC reception, can be regarded as potentially dangerous.

Another Husband-and-Wife Station

G3FYT of Bury, Lancs, is Mrs. Dorothy Kelly. Her husband is G3FIV, and they ask for separate appearances in "New QTH's" and the *Call Book*. This family-station business is getting quite a thing—and how nice to know that it is possible, and that so many XYL's are taking an active interest in the practice of Amateur Radio.

Correction—"Breadboard Special"

In the article by G3CWX in the last issue, a possible ambiguity (in no wise the fault of the author) requires to be straightened out. On page 47, under the heading Setting Up, line 11, for "no-load" read "on-tune." Incidentally, the tuning process as outlined there is that applicable to all such aerial coupling networks, whether direct or link coupled to the RF source.

British Short Wave League

In our issue for December last, it was stated in this space that we had accepted responsibility for the continued existence of the British Short Wave League, founded as long ago as 1935. The *BSWL Review* is incorporated as an addition to our *Short Wave Listener*, the combined journal going to BSWL members only. We are glad to say that during the last few months League membership has shown a steady increase, and at the present rate the BSWL should very soon be able to take its due place among the world's Amateur Radio organisations. A Transmitter Section is a feature of the League, and the intention is to develop this as a strong and active unit within the BSWL. League members have free two-way use of our QSL Bureau (the only one of its kind in the world operated on a direct-mail system) and as progress is made, so many other membership advantages will be brought into being. Full information can be obtained on application to The Manager, British Short Wave League, 53 Victoria Street, Westminster, London, S.W.1.

Radio Handbook—12th Edition

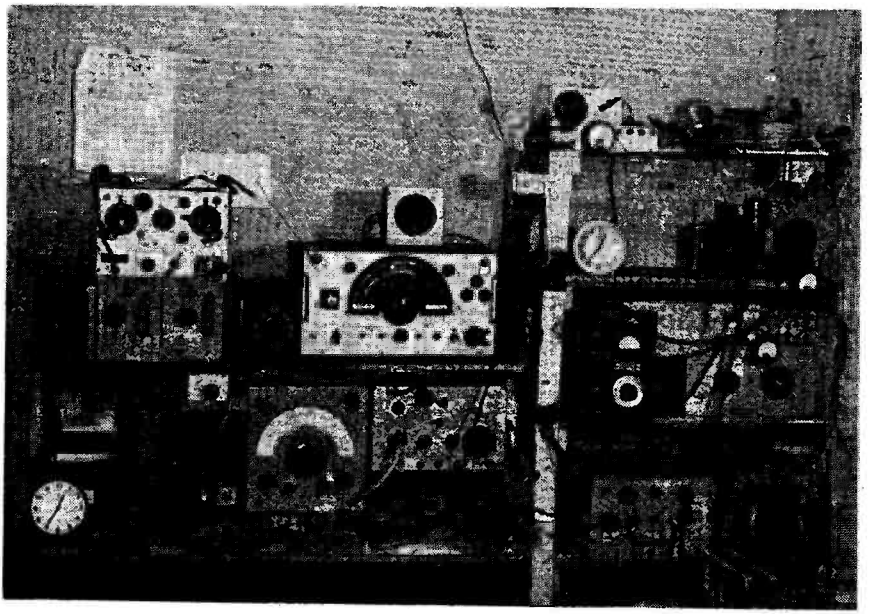
No doubt many readers have become possessors of the 11th edition of the well-known *Radio Handbook*. The 12th edition is quite different in that the material covers in the fullest possible way the constructional side as distinct from the theoretical, and detailed information is given on a wide range of equipment for the amateur station. The *Radio Handbook* is very well illustrated and no keen amateur, having glanced through its pages, could resist the urge to settle down to a steady programme of new construction on the bands in which he happens to be interested. In schools, technical colleges and other institutions in which the science and practice of radio are taught, the 12th edition of the *Radio Handbook* will be found quite indispensable.

DX SSBSC QSO

We are glad to be able to record that on March 11 G2NX had a two-way contact with W2TGO on Twenty, both stations operating in the SSBSC mode. This is not actually the first such QSO, there having already been contacts W2/DL4 and OZ/W1 using SSBSC. G2NX reports that the W's interested in single-sideband operation appear in the band 14200-14220 kc, and that W1DX is another station worked by him under SSBSC conditions.

ZL Licensing

There are now well over 1,800 amateurs licensed in New Zealand. On the ratio-of-population basis, the U.K. needs something like 50,000 amateurs to compare with the ZL figure !



The other man's station G3BTP

Pictured here is the station owned and operated by R. Young, G3BTP, at 16 Elmhurst Road, Langley, Bucks. Located in the spare room of the house, the gear is entirely home-constructed and designed to operate on all bands 1·7-28 mc, with separate receiving equipment for 430 mc.

First licensed in 1947, after some 11 years' experience as a commercial operator, G3BTP confines his main activity to CW working with power restricted to 20 watts, though there is also a 2-watt phone "chatterbox" for joining in on the local net.

As at present in use, the Tx is essentially VFO-PA, using an 807 as RF amplifier up to 14 mc, with a doubler-PA for Ten. The aerial is a Zepp-fed 135-ft. wire, operated against ground as a Marconi for Top Band working. A /P licence is also held, and the portable Tx/Rx (which can be carried about on a cycle) operates on the 1·7 and 7 mc bands.

The receiver at G3BTP is particularly interesting—it is in three parts, consisting of power and audio section incorporating rejection filters; a 1·7-2·1 mc unit with 85 kc IF and BFO; and plug-in CC converters for the bands from 3·5 to 14 mc, with a tuned converter for Ten. Frequency checking is carried out on a combined monitor-oscillator, giving 100 and 10 kc marker points, the unit itself providing for the excitation of external crystals. Key monitoring is achieved by means of a neon-tube oscillator feeding the audio section of the receiver.

Recently, most of G3BTP's energies have been dissipated on 1·7 mc, with 11 countries worked and EK1AO as best DX. On the QRP portable, OK1ASF on 7 mc represents the outstanding result to date, the input being 1½ watts. A peculiar and most unusual feature of the station record is that so far no single W has been worked on any band—this is only because it is intended that the first one shall be on 1·7 mc! And a very fine ambition, too. The operator of G3BTP is obviously an amateur who has ideas of his own, and his station reflects that individuality which is the hall-mark of the genuine experimenter.

NEW QTH's

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

G2DHG M. S. Mitchell, 2nd Floor Flat, 12 The Steyne, Worthing, Sussex.

G3AID J. H. G. Davey, 7 The Strand, St. Mary's, Scilly Islands.

G3APA E. G. Kendall, BM/TXRX, London, W.C.1.

G3AQT D. K. Pescud, 51 Court Farm Road, London, S.E.9.

G3BGC T. G. Hame, 34a Edenvale Street, Fulham, London, S.W.6.

GW3BKP G. Didcote, 8 High Street, Coedpoeth, Wrexham, N. Wales.

G3BTO D. M. Wrightson, 11 Norfolk Avenue, Balmoral Road, Morecambe, W.E., Lancs. (*Tel. : Morecambe* 2160).

G3BYT F/Lt. R. B. Berwick, D.F.C., The Barley Mow Cot, Boundary Road, Wooburn Green, Bucks.

G3CDM I. W. Gardner, 63 Milbank Road, Darlington, Co. Durham.

G3CKY J. T. B. Smith, 36 Newhall Street, Cannock, Staffs.

G3DND H. G. Ball, The Bungalow, Bushy Lane, Hollesley, Woodbridge, Suffolk.

G3EIE L. Bergna, 121 Addycombe Terrace, Heaton, Newcastle-upon-Tyne, 6.

GI3EVU Maj. H. M. Humphreys, R.A., 94 Locksley Park, Finaghy, Belfast.

GM3FGJ I. Mackenzie, 41 Easter Drylaw Drive, Edinburgh, 4.

GI3FJA W. E. D. Sleat, Carrowlaverty, Armoy, Co. Amtrim.

G3FLK B. C. Munro, 43 Prospect Park, Exeter, Devon.

G3FSM Brentwood & District Amateur Radio Society, Hon. Sec. : 45 Geoffrey Avenue, Harold Park, Romford, Essex. (*Tel. : Ingrebourne* 2910).

G3FTF D. W. Mote, 22 Furlong Road, Gloucester.

G3FVV R. C. Fagg, 14 Westover Road, Broadstairs, Kent.

GD3FWO J. Galt, 4 Waverley Terrace, Douglas, Isle of Man.

G3FXY/A M. W. Swithinbank, 39 Pembroke Street, Saint Aldate's, Oxford. (*Tel. : Oxford* 3045).

GM3FYH D. Campbell, 102 Glasgow Road, Clydebank, By Glasgow.

G3GBS M. L. Sandoz, 31 King Edward Road, Moseley, Birmingham, 13.

G3GCY T. C. Brewer, 57 Abbots Way, Beckenham, Kent.

G3GDR L. V. Dent, 23 Trowley Bottom, Abbots Langley, nr. Watford, Herts.

G3GEE L. Frankland, 107 Saville Road, Blackpool, S.S., Lancs.

G3GGD F. J. Brooks, 9 Snakes Hill Cottages, Navestockside, Brentwood, Essex.

G3GGL A. W. G. Wormald, Little Gayles End, Otley Road, Bramhope, nr. Leeds, Yorkshire.

G3GGR J. Sykes, 12 Lily Street, West Bromwich, Staffs.

G3GGS W. E. Waring, 43 Towngate, Leyland, nr. Preston, Lancs.

GI3GGY J. A. Porter, 22 Dungiven Road, Waterside, Derry.

G3GHC T. J. Brooke, 10 Turton Street, Kidderminster, Worcs.

G3GIH J. C. Bird, Hall Farm, Troston, Bury St. Edmunds, Suffolk.

GM3GIJ F. D. Bell, 30 Tulloch Street, Cathcart, Glasgow, S.4.

G3GIO D. O. O'Connor, Royal Arms Hotel, 10 North Street, Guildford, Surrey. (*Tel. : Guildford* 61232).

G3GIR W. J. De'Ath, 156 Middleton Road, Gorleston, Norfolk.

GM3GIV F. C. Robertson, Mount Carron, Falkirk, Stirlingshire.

G3GIY H. Gregory, 10 Royal Exchange, West Hyde, Rickmansworth, Herts.

G3GJF G. F. Lyon, 125 Rokeby Road, Parson Cross, Sheffield, 5.

G3GJG J. B. Trueman, 141 Ince Avenue, Liverpool, 4, Lancs.

GM3GJJ P. B. Watson, c/o Mrs. Forbes, 15 Marjory Drive, Paisley, Renfrewshire.

G3GJM F. W. Clarke, 51 St. Leonards Rise, Orpington, Kent. (*Tel. : Farnborough Kent* 4149).

G3GJR H. J. Randall, 36 Hemlingford Road, Walmley, Sutton Coldfield, Warks. (*Tel. : Ashfield* 1429).

G3GJT Eastbourne and District Radio Society, c/o 56 Whitley Road, Eastbourne, Sussex.

CHANGE OF ADDRESS

EI3W J. B. S. Lawlor, c/o E. S. B., Cathaleen Falls, Ballyshannon, Co. Donegal.

EI8T M. P. MacCarthy, 27 Calary Road, Mt. Merrion, Dublin.

G2BMC J. E. Church, 8 Common Road, Upper Edge, Elland, Yorkshire.

G2FKO T. G. Ward, A.M.I.E.E., 1 Westcroft Terrace, Bideford, Devon.

G2FMP T. Elkes, 36 St. Luke's Road, Horninglow, Burton-on-Trent, Staffs.

G2FTS R. F. Nugent, Field House, Windmill Hill, nr. Hailsham, Sussex.

G3AII H. W. Brunton, 57 Tudor Avenue, North Shields, Northumberland.

G3AYK T. Murgatroyd, 71 Paddock Lane, Halifax, Yorkshire.

G3AZM C. E. Stebbings, 2 Vernon Drive, Monkseaton, Northumberland.

GM3BN A. E. Sutton, 46 St. Andrews Crescent, Arbroath, Angus.

G3BNG R. S. Andrews, 24 Hillingdon Hill, Uxbridge, Middlesex.

G3BUX M. Faraday, Royal Oak Hotel, Leominster, Herefordshire.

G3CHW D. V. Newport, 145 Ilchester Crescent, Bedminster Down, Bristol, 3.

G3CII R. Haigh, c/o The Vicarage, Armitage Bridge, Huddersfield, Yorkshire.

G3DGR B. Goodger, 27 Woodside, Oswestry, Salop.

G3ESY P. W. F. Jones, 54a Hunderton Road, Hereford.

GM3EXJ C. M. Burgess, 12 Meiklefield Road, Dingwall, Ross-shire.

G3YC E. J. Charles, Sycamore House, Woonton, Almeley, Herefordshire.

GM4GK J. C. Imrie, Red Roofs, Markinch, Fife.

G6NB D. N. Biltcliffe, Billingsfield, nr. Aylesbury, Bucks.

G8CL G. A. Patrick, 29 Park Road South, Chester-le-Street, Co. Durham.

CORRECTION

G3BSU A. F. Cleall, 23 Chapter Road, Strood, Kent.

G3ENT North Kent Radio Society, c/o 8 Windsor Road, Bexleyheath, Kent.

G8IX G. H. Tagg, 17 Nelson Road, Hanley, Stoke-on-Trent, Staffs.

The Month with the Clubs

FROM REPORTS RECEIVED

This month the Clubs have broken all records, with a total of no less than 54 reports received—a compelling tribute to interest and activity. Probably this number will be up to 60 or more by three or four days after the deadline, and we are therefore constrained to say once again, in the strongest possible terms, that the closing date given each month really *is* the deadline ; reports received late cannot appear, because this feature involves special setting.

We are often asked by Club Secretaries why we "ignore" their reports ; the answer is invariably that we have not received them on time. In many cases we have to bear the responsibility for an omission which is really the fault of whoever it is whose job it is to forward the regular reports !

NOTES FOR SECRETARIES

First : If your report cannot reach us on time, *don't* send it a few days late. It will be stale by the following month, so save the information and make sure of catching the *next* date.

Secondly : Please do not send reports in which the only details given are of past meetings. Very few people wish to read, in early April, that so-and-so lectured in February. Always give, where possible, the dates of the meetings ahead of the next publication date.

Thirdly : Please keep reports as concise and as compact as possible. Long ones always have to be condensed ; if you yourselves do the condensation you are making sure that we print what you want us to publish.

And so to this month's reports ; with a special welcome to the Amateur Radio Club formed at the Guilford Secondary Girls School, Nottingham—probably the first all-YL organisation of its kind in the country and perhaps in the world. They have 24 keen members and their own G3FYN and G2ATM/A active on 7 and 14 mc and CW phone. All other Clubs will want to wish them success and good fortune in their venture.

(May dead-line : April 12.)

Babcock & Wilcox Staff Association Radio Society.—This Club was formed in June, 1949, and members have visited the L.C.C. Fire Brigade H.Q. to see the very fine VHF gear used in the Fire Service, and the British National Films Studios at Elstree, to view the sound equipment. Lectures on a variety of subjects have been given by G2CRD, G3BSU, G4OO and G8IP. A Club station with the call G3GKM is being built at present. Members of Babcock & Wilcox staff and of associated companies at home and overseas are invited to get into touch with the Hon. Sec.—see panel.

Cambridge & District Amateur Radio Club.—Recently formed for the benefit of persons interested in any branch of Amateur Radio, they meet monthly at The Jolly Waterman, Chesterton Road, Cambridge. Next sessions are on April 28 and May 26, both at 7.30 p.m. Local amateurs and prospective members are asked to contact the Hon. Sec.—see panel for QTH.

Coventry Amateur Radio Society.—Recent activities have included a discussion on 144 mc Converters and Receivers, a visit to the local police VHF station, a demonstration of VFO's by G3FAB, and a talk on Diecasting. The Annual Dinner is shortly to be held at the Hare and Squirrel, and tickets are available from G3FOH. Morse classes continue to command a good attendance, and a Morse test was held on March 9 to decide the winner of the G2LU Cup.

Gillingham Telecommunications Society.—They now have a licence and operate G3GTS from headquarters at the Medway Technical College, Gillingham. The first A.G.M. was held on March 21, and regular meetings take place on the third Tuesday of the month at 7.30 ; the transmitter will then be in operation on 1·7 mc, and contacts with other Clubs will be welcomed.

Midland Amateur Radio Society.—At a recent meeting a member, Mr. W. H. Rigg, gave an interesting lecture on Oscilloscopes. Meetings are held regularly on the third Tuesday of the month at the Imperial Hotel, Birmingham.

Oxford & District Amateur Radio Society.—This Society's Hamfest took place at the end of February ; the regular fortnightly meetings are well attended and new members are steadily joining up.

Poole & District Amateur Radio Club.—A new Club in full swing with headquarters at the Rechabite Meeting Room, Cranbrook Road, Upper Parkstone. Members are building a two-metre converter, transmitter and power pack ; a two-metre beam is being erected, and a member who has recently moved to Two Metres has donated a 25-watt, five-band transmitter. A Club net operates on 1810 kc most evenings, and G5GG conducts a slow Morse party.

Rotherham & District Radio Club.—The first meeting of this newcomer was held in January, and it was decided to meet weekly—every Wednesday at the Oddfellows Hall, Westgate, Rotherham, at 7 p.m. Membership is already about 40, with G2LG as President and G3GCV as Chairman. The Hon. Sec. (see panel) will be pleased to give further information to anyone interested.

Southend & District Radio Society.—A Club Contest was held on March 4 and 5, and other events during the month were a talk on Valves and an account of Amateur Experiences in the Middle East. The Annual Social is scheduled for April 21 (Middleton Hotel) and the usual full programme continues. The Club Tx is not often on the air, but there is a local net on the Top Band, altemate Fridays at 9.30 p.m. Next meeting, April 14, 7.15 p.m.

Spen Valley Radio & Television Society.—The A.G.M. was held in February; G8OK is now the Chairman and G6PL Vice-Chairman. A 50 per cent. increase in membership was reported, also the fact that the past year had seen 15 lectures and several interesting visits. A trip to Cranwell is planned for April, and an outing to the Yorkshire coast in July—specially for the "Widows, XYL's, YL's and Harmonics."

Stourbridge & District Amateur Radio Society.—This Society now boasts 28 licensed members—exactly 50 per cent. of the total membership. They are entering a stand in a local exhibition from April 24 to 29 and will be running a station —G3BMY/A—on 1·7, 6, 14 and possibly 144 mc. Contacts will be appreciated.

Torbay Amateur Radio Society.—At a recent meeting G2BMZ was congratulated on holding the two-metre Tropospheric Record of 384 miles. Another event scheduled for a recent meeting was G5SY's lecture on Aerial Patterns, demonstrated with the aid of the 10-cm. Klystron.

Watford & District Radio and Television Society.—The spring session was opened on February 21 with the A.G.M. and a lecture on Oscilloscopes and their Practical Application. April meetings will be on the 4th and 18th, and a series of talks on Radio Fundamentals will be inaugurated by G2HAR. On April 18 there will be an exhibition of home-built apparatus and a prize will be awarded. This Club maintains the BC receiving gear at the Watford Peace Memorial Hospital, and inspection visits are paid twice monthly. Gifts of high-resistance phones for this cause will be welcomed, since the work is a self-imposed voluntary task.

Worthing & District Amateur Radio Club.—The "Sussex Top Banders" are holding their annual social gathering in the form of a Bucket-and-Spade Party on the foreshore at Worthing, August 27. Any other Club wishing to join in this unusual type of Hamfest will be welcomed, hence this early notice, as the Hon. Sec. (see panel) wishes to be notified as early as possible. Needless to say, XYL's, YL's and Junior Ops. will be catered for.

York Amateur Radio Society.—A change of title to the above was voted at the A.G.M., at which G3FCB was elected Chairman and G3FTS Secretary. The financial position was reported as sound, and the Committee's efforts have now secured a Clubroom at Community House, Falsgrave Crescent, Burton Stone Lane. Meetings will be held there every Wednesday at 7.30, and the Club Tx, G3DQR, will be installed.

East Surrey Radio Club.—At the March meeting Mr. W. H. Pierce demonstrated a grounded-grid oscillator on 70 cm. For April 6, the next meeting, there is to be a talk on Aerial Design, with practical demonstration. A listening contest will have taken place by then (April 1-2) and the winner will be presented with a silver cup donated by G5LJ of Sutton Coldfield.

Edinburgh Amateur Radio Club.—Meetings continue at Unity House, 4 Hillside Crescent, Edinburgh, every Wednesday at 7.30 p.m., and it is hoped to have the Club Tx on the air shortly. A return visit to the R.N.V.(W.)R. Headquarters is scheduled, and also a lecture on Oscilloscopes. Ten members are sitting for the R.A.E. in May, and for these, and others like them, R.A.E. classes and Morse sessions are run weekly.

Neath, Port Talbot & District Amateur Radio Club.—New members are still appearing, and GW3FSP continues his series of talks to R.A.E. candidates. At the last meeting GW3CMR gave a lecture-demonstration on Modulation Systems, and at the next GW3ZV, from Rhigos, will talk on Standing Waves and their Measurement. Meetings are fortnightly, at the Royal Dock Hotel, Briton Ferry.

Sanderstead & Purley Amateur Radio Society.—This newcomer, meeting at the Cranleigh Restaurant, Limpsfield Road, Sanderstead, already has a membership of 27, of whom 14 are licensed. A news sheet is circulated to members and carefully timed to serve as a reminder of the next meeting (other Hon. Secs. please note !). In this case the meetings are at 8 p.m. on the fourth Friday.

Reading Radio Society.—At a recent meeting the Ekco Cloud and Collision Warning Radar Set was described and discussed, the gear itself being on view without the aerial system. Considerable interest was shown in the construction of the very high gain 45 mc IF strip. A Junk Sale was also held recently.

West Somerset Radio Society.—Membership has increased by 20 as a result of two meetings held in Taunton. A full programme of meetings and visits has now been arranged for the benefit of the Taunton area, in addition to the usual meetings in Minehead and elsewhere.

South Manchester Radio Club.—During February members heard a very interesting talk

G3GBH, Assistant Secretary, knocking out the Morse practice at a meeting of the Scarborough Amateur Radio Society. G3KS and G3DHL are standing left and second from left respectively.

on TVI by G3YB, of the Post Office Radio Branch, and a Club team is being formed so that suffering members will not have to tackle their troubles single-handed. Another recent meeting was devoted to a general "rag-chew," and on March 3 the Chairman, G6DN, gave a talk on his band-switched exciter unit, fully TVI-proofed. Morse and R.A.E. classes continue, and the youngest member (aged 10) is one of the keenest CW enthusiasts.

Wanstead & Woodford Radio Society.—The first and third Tuesday in each month will, in future, be "practical evenings" for this Club. This arrangement will not be varied, and members will thus be in no doubt whether they are in for a lecture or some practical work. Coming talk subjects include Coil Winding and Fault Finding.

Warrington & District Radio Society.—Last month Mr. A. P. Dell began a series of lectures on Mathematics, and G3BAK gave a lecture on Aerials. On April 3 and 17 Mr. B. A. Webster will talk on Workshop Practice and Mr. Dell will continue. Meetings are on the first and third Monday, 7.30 p.m., at the Sea Cadet Headquarters.

Bournemouth Radio & Television Society.—Sixty members heard a lecture on Interference by Mr. P. W. Crouch, of the G.P.O., at the February meeting. Representatives of the local radio trade were also present. The Club Tx will be on the air on March 20, working CW on all bands. G3FVU should be heard every Monday and Thursday, and reports will be welcomed.

Bradford Amateur Radio Society.—The value of publicity in these columns has been shown, according to the Hon. Sec., by the numerous visitors, some of them from overseas. The February lectures were by G3FX (Aerials) and Mr. A. R. Sugden (Microgroove Recording). April dates are the 11th (Auction Sale) and 25th (Lecture).

Edgware & District Radio Society.—The A.G.M. was held recently, and members visited a London theatre before congregating for the Annual Dinner. Twelve prizes were awarded for the events of the year, and it was announced that a five-guinea prize will be awarded this year for the most ingenious idea put up by a member. A "CQ Clubs" call from G3ASR during a recent Wednesday meeting produced no reply—what other Clubs are active on Wednesdays? A Top Band D-F Contest has been fixed for April 16.

Grimsby Amateur Radio Society.—Attendances at recent meetings have been poor, and members are asked to wake up! At a recent meeting a lecture and demonstration was given on Disc Recording, and a short discussion on "Phone versus CW" was recorded for posterity.

Radio Society of Harrow.—This Club will welcome schedules or contacts with other Clubs, either on Top Band or, through G2DD, on 144 or 420 mc. They recently made their first 2-metre contact, across London to G3FP. Next transmitter nights are April 13 and 27. Refreshments are now available at the new premises, and visitors

will be welcomed at the Club-room every Thursday evening.

Kingston & District Amateur Radio Society.—Recent meetings have heard lectures on The Modern Trend in Transformer Design and on Aerials (Part I). On another occasion, the Brains Trust quizzed the members, for a change. A Field Day is being arranged for May, and private meetings are being held to rub up Morse and gen. for the next examination. April meetings are on the 12th and 26th, Penrhyn House, 7.30 p.m.

Leeds & District Amateur Radio Society.—Great activity has been evident in the transmitting room (with scrubbing brushes and whitewash among the weapons used) and it is hoped that the aerial mast will be erect by now. Visits have been paid to the G.P.O. and B.B.C., and one to Moorside Edge is pending for May.

Lincoln Short Wave Club.—This Club finds that its members prefer informal rag-chewing to set lectures, and is arranging future meetings with the main business sandwiched in between two informal periods. They are holding an equipment session on March 22, including lecturettes on VFO's, PA's, Receivers and the like. On April 5 there will be a talk on Rugby and Humber Radio and on the 26th a G.P.O. talk on TVI.

Manchester & District Radio Society.—Reformed in 1946, this Club meets monthly at The Reynolds Hall, College of Technology, Sackville Street. The future programme is: April 3: G3AH and G6OM on VFO's, with demonstration. May 1: G2AMV, of Wirral, on his Home-built Control Unit. June 5: G6KS on How to Work DX. A competition is being run for amateur home-built apparatus, and prizes will be awarded at the October meeting.

Rhigos & District Radio Club.—The second Annual Dinner will be held on April 30, details of which may be obtained from the Hon. Sec. A recent lecture covered The Development of Long-Distance Telephony Communication. Many local members are very active on the bands, and the Club Station, GW3FFE, is out for QSO's with other Clubs

Salisbury & District Short Wave Club.—This Club has been QRT on the LF bands for some time, and is now experimenting on 144 mc. Meetings are held at Figbury Barracks, Winterbourne Gunner, on Tuesdays at 8 p.m. Slow Morse transmissions are put out on Sundays at 9 p.m. Members of the Forces will be specially welcome at Club meetings, which take place in an Army Camp.

Sheffield Amateur Radio Club.—Recently reorganised, they are very anxious to make new contacts and increase membership. Meetings are on the fourth Wednesday at the Dog and Partridge Inn, Trippett Lane, Sheffield, 8 p.m. Technical lectures are also given on the second Wednesday at Albreda Works, Lydgate Lane—also 8 p.m. Forthcoming events: April 12, lecture on Test Equipment; May 10, QRP Operation and possibly demonstration of Portable Equipment.

Tees-side Amateur Radio Society.—This Club is now in full swing, with a clubroom in All Saint's Hall, Grange Road, Middlesbrough. Junior members (under 15) are admitted free of charge. Slow Morse classes are running and are well attended. A two-metre receiver is being built in the workshop, and it is hoped to have a 3·5 mc phone transmitter on the air for next year's Model Engineers' Exhibition; the Club had a stand at this year's event.

Thames Valley Amateur Radio Transmitters' Society.—At the February meeting G8IP lectured on Microphones and Modulation; in March G8LX gave a talk on the cable system of Cable and Wireless Ltd. Next meeting will be on April 5.

Wirral Amateur Radio Society.—Recent talks were by G3XFT (Conversion of SCR-522) and by G2OA (Automatic Control and Switching). The April meetings will be on the 12th and 26th, 7.30 p.m. at Y.M.C.A., Whetstone Lane, Birkenhead.

Worcester & District Amateur Radio Club.—Regular weekly meetings are being continued throughout the year; the A.G.M. has been held and the new Chairman is G3BGR. A slight deficit in the balance is being made up with regular "swindles," in the traditional manner! The Club now holds the call G3GJL and hopes to be on the Top Band in the near future.

Yeovil Amateur Radio Club.—A permanent Clubroom has at last been obtained at Grove House, Preston Road, where meetings are held, as before, every Wednesday at 7.30 p.m. All equipment has been moved and a 138-ft. aerial erected. G3CMH is already in operation and has made several contacts on 7 and 14 mc CW and Phone. The station has been rebuilt and is now completely relay-operated. Popular features are weekly Morse classes and demonstrations of members' own receivers.

Eccles & District Radio Society.—As a result of the notice published in these columns (February issue) 20 enthusiasts turned up to the first meeting and decided to form a Society under the above title. The second meeting was even better, and excellent accommodation has now been secured at Mill Brow Café, Worsley Courthouse, where meetings will be held on the first and third Mondays at 7.30 p.m. For Secretary's QTH, see panel.

Chester & District Amateur Radio Society.—This Club's Tx, G3GIZ, went on the air for the first time in March, under the leadership of the new Chairman, G2YS. Local press heard of this event and are taking more than a passing interest in activities. The Club had a visit from G3ERB, of Wirral, who gave an account of his recent trip to the U.S.A. Annual Dinner is on March 31.

Grafton Radio Society.—Recent lectures have covered

Rugby radio amateurs held their annual dinner at the Grand Hotel last February. Seated left to right are G3AUF, G3BDC, SWL, G5BJ, and G3BLB. The cup for the most outstanding work of the year in the Rugby Group is being held by G3GG.

the subject of Oscillators and included a coloured film show. The new 150-watt Tx is making good progress, and Club equipment includes a BC-221. Just after making last month's fcomment on "Club QSO's" G3AFT had the misfortune to break a mast, and so have not been on the air as much as usual. They will however, be looking for Club QSO's on the Top Band every night of the week, roughly between 2130 and 2315; if no Club QSO's result, they are prepared to come on at week-ends as well!

Guilford Girls' School Amateur Radio Club (Nottingham).—This is a new, and possibly unique, organisation, limited to 24 members, all girls at the school. The main idea is to get the membership really interested in Amateur Radio, with the object of increasing the number of G-YL operators. To this end G3FYN is operated on CW and G2ATM/A on phone, in the 7 and 14 mc bands. Activity periods are 1300-1345, Mondays and Wednesdays, on Forty, and 1630 1800 Thursdays on Twenty. Contacts are always welcome with any station at any distance—as the Club report puts it, "It takes a lot of QSO's to get 24 YL's confident"!

Lewes Amateur Radio Club.—This Club reports good progress since their original write-up in these columns. Membership has increased and they now possess a receiver; so interest centres mainly on transmitter design so that Lewes can be on the air in time for their first anniversary in November.

Edinburgh (Lothians) Radio Society.—Fortnightly meetings continue at 25 Charlotte Square, Edinburgh—Thursday at 7.30 p.m.. April dates being the 13th and 27th. An interesting series of talks has been planned and prospective members are cordially invited to attend these next two meetings. Further details from the Hon. Sec.

R.A.E. & Farnborough District Amateur Radio Society.—Fortnightly meetings are held in the Assembly Hall, R.A.E., and an interesting and varied programme has been arranged for the coming year. A new Chairman, Secretary and Committee were elected at the A.G.M. On April 24 members will hear a lecture by Mr. R. W. Lowden on Modern Techniques in Quality Reproduction. All interested will be made welcome.

Southport Radio Society.—At the recent A.G.M. Mr. H. Lawrence, G3FGG, was elected Chairman. In February G3GSS lectured on Television, and in March Mr. Bell, of Merseyside, talked on Aerial Couplers. Meetings are on the third Monday, 8 p.m., at 38a Forest Road, Southport, but the Clubroom is open every Monday and Wednesday evening and prospective members are welcome.

West Kent Radio Society.—Meetings are held at Culverden House, Culverden Park Road, Tunbridge Wells, fortnightly. An excellent programme of lectures has been arranged for the coming season, and the West Kent net operates every Sunday morning, 11 a.m. on 1895 kc; the Club will be glad to welcome any licensed amateur "into the net."

Brighton & District Radio Club.—Good attendances are reported at the weekly meetings; new members have appeared, but still more are wanted. At recent meetings members heard G2UN on his 160- and 80-metre Transmitter; and talks on a Hi-Fi Amplifier and Radar Equipment. In April G2AON will lecture on Two-metre Equipment, and G2CMH on his pet subject (not yet revealed). The Hon. Sec. will proceed with Part II of his History of Wireless.

Nottingham Short Wave Club.—Meetings are held every Monday, 7.45 p.m. in the Old Boys' Club, Middle Street, Beeston. The Annual Transmitting and Receiving Contest will be held during the month of April, and in place of the usual SLP's a monitor survey has been taking place on all the amateur bands. The Club Tx transmits slow Morse on Thursdays at 8 p.m. on 1900 kc, and one of the commercial Morse recordings was recently used as a trial—it proved very successful and gave the usual duty operators a rest !

Newbury & District Amateur Radio Society.—Membership is increasing, and recent meetings have included a lecture-discussion on TVI and a talk for the benefit of the newcomer. A Morse class will be in action shortly. Meetings are on the last Thursday, 7.30 p.m. in the lounge of the Railway Hotel, Greenham Road, Newbury.

Romford & District Amateur Radio Society.—This Club recently staged a public demonstration of Amateur Radio before an audience of about 450; the Tx and Rx had to be carried on the stage and fitted up within two minutes, but this was done and a Top Band contact made ! In April there is to be a lecture-demonstration on 3-cm. aerials. Plans are going ahead for NFD and also for a D-F Contest.

NAMES AND ADDRESSES OF CLUB SECRETARIES :

BABCOCK & WILCOX (LONDON) : L. E. J. Manders, G2CRD, Babcock & Wilcox Staff Association Radio Society, Babcock House, Farringdon Street, London, E.C.4.
BOURNEMOUTH : F. G. Hamshere, 99 Elmes Road, Winton, Bournemouth.
BRADFORD : V. W. Sowen, G2BYC, Rushwood, Grange Park Drive, Cottingley, Bingley, Yorks.
BRIGHTON : L. Hobden, 17 Hartington Road, Brighton.
CAMBRIDGE : T. A. T. Davies, G2ALL, Meadow Side, Comberton, Cambridge.
CHESTER : H. Morris, G3ATZ, 24 Kingsley Road, Boughton Heath, Chester.
COVENTRY : K. Lines, G3FOH, 142 Shorncliffe Road, Coventry.
EAST SURREY : L. Knight, G5LK, Radiohme, Madeira Walk, Reigate.
ECCLES : P. A. Evans, 160 Greenleach Lane, Worsley, nr. Manchester.
EDGWARE : R. H. Newland, G3VW, 3 Albany Court, Montrose Avenue, Edgware, Middlesex.
EDINBURGH : D. A. E. Samson, GM3EQY, 56 Elm Row, Edinburgh, 7.
EDINBURGH (LOTHIANS) : I Mackenzie, GM3FGJ, 41 Easter Drylaw Drive, Edinburgh, 4.
FARNBOROUGH (R.A.E.) : J. St. C. T. Ruddock, G8TS, Radio Department, R.A.E., Farnborough, Hants.
GILLINGHAM : R. A. Lucas, G2BJW, 38 Junction Road, Gillingham, Kent.
GRAFTON (N. LONDON) : W. H. C. Jennings, G2AHB, Grafton LCC School, Eburne Road, London, N.7.
GRIMSBY : J. W. Booth, G2AJB, 33 Buller Street, Grimsby, Lincs.
HARROW : S. C. J. Phillips, 131 Belmont Road, Harrow Weald, Middlesex.
KINGSTON : R. Babbs, 28 Grove Lane, Kingston, Surrey.
LEEDS : L. H. King, G3CML, 14 Clarence Street, Bramley, Leeds.
LEWES : M. B. Beck, 5 Grange Road, Lewes.
LINCOLN : G. C. Newby, G3EBH, The Vicarage, Nettleham, Lincoln.
MANCHESTER : H. Marshall, G4ND, 14 Greenway Close, Sale, Cheshire.
MIDLAND : A. W. Rhodes, 135 Woolmore Road, Birmingham, 23.
NEATH AND PORT TALBOT : W. R. Petheram, GW3CIJ, 7 Tynyrheol Avenue, Tonna, nr. Neath, Glam.
NEWBURY : A. W. Grimsdale, G3CJU, 164 London Road, Newbury, Berks.
NOTTINGHAM : S. Read, G2ATM, Guilford Secondary Girls' School, Nottingham.
NOTTINGHAM : D. Hall, 19 Charnwood Avenue, Chilwell, Nottingham.
OXFORD : J. Hickling, 47 Banbury Road, Oxford.
POOLE : J. Loader, 5 Highwood Road, Parkstone, Dorset.
READING : F. Hill, G2FZI, 997 Oxford Road, Reading.
RHIGOS : F. Hamer, GW8BW, 7 Neath Road Bungalows, Aberdare, Glam.
ROMFORD : D. L. K. Coppendale, G3BNI, 9 Morden Road, Chadwell Heath, Essex.
ROTHERHAM : R. A. Watson, 147 Fitzwilliam Road, Rotherham.
SALISBURY : V. G. Page, 32 Feversham Road, Salisbury.
SANDERSTEAD AND PURLEY : Miss M. A. Clanfield, 212 Limpsfield Road, Sanderstead, Surrey.
SHEFFIELD : E. Walker, G2LT, 11a Welwyn Close, Intake, Sheffield, 12.
SOUTH MANCHESTER : M. I. Wilkes, G3FSW, 57 Longley Lane, Northenden, Manchester.
SOUTHEND : J. H. Barrance, M.B.E., G3BUJ, 49 Swanage Road, Southend-on-Sea.
SOUTHPORT : F. H. P. Cawson, G2ART, 113 Waterloo Road, Southport.
SPEN VALLEY : N. Pride 100 Raikes Lane, Birstall, nr. Leeds.
STOURBRIDGE : W. A. Higgins, G8GF, 28 Kingsley Road, Kingswinford, Brierley Hill, Staffs.
TEES-SIDE : J. H. Davies, 85 Cobden Street, Thornaby-on-Tees.
THAMES VALLEY : Maj. A. Eden, G3HAE, 31 Chatsworth Crescent, Hounslow.
TORBAY : K. Grimes, G3AVF, 3 Clarendon Park, Tor Vale, Torquay.
WANSTEAD : R. J. C. Broadbent, G3AAJ, Wanstead House, The Green, London, E.11.
WARRINGTON : J. Speakman, Davyhulme Cottage, Dark Lane, Whitley, Warrington.
WATFORD : R. W. Bailey, G2QB, 32 Cassiobury Drive, Watford.
WEST KENT : G. B. Brewer, G4LJ, 80 London Road, Southborough, Kent.
WEST SOMERSET : T. C. Bryant, G3SB, 16 The Parks, Minehead, Somerset.
WIRRAL : R. A. Browning, 24 Norbury Avenue, Bebington, Cheshire.
WORCESTER : J. Morris-Casey, G8JC, c/o Brookhill Farm, Ladywood, Droitwich.
WORTHING : R. Forge, G3FRG, 2 The Plantation, Worthing.
YEOVIL : D. L. McLean, 9 Cedar Grove, Yeovil.
YORK : A. Horner, G3FTS, 54 Plantation Drive, York.

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QST: Wanted to buy or borrow, *QST* for November 1949. DL2PZ, HQ Hamburg District Signal Squadron, B.A.O.R.3.

SALE.—Franklin 1·75/3·5 mcs VFO with p/p, 5 valves, 2 switched xtals. FB performance, £4, or nearest offer.—G8TS, 80 Byworth Estate, Farnham, Surrey.

RECEIVER R.208, 10-60 mcs in three bands. Built-in p/p and speaker. Input 230v AC or 6v DC. Excellent condition, £10, carriage extra. Parmeko Ex-Admiralty P.A. amplifier, 6K7, ECC31, PP EL35's, 12v input. Easily convert for AC, £7.—Box No. 712.

EDDYSTONE 504, good condition, one owner, £27/10/-.—Box No. 716.

WANTED, HRO coils, 30-14 mcs and 14-7 mcs G.C. or B.S.—G3ELG, 37 Slough Hall Road, Thorpe Hesley, Rotherham.

FOR Sale, RME 69 receiver with DB20 pre-selector. What offers?—K.C. North, 31 Stumperlowe Crescent Road, Sheffield, 10.

GENERAL Electric portable wire recorder and reproducer fitted latest type record/erase head. Complete with mike, wire, manual, £45, or exchange for Hallicrafters SX28A. Wanted SX42.—Box No. 715.

19 SET 35/-. New UM2, 35/-. Various components. Swap anything. Wanted D104 case. SAE please.—G2FCI, Little Pleasance, Ash Burton, Devon.

WANTED.—Communications receiver and transformers 350-0-350 and 800-0-800.—Box 714.

FOR SALE.—Hallicrafters HT6, 30-watt Phone/CW transmitter, complete, coils, xtals, all bands. Any 3 bands switched; £35. C43 transmitter, 450 watt, Phone/CW complete, less power unit, £30.—Box No. 713.

XTALS. Holdered (16), 5050 to 6810 kcs, 4/- each. Type 54A transmitter 2·4-6·7 mcs, 807 Eco 807 PA. High stability, oscillator thermostat controlled, Ganged inductance tuning, Handbook, £4. BC348Q, AC Power pack, £12/10/-. Transformer 230 to 115v 1 kVA, £1/10/-.—Box No. 719.

SMALL ADVERTISEMENTS

READERS'—*continued.*

SALE, HRO receiver, new condition, nine general coverage coils, mains power pack, spare valves, £29. BC312, xtal filter, speaker, mains power pack, excellent condition, £16. Tank condenser, 250 mmfd variable, 6,000v, 15/-. Two 33-ft. sectional steel masts, complete with guys, etc., in canvas carrying cases, £6 the pair. Sound Sales transformer 230v primary, 750-0-750v 200mA secondary, £2. PX25's, 17/6. 5CP1, 25/-. 807's, 4/-. Pair of RK48A's, £2.—Box No. 718.

HRO Senior, S meter, xtal, 4 coils—28 mc bandspread, noise limiter, £12/10/-. HRO 14/28 bandspread coil, £2. SCR522 Tx, spare valves, manual, £3/10/-. New RCA 813's boxed, £1. BC221 case, BC348 manual, 206 service sheets offers.—Box No. 717.

AR88LF new condition, spare valves, £30. —Box No. 720.

EDDYSTONE 640, still under guarantee, absolutely as new, £21. Radiocraft ganged 3-stage converter, full-vision dial, self-contained power-pack, with 10-metre coils, £8/10/-.—Randall. 9 Glendale Close, S.E.9.

3A5's wanted, also 957's and 958's. Good Rx wanted too. Your price paid.—Box No. 724.

SALE.—Tx TU6B, case (as *Short Wave Magazine* specification), £4/15/-. One or two 500 kc xtals. 83 Mercury Rectifier cheap. G5UJ, 80 East Bawtry Road, Rotherham.

HRO Senior, Bandspread coils 1·7 to 30 mcs, P/P, modified oscillator and limiter as HRO-7. Offers near £30. S27, re-valved, 27-143 mcs, £15. Portable Tx 1·7-14 mcs, with rotary, £3. Oscilloscope, 2AP1 tube, 50/-. Broadband exciter, with four 6L6, 807, £4. ZB3 with valves, 25/-. Valves HK54 (2), £2; 35T (2), 15/-; 8012 (4), 15/- each. Many receiving types, and components by Labgear, Cyldon, etc., surplus to requirements. SAE for details. —G5RP, Old Gaol House, Abindgon, Berks.

HAM must sell up—2 P/P's 1,250v 100 mA (Woden parts)—550v, 400 mA + 300v 100 mA, modulator 100-watt Zerobias 807's, VM3, Y61 and 913 CRT 1 in. modulation indicator. Tx kit TZ40's, 6-ft. rack, £1, B2 Tx/Rx (new) 3 xtals, wavemeter class D, Mk II. steel mast, 50 ft. Other items. Come and quote your price. *Phone: Eccles* 3946 or call, 92/94 Liverpool Road, Patricroft, nr. Manchester.

WANTED, AR88, or any other good communication receiver. State condition and price.—Box No. 722.

BC375E TU's 5, 6, 8, four spare new 211's, £14; 34F pack, £14. BC221M, spare valves, canvas cover, £11. Exchange any/all, good Rx.—Box No. 727.

WANTED, compact mains Phone transmitter covering 1·7-3·5 mcs. D104 microphone, S. meter for Eddystone 640.—Box No. 721.

FOR SALE.—New 1155 modified with 6V6 output. Separate power pack with speaker. Working, needs realigning, £7/10/-. *Phone* Rayner, *Abbey* 1577, between 10-5.

WANTED S.27 Hallicrafter receiver, also wanted, AR88 speaker, also wanted good 2-metre converter.—7a Victoria House, South Lambeth Road, S.W.8.

FOR SALE.—Ex-Admiralty wavemeter and oscillator type G56, made by Marconi. Frequency coverage 15 kcs to 24 mcs continuous. Stated accuracy 0·2 per cent. Complete with valves and calibration book. Requires power pack. Offers around £9, or would exchange for R.1155. etc.—Hadwick, 96 Dalewood Road, Sheffield, 8, Yorks.

VARIAC 0-230v 8 amps, new 3E29/829B, 1616. BC1306 radio-telephone. Write for full details. Offers, 103 Langstone Road, Birmingham, 14.

SMALL ADVERTISEMENTS

READERS'—*continued.*

TELEFUNKEN all-metal portable communications receiver, 1·5 to 25 mcs. Continuous bandspread, FO, internal switched speaker, sockets for 'phones, 110 to 230 AC, internal 24v vibrator. Good condition and re-aligned. First offer over £12. BC348R built-in power pack valves checked and re-aligned, first-class condition. First offer over £13.—Groveley, Green Lane, Prestwood, Bucks. *Phone : Gt. Missenden* 386.

RECEIVER 107 and 1155N tip-top condition, nearest offer £10 each, or two together nearest offer, £19.—Barns, 40 Park Ridings, Hornsey, N.8.

WANTED 31 sets Army Tx/Rx, must be complete. Will offer up to £6.—Morris, Bruce House, Stowe, Bucks.

SALE.—combined Rx/Tx. Two units, including 230v power pack, 25-watt Tx covers 8-5 mc. 6L6 CO. Five-valve superhet 69/35M and 36/18M. Commercial job. £10.—Box No. 723.

HRO Senior for sale, complete with power pack, matched speaker and four coil packs. Excellent condition. Owner going abroad and must sell. Offers to Box No. 722.

SALE.—B2 Transmitter/Receiver complete power pack, spares including coils, key, 'phones. 3·5 mc xtal Instruction book. Frequency 3 to 15 mcs. In waterproof steel cases. £15.—Box No. 725.

HAMBANDER 1·7-32 mcs, perfect condition, hardly used. Ideal for SWL. £15 or offers.—42 Derwent Road, Flixton, Manchester.

150 service sheets (100 post-war) never used. Pair matched MZ1-100's, little used. Offers.—Ward, 44 Northgate, Barnsley.

RECEIVER all-wave double superhet DST100 (includes 30 mcs), splendid results. £17/10/-, plus carriage. Marconi CNY Tx complete except receiver, input 24/230v 807's VFO PA MOD. Tested before despatch. £15, carriage paid. 230v Transformer and Metal rectifier 250/300v 250mA output, 25/-, carriage extra. Steel frame, 37 × 16½ × 14½, 10/6, carriage paid. 24v Generator, easy-change, 230v input, 4/6. TU9 with case, 8/-. Assorted condensers, 2/3 doz. Relays, 1/-. Valves: 703A Doorknob, 8/-; U17, CV66, 6/ ; L63, EF50, 5/-; KT44, 4/6; SP61, SP41, 2/9. 7-core HRC cable, 6d. yard. 1154A transmitter, excellent condition. Offers ?—GM3ETM, Minto Cottage, Boswall Road, Edinburgh, 5.

COMPLETE station in suitcase with AC pack, etc. Type A, Mark 1. Sell or exchange.—G3COI, 59 Darlington Street, Wolverhampton.

QRO 150/500w, T53 Phone/CW transmitter, p/p 813 final, p/p 813 modulator. Four amateur bands, perfect working condition. Nearest offer to £50 accepted for quick sale. Also 1131 transmitter, good condition, unmodified, offers to G8VB, 124 Carr Road, Greenford, Middx.

COLLARO AC/DC gramophone motor with automatic stop and pickup. Condition as new, £8. —Hart, 56 Approach Road Cliftonville, Margate, Kent.

B2 Rx power pack, neat home-built Tx. 30 w CW Key, 'phones, 14 mc wavemeter; £10 lot.—Box No. 728.

1154N Transmitter, good condition, £2/5/-. No. 58 transmitter, £2.—W. H. Dixon, 26 Stallcourt Avenue, Cardiff.

WANTED.—Instruction manual or technical particulars of Canadian Marconi Type 52 receiver. —Hacker, 29 Vallis Way, West Ealing, W.13.

NEW BC453, boxed, 50/-. No. 19 Rx valveless, including L.M.S. coilpack, 50/-. Wanted, coilpack, 30 mcs-1·5 mcs plus MW, 465 IF, Denco CT2A or equivalent price.—Box No. 729.

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SHORT WAVE MAGAZINE

FOR THE RADIO AMATEUR AND AMATEUR RADIO

E D I T O R I A L

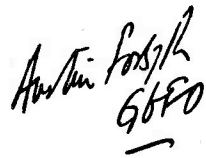
Signpost

In this issue is reported an occurrence of great moment in the VHF world, and indeed for the future of Amateur Radio itself. By it, not only are the contentions put forward for so long in the SHORT WAVE MAGAZINE *once again fully justified but (what is more important) the way for future development is clearly indicated.*

A contact has taken place on 70 centimetres between two stations, operating from their home locations, over a distance of 119 miles. There are many of us who can well remember when to suggest the possibility of such a QSO on five metres was regarded as cranky enthusiasm, beyond the bounds of reason; yet it was easily done when the equipment problem had been overcome, as the results reported in these pages over a period of years testify. Then there were those who thought that the line-of-sight limit on VHF would be reached on two metres, but once again on this band, too, it has been found that with the right equipment the results obtained on Five can easily be repeated.

The emphasis is, of course, on the equipment. It is a matter for regret that in some quarters it is still supposed (as it was in 5-metre days) that the VHF bands can be developed by the use of apparatus which would not have been tolerated on the normal communication frequencies of 20 years ago. It is certain that the latest results on 70 cm. would have been impossible with self-excited oscillators and squish receivers, which merely mask the communication possibilities of our VHF bands over GDX distances.

While GDX can rightly be regarded as an end in itself, the important thing is that the striving for communication over distances outside line-of-sight range will in due time reveal the mechanism of propagation at these frequencies. It is already clear that amateurs in general, and British amateurs in particular, have once again confounded the theories of VHF propagation—but the contribution is being made, as always, by those who apply themselves to the problem by the use of stabilised transmitters and receivers capable of holding a CW signal.



TWO METRES WITH THREE VALVES

Design for a 145 mc Exciter/Transmitter

PART I

By G. ELLIOTT, B.Sc., A.R.I.C. (G3FMO)

This is a fully detailed description of the design and construction of an efficient crystal-controlled two-metre transmitter for 25-watt working, built round three valves only. It will thus be of interest to all contemplating operation on 145 mc—particularly as a transmitter of this type will also serve as an exciter unit for full-power operation on Two, or as the early stages for 430 mc CC equipment.—Editor.

THE transmitter described in this article was constructed with the idea of getting the full 25 watts input, allowed on the two metre band for newcomers, with the minimum number of valves, the minimum power consumption and the minimum amount of space occupied. At the same time a stable crystal-controlled transmission was required, so self-excited oscillators were not considered.

The crystal oscillator circuit was based on that developed by the Squier Signal Laboratory (Signal Corps Engineering Laboratories, Fort Monmouth, N.J., U.S.A.) and described in some issues of *QST*. (See Bibliography.)

The circuits described use controlled regeneration in the system to facilitate crystal oscillation, employing a feed-back coil, the crystal being series resonant in the grid circuit. The crystals used for the 145 mc band may be 48 or 72 mc harmonic types, or fundamental crystals in the 6, 7 or 8 mc range. The harmonic type crystals are not readily available and are expensive, and of the fundamental types, obtainable as Government surplus, the 8 mc ones give the best performance.

The Oscillator Tripler

The oscillator circuit was designed for an 8 mc crystal operating at its third harmonic on 24 mc. The circuit of the complete transmitter is shown in Fig. 1. The coil L1 consists of 17 turns of 0·8-in. diameter, tapped at 6½ turns. Full coil details are given in the coil-winding table. The portion of the coil above the tapping point, together with C1 and C2, forms the resonant circuit, the coil below the tapping point being the regeneration winding. The use of a fair amount of capacity across the tuned circuit, say about 15 $\mu\mu$F, together with the low value of the grid leak R1, tends to prevent oscillation at frequencies other than the crystal frequency. In the circuits described in *QST*, V1 is given as a 6J6 or 12AT7, but it was decided to try a 6SN7GT in this position, as it was cheaper and readily obtainable on the surplus market. (The small supply of 6J6's to hand were earmarked for receiver applications). The potentiometer R2 is used to control the power output of the CO stage, and is set for the minimum power which will supply the PA with the required drive. This is to minimise crystal heating.

The condenser C7, of ·001 μF, connects the drive to the second section of the 6SN7. The *QST* circuits show a small condenser of 15 to 40 $\mu\mu$F in this position, but it was found that much more drive could be obtained with a value of ·001 μF, without any apparent disadvantages.

In the anode circuit of the tripler a condenser is placed in series with L2, to enable an ordinary small variable condenser, with grounded moving vanes, to be used for tuning. The bias for the CO stage is derived partly from the grid current through R1 and partly from the cathode resistor R2. The latter, together with the anode resistor R4, is sufficient to limit the current through the valve to a safe value when off resonance. The tripler section of V1 is heavily biased with the full 110 volts from the bias supply, together with additional grid leak bias from R3, the total voltage under working conditions being about 140-150. This voltage was found experimentally to give the best RF output in the circuit described.

Referring once again to the American circuits, in the article in *QST* for October 1948, the second section of the 6J6 acts as either a tripler or a doubler, depending on whether a 48 mc or 72 mc crystal is used, the 832 final being operated as a straight amplifier. For output on 144 mc, Tilton employs the 832 PA as a *tripler*, the second section of the 6J6 being a doubler to 48 mc. However, he runs the 832 as a straight amplifier on 50 mc. the CO working on 25 mc. In the circuit of the transmitter developed by the author it was found, however, that greater efficiency was obtained by running the second section of a

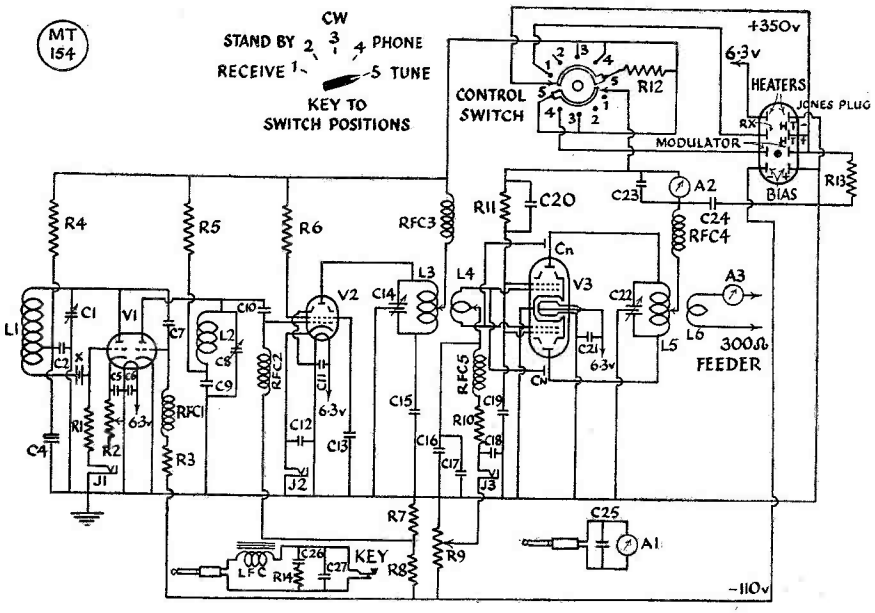


Fig. 1. Theoretical circuit complete of the 144 mc transmitter designed and described by G3FMO in the accompanying article.

Table of Values

Fig. 1. Three-Valve Two Metre Transmitter

C1	=	50 $\mu\mu$F, variable
C2, C5, C7, C9, C13, C16	=	0·001 μF, mica
C4	=	32 μF, electrolytic, 350v wkg.
C6, C10, C11, C12, C19, C21	=	500 $\mu\mu$F, mica
C8	=	10 $\mu\mu$F, variable
C14	=	8 × 8 $\mu\mu$F, split stator variable
C15	=	5 $\mu\mu$F, ceramic
C17, C18, C23, C24, C25	=	300 $\mu\mu$F, mica
C20, C27	=	0·01 μF, paper
C22	=	14 × 14 $\mu\mu$F, butterfly variable
C26	=	0·2 μF, paper
R1, R10	=	3,300 ohms, ½-watt
R2	=	550 ohm, potentiometer, ½-watt
R3	=	33,000 ohms, ½-watt
R4	=	7,500 ohms, 2 watt
R5	=	5,000 ohms, 2 watt
R6	=	120,000 ohms, ½-watt
R7, R8	=	10,000 ohms, ½-watt
R9	=	5,000 ohms, potentiometer, 5 watt
R11	=	20,000 ohms, 3 watt
R12	=	2,000 ohms, 15 watt
R13	=	15,000 ohms, 10 watt
R14	=	100 ohms, ½-watt
RFC1	=	1·25 mH, Eddystone Type 1010
RFC2, RFC3, RFC4, RFC5	=	5·6 μH, Eddystone Type 1011
LFC	=	1 Henry
V1	=	6SN7GT
V2	=	QVO4/7 (Mullard)
V3	=	832
A1	=	0-30 mA
A2	=	0-100 mA
A3	=	0-350 mA, RF thermocouple

***Note:** All fixed paper, mica and ceramic condensers should be 500v working.*

twin-triode as a tripler, with V2 working as a doubler, rather than doubling initially, followed by V2 as a tripler. The reason for this is, clearly, that sufficient drive is available from the CO to work the second section of V1 as a tripler, which for efficient operation needs a heavy bias. On the other hand, sufficient drive is not given by the second section of V1, acting as a doubler, to work V2 as a tripler quite so efficiently.

Variations on the CO Stage

Those who prefer to try the 6J6 as originally described will no doubt find that it is easier to obtain good output than with the 6SN7GT, as the former is specially designed for VHF and the triode sections have a higher mutual conductance. One or two turns should be removed from the grid end of the regeneration winding of L1 to compensate for the increased efficiency of the valve. A disadvantage in the