The SHORT WAVE Magazine

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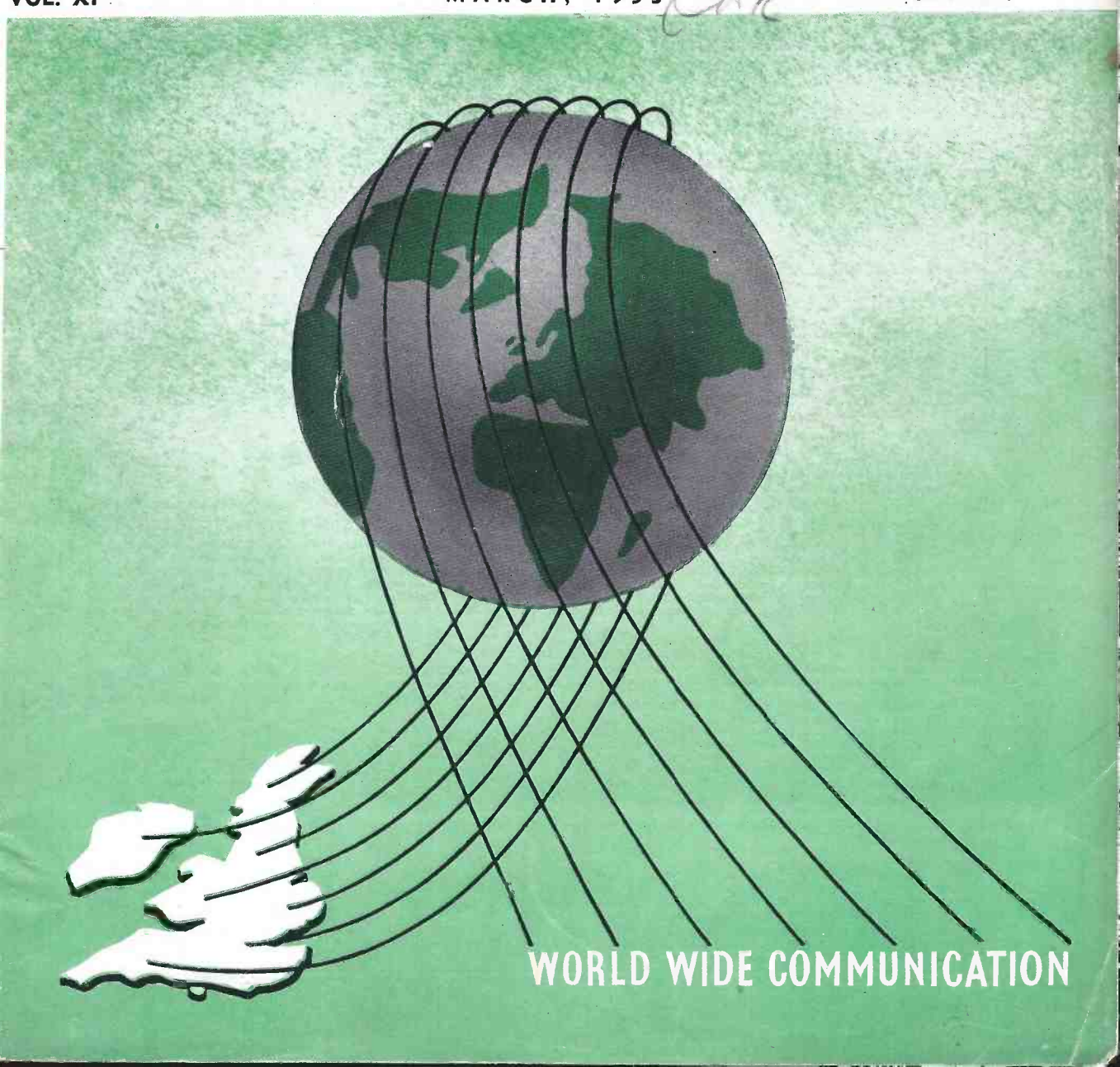
VOL. XI MARCH, 1953 NUMBER 1



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SHORT WAVE MAGAZINE

VOL. XI MARCH, 1953 No. 115

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FOR THE EXPERIMENTER AND THE RADIO ENGINEER

The SHORT-WAVE Magazine

EDITORIAL

Emergency

When the flood disaster struck the East of England, Northern Holland and Belgium, there was an immediate call to arms—and among the many organisations and groups of individuals who responded with alacrity and enthusiasm were, of course, those radio amateurs who were in a position to help.

In Britain, amateurs offered shelter and assistance to those of their fellows who they thought might be in immediate need of it; one enterprising group took over the watch for a Coast Station temporarily put out of action. The Dutch got together an emergency network, operating QRP battery gear in the 80-metre band, and such arrangements as were possible were put in hand to keep clear channels for them.

Arising from all this, there followed a number of letters in the newspapers, on the one hand discussing the desirability of establishing an Amateur Emergency Service, to be ready for disasters such as this, and on the other castigating those amateurs who unwittingly interfered on the frequencies being used by the Dutch. As to the latter point, it can be confidently asserted that in such circumstances nobody would knowingly have caused interference—the offending operators just did not know what was going on.

Much more important, however, are the lessons to be learnt and the conclusions to be drawn from this occurrence. In the first place, emergency operation guaranteed free of interference is really only possible on frequencies segregated for the purpose in advance; any disaster network operated in a band like Eighty is bound to be heavily QRM'd, at least in the early stages, by reason of the fact that so many long range stations will be quite out of touch with what is happening. Secondly, an emergency network, if it is to be at all effective on The Day, must be constantly exercised, and triple-banked to guard against failures due to absence of key operators. Thirdly, in this small Island we are fortunate in having already the most highly developed system of internal communications in the world, mainly by buried cable. Fourthly, we suffer but rarely from those cataclysms of Nature which could give rise to a communications emergency. And finally, no system of amateur emergency communications could be operated independently—it would have to be closely integrated with the existing official networks.

In discussing an Amateur Emergency Scheme it should be remembered that the Armed Forces and the Civil Defence services are already crying out for recruits to their existing reserve organisations.

Austin Forbes G6FO.

Self-Contained CW/Phone Transmitter for Ten

DESIGN AND CONSTRUCTION OF A SPOT-FREQUENCY 25-WATT RIG WITH INCORPORATED POWER SUPPLY

J. N. WALKER (G5JU)

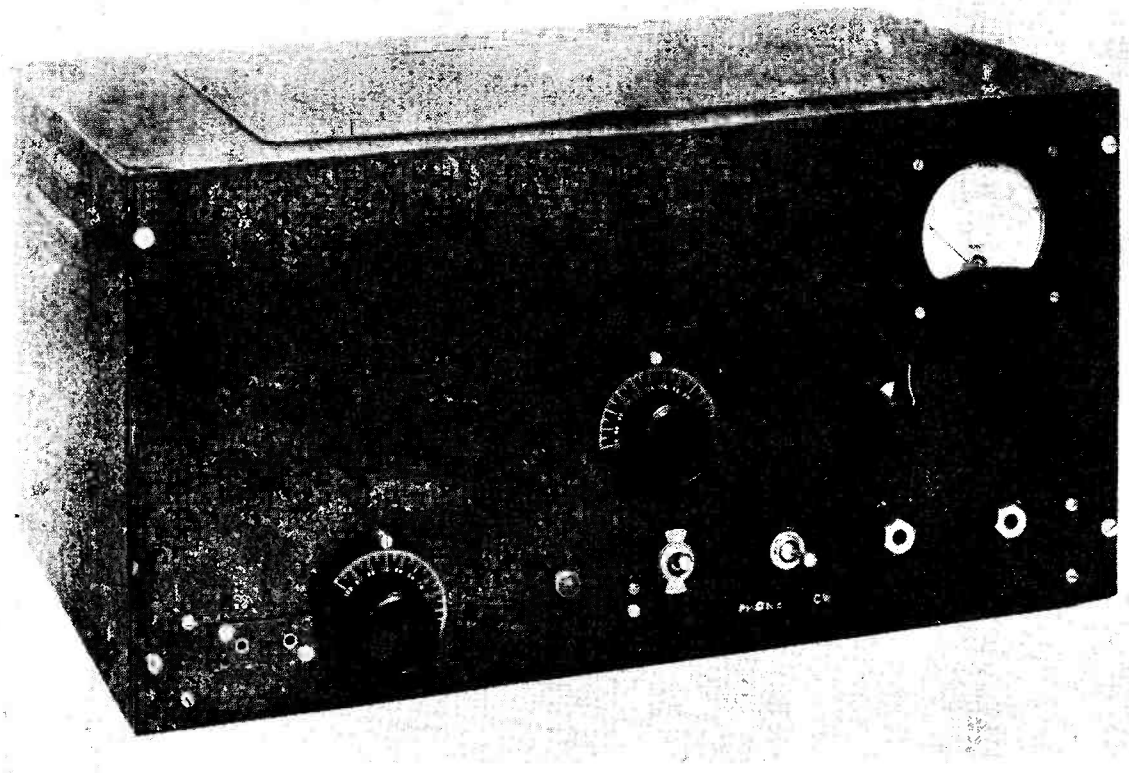
It will be generally agreed that for really satisfactory operation on Ten Metres a transmitter entirely separate from the main communication band equipment is desirable, if only on the score of convenience. It would also be true to say that when conditions are good for DX, high power is not necessary, while for purely ground-wave working an efficient input of 25 watts or so is ample. With 28 mc conditions as they have been for some time past, and the widely-held notion that the band is "only good for DX, but not just now," Ten has become seriously neglected throughout the world. But it is in fact almost the ideal frequency area for local working and could be used to relieve the LF bands of much of our short-haul traffic. The Transmitter described here—specially commissioned by SHORT WAVE MAGAZINE*—meets all requirements for effective and economical operation on Ten Metres. It provides for either CW or Phone working, uses an improved system of Clamp modulation, and if built exactly to specification can be plugged in and switched on; the only accessories needed are a mains point, a microphone and/or key, and a 10-metre aerial. Alternatively, the electrical design could quite easily be adapted to individual requirements on the constructional side, or to fit into an existing station layout. — Editor.*

IN his Editorial in the October, 1952, issue of *Short Wave Magazine*, the Editor suggested that, during the present quiet spell on 28 mc—a spell which, as regards consistent DX, is likely to last for some considerable time yet—it would be a Good Thing to make use of the band for inter-G contacts. The transmitter described in this article is intended to meet the need for an entirely self-contained outfit for Ten, built in neat and compact fashion, which can be brought into operation quite independently of other transmitting equipment.

For the purpose in mind, high power is not necessary—in fact it is to be discouraged—and the transmitter is therefore designed to run at some 18 to 25 watts, depending on the HT voltage. Further, a VFO would confer no particular advantage, and, if included, would only add to the complexity of the circuit and of the construction. As on Two Metres, it is an excellent plan to adopt a fixed frequency and others will then know just where to look on their receivers for any particular station. It is suggested that one crystal, giving a frequency near the low frequency end of the band, be employed for CW working and another, higher up the band, for telephony. To enable a quick change of frequency, the crystal-holder is mounted on the front panel.

General Description

The radio frequency side of the transmitter consists of only two valves. The first is a 6V6 working as a harmonic oscillator and providing an output direct on 28 mc from a 7 mc crystal. Originally, it was intended to use what is known as the Squier circuit, as drawn in Fig 1. The major advantage of this circuit is that oscillation occurs fundamentally at the frequency to which L1/C1 is tuned—there is no oscillation at the crystal frequency and the second harmonic is therefore further removed than it would otherwise be. For the information of those readers who might be considering the incorporation of the Squier circuit, it may be said that all the writer's attempts to make it function on the *fourth* crystal overtone failed completely. The crystal could be made to take firm control with the output on either 21 mc or 35 mc—*odd* overtones. But no amount of "frigging" would persuade it to take even light control at 28 mc—it was a case of either no oscillation whatsoever, or normal self-oscillation with the crystal having not the slightest effect even with the tuned circuit at resonance to the fourth harmonic. Further, this happened with several different types and makes of crystal—so one is forced to the conclusion that the Squier circuit will function only on *odd* overtones.



General appearance of the Self-Contained CW/Phone Transmitter for Ten. The knob lower left of the PA plate meter is for adjusting the output coupling. Designed for spot-frequency operation, and incorporating its own modulator and power pack, this Transmitter once set up can be relied upon to operate indefinitely.

Recourse was therefore made to the "sure-fire" oscillator shown in the complete circuit diagram. Here the crystal does operate at its fundamental frequency and the second, third, and fourth harmonics can be extracted in the anode circuit. A rather low L/C ratio is used in this tuned circuit to give high discrimination against unwanted harmonics.

The second valve is the ubiquitious 807. Ample drive is secured from the oscillator using straightforward capacitative coupling and the output circuit is simplified by having to cover only the one band. A butterfly condenser is used to tune the anode circuit and, to avoid an unduly high L/C ratio, an added amount of parallel capacitance is provided by a small trimmer connected directly across the tuning condenser. It is important to be able to adjust the output link for optimum coupling and the home-made device used can be seen in the photograph showing the top deck of the transmitter and is described in detail later.

An unneutralised 807, working as a straight-through amplifier, is almost certain to show signs of instability at 28 mc and, to make sure on this point, the stage is neutralised in the usual way.

For CW working the key is inserted in the cathode circuit of the oscillator valve so that break-in operation is possible. A clamp valve prevents excessive dissipation in the 807 when the latter is not delivering RF energy. The standing current which flows through the 807 improves the regulation of the power supply and is an advantage rather than the reverse. This same clamp valve is pressed into service for modulation of the transmitter. The modulator section is built on the lines of the unit described by G3DZW in the September, 1952, issue of *Short Wave Magazine*, with some minor deviations. This circuit utilises negative feedback and gives excellent results. G3DZW employed miniature valves to keep the unit small, but ordinary octal-based valves work equally well and, as space is not restricted, they are used in the present design.

The overall gain was found to be excessive for the power employed and for the lower anode voltage applied to the 807, hence the inclusion of a resistive network to reduce the amplification. Also, initially, trouble was experienced from RF feedback and additional measures had to be taken to eliminate it. The circuitry around V4 has been adapted to meet the need for CW as well as telephony operation.

The power unit is conventional and utilised components on hand. The transformer is a broadcast receiver type and delivers a smoothed 330 volts high tension. This is admittedly somewhat on the low side, and, with the 807 drawing about 60 mA, results in an input of about 20 watts. It would perhaps be better to fit a transformer with a 400-volt output when a full 25 watts — and possibly more — would easily be secured.

The transformer shown in the photograph has a fuse incorporated, but where this is not the case it is advisable to include a fuseholder —there is room for one near the smoothing condensers. No mains switch has been fitted as the writer considers two switches on the front panel enough, but one can easily be added if desired, either at the front or rear. The switch should be of the *double*-pole type, completely to isolate the transmitter from the mains supply when not in use.

Construction

The transmitter is built on a chassis 2½ ins. deep which fits inside a cabinet of standard size. Chassis, panel and cabinet are all of aluminium and this, combined with the absence of special "bits and pieces" in the shape of screens, makes the construction comparatively easy.

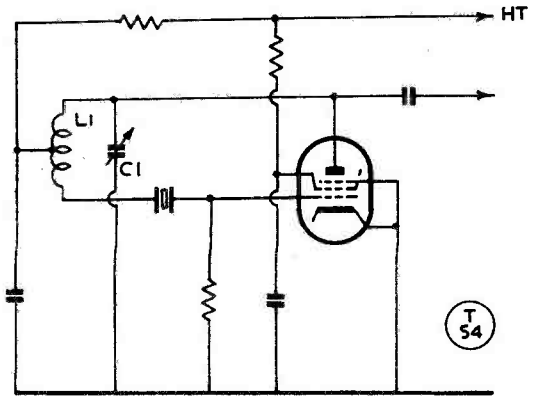


Fig. 1. The "Squier" overtone oscillator which is not suitable for even-harmonic working—see text.

Table of Values

Fig. 2. Circuit complete of the Transmitter for Ten.

Fixed Condensers

C1, C1A, C10, C7A	= 100 μμF, Silvered Mica.
C2	= 0.1 μF paper
C3, C5, C8	= 8 or 16 μF Electrolytic
C4	= 30 μF (15v.) Electrolytic
C4A, C17, C19, C22, C25, C27, C28	= .001μF (350v.) Moulded Mica
C9, C13, C14, C24	= .001μF (500v.) Moulded Mica
C6, C7	= .01μF paper miniature
C11, C12	= 32 or 50 μF Electrolytic
C15	= 20μμF ceramic or mica
C16	= 30μμF ceramic or mica
C21	= 50μμF ceramic or mica
C18	= .05μF (at least 400v.) paper

Fixed Resistors

R1, R1A, R11	= .05 megohm, ½ watt
R2, R11A, R19	= 10,000 ohms, ½ watt
R3, R6, R7	= 1 megohm, ½ watt
R4, R8	= 330,000 ohms, ½ watt
R5	= 1,500 ohms, ½ watt
R9	= 1,000 ohms, ½ watt
R10	= 100,000 ohms, 1 watt
R12, R21	= 20,000 ohms, 1 watt
R13	= 56 ohms, ½ watt
R14	= 47,000 ohms, 1 watt
R15	= 14,000 ohms, 5 watts or more
R16	= 47,000 ohms, ½ watt
R17	= 250 ohms, 1 watt
R18	= 1,000 ohms, 1 watt
R20	= 22 ohms, ½ watt
R22	= 6 to 12 ohms, 1 watt
R23, R24	= 100 ohms, ½ watt

LIST OF PARTS

1	Cabinet, panel and chassis (see Figs. 3 and 4)	Burn Engineering*	
5	Valveholders, international octal		
1	Valveholder, American medium 5 pin		
2	Valves (V1, V2), 6SK7, 1852 or 1853		
2	Valves (V4, V5), 6V6 (preferably metal)		
1	Valve (V3) and holder, EA50 or similar		
1	Valve (V6), 807, QV05/25, etc.		
1	Valve (V7), 5Z4G or similar		
1	Variable condenser (C20) 60 μμF	Cat. No. 582	Eddystone
1	,, (C23) 15 x 15 μμF	,, ,, 587	,,
1	Neutralising Condenser (*see text*) (Cn)	,, ,, 481	,,
1	Concentric trimmer (C26)		Philips
2	Dials	Cat. No. 595	Eddystone
2	RF chokes (RFC1, RFC2)	,, ,, 1010	,,
1	RF choke (RFC3)	,, ,, 1011	,,
1	Pointer knob	,, ,, 1044	,,
1	Pilot lamp and holder (isolated)		
1	Switch, SP on/off (S1)		
1	Switch, SP change-over (S2)		
2	Jacks		
1	Meter, 100 mA, f.s.d.		
1	Crystal, 7 mc and holder		
1	Mains transformer — outputs of 300/400 volts, 100/120 mA, 6.3 volts 2.5 amps., 5 volts 2 amps.		
1	Smoothing choke (LFC), 12 Hy. 100/120 mA.		
1	Fuseholder and fuse		
1	Coaxial output socket		

* *Burn Engineering, 8 Victoria Street, Liverpool, 2.*

The layout of the valves and components on the chassis is not critical, but the audio and RF sections should be well spaced from each other. The actual layout adopted, shown in Fig. 3, should be followed as closely as possible, although it is appreciated that differences in the sizes of mains transformer or choke may entail minor changes in the placing of parts. However, there is ample room for a larger mains transformer, as suggested earlier, and some of the electrolytic condensers could perhaps be mounted below the chassis. Individual smoothing and decoupling condensers have been used because they were to hand, but there is no reason why multiple units should

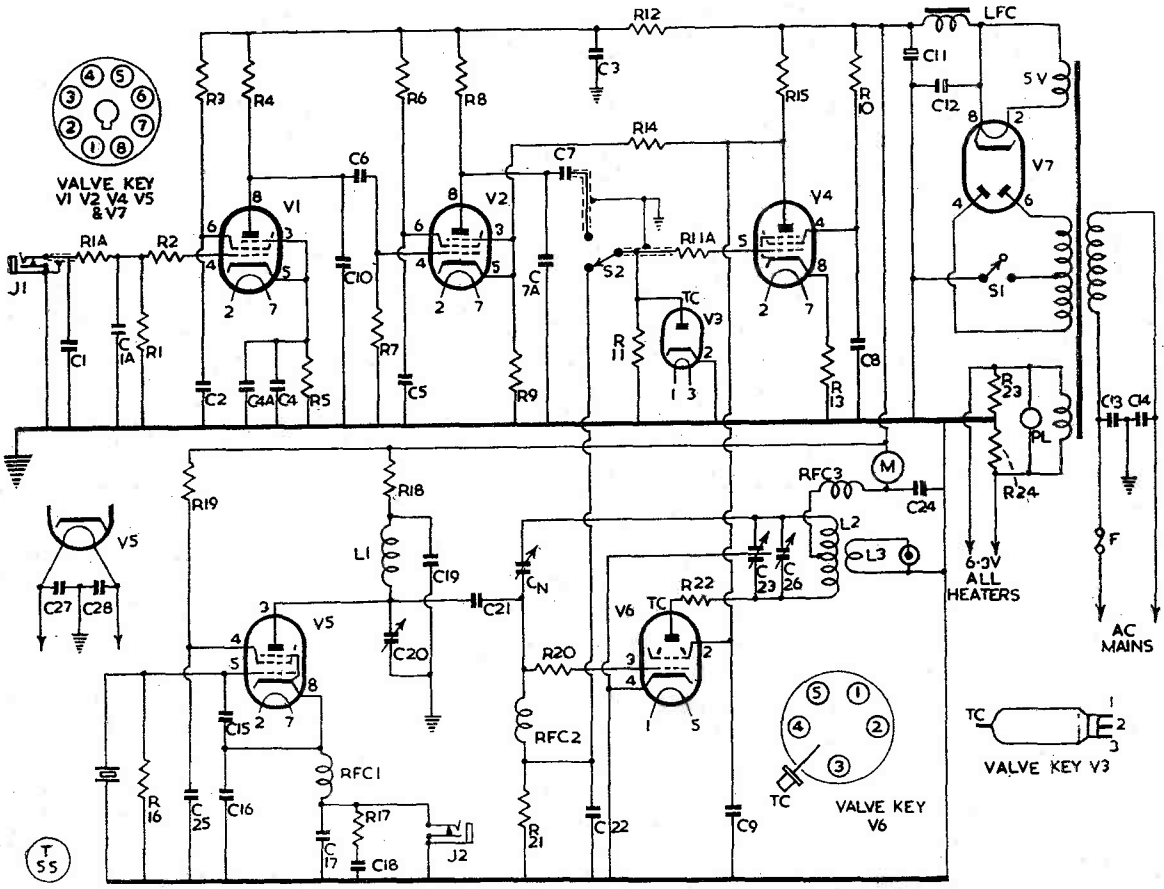


Fig. 2. Circuit diagram complete of the Transmitter for Ten. It is designed for crystal control and switch-on, switch-off operation. The only externals required are key (or microphone), aerial and AC power point.

not be used if preferred. All condensers should possess an adequate margin of safe working voltage according to the value of HT actually employed.

The RF valves and components lie along the side of the panel. The circuitry associated with the crystal oscillator V5 is below the chassis and the valve itself is of the metal type. If a glass valve is used, it should either be fitted with a metal screen or have a small sheet of metal bolted to the chassis, flush with the panel, to screen it from the 807. The oscillator coil has nine turns 22 gauge enamelled wire wound on a length of $\frac{3}{8}$ in. polystyrene rod, which is tapped 6BA at one end and bolted to the chassis.

The valveholder for the 807 is sunk below the top deck on 1 in. pillars. The anode circuit tuning condenser C23 is physically and electrically small but adequate for the purpose and directly across the stators is soldered the small trimmer C26. The anode coil consists of seven turns 16 gauge enamelled wire wound on a former $1\frac{3}{4}$ ins. diameter, made to occupy a length of about one inch, which gives a turns spacing of about one wire diameter, and is slipped off to make it a self-supporting coil. The ends are soldered directly to the stators of C23—one end to one lug, the other to the rod near the ceramic end-plate.

The layout of the panel is drawn in Fig. 4. The lower line of components calls for holes in both panel and chassis wall and the holes should be marked off and made first in the panel and then holes to match made in the side of the chassis. C23 is fitted to a metal bracket for greater rigidity and the hole in the panel need only give clearance to the spindle. The single meter, reading the anode current to the PA stage, is accommodated in the top right-hand corner of the panel.

The Neutralising Condenser

This is specially fabricated for the purpose and is a variation of the type advocated in earlier articles for neutralisation of pentode or tetrode valves where the capacitance required is very small. The parts are taken from an Eddystone Cat. No. 481 condenser, the larger cup being removed as before. The two metal parts are taken off the steatite base and bolted to the ends of strips of polystyrene measuring $\frac{3}{4}$ in. by $\frac{3}{8}$ in. The flat metal piece is fixed below the chassis in the position indicated in Fig. 3, so that it is spaced away from the chassis floor by about $\frac{1}{8}$ in. The cup section is mounted on a pillar above the chassis, to face the other part accurately through a $\frac{1}{2}$ in. hole made in the chassis. In practice the cup needs to be some $\frac{1}{4}$ in. away from the other section for proper neutralisation, but the adjustment is not critical.

Variable Aerial Coupling

This feature is somewhat unusual in a home-made coil assembly, but it is a valuable one and enables the most to be made of the comparatively low power at which the transmitter operates. And it is much more convenient to be able to make the adjustment from the panel rather than do it roughly through the lid of the cabinet.

The photograph of the upper deck has been taken from an angle which shows the construction of the variable coupler, but some further detail will be useful. A piece of ebonite or keramot rod (dry wood is also quite suitable) 2 ins. or $2\frac{1}{2}$ ins. long and $\frac{3}{8}$ in. diameter, is tapped 6BA at one end. Another piece of rod, $1\frac{1}{4}$ ins. long and $\frac{1}{4}$ in. diameter to fit smoothly into a standard panel bush, is also tapped 6BA and the two pieces are screwed together with a short piece of 6BA studding—actually a 1 in. screw with the head removed. Two 6BA bolts, each holding two soldering tags, are secured in the larger rod to coincide with the centre of the tank coil. The ends of the single turn coil ($7\frac{1}{2}$ inches of 18 gauge wire enclosed in sleeving) are soldered to one pair of tags and flexible leads are taken from the other pair to holding points (the ceramic base removed from the neutralising condenser comes in useful here) and thence to the output socket. The latter can be placed anywhere convenient on the right-hand side — in the present instance it is mounted at the rear of the cabinet.

A loose rubber collar (made from a grommet) is slipped over the front of the spindle, then a brass collar, with grub screw, tight up against it, to prevent wobble and to make the movement reasonably stiff. An indicating scale can be fitted beneath the bush fixing nut if desired.

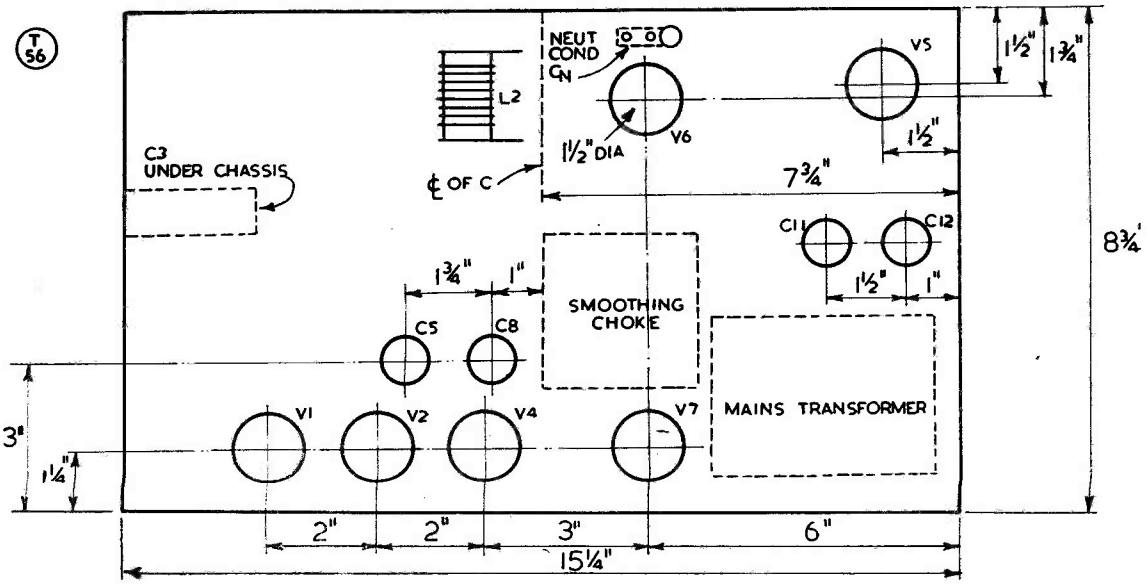
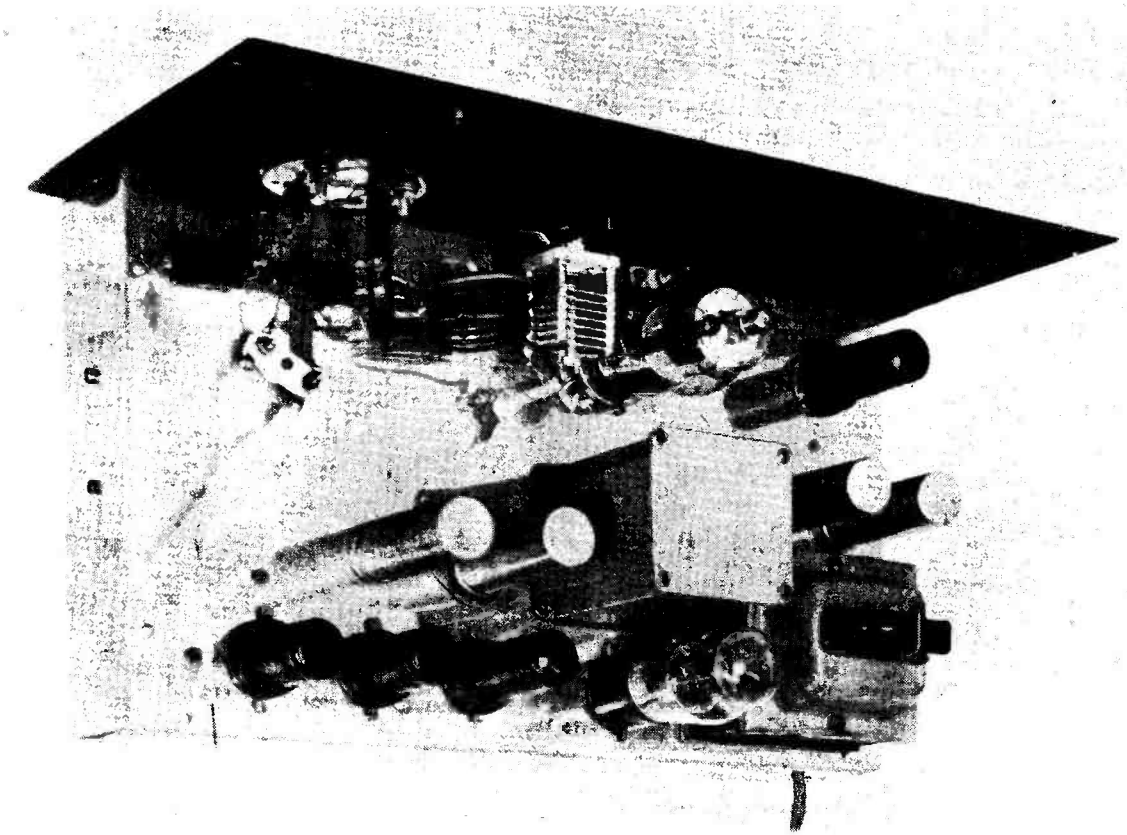


Fig. 3. Layout of the Transmitter chassis. This can be varied to suit individual requirements, but must be closely followed if construction is to be as specified.



In this top view of the chassis of the Transmitter for Ten, note the positions of the neutralising condenser between PA valve and panel and the output coupling link. The general disposition of the parts will also be clear from this photograph.

The Modulator

To simplify matters, the components in the audio section have been given the same annotation as in the original article by G3DZW (see *Short Wave Magazine*, September, 1952). The additional components found necessary have an "A" suffix. The control grid of V1 is extremely sensitive to stray pick-up and a piece of copper foil has therefore been "moulded" around the grid tag of the valveholder and its associated components. This piece of foil is soldered to the valveholder tags on each side of the control grid—actually the cathode and G3 pins—and is earthed as regards RF through the mica condenser C4A which also helps to support the foil.

The lead from the microphone jack is of screened wire, kept close to the wall of the chassis, and screened wire is also used for the leads to the Phone/CW switch. The connections to the latter are quite different from the original since HT must remain all the time on both screen and anode of V4, whilst the grid of this valve has to be controlled differently according to the mode of operation. V1 and V2 together take only a very small current and it is not worth while arranging to remove HT from them when operating on CW. It will be noticed metal valves are used for V1, V2 and V4. Again, if glass valves are employed, a metal screen should be arranged around them to minimise RF pick-up. The valveholder for V3 is supported on stiff heater wires coming from the V4 valveholder.

Other Points

The heater wiring is balanced to earth and as the transformer does not have a centre lap on the heater winding, two 100-ohm resistors are connected across the heater supply, with the junction taken to chassis.

The value and wattage of some of the resistors will call for alteration if a higher HT voltage is employed. For instance, R15, the

screen dropping resistor for the 807, is 14,000 ohms with 330/350 volts—but should be 16,000 ohms with 400 volts, and 20,000 ohms with 500 volts. In the under-chassis photograph can be seen, mounted on the wall of the chassis, two heavy duty resistors which form R15. They are unduly large for the purpose, but they give the correct resistance and obviously have ample dissipation. Normally a five-watt type will suffice, increasing to ten watts dissipation at higher applied voltages.

R18 drops the anode voltage of V5 to a value not greater than 300v. As the HT voltage is increased, so must the value and rating (up to 2 watts) of R18 be increased. The screen resistor R19 should also be changed for a higher value—say 15,000 ohms—if the HT is 400 volts or more.

The first two valves in the audio section have high value anode and screen resistors and a change of HT will have no practical effect. R12 has been increased, as compared with the original circuit, to compensate for the fact that the screen current of V4 no longer flows through it, and incidentally to provide a greater degree of decoupling.

TVI Factor

The whole transmitter is almost totally enclosed in metal, the only major aperture being the meter opening on the front panel. The amount of heat developed is not great and, as the matt black surface of the cabinet acts as a good radiator of heat, the two small louvres on each side afford sufficient ventilation.

The only opening at the rear is a small hole through which passes the mains lead. By-pass condensers C13 and C14 are taken from each mains lead to chassis. A by-pass condenser is connected directly across the keying jack, which is a metal one as insulation from chassis is not necessary. The amount of harmonic radiation "escaping" from the transmitter itself is therefore small and TVI is unlikely to be a problem except in fringe areas, where extra precautions may have to be taken. These should take the form of increased decoupling —that is, the insertion of VHF chokes in all leads leaving the chassis and perhaps more by-pass condensers—and screening of the meter opening and louvres with copper mesh. A filter of the low-pass type, as described by G6LX in recent issues, should be interposed in the coaxial output cable.

Operation

First of all, the PA stage should be tested for freedom from instability. With switch S2 in the CW position, HT on and no crystal inserted, the anode current meter should show a fairly low reading—around 20 mA. Rotating the two tuning condensers should have *no effect whatever*, but if the anode current rises, the stage is going into self-oscillation and adjustment of the neutralising condenser is called for. It is essential that complete stability be achieved around the working frequency of 28/29 mc. When correctly neutralised, some slight sign of instability may exist with both C20 and C23 at minimum (a frequency well above 30 mc) but this can safely be ignored.

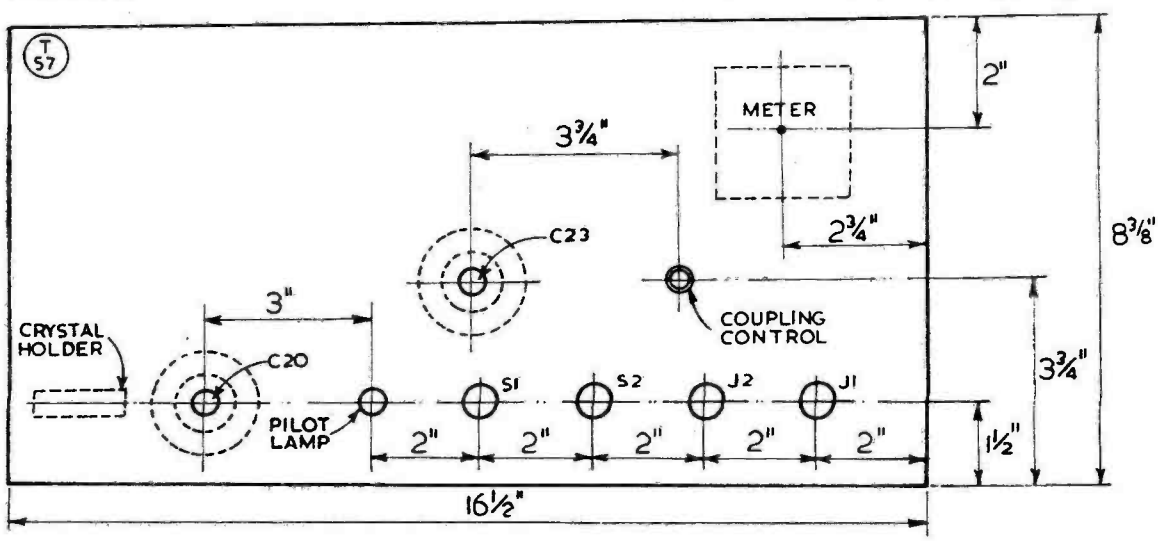
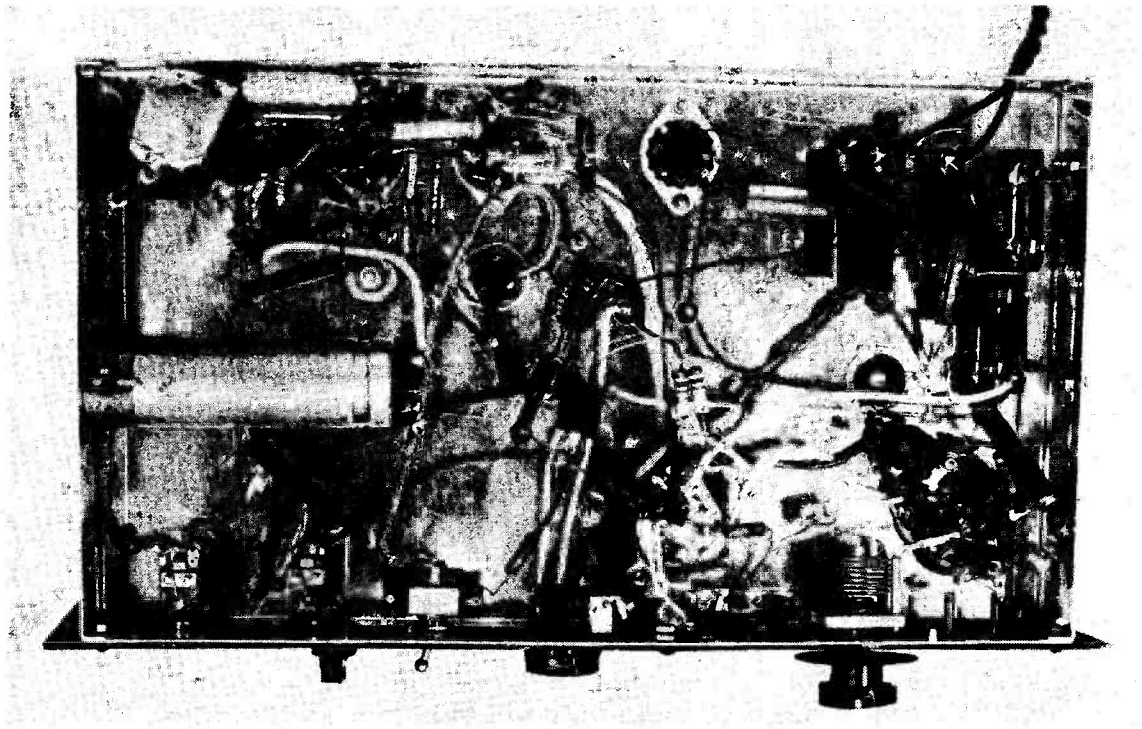


Fig. 4. Panel layout for the 10-metre Transmitter.



Layout beneath the chassis, showing wiring and placing of the major components.

The anode circuit of the 807 is best set up with a grid dip meter, the trimmer C26 being adjusted so that the LF edge of the band (28000 kc) is just reached with the tuning condenser C23 at full mesh. If no "grid-dipper" is available, the adjustment should be made with a crystal at the low frequency end of the band.

With the component values recommended, the oscillator should function with absolutely no difficulty. Although there will be little doubt about it if C20 is at half mesh or more, the output from the oscillator should be checked to ensure that the correct 28 mc harmonic has been selected. An absorption wavemeter or a grid-dip meter will help considerably here. If the signal is tuned in on a receiver, the strength will increase greatly as C20 is brought into resonance. If a crystal with a metal top plate is used, it is well to see that the crystal is inserted so that the top plate is connected to chassis and not to grid.

The anode current of V6 will rise to 80 mA or more and a bias voltage of about 50 should appear across the grid resistor R21. No time should be lost in tuning C23 to resonance. A 24-volt 12-watt bulb connected across the output link lights to full brilliancy with an input of 18 watts and the effect of the coupling adjustment is well brought out in obtaining a proper loading at the relatively low impedance presented by the bulb. When working into an aerial, there is no difficulty in loading the 807 to between 60 and 70 mA, whilst still showing an appreciable dip at resonance. A key click filter is built into the transmitter and keying is clean.

Telephony

On switching over to telephony, the output will drop considerably. Taking the bulb indications, the glow becomes red instead of white but, on speaking quietly into the crystal microphone, the lamp lights up again—not quite to the original brilliancy but nevertheless showing a very respectable output. Reports on test over the air indicate that the quality and stability (freedom from splatter and spurious emissions) of the radiated signal are excellent.

Aerial Systems

With the single turn coupling loop, the transmitter matches well into 52-ohm to 80-ohm coaxial line. Balanced line can be used by fitting a different type of output socket or two insulated terminals in lieu thereof. If the feeder

impedance is 300 ohms, the coupling loop should be made two turns of 20 or 22 gauge enamelled wire, run through the same piece of sleeving to keep the bulk small and enable the coil to slip easily into the centre of the tank coil.

For the purpose in mind—local or semi-local contacts—it is suggested that a ground-plane aerial is the most suitable. It gives omni-directional radiation and occupies little space. The aerial proper should have a length near eight feet and made to resonate at around 28.4 mc, when it will function well in both the CW and lower telephony portions of the 28 mc band. Three or four radials, each 8 ft. 6 ins. in length, are arranged around the lower point of the aerial, which can usually be erected on stand-off insulators on an existing mast. The aerial should, ideally, be fed with 52 ohm coaxial cable (inner to the aerial and outer to the radials) but providing the feeder run is not excessive — say less than 50 feet — the mismatch with 72-ohm cable is not serious and can be tolerated.

Or an ordinary dipole can be put up. A stretch of 17 feet at the most, including insulators, is all that is required, and the aerial can be horizontal, vertical or sloping. Incidentally, the figure-of-eight radiation pattern of a horizontal dipole can be made sensibly omni-directional if the arms of the aerial are bent in opposite ways half way along their lengths, though this means additional supporting points. Two dipoles at right angles to each other, with a switch near the transmitter to change from one to the other, will overcome directional difficulties.

Using a separate aerial of whatever type (and perhaps erected in the roof space for convenience) does save the complications of an auxiliary aerial tuning unit, but where a general purpose aerial has to be used (for example, a long wire or what-have-you), such a unit can be made up in compact form and mounted alongside the transmitter or at some appropriate position. The tuning condenser should have a maximum capacitance of 25 $\mu\mu$F whilst the coil would have six turns with a diameter of about 2 ins.

Bandspreading the VFO

CIRCUITRY, AND CONSTRUCTION OF A STABLE BANDSPREAD OSCILLATOR

G. MAGEE (ZE3JL/G3IHQ)

This is an interesting practical article which deals with the problem of adequate VFO tuning coverage over several bands. Our contributor shows that the design of a stable drive oscillator of this type is quite possible. He also discusses a useful sidetone keying monitor circuit.—Editor.

DURING a stay in this country, the writer—scared by the heavy European DX QRM and of course TVI—turned to a large scale re-building programme. The first part of the rig to come under the axe was the long suffering VFO.

The requirements for a perfect VFO, to end all VFO's, were listed. Stability, isolation, clean keying and note were assured by the results of past experience but at the end of the list came:—

(1) The ability to leave the El-Bug permanently connected.
(2) Good facilities for "Netting."
(3) Some form of sidetone.
(4) Bandspread for all bands.

The first two of these desiderata were soon met and taken care of by a switching network, but what of the Bandspread ?

At some time or other, it must have been borne in on most operators that the normal type of VFO suffers from one marked disadvantage when used on the higher frequency bands ; Lack of bandspread. The majority of VFO's in use are those having a fundamental frequency of 1.7 or 3.5 mc, the output being multiplied by various doubler stages for operation on the higher frequency bands. Now for complete coverage of any band (with the exception of ten metres) only the range 3.5 to 3.5875 mc is required. Even on ten metres the frequencies between 28.0 and 28.8 mc seem to be the most used. This small range on an 80-metre VFO represents only about one third of the tuning coverage, and for the CW operator, using the low ends of the bands, even less.

This state of affairs has never been tolerated

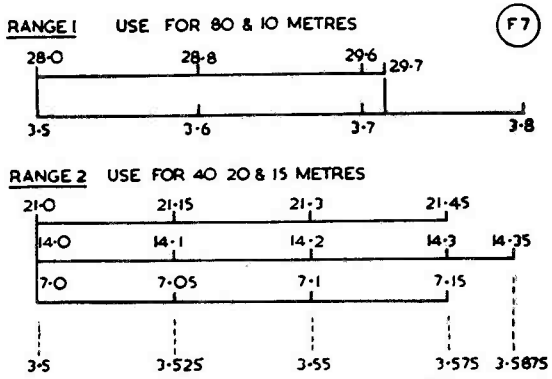


Fig. 1. Showing the two ranges for which the VFO can be set up and the bands to which they apply—see text.

in receivers, where designers have gone to extreme lengths to obtain bandspread of the higher frequency bands. Except for a few commercial units using some form of mechanical spread, the VFO seems to have been forgotten.

Perhaps there is some natural reluctance to fiddle with the VFO.

The old warnings of drift and instability are still remembered. But these can now be moderated, considered in the light of modern valves and technique. What vast changes in technique have taken place since about 1938, when VFO theory was first propounded. Keying an oscillator was looked upon in horror even a few years ago.

But why not play with the VFO, copy receiver design, and bandspread the tuning?

Experimental Approach

The Clapp oscillator was chosen for experiment, and the bandspreading accomplished by switching condensers in series with the main tuning. Reference to Fig. 1 will show that only two ranges are required, and to which bands they apply. The frequencies shown are those as laid down by the Atlantic City Conference, and which have been in force in ZE-land for the last three years. If the whole of the 40-metre band is required by G operators, Range 1 should be used.

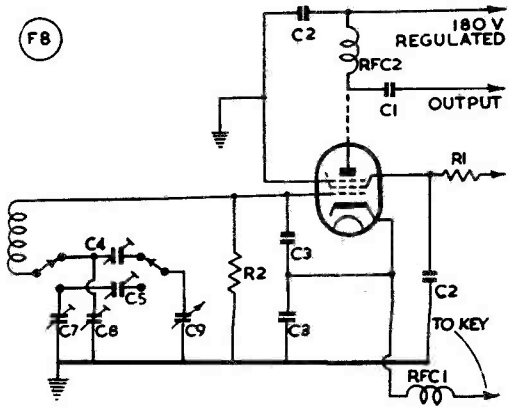


Fig. 2. A Clapp VFO with bandspread incorporated, as discussed in the text. The anode load, coupling and decoupling condensers are not mounted within the VFO box.

[Note: for C9 above, read C6.]

There has been much argument for and against the Clapp circuit; it was, after all, somewhat of a revolutionary change from the High-C oscillators. Its main disadvantages were said to be the varying output and failure to oscillate at frequencies much above 3.8 mc. Neither of these contentions have been confirmed by the writer's experiments. Oscillators have been constructed operating as high as 21.0 mc with no variation of drive over a 450 kc swing. Perhaps previous experimenters have missed the point about the requirements for a Clapp oscillator.

The first is choice of a suitable valve. Triodes, and pentodes with internally connected suppressor grids, are *entirely unsuitable*. The valve must have high slope, very small anode/grid capacity and the suppressor grid brought out to a separate pin. In most applications the valve must be a power type. Very few valves actually meet these requirements, but the 6AG7 is one. Another point often missed is that the total series capacity must be chosen correctly. Too low a value will tend to make the valve "squegger," or cease oscillating altogether; too much will cause the output to vary over the tuning range. For an 80-metre VFO the capacity should be 50 to 55$\mu\mu$F at 3.8 mc. At 21.0 mc it is 25 $\mu\mu$F and the two shunt condensers are 200 $\mu\mu$F. One also finds the Clapp circuit shown with a grid condenser, but its inclusion is entirely unnecessary.

Construction of Bandspread Oscillator

The oscillator is built into a metal box, complete with valve, designed for sub-chassis mounting. The box is made of 16 SWG aluminimum, measures 7 x 4 x 4 inches, and is constructed in two halves which are screwed

Table of Values

Fig. 2. Circuit of the Bandspread Clapp VFO.

C1	= 200 $\mu\mu$F, silver mica.	C8	= *See text.*
C2	= .001 μF, mica.	R1	= 50 ohms.
C3	= .001 μF, silver mica.	R2	= 50,000 ohms.
C4, C5 C6, C7	= 60 $\mu\mu$F, air-spaced trimmers.	RFC1, 2	= 2.5 mH.
		Valve	= 6AG7.

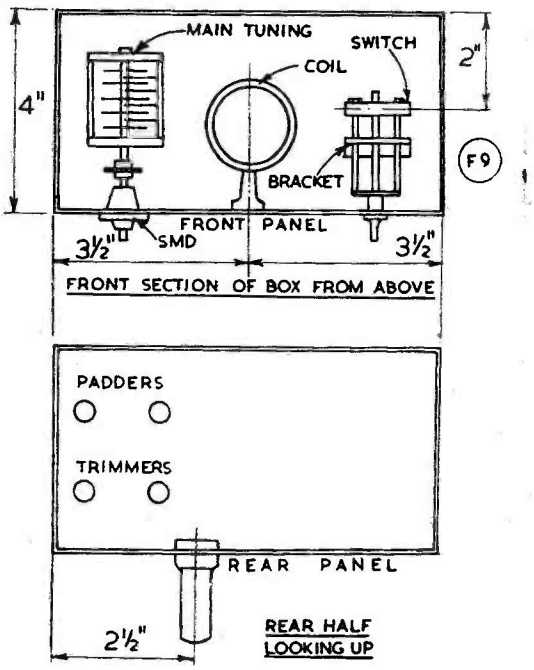


Fig. 3. Sketch showing general arrangement and layout of main components.

together. The front and bottom form one half, the top and back the other. The end plates are secured using self cutting screws. Details of construction are given in Fig. 4 and layout of components in Fig. 3.

The tuning condenser is a 120 $\mu\mu$F double space type removed from a surplus Command Transmitter, BC-458. Although any high grade condenser with a capacity of more than 25 $\mu\mu$F will do, those with a swing of 100 to 150 $\mu\mu$F are preferable if adjustment of the series padders is not to become critical. The trimmers and padders are small 60 $\mu\mu$F pre-set air spaced condensers. The inductance is wound on a 2 in. diameter ceramic former and is 35 μH. It is mounted on the front panel by two stand-off insulators. The switch is fixed to the bottom panel by a mounting bracket and the $\frac{3}{8}$ in. diameter nut of the spindle attached to the front. The condenser is coupled to the slow motion drive of an Eddystone full vision dial assembly by a flexible coupler. The S.M.D. is attached to the front panel of the box, but the dial assembly is later fixed to the front panel of the main chassis. The valve base is mounted to the rear of the box, as low as possible with the heater, anode and metal shell pins to the bottom. A metal shield screens these pins from the rest, the anode and heater leads passing out of the box through the bottom panel. The RFC2 and coupling condenser C1 are not mounted in the box, but on the main chassis in which the box is sub-mounted. The screen HT and cathode leads leave through the rear panel.

The components associated with the valve base are connected between their appropriate pins and a tag strip. The only exception is the uppermost .001 μF condenser which is placed directly between the grid and cathode pins. The pre-set condensers are fixed to the top panel, the two padders being isolated.

Heavy 16 SWG copper wire should be used for the tuned circuit and all earth points bonded together by wire or copper strip. The long connection from the tuning condenser to the switch should be supported in the middle by a stand-off insulator. Most of the wiring can be completed before the two halves of the box are joined, but the remainder can easily be reached through the ends, before the plates are secured.

Adjustment of the oscillator is carried out using a BC-221, or similar frequency meter. Use of a trimming tool is recommended for adjustment of the series padders.

Calibration

First mark the dial to correspond with the high and low ends of the bands. These will be when the condenser is "just in" and "nearly full" mesh. Starting with the condenser at the high end of the scale, adjust the trimmers C8 and C9 to tune at 3.8 and 3.5875 mc on range 1 and 2 respectively. With the condenser at the low end, adjust the padders to tune at 3.5 mc on both ranges. Some re-adjustment back and forth may be necessary to arrive at the correct spread, but once this

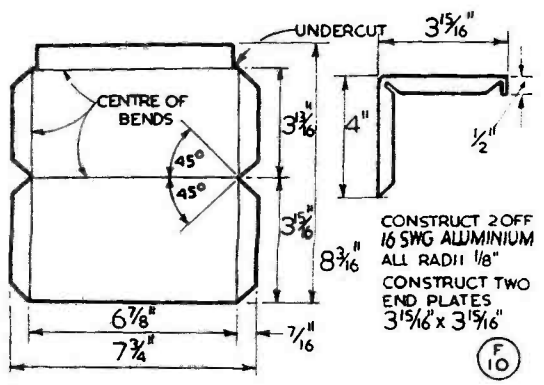


Fig. 4. Dimensions and details for construction of a suitable 7 x 4 x 4ins. box for mounting the VFO. Material is 16g.

has been obtained the dial can be calibrated. Unless some form of straight-line condenser is used for the main tuning, there will be slight cramping at the high ends of the scale. This is something of an advantage as the most used low ends of the bands are bandspread even more.

Switching from one range, then back again, should produce no more than a *few cycles* jump in frequency, and if the VFO is operated in conjunction with some form of crystal check oscillator (as it should be) frequencies within a kilocycle or so can be set up.

In the writer's VFO, the oscillator has been sub-mounted on a main chassis containing buffer and output stages, voltage regulators, relay keying and a switching network.

Simple Sidetone Oscillator

When using a semi-automatic bug or electronic key, some operators listen to the clatter of the relays, back-tune the receiver, or just "bash on regardless." But some form of sidetone check is very desirable for monitoring the keying. This is usually a valve oscillator, or apparatus of the "Monotone" type. A very simple neon oscillator can be incorporated in the VFO which gives a most pleasing harmonic note.

Fig. 5 shows the circuit, and two modes of keying it. The first shows the method as used by the writer, where the voltage to strike the neon is obtained by the drop across a resistor in the relay circuit. Obviously, any resistor that will produce a change of 100 volts or so when the transmitter is keyed can be used. The current taken by the neon is less than 1 mA, so its inclusion will not affect any circuit. The

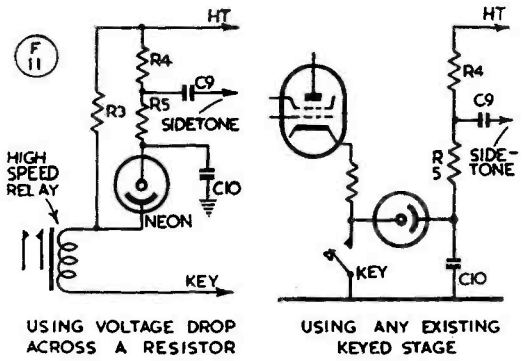


Fig. 5. An ingenious application of the neon to get side-tone on CW. Two possible arrangements are shown, and are covered in the text. Values of C9, C10 can be found by experiment.

second method can be wired into practically any normal keyed circuit.

The value of resistors R4 and R5 will largely depend upon: The supply voltage, type of neon used and the required note. All that is needed is that the neon should just strike when voltage is applied. The resistors will be between 2 and 5 megohms, and a quick lash-up on the bench will soon determine the correct value. The output is sufficient to be heard in a headset, but it should preferably be taken to the volume control of the station receiver. Controllable sidetone is then available whether speaker or phones are being used. The HT supply to the neon can be switched to prevent sidetone when tuning or working on telephony.

The writer would like to acknowledge the help of G4RW for his ideas and assistance during this and many other experiments on Clapp oscillators.

THE GREAT FLOOD

We have had several personal accounts of flood experiences and, arising from this, it has been suggested that a general survey incorporating these stories would be interesting and instructive. Readers who were directly affected by the floods in any way are asked, therefore, to write us with such details as they may care to give. From this material, an article will be prepared for publication in *Short Wave Magazine*, and a small payment made to all those whose accounts are used. The closing date will be March 25, for appearance in the May issue.

IMPROVING THE DELIVERY

The only reason why we had, temporarily, to use wrappers to send out Volume X was because it was impossible early in 1952 to obtain the larger envelopes required in sufficient quantities. Commencing with the present issue, and henceforth, we are able to revert to our earlier practice of delivering the *Magazine* flat to direct subscribers, in a suitable envelope. This will avoid that crease down the middle and will ensure that copies arrive clean and unmarked. Direct subscribers at home receive their copies by post on the day of publication—a subscription now costs but 24s. post free for a year of twelve issues, and orders, with remittance, can be placed with The Circulation Manager, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

"NEW QTH'S"

It is regretted that, due to pressure on space, we are unable to include the usual "New QTH" list in this issue. It will, however, appear again in April. In the meantime, those whose call-sign/addresses are awaiting publication can be assured that this will not hold up the appearance of their QTH in the *Radio Amateur Call Book*.

Portable/Mobile on Forty

MODIFYING THE BC-455 FOR AC OR DC WORKING

A. H. CAIN (VQ2AH)

This article outlines the modifications it is possible to apply to the BC-455 to make it a low-power phone transreceiver for /P or mobile work. Inputs up to 5 watts can be obtained on the transmitter side, using either dynamotor or vibrator pack supply, and the circuitry is so arranged that part of the BC-455 receiver section is used in the transmitter. The complete set as a Tx/Rx unit can also be operated as QRP station equipment off a mains power pack. The modifications as discussed here could of course be applied to a band other than Forty—which in the European Region is hardly suitable for anything but very local /P working.
—Editor.

THE BC455, one of the series of well-known "Command" receivers, lends itself very well to a mobile or portable conversion. It is compact, quite efficient, easy to obtain and relatively cheap.

The conversion consists of building on to the space vacated by the receiver dynamotor, a small transmitter, or at least the PA section—the power unit for the finished conversion is built and housed separately (which is advantageous from a "hash" and noise-filtering point of view) and also allows a wide variety of power units to be used. The writer has successfully tried a 12-volt DC dynamotor (ex-BC342), a 12-volt vibrator pack (synchronous type), and a small 230v. AC pack suitable for use in the home station.

Receiver Modifications

These consist of : (1) Removing the BFO coil and associated condenser and resistance, (2) Re-wiring the heaters for 12 volts, *i.e.*, in parallel, (3) Reducing the cathode bias resistors (to 250-ohm components) of the RF, mixer, and first IF valves, (4) Removing the output transformer and HT and LT chokes ; the output transformer is rewired on the top of the chassis as shown on Fig. 2 (a) and the HT choke can be usefully transferred to one of the power units.

In the space vacated by the output transformer, a carbon microphone transformer is bolted on, its secondary winding wired into the grid circuit of the receiver 12A6 valve—in parallel with the grid leak resistor. The 12A6 receiver output valve and output transformer are also the modulator valve and choke, the Heising method of modulation being used.

The triode section of the 12SR7 becomes the crystal oscillator for the transmitter. The HT line to the receiver valves, other than the 12SR7 and 12A6, is broken and rewired *via* relay RL1.

Transmitter Circuit

The original BFO valve now becomes a crystal controlled oscillator, capacity coupled into the PA which is a 12A6. RF output is taken from a two-turn link wound over the PA tank coil. One end of the link coil is grounded at the transmitter, the other side feeding a quarter-wave aerial or inductively-loaded whip. Relay RL1 was obtained from the transmitter unit of the American VHF equipment SCR522. Any other 12-volt relay with the necessary contacts could of course be used. The function of RL1 is to swing the HT supply from receiver to transmitter, change aerial from Receive to Transmit, and break the audio output line, to prevent audio feedback. If side-tone is required a resistor and condenser in series, R6 and C10 Fig. 1, can be wired in, as shown dotted. C10 can be .01 μF and R6 500,000 ohms to 1 megohm.

The switch S2 fitted in, or on, the carbon microphone (a T17 type is recommended) is the Transmit-Receive control ; closing the switch completes the microphone input circuit and earths the relay return line.

Audio is applied to the grid of V2 (receiver output valve) the modulated output across T1 (receiver output transformer) being applied to the anode of V3. Neon tube N is the miniature type in the BC455, either the input or output neons being used. It is disconnected and rewired as shown, and used as a tuning indicator ; it also checks that modulation is being applied to V3. The value of C11 is adjusted until the neon strikes at resonance *when the 12A6 is fully loaded*, the idea being to use the smallest value of C11 that will give a definite indication of resonance. A meter (0-50 mA) in the cathode or plate circuit of V3 is recommended for preliminary adjustments. A meter can of course be wired in permanently if required : a continuous check of plate input would then be possible.

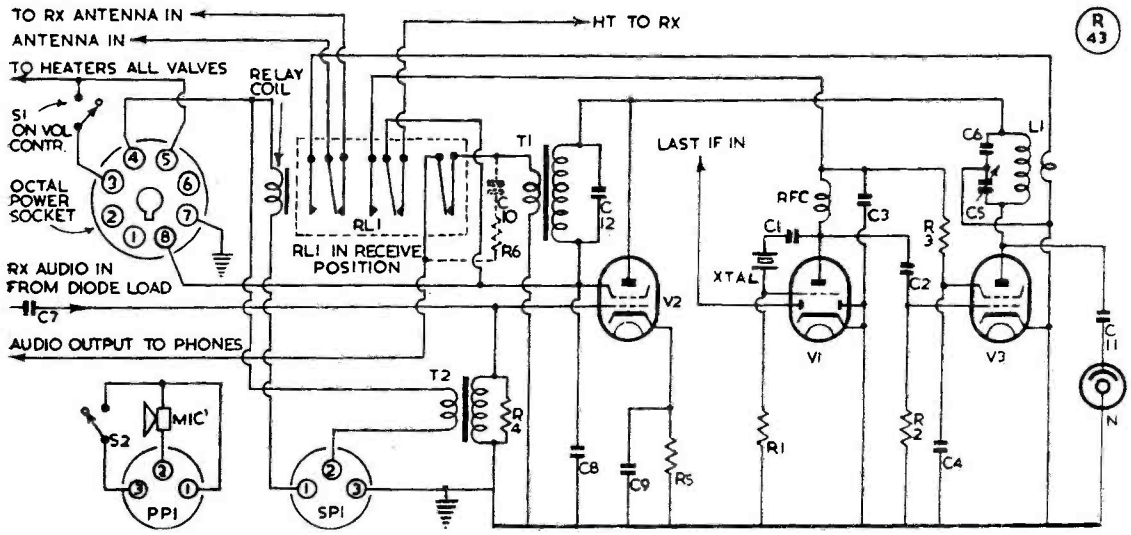


Fig. 1. Circuit of the transmitter section, showing receiver components common to both sections. All necessary values are given in the table.

Construction

It is more than probable that many readers will have had dealings with the "Command" type receiver, and may have one partly modified. However, for those who have not modifications are as follows: Remove from the Chassis—

(1) Four dynamotor mounting posts.
(2) The power and control socket on rear of chassis.
(3) The dynamotor 3-pin chassis plug.
(4) The remote control socket on the front of the chassis.

The wiring joining (2) and (4) is removed entirely. It will then be found that three main leads are left:

(1) HT positive lead to HT choke.
(2) LT positive lead to LT choke.
(3) Gain control lead to cathodes.

The plate carrying the front socket is used to mount a gain control of about 20,000 ohms variable with switch (cathode lead goes to slider and earth on tag). This switch, S1, is the On/Off control when a 12-volt DC pack is used. It is inoperative with a mains supply pack, a separate On/Off being fitted as in Fig. 3 (a).

Remove HT and LT chokes and output transformer. In the spaces left vacant by the 3-pin dynamotor plug, and rear power socket, mount octal type valve holders. Depending on the type used, a little filing may be necessary here. A crystal holder is mounted on the side wall, as shown. Fit the relay and variable condenser.

Table of Values

Fig. 1. Circuit of Transmitter Section.

C1,	C4 = .001 μF, mica.		R3 = 100 ohms.
	C2 = 100 μμF, mica.	R4,	R5 = Existing BC-455 components.
	C3 = .005 μF, mica.		R6 = *See text.*
	C5 = 100 μμF, variable.		N = Neon from BC-455.
	C6 = 800 μμF, mica.		
C7,	C8		
C9,	C12 = Existing BC-455 components.		T1 = Output xformer.
			T2 = Microphone xformer.
C10,	C11 = *See text.*		
	V1 = 12SR7.		RL1 = C/O relay.
V2,	V3 = 12A6.		SP1 = 3-pin socket.
R1,	R2 = 4,700 ohms.		PP1 = 3-pin plug.

For 7 mc Band, coil L1 is 20 turns 20 SWG on 1¼in.former, with 2-turn link overwound.

Output Coil

A standard coil former of 1¼ ins. diameter is wound with 20 turns of 20 SWG and mounted in position after the pins have been removed, and a hole drilled in the bottom of the former to take a bolt for securing through the chassis.

It is suggested that the two-turn link be left until everything is wired up. Some experimenting with the link (turns and coupling) will be worth while for maximum loading and output. Two holes are cut in the front panel, one to take socket SP1, and the other to view the neon tuning indicator.

The cover is removed from the receiver tuning condenser, and the aerial lead from the spring loaded terminal unsoldered and

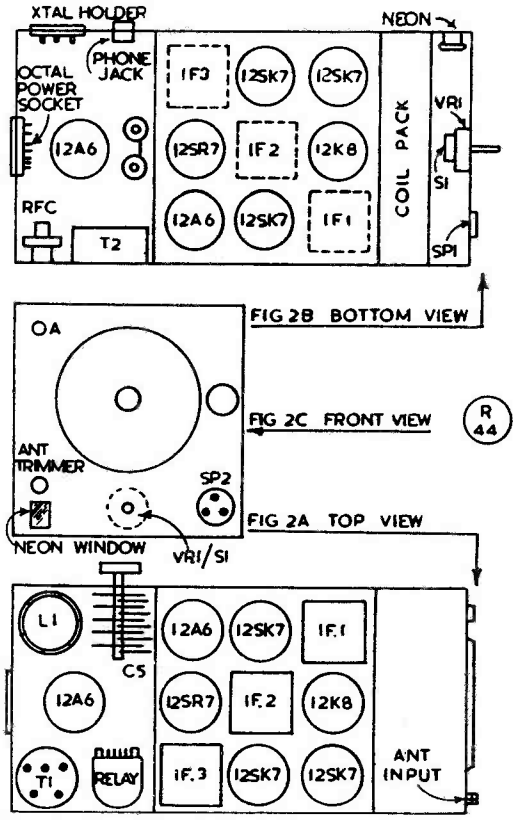


Fig. 2. Front, top and bottom view of the BC-455 showing main components and additional parts for carrying out the modifications suggested.

rewired as in Fig. 1. Before replacing the cover cut a small slot in the bottom edge of the cover to allow the aerial leads to RL1 and the receiver free outlet.

Testing

For test purposes an AC unit was made up as shown in Fig. 3 (a). The transformer T4 was a bulky item and was eventually discarded in favour of two 9-volt GB batteries in parallel. LFC1 was a very low resistance LF choke from a surplus unit, but it did give the necessary smoothing, in conjunction with C3 and C4, to provide hum-free DC for microphone energizing.

Table of Values

Fig. 3 (A). Circuit of Mains Power Unit.

C1 = 8 μF, elect.
C2 = 16 μF, elect.
C3, C4 = 50 μF, 50v.
LFC1 = LR Choke.
LFC2 = Smoothing choke
T3 = Standard mains xformer giving 250v.
T4 = Xformer to give approx. 20 volts output.

The dynamotor unit (ex-BC342 receiver) is already filtered and smoothed and worked very well, as did the vibrator pack. Inputs were practically identical on all packs—about 5 watts—and with an input of only 1.5 watts QSO's have been made with ZS and ZE and local reports (40 to 60 miles) give R5S9+. Results will of course depend very much on the aerial in use and for QRP working a co-axial cable to a separate aerial coupler could be used with advantage; this will mean removing the spring loaded item and substituting a co-ax socket. An untuned primary of four or five turns wound over the first RF coil in place of the direct connection in use at present would also be better from the point of view of receiver input matching. The BC455 cover will also need some modifying at the rear to clear the various components and screen the transmitter.

Conclusion

Due mainly to the high IF of the BC455 (2830 kc) selectivity is not good and was a disadvantage even though QRM is not bad in VQ2 on Forty. A spare BC455 was available and it was decided to try and improve selectivity, using double-superhet technique.

The last IF transformer was removed completely and a 260 kc IF unit mounted in its place. The 12SK7 valve was replaced with a 12A8, to be used as second frequency changer. The BFO coil (taken from the mobile/portable job), was modified by removing three turns from the tuned winding.

Some of the larger components were juggled round, and space made to mount the BFO coil, complete with screen, as close to the 12A8 as possible. This coil was wired up as

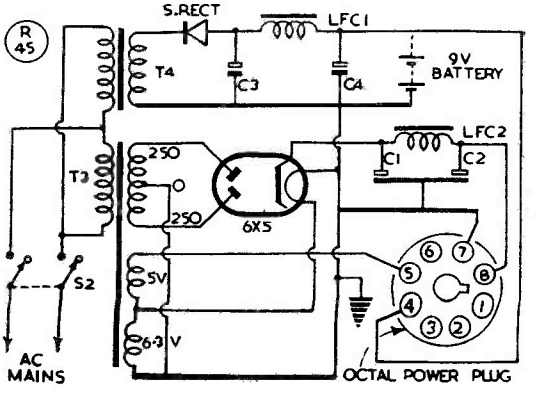


Fig. 3(A). Mains power unit, with LT windings connected in series to obtain 12v. heater supply. The 6X5 heater is tapped in at the junction.

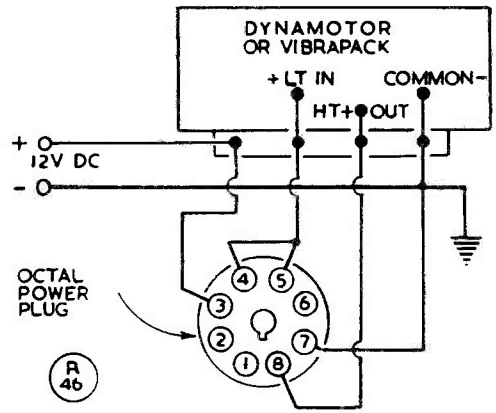


Fig. 3(B). The dynamotor or vibrator power supply connection. Note that pins 4, 5, are strapped.

the oscillator part of the 12A8 and operated on 3090 kc, the small trimmer condenser tuning it exactly to that frequency. Input at 260 kc was taken *via* the IF transformer to the 12SR7 diode. Selectivity was improved enormously, and had two 260 kc IF transformers been available, the last two 2830 kc transformers would have been removed and the 12A8 then been followed by a stage of amplification at 260 kc. (465 kc could of course be used, the BFO coil being modified accordingly.)

Unfortunately it was not possible to transfer the good results of this experiment on to the portable job due to lack of space to fit the modified BFO coil, but possibly by replacing the large metal cased condensers with the miniature type, it could be done, and the results would be well worth while.

DX on Forty

EUROPE-ZL WORKING OVER A TWELVEMONTH

R. CASSEY, B.Sc., A.M.I.E.E. (ZL2IQ)

During the year 1952, no less than 295 European contacts were made on Forty from ZL2IQ, 113 of them being with G stations. Having been actively in search of DX on the 7 mc band since 1949, and being possessed of a questing mind, ZL2IQ has collated his results over the last three years; in this interesting and significant article he shows how Forty can be expected to behave for ZL working, and when G/ZL contacts should be possible. His findings are not only a useful contribution on the DX potentialities of one of our most difficult bands from the QRM point of view, but he also shows how valuable statistical data can be extracted from a careful log record.—Editor.

OPERATION on the 7 mc band has shown that, at certain times of the day, a path is frequently open between Europe and New Zealand. For example, during 1952 a total of 295 European contacts was made on 7023 kc by station ZL2IQ located at Wellington, using an input of 30 watts with a full-wave Windom aerial erected in an East-West direction.

Since information about this behaviour of the 40-metre band may be of interest to European operators wishing to make contact with New Zealand, a graph has been prepared (*see* Fig. 1) to show the commencing time of the contacts made during each week of the year. A number of deductions may be drawn from the graph :—

(1) The time that the path is workable to New Zealand follows a definite trend, being open at 0800 GMT ± one hour in January, becoming progressively earlier by about half-an-hour per month to become 0500 GMT in July; then going later by half-an-hour per month until December.

(2) G stations are the last of the Europeans to be worked. It has been found that the first of the Europeans (I, OK and SM) can generally be raised about one hour before the G stations.

(3) The best months appear to be September and October (53 European contacts each month).

(4) Contacts are unlikely during May and June, presumably because very few stations would be on the air before 0500 GMT, either in Europe or in New Zealand. (NZ time is GMT plus 12 hours).

Similar graphs have been prepared for operations during 1950 and 1951 and exhibit the same trends as are to be noted from Fig. 1.

No positive analysis has been attempted to explain why this transmission path should open so consistently between New Zealand and Europe. However, one or two comments in this connection may be of interest.

First, at these times the long path *via* South America is in darkness and would be the logical route.

Secondly, this path is nearly all over the sea so that losses at the reflection points on the earth's surface should be small. For example, on the long path (13,000-14,000 miles) to Italy and France, the main land mass is South America, which lies at a distance of 6,500 to 8,500 miles from Wellington. To Germany, the long path passes through the Southern Auroral Zone and thence along the eastern coastline of South America *via* Cape Horn. The latter, by the way, is the nearest point of the Americas from New Zealand, being only 5,000 miles distant. To Germany and Poland, the path also passes through the Southern Auroral Zone and just grazes Africa at Dakar. It is noted that the majority of contacts with these latter three countries having Auroral long paths took place in September and October.

Thirdly, the long path (160°-195°) from Wellington to the United Kingdom passes through the middle of the Southern Auroral Zone, and the short path (340°-015°) through the middle of the Northern Auroral Zone. Either path may be in darkness depending on the time of the year, and some doubt exists as to which path is followed. In either case it would appear that the auroral absorption does not attenuate the signals to the extent that one would expect, since communication is possible with powers of less than 50 watts and with simple aerials at each end of the circuit. Alternatively, it may be that the signals travel over some path other than the true great circle one. It has been suggested that the ionospheric front may be tilted while in the course of transition between the daylight and the darkness conditions, and that signal paths are distorted by reflection from this tilted front. No conclusion can be drawn on this point at present, but in tests made during 1945-46 by the New Zealand Post Office, it was found that, during November, December and January, signals were received on bearings as much as 50° to the north of the true great-circle bearings. It is thought that reports of signal bearings obtained by any operators who may be using 7 mc rotary beams in Europe and in New Zealand could clarify this point.

Fourthly, a similar long path does not exist between Australia and Europe. This is to be expected, as such a path would not be in darkness since Australia lies 1,300-3,500 miles to the West of New Zealand.

Fifthly, it is thought that a second path opens up between 1700 and 2100 GMT at certain times of the year. The writer (not being an early riser !) has made no attempt to determine whether this is so. However, on the odd

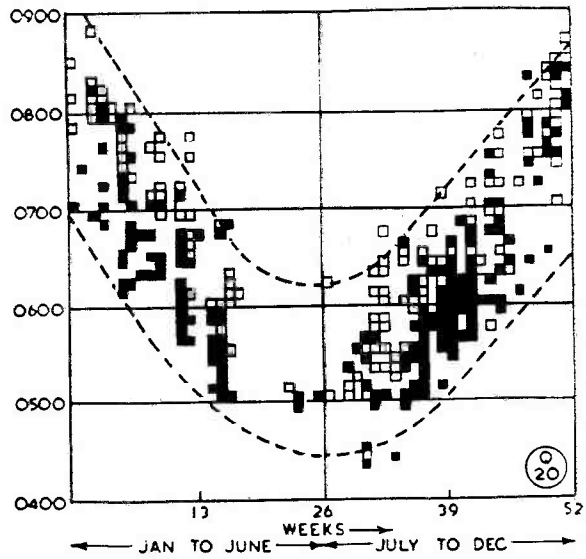


Fig. 1. Graphical representation of the volume of contacts obtained on the 40-metre band over the path Europe-New Zealand during the weeks of 1952, plotted against GMT.

occasions when tests have been made, a few European stations have sometimes been heard. Contacts have not been made, presumably due to the high level of QRN and QRM at the European end of the circuit at such times.

In conclusion, the writer would like to thank the many European stations (particularly G6BS, G3BKF, I1ARK, F8EL and DL1IH) who have contacted ZL2IQ so frequently during the past three years, and, unknowingly, have contributed so largely to the preparation of this article.

★ ★

"THE RADIO QUARTERLY"

We have decided to establish a new publication, appearing four times a year and to be known as the *Radio Quarterly*, the first issue of which will be launched about the end of May—and every three months thereafter. This will be a 96-page manual, ranging widely over the short wave field, covering construction and operating practices, and containing numerous articles of general interest, including certain aspects of television. The format will be somewhat similar to *Short Wave Magazine* when in the smaller size, and the cover price will be low enough to ensure a wide circulation. Readers who care to send us their name and address on a slip marked "Radio Quarterly" will be sent full details when the first issue goes to press.

DX COMMENTARY

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

GM2DBX

CONDITIONS on the bands may be improving a little as the winter wears on, but the change is pretty slow. One or two optimists wax enthusiastic as soon as we have two good days in a row, but on the whole there's no denying that things are pretty deadly in the world of real DX.

Evidence of this is not lacking in the mail-bag; after a preliminary glance through the customary pile of letters, we thought quite seriously of calling this "Top Band Commentary," for the 160-metre news undoubtedly outweighs all the comments on the other bands combined! However, let us not grumble at this; thank goodness we *have* such a band into which we can divert our energies when the others let us down.

There is no denying that the rush for WABC stirred up a phenomenal amount of activity on One-Sixty, but now that the real strivers have collected their awards the band is noticeably quieter of nights. It is good to see, though, from the Top Band Ladder (note the great increase in the number of rungs this month) that another contingent is coming up very near the 60 mark and will doubtless be keeping the band as busy as ever.

So we will start with our lowest frequency and see what its habitués have to say on the subject.

Top Band Topics

Dealing first with matters unconnected with the Trans-Atlantics, we hear from GM3OM (Larbert) that two new counties for him were Bute (GM2FNF) and Anglesey (GW2BMN). G2YS (Chester) is very near the 60 mark but QSL's are lacking; his latest addition is G3HMR (Westmorland).

G3IOQ (Haslemere) stakes a claim for the bottom rung of the ladder, but is short of time, being at school. If he could find a steeplejack he could get up a nice 500-ft. aerial between two trees, but at the moment he is limited to 132 feet. G3DVQ (Purley) has completed a new transmitter, which, with 106 feet of wire, has worked OK1KKU and HB9CM. He also heard the latter working OH3NY and HA5BT. 'DVQ raised OH3NY in January, 1952—probably one of the first OH QSO's on the band.

G3IAF (Guildford) is hot on the WABC trail with 59 confirmed. He can't get his sixtieth even with stamped addressed envelopes! Recent ones include Bute (GM2FNF), Anglesey (GW2BMN), Westmorland (G3HMR) and GM2CAS (Kincardineshire). 'IAF finds that the best time for CW work of this kind is between 2200 and 2300, when general QRM seems less and the phones are not so troublesome as later.

G3HDQ (Woodford) moved on to 1.7 mc in January and worked HB9HT, OH3NY, OK3MR and some 35 counties, using his 68-ft. Zepp. GW3CKB (Barry, Glam.) has worked OH7OH twice during the past week—the OH uses 30 watts. Since January 5 GW3CKB has raised 41 counties.

GM3IGW (Alloa) collected DL2RO and MF2AG for new ones in the country line. For *counties*, he has worked most of those we have already mentioned, as well as G6VQ (Westmorland). He adds that GM3IPU is putting Roxburgh on the map, GW3ZV intends to operate from Brecon, and 'IGW himself promises to put in some week-ends from Kinross. You can take it that he is there if you hear GM3IGW/A. Finally,

CALLS HEARD, WORKED AND QSL'd

Mike reminds us that ZC4XP and TF5TF have reappeared on the band.

G5JU (Birmingham) has started on the trail, and finds contacts much easier to get than confirmations . . . . G6ZN (Horbury) heard a new one in the shape of GM2BNX (Coldstream, Berwickshire), and also worked OH7OH twice. His real triumph, though, was W3EIS on January 18!

G6KP (Morden) is another convert to One-Sixty, and before he had been up there four days he had a contact with ZC4XP, not to mention OH3NY, OH3RL and OK2DC. GM3EFS (Alexandria), who was slightly "anti-WABC" a month or so ago, now thinks it's a Good Thing after all. But he says "it was rather hectic until the DX Kings had all collected their 60 cards!" 'EFS has worked over 300 stations in the past five months and has answered all QSL's received. His score of 72 worked includes *all* English counties.

GI3HFT (Belfast), who collected WABC No. 1, continues to chase the rare ones on the band. His transmitter is self-contained in a TU5B box and calibrated accurately through the band. Best DX so far—OH3NY, OH7OC and HA5BT; still gunning for Shropshire.

G3ESY (Hereford) puts himself on the ladder after collecting his WABC. G3FXB (Hove) is a new occupant, mainly for rag-chewing purposes. Aerial size makes DX difficult, although he has raised OH3NY.

G3AKU (St. Ives, Hunts.) sends one of his very rare reports; he is another who has worked all the English counties, and 60 altogether, but this was two years ago, and now he has to do it all again. (This shouldn't be difficult, as he says he has worked 54 counties in 13 days on the air since last October!) Anyone wanting Hunts. should look for G3AKU on Sunday evenings during March—activity at other times will be practically *nil*.

G3ELZ (Grimsby), G8KP (Wakefield) and GM3IGW are the only three stations, at the time of writing, with the distinction of having 70 confirmations. Please note that we do not propose to issue "stickers," but will keep the Ladder going until someone gets to the maximum of 98!

Probably by now someone will have worked GW3ITD (Carmarthenshire), due to be on by February 14, and also G5PP/P (Rutland) the following week-end.

One-Sixty Overseas

A special overseas Top-Band section is quite an event! OH3NY (Lyly) earns our hearty congratulations on his attainment of WABC—the first to do so from outside the U.K. He sent his 61 cards at the end of January, and we were delighted to sign on the dotted line for him! Matti has certainly put Finland on the map in a big way.

W2QHH (Hamilton, N.Y.) has at last worked his first G (G5RI), and also collected EI9J, using 16 watts to his 6L6. Howy is now hot-foot for the *Magazine DX Award*. But he says "One-Sixty is a rough deal—you just can't get the Central American and West Indies guys interested, and so many of them are barred from the band, even our own possessions like KS4. And the Loran set-up really screws up the works."

CN2AN (Tangier) is ex-PAØOA and very much wants to work the U.K. on Top Band. He has a 350-watt rig running on six bands, so, in spite of the absence of a half-wave aerial, he ought to be audible! He will QSL if reply coupons are enclosed with incoming cards, no matter what band they concern. QTH: CN2AN, British P.O. Box 57, Tangier.

DL1IX sends a long list (much too long to publish!) of U.K. and European stations logged on 1.7 mc on January 24 and 25. He is very sorry that transmission is impossible, but is still a keen listener to the band.

CN2AP is ex-G, but says he cannot work 1.7 mc because of lack of aerial space—he has only 33 ft. available (but it would be worth trying!).

The Trans-Atlantics

Not wishing to "jump the gun" on our full report, which we hope to collate in time for the next issue, we will not go into much detail here. Unfortunately, the beautiful conditions of January 11 have not been repeated so far; the test of January 25 was, as we all know, A Mess. The clash of dates could not be avoided, but we did hope that the masses of G stations working each other could have left a hole at 1800-1825 kc clear for those who hoped to work W or VE. As it happened, though, long-distance conditions were pretty poor, and few stations were heard at all. Those that did break through were VE1HJ, W1BB, 2HCW, 3EIS, K2ANR and KV4AA.

January 18, though not an official test morning, proved to be

TOP-BAND COUNTIES LADDER

(*Starting Jan. 1, 1952*)

Station	Confirmed	Worked
G8KP	70	72
G3ELZ	70	71
GM3IGW	70	71
GI6YW	69	69
G6ZN	68	72
GM3EFS	67	72
GM3OM	67	69
GI3HFT	67	68
G3ESY	64	65
G6VC	63	69
G2NJ	62	63
GM3JDR	61	66
G5LH	60	61
G3IAF	59	67
G3AFL	58	60
G4XC	56	64
G5JU	46	57
G3HTI	43	55
G2YS	41	58
G3AKU	40	54
G3BDS	30	50
G5FA	20	24
GW3CKB	17	41
G3NA	11	27
G3DVQ	10	21
G3HDQ	7	31
G3HWH	6	31
G3IOQ	4	16

moderately good; G5MP (Hythe) worked W0NWX, and long lists of W's heard were sent in by our leading SWL's. 'Way back on January 11 we now know that W2EQS worked VP4LZ on 1982 kc. but no one over here has yet reported receiving the VP4. Just before going to Press we hear from J. L. Hall (Croydon) that he has logged KG4AF (1819 kc). All other news on Trans-Atlantic matters is being carefully sifted and filed for use in the complete report thereon to appear in the next issue.

DX on Eighty

W2QHH is only one short of the Century now on this band! It is only two or three years since 50 was an achievement, but Howy's score is now 99, the latest being FF8AG, EA9AP, VR2CG, OE13RN. Of these, 95 are confirmed already.

GW3CKB (RAF St. Athan) had a fling on phone on the night of January 11/12, and worked eight W's, three VE's, a VO and a KP4—all reports between S6 and S8.

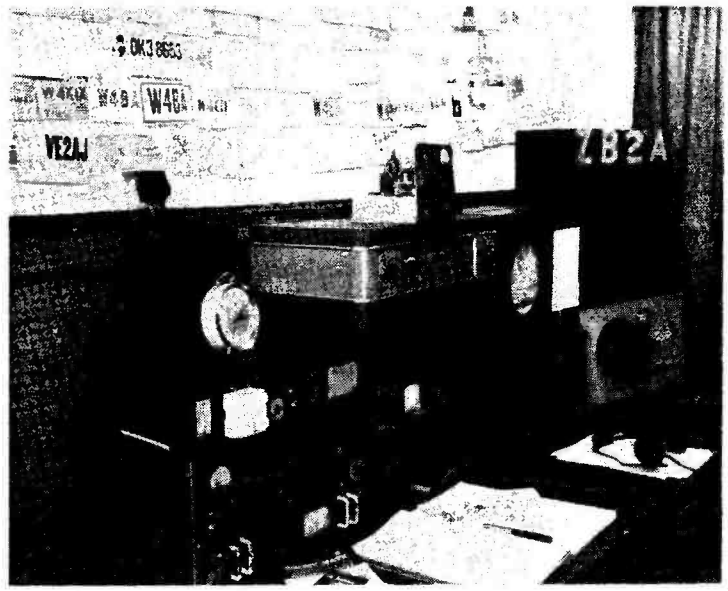
G3FXB was thrilled to land AP2K on 3525 kc (midnight), the only other CW DX being 5A3TU, although some W's and VO's were worked on phone. G5BZ (Croydon) worked a couple of ZL's one morning, but otherwise hasn't been on the band.

Others have been heard calling or working ZL's, but they are the types who don't report, so we can't comment with certainty. (There's a lot of secrecy about DX these days, it being rather scarce!)

Forty Metres

This is a band which has, at last, shown signs of a come-back. We were amazed to work a couple of W6's one morning, as late as 0850, and when we heard them again (long way round) the following afternoon at 1530 we realised that the band is wide open but *just jam-packed with QRM of all* kinds.

G5BZ says the surprise of the month has been the terrific strength of ZS7D, ZS7F and ZS9I on this band (he worked two of them). Other QSO's were with ZS, ZL, KP4, VK, PY and lots of W's, but a miss on ZS2MI.



The station of ZB2A, on the Rock of Gibraltar. ZB2A is actually a club station operated by Service personnel, and chief interest is in the 14 and 21 mc bands, with inputs never exceeding 20 watts to an 807 PA. The bench boasts a good selection of receivers—AR77, AR88, HRO and S.740—and various aerials are available, with a 3-element beam under construction for 14 metres. The only other active station on the Rock is ZB2I.

G5FA confirms that things have been interesting, and he worked YI2AM on phone, plus CO3YY, KP4UW, JY1RT, MP4HBK and stacks of W's, including W7GHU (Ariz.). The MP4 was raised with 25 watts at 1600. HH2LD, FM7WD, KZ5CP and KC6QY were also heard. (Well, well, if some of this doesn't sound like real DX again!)

G3BLG (Malvern) worked KL7PI, PX1YR, VK2NO and YI2AM. G3HDQ reports working ZD2DCP on the band (first day with 'HDQ's new aerial, too), and G2WW collected ZB1KQ and VQ3DN, both on phone, plus VQ4HJP on CW. G3FXB found EA6AU for a new one, also phone with VE2WW (7220 kc, all in among the broadcast). W2ESO reported his phone S7 the same night.

Interesting ones said to be active on Forty are JA1AL, YV5AO, VP7ND and PJ2AD—all on CW at the low end. VQ3K1F has been a wonderful signal around midnight on occasions, and we have already remarked on the ZS7 and ZS9 boys. Altogether, Forty is a good band—if you can stand the racket!

And, talking of rackets, what is the HF end going to sound like in a few days' time, when the W's are going ahead on phone for the first time? Let's hope some of their kilowatts succeed in shifting some broadcast stations. . . . .

Twenty-Metre DX

And so to Twenty, for what it's worth, which doesn't seem more than about twopence at the time of writing. G3FXB puts in a *nil* report, except for a few W's on phone. G2WW ferreted around in the contest QRM and worked 11AHR/9A2 in San Marino (phone). On February 7 the local Europeans suddenly faded out at tea-time and two stations called him—VK2FA and VU2JP—giving him S9 and S9 + 40 respectively. Within five minutes they had gone back into the mud. FB8BA on phone was another nice one.

G5FA, not having been on the band for a long time, had a day at home and collected OD5BN, FQ8AP, XZ2OM and some VK's, ZS's and the like. 'FA nearly got bitten by the DX bug again. G5BZ reports "nothing out of the ordinary" and quotes AP2R, ZS2MI, VQ3 and "the usual run."

G3GUM felt a bit remorseful over his recent ruderies about the band, and went back. He worked FF8AP (Tchad), HC2OT, KV4AA, FF8JC, MI3AT, VS1FE, KH6WU and other nice ones. He missed ZS2MI but heard him go back to a GW3, who said it was his *very first QSO* (licence arrived that afternoon!) There was a pile-up of W's calling ZD8BE, who was not heard.

G3HDQ, with his new QTH and aerial, has been pushing 75 watts around; initial results have been promising, with ZS's, PY, VK, W7, OX, TA and the rest. Since then he seems to have had little luck, but has been active on Top Band.

G3BLG (Malvern) collected some very nice southerly spots with FB8BB, FB8ZZ, VK1PN, VP8AA (South Sandwich) and ZS7D; this with 150 watts to a 33-ft. Windom.

Doings on 21 mc

Our new band still suffers from lack of activity; even at week-ends we have the feeling that many more countries could be heard if only they would come on. Conditions haven't given it a fair chance, either, but at times it has been surprisingly good by comparison with 14 mc.

G3DO (Four Oaks) is now up to 40 countries, including ZS7, ZD9 and VU, and he has worked 26 of them on phone. G2YS puts in a similar score, but has spent little time on the band.

G3GUM winkled out three new ones — VP6PV, KZ5IF and VQ3BM. He tells us that February 8 gave no opening to VK, but VU2CQ was there at 0930, and the band opened wide for W and VE all the afternoon. On one occasion 'GUM worked "all the stations on the band simultaneously" — ZC4DW and W8BHW! And he confirms that W4COK has now received his old call, W2COK, back again and will be gunning from there in future.

ZE3JO (Salisbury) is pretty active, and has worked 27 countries on CW and 13 on phone—total 30. G5BZ added four new ones with ON, SM, SU and CR7. G2WW found a nice opening and had five QSO's, each with a new country—OQ, ZC4, ZB1, VQ4 and OD. ZD9AA was also worked on phone.

G3FXB only had one QSO—with AP2K. He reminds us that the W's are let loose on phone from March 28.

CN2AP (Tangier) is very active on 21 mc phone, and has worked a total of 38C on all bands—which he feels is not enough considering the time he has put in. He is beginning to think that CN2 is not a good locality for DX after all!

General Chat

Comments on the individual bands are scarce, but there is quite a lot of chat on matters of general interest—not forgetting the usual proportion of binds, moans and squeals.

We could easily dish up two columns on these matters, but they have all been aired before, some of them so often that there seems little point in repeating them. (*Examples*—Phones in the CW bands; G stations in the W/VE section of the Top Band during Tests; and so on). We don't propose to waste any further space on these manifestations—so do something about it yourselves! Write them rude letters; ring them up at inconvenient times; tell them what you think *over the air*; but keep these columns uncontaminated in future. Away with Clots—we've never heard of them!

Matti of OH3NY writes to tell us of his QSO with W1BB on January 11—a fine piece of work and an undoubted "First." We are glad to note that he is getting his G cards through at last, and has, of course, already made his WABC.

G2NJ forwards two interesting QSL's. The first, from F8OC, shows that he is 80 years old and still going strong. The second, from GM2CAS, says "Work three other Aberdeen stations (any band) and qualify for Coronation Year Award." So the Aberdeen boys are making themselves attractive during 1953!

Geoff Barber of MP4KAE (formerly VT1AF) has come to the end of his stay and will soon be home on leave. He tells us that Box 54, Kuwait, is completely wound up for QSL purposes, but MP4KAC has offered to act as manager. QTH: W. N. Burgess, c/o Kuwait Oil Co., Ahmadi, Kuwait.

G3IDR/DL2SR is off the air for various reasons, but disagrees with recent comments on aerials and the B2. With his own, he says, a 68-ft. end-fed worked very

FOUR BAND DX TABLE

POST WAR

Station	Points	3.5 mc	7 mc	14 mc	(21 mc)	28 mc	Countries	Station	Points	3.5 mc	7 mc	14 mc	(21 mc)	28 mc	Countries
W2QHH	519	99	98	216	—	106	216	G6QX	332	48	85	142	(28)	57	161
DL7AA	515	74	131	210	(53)	100	217	G3ABG	286	35	79	142	(17)	30	149
G6QB	502	52	100	215	(51)	135	231	G2BW	268	24	57	144	(15)	43	151
G5BZ	438	56	101	216	(51)	65	220	GM2DBX	260	5	31	143	—	81	161
G2AJ	433	42	81	192	—	118	211	G8VG	259	34	76	123	(9)	26	140
G2VD	413	46	84	175	(55)	108	184	G2YS	251	42	45	124	(38)	40	142
G6LX	392	58	56	172	—	106	194	G3GUM	218	31	38	148	(63)	1	159
G2WW	387	23	70	187	(25)	107	194	G6TC	213	17	59	100	—	27	119
G5FA	368	33	112	150	(22)	73	165	GM3EDU	197	37	41	96	—	23	116
G3FXB	363	54	102	168	(40)	39	174	G3FPQ	197	45	24	116	—	12	119
								G3FXA	193	22	46	117	—	8	124

(Note: Next month this becomes a Five-Band Table, the 21-mc score being included in the total. This month the 21-mc figures are shown for interest only. All scores are Post-War. If you wish to continue in this table, please send in your 21 mc score with the rest and show the new total.)

well indeed. He is going camping in Denmark next June and would like to meet some OZ amateurs; in August he hopes to get around EA, I and YU.

Multi-Banders

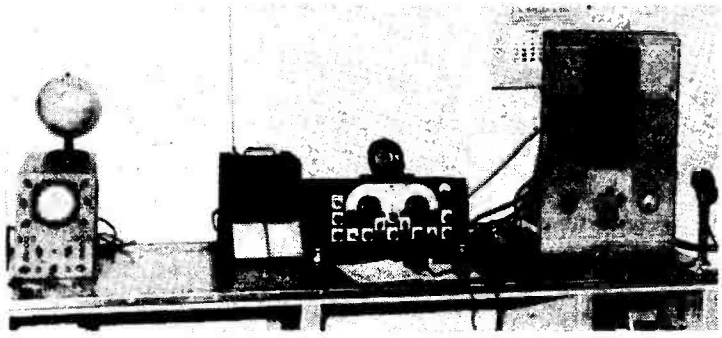
Last month's quote on 5-band and 6-band contacts has, naturally, stirred something up, and here we have a few claims from W2QHH. Of course, 27 mc gives him an extra band, but nevertheless he claims seven-banders with W, VE, KP4, KG4 and KV4; six-banders with EI, G, GD, GW, VO, VP4, 7 and 9, OA, PY, KH6, KZ5 and DL. These are all fully QSL'd. Any challenges?

G3AKU suggests that the FBA is now not difficult enough, and points out that it should be possible to get 20 countries reasonably on 5 bands, and at least 10 to 15 countries on 6 bands. Well, we admit that 21 mc has altered things somewhat, but the Four-Band Award has been launched and will stay—whatever else we may think up.

21 MC MARATHON

(Starting July 1, 1952)

STATION	COUNTRIES
W4COK	64
G3GUM	63
G6GN	61
G2VD	55
G2BJY	55
DL7AA	53
G5BZ	51
G6QB	51
G8KP	50
G3DO	40
G3FXB	40
G2YS	38
G8OJ	32
ZE3JO	30
G6QX	28
G2WW	25
G5FA	22
G3ABG	17
G2BW	15
G2DHV	10
G8VG	9



Operating position at VK3XO, Fairfield, Melbourne, showing the receiver, VFO and beam control panel (right). The Rx is a home-built 19-valve double-conversion job, covering 540 kc to 32 mc in switched bands. The VFO is a "Command" unit adapted to give drive output on 7 mc, and the PA is an 813, running 100 watts CW or phone, modulated by a pair of 807's in AB2. Operation is mainly on Twenty, for which band the aerial is a 3-element beam mounted on a 40ft. tower, with remote control and indication. VK3XO started in 1919, his first callsign being A3LP, becoming OA3LP in 1929 and VK3LP pre-war. The station record is 154C in 40Z worked, with 130C and 38Z confirmed. VK3XO is also the holder of many DX operating awards and certificates.

The only change is that it has now become a rather easy one instead of a medium-to-difficult one. 'AKU adds that he has 6-band contacts with G, DL and OZ, and 5-band with ten countries (without counting 21 mc at all, as he hasn't started there yet.)

In the Floods

We are asked by G2HKU (Sheerness) to pass on the good news that he and his family are safe, although his home and shack were flooded, with no power, no sewage and so on. His post-card, dated February 4, says "Hope to get downstairs when water goes—Red Cross supplying meals by boat and fresh water coming by boat from Chatham. Two phones working on the island. G4FN and 6AB have sent us supplies." It is good news indeed to know that they are safe, but extremely bad luck to have been through such an ordeal at all, and a big rebuild (though necessary) will be one of the least of Ted's worries afterwards.

We wish him luck, and couple his name with the many other readers who must have been flooded out and have not yet been able to let us know of their progress. A good many tragedies, either great or small, are never heard of at all; most people are slow to write when all is *not* well.

GM2DBX (Methilhill) hasn't yet started up on 21 mc, so will be dropping out of the Four-Band Table for a while. He worked ZD2RRW, MI3LK and HP1EV on Twenty phone, and enjoyed himself in the ARRL Contest—but no W7's worked.

G2ZA (Brighton) is an Old Timer introducing himself. He was G2WW for several years before the war, but let the licence lapse and lost the call (Penzance, please note!) He started on the air again in 1951, after which came a pause, but he is now active once more and has decided to "forget the past" and start from scratch once again; so we hope to hear of his doings on 14 and 21 mc from time to time. He is now using a 66-ft. *indoor* aerial and finds results encouraging, even compared with his former 265-footer.

ZB1AH recommends the keen ten-metre types to listen on 28.5 mc on Sunday mornings, when they should hear the Malta net at work between 1000 and 1200 GMT. ZB1AH, 1BM, 1KQ, 1L and 1S are always there, and sometimes others as well. 1AH tells us that they are still limited to CW only, and 21-21.2 mc on the new band.

GW3ALE will be home at Dinas Powis, Glam., by mid-March, but his licence has gone through in Ceylon and he is now VS7AL. Leave will be spent building a 100-watt table-topper for CW, and after June the QTH will be Box 858, Colombo. Meanwhile, Bernard looks forward

to personal contacts in the U.K., especially with the Grafton boys (he was their first President and held that office for four years).

G2NS (Bournemouth) harks back to the "T2FD" aerial and tells us that a local. G3IQX, using the 40-20-10 version of it, finds that for some reason it loads up and gets him out on 80 as well!

G3HHR (Lancaster) reports that a station will be working from the annual Hobbies Exhibition up there between April 8 and April 11. Call-sign G3BAP/A, and operation on Twenty and Eighty between 1400 and 2100 GMT each day. A special QSL card will be used for confirming contacts.

VS1FE, Singapore (who is G3GDW) writes to say that he is now on with 145 watts, CW and phone, and will be looking specially for U.K. contacts.

Strays

From KV4AA we received the following interesting flashes:— VK1HM (Cocos) operates on Twenty phone, 1300-1430 daily; VS9AW (Oman) is now QRT, but VS9AS will be running the same rig; VQ6AC has been worked by W6's; VR1A is on 14068, xtal; the former W5AGB/FM (Fletchers Ice Island) has been signing KF3AA; ZC5VS (North Borneo) is still active on 7010 kc.

No further news of the expedition to Easter Island, and no confirmation of the rumours of activity on Galapagos or Cocos Island (the other one!)

Perhaps some real DX will be starting up by the time we write the next effusion; this should be the season for it, anyway, March and April always having been the peak months up to now. Meanwhile, keep scratching away, use all the bands you can, don't neglect 21 mc, and keep on the air *somehow*! Don't add general inactivity to the natural hazards that beset us all in this trough of conditions.

So, until next month, we take our leave again. Send it all in to "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1, by **March 11, first post.** For the month after the deadline will be *April 15*. 73, BCNU, and keep chasing them!

Short Wave Magazine
DX CERTIFICATES

The following have been issued since the publication of the last list, in the February issue:

WNACA

No. 30. SM5YG (Bromma)
31. SM5CO (Stockholm)
32. OH3NY (Lyly)
33. ON4PJ (Brussels)
34. G3AKU (St. Ives)
35. DL1TM (Hann-Muenden)

FBA

No. 10. G6KP (Morden)
11. G2WW (Penzance)
12. G5FA (London N.11)
13. G3FXB (Hove)
14. G3AKU (St. Ives)

WFE

No. 4. SM5LL (Enskede)
5. VK4HR (Brisbane)

WABC

No. 10. G3ELZ (Grimsby)
11. G2NJ (Peterborough)
12. GM3EFS (Alexandria)
13. G6ZN (Horbury)
14. G6VC (Northfleet)
15. G8KP (Wakefield)
16. G3ESY (Hereford)
17. OH3NY (Lyly)

General conditions for the issue of MAGAZINE DX AWARDS were given on p. 673, January, 1953.

SWISS CONTEST

The Swiss "Helvetia 22 Contest" will be run off on the following dates:

Phone: March 14, 1300 to March 15, 1900;
CW: April 18, 1300 to April 19, 1900 GMT.

Stations outside HB will work as many HB's as possible in each of the 22 Swiss cantons, using the number of the latter worked on each band as a multiplier.

Three points per contact, exchange RST (or RS) and serial number starting from 001. No contacts allowed between HB and Europe between the hours of 2100 and 0600.

Logs to be mailed to R. Faessler, Zurcherhof 4, Cham, Switzerland, before April 30.

THE LATEST CALL BOOK

This is the Winter Edition of the *Radio Amateur Call Book*, running to 450 pages and giving the call-sign, name and address of every known amateur throughout the world, by prefix, country and call-sign alphabetically. The *Call Book* gives also the Zone location of each country, and the address of its QSL Bureau—as well as much other useful information. The G Section of the new edition runs to 20 pages, totalling 60 columns, containing the call-sign/addresses of more than 7,000 licensed amateurs in the British Isles. All QTH's and changes of address as published in our "New QTH" feature up to and including the November 1952 issue of *Short Wave Magazine* appear in the Winter Edition. The price is 25s. post free, of the Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1. We can also supply the Foreign Section of the same edition, at 10s., which is the *Call Book* less only the 270 pages of American amateur listings.

RHODES CENTENARY CELEBRATION

We are informed that during the period July 11-17, the Northern Rhodesia Amateur Radio Society will be operating VQ2RCC on all bands 7 to 28 mc, and looking for contacts throughout the world. The station will be on the site of the Rhodes Centenary Celebration Festival in Nkana-Kitwe, Northern Rhodesia. A special QSL card is being designed for the occasion. We are also asked to say that the N.R.A.R.S. would be very glad to fix schedules for VQ2RCC for the week from July 11; correspondence in this connection should be addressed to: The Secretary, Northern Rhodesia Amateur Radio Society, P.O. Box 332, Kitwe, Northern Rhodesia.

Amateur Radio in Soviet Russia

LICENSING SYSTEM AND CALLSIGN SIGNIFICANCE

For some years, two British amateurs with a knowledge of the Russian language and access to radio periodicals published in the U.S.S.R. have been observing the processes of Amateur Radio in the Soviet Union. This is the first authentic post-war survey of the subject, and is compiled entirely from Russian sources. The next instalment will deal with the annual contests held and DX certificates issued by Iron Curtain countries, including also a review of the Russian magazine "Radio," with a description of a typical Russian club station, and translations of various types of the Russian QSL's held by many operators in this country. To safeguard their sources of information, and for other obvious reasons, the authors of these articles are being given the protection of anonymity. Readers may be assured, however, that this does not in any way detract from the reliability of what they have to tell.—Editor.

ALTHOUGH Russian scientists had foreseen the possibility of wireless communication before the beginning of the present century, it was not until 1926 that permits were issued for the operation of amateur transmitting stations in the sense we know. The first of these licences went to one Fedor Alekseevich L'vov, who was given the call R1FL and operated a home-built transmitter in the town of Nizhniy Novgorod—since renamed Gorkiy—about 250 miles east of Moscow. In the following year a new callsign system was adopted consisting of the prefix EU or AS (depending on whether the station was located in Europe or Asia), followed by a number 1-Ø on somewhat similar lines to the present system, and finally a two-letter suffix in the normal sequence AA—ZZ. By the end of 1928 some 40 calls had been issued and there were by then amateur stations in most of the major cities and towns of the Soviet Union.

Then in 1934 the system was again altered and the general prefix U was adopted, with the special prefixes UE, UK and UX denoting Experimental, Club and Expedition stations. Few of the pre-war operators are active to-day, but some notable exceptions are Vadim Vostryakov, UA3AM, who was first licensed in 1927; N. V. Kazansky, UA3AF, who previously held the call U4AM; N. A. Baykuzov, UA3AG, ex-U3AG, who is also Chief Editor of the Russian journal *Radio*, which frequently reprints articles from *Short Wave Magazine* without acknowledgment; and A. F. Kamalyagin, ex-U3EB/U1AP—now UH8AF.

It will probably astonish many readers to know that at present the number of active amateur stations in the USSR totals no more than 750, which is roughly the same number as were authorised by 1939. On the other hand, no less than 30% of the issued amateur calls are held by radio clubs, factories and collective farms (Kolkhozes), thus affording operating experience to a far greater number of enthusiasts than would be possible if they were individually owned.

Licensing System

Operating permits are required for use of any short-wave equipment, whether transmitting *or receiving*, and these are obtainable from an organisation know as DOSAAF—the All-Union Voluntary Society for Co-operation with the Army, Air Force and Navy. Amateur Radio is merely one small offshoot of this organisation, which covers a very wide range of activities. As its name implies, membership is entirely voluntary—that is to say, anyone not requiring a ticket need not become a member! Three types of licence are issued: Novice, Class II and Class I, depending on the applicant's qualifications. Briefly, a Novice Class licence permits operation on the 160- and 80-metre bands only with a maximum input of 10 watts; a Class II ticket allows operation on 160, 80, 40 and 20 metres with a maximum input of 40 watts; while the Class I permits entitle the holder to the use of all bands, including 21 and 28 mc, with 200 watts input, CW or phone. In addition, all classes are permitted to use the Russian 85-87 mc band for Phone or CW.

No charge is made for operating permits and postage on QSL cards is free! Amateur working is allowed on an inter-Union basis, but contacts outside the U.S.S.R. can only be made with stations in Poland, Bulgaria, Roumania, Czechoslovakia, Hungary, Albania, the Russian-occupied Zones of Germany and Austria, and with China and Manchuria. In several of these countries there are, at present, no active amateurs. As will be well-known, for many years Russian amateurs were also permitted to work stations in any part of the

TABLE 1 — CALLSIGN ALLOCATION SYSTEM FOR RUSSIAN AMATEUR STATIONS

Letter Following Numeral (or K)	UA1	UA1K	UA2	UA2K	UA3	UA3K	UA4	UA4K	UA6	UA6K	UA9	UA9K	UAO	UAOK
A	Leningrad	Leningrad	Kaliningrad	Kaliningrad	Moscow	Moscow	Stalingrad	Stalingrad	Krasnodar	Krasnodar	Chelyabinsk	Chelyabinsk	Krasnoyarsk	Krasnoyarsk
B	Leningrad	Leningrad			Moscow	Moscow								Krasnoyarsk
C	Leningrad				Moscow	Moscow	Saratov	Saratov			Sverdlovsk	Sverdlovsk		
D	Leningrad				Moscow						Sverdlovsk	Sverdlovsk		
E		Archangel				Kalinin		Penza		Stavropol		Molotov		
F	Leningrad	Archangel			Moscow	Smolensk	Penza		Stavropol		Molotov		Khabarovsk	Khabarovsk
G					Moscow	Orel								Khabarovsk
H					Moscow	Yaroslavl	Kuibyshev	Kuibyshev			Tomsk	Tomsk		
I		Vologda			Kalinin	Kostroma								
J									N. Osetin		Tyumen	Tyumen		
K						Tula		Ulyanovsk						Primorsky
L						Voronezh			Rostov				Primorsky	
M		Novgorod			Yaroslavl	Tambov	Ulyanovsk				Omsk	Omsk		
N	Archangel				Kostroma	Ryazan	Kirov	Kirov						
O	Archangel					Gorkiy				Rostov	Novosibirsk	Novosibirsk	Buryat-Mongol	Buryat-Mongol
P	Archangel				Tula		Tatar	Tatar	Grozny	Grozny			Buryat-Mongol	
Q	Vologda				Voronezh	Ivanovo	Tatar				Kurgan	Kurgan		Yakutsk
R					Tambov		Tatar							
S					Ryazan	Vladimir	Mari	Mari	Crimea	Crimea	Chkalov	Chkalov	Irkutsk	Irkutsk
T	Novgorod				Gorkiy	Gorkiy				Astrakhan				Irkutsk
U					Ivanovo	Kursk		Mordov	Astrakhan		Kemerovo	Kemerovo	Chita	
V					Vladimir					N. Osetin			Chita	
W					Kursk	Kaluga				Dagestan	Bashkir	Bashkir		
X					Kaluga									
Y	Murmansk					Bryansk		Chuvash			Altai	Altai		
Z	Murmansk													

NOTE : Whilst this table is by no means complete it will enable the reader to determine the locations of all known active amateur stations in the U.S.S.R.

world, but this privilege was withdrawn in May, 1951—hence WSEM !

Callsign Pattern

The greater part of the Soviet Union is known as the Russian Soviet Federated Socialist Republic and the callsign districts within this area consist of UA1, 2, 3, 4, 6, 9 and Ø. For administrative purposes each of these districts is divided into *oblasts* which correspond roughly to our counties. In most cases the oblast is named after the principal city therein which forms the capital of the oblast. In the following list of oblasts the exceptions to this rule are followed with the name of the capital in brackets:

UA1: Leningrad, Archangel, Pskov, Novgorod, Vologda and Murmansk.

UA2: Kaliningrad — formerly East Prussia.

UA3: Moscow, Gorky, Ivanovo, Tambov, Tula, Smolensk, Bryansk, Vladimir, Voronezh, Ryazan, Kursk, Kaluga, Yaroslavl, Orel, Kalinin, Kostroma and Velikye Luki.

UA4: Stalingrad, Penza, Kuibyshev, Ulyanovsk, Mari (Ioshkar-Ola), Udmurt (Izhevsk), Mordov (Saransk), Chuvash (Cheboksary), Saratov, Kirov and Tatary (Kazan).

UA6: Rostov, Krasnodar, Crimea (Simferopol), Kabardin (Nalchik), Astrakhan, Dagestan (Makhach-Kala), N. Osetin (Dzau-Dzhikau), Stavropol and Grozny.

UA9: Sverdlovsk, Chelyabinsk, Komi (Syktyvkar), Bashkir (Ufa), Altai (Barnaul), Molotov, Kurgan, Novosibirsk, Tomsk, Omsk, Tyumen, Chkalov and Kemerovo.

UAØ: Khabarovsk, Krasnoyarsk, Chita, Primorsky (Vladivostock), Irkutsk, Yakutsk, Tannu-Tuva (Kyzyl) and Buryat-Mongolia (Ulan-Ude).

It is, perhaps, not generally known that the letter following the numeral in Russian call-signs is a direct indication of the oblast in which the station is located—in the case of collectively-operated stations which have a 3-letter suffix the K which follows the numeral should be ignored. Table I can be used to obtain the location of any Russian amateur station using the prefix UA. Thus UA9FB would be located in Molotov Oblast, while UA4KAB would be in Stalingrad, UA2KAW in Kaliningrad, and so on. In the case of the non-federated republics, *viz.*, the Ukraine (UB5), Byelo-Russia (UC2), Azerbaijan (UD6) and others, these are also divided into oblasts, but the system is *not* used in the allocation of call-signs; therefore, calls such as UB5AA, UB5AB or UB5AC may well be found to emanate from widely separated oblasts of the Ukraine.

Before leaving the geographical aspect a note on the Zone angle may be of interest to the DX-minded fraternity. The information given below is the result of discussion with *CQ*—originators of the Zone scheme—and is therefore believed to be accurate for Zone computing purposes. Briefly, then, the U.S.S.R. is incorporated in the following DX Zones:

Zone 15—All UA2, UP2, UQ2 and UR2.

Zone 16—All UA1 except Franz Josef Land and Novaya Zemlya both of which are in Archangel Oblast.
All UA3, UA4, UA6; UA9 — Bashkir and Chkalov only.
All UB5, UC2, UN1 and UO5.

Zone 17—UA1 — Novaya Zemlya (Archangel obl. only); UA9 — Sverdlovsk, Chelyabinsk, Komi, Kurgan, Molotov, Omsk, and Tyumen oblasts.
All UH8, UI8, UJ8, UL7 and UM8.

Zone 18—UA9 — Novosibirsk, Tomsk, Kemerovo and Altai only.
UAØ — Krasnoyarsk, Irkutsk, Chita and Buryat-Mongolia.

Zone 19—UAØ — Khabarovsk, Yakutsk, Primorsky and northern half of Sakhalin I. (Khabarovsk obl.)

Zone 21—All UD6, UF6 and UG6.

Zone 23—UAØ — Tannu Tuva only.

Zone 25—UAØ — Sakhalin I. (Khabarovsk obl.) southern half only.

Zone 40—UA1 — Franz Josef Land (Archangel obl.) only.

From the foregoing it will be seen that the Soviet Union occupies all or part of nine of the DX Zones. *(To be continued)*

INDEX TO VOLUME X

Every copy of this (March) issue of *Short Wave Magazine* should contain, as a free loose supplement, the complete Index to the tenth volume, which closed with our February issue. Those who for any reason may not find the supplement in their copies can obtain one for the price of a stamped, addressed envelope sent to: The Circulation Manager, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1, with a slip marked "Index, Please." A glance over the Index to Volume X will show that it is the most comprehensive we have ever issued, covering a wide range of subjects discussed by a larger number of contributors than those who achieved print in the previous Volume.

The Operation of Transmitting Valves

NOTES ON CAUSE AND EFFECT OF FAILURE

E. H. CHAUDRI, Grad. Brit. I.R.E. (G3DCS)

We are apt to take valves, and valve ratings, for granted, without much consideration of the effect mis-use of a valve might have on its life or operating characteristics. This interesting and informative article will explain many obscurities in the design and construction of transmitting valves, and shows how important it is to operate them strictly in accordance with the manufacturer's ratings and recommendations. The author also discusses measurement of RF power output.—Editor.

THE transmitting valve is a piece of complicated scientific apparatus and considerable thought and engineering skill goes into its manufacture. Valve life, however, depends upon many factors. The purpose of this article is to explain to the interested reader not only what happens when he misuses his transmitting valves, but also some of the reasons underlying the occurring phenomena. No claim of originality is made for the subject matter contained herein, but it is considered that much of the information may appear only in technical literature not normally found on the amateur's bookshelf.

The cheap Government surplus valves which have been available to us for the last few years are making a gradual exodus. New designs are appearing which are unlikely to come on to the surplus market for some time. The progressive amateur who wishes to keep abreast with the latest techniques will be purchasing these new valves. In the interests of economy it is essential that these should not be ruined quickly by mis-operation !

The mental processes of the radio amateur designing a new power amplifier are usually rather unorthodox. The *maximum* ratings are often taken as a stepping stone for the design procedure and the "calculations" involved might possibly follow these lines:—

> *"Filament volts 6.3 — hmm ! only got that old 5-volt tranny in the junk box : still, guess that'll be OK — only 20% out — s'near enough ! Maximum grid current 5 mA — one thing I do like is stacks of drive, ought to take 10 mills at least ! Recommended grid resistor 10K ; make that 20K and 10 mills drive, that gives us 200 volts negative bias ! Four times the recommended bias for Class-C — ought to be really efficient, 80% at least I reckon ! Maximum anode voltage 750v. Maximum anode dissipation 25w. 25w. at 80% efficiency gives 125w. input. It would be nice to run 150w. on CW and go down to 125w. on 'phone !"*

A very risky design indeed !

Finally the transmitter is completed. After running for 30 minutes or so with the anode circuit out of resonance, the valve blushes with shame at its frailty, decides it can no longer cope with the pace of modern civilisation, and dies. Its owner is outraged and its maker exceedingly maligned.

Perhaps you, yourself, exercise greater caution in your designing, but even so, perhaps unwittingly, you may be guilty of mishandling your valves. For this reason the writer would like to elaborate on some of the points in favour of correct operation which may not be fully appreciated by the average radio amateur.

There are three types of emitter normally found in the modern transmitting valve:—

(a) The oxide coated filament or cathode.
(b) The carbonised thoriated tungsten filament.
(c) The pure tungsten filament.

Let us now consider, first of all, each type and the effects of insufficient or excessive filament voltage.

The Oxide-Coated Cathode

Low filament volts, i.e., low cathode temperature. The surface of the oxide coated cathode is covered with a thin film of barium which forms the emissive layer(1). This surface is very easily poisoned by the chemical attack of gases, such as oxygen, which may be liberated from the valve electrodes should they become excessively hot (2). At low temperatures this emissive surface is less likely to resist gas attack and sufficient poisoning may occur to result in low emission. No matter how carefully evacuated a valve may be, there is always a *certain amount* of residual gas present. Electrons, during their passage from cathode to anode, collide with the gas molecules. The resultant impact is sufficient to knock an electron from the gas molecule causing it to lose its state of equilibrium and to possess a positive charge (3).

These positive ions, as the electron-deficient molecules are called, are very heavy in com-

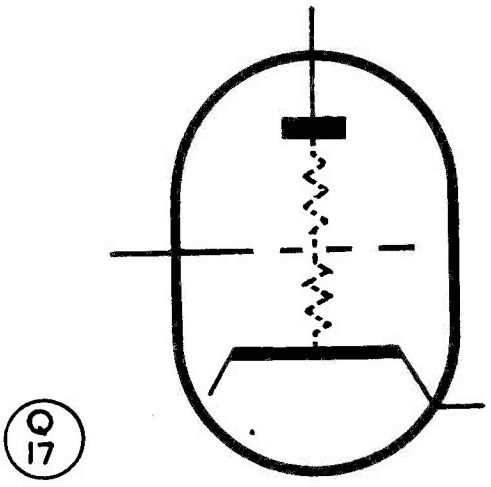


Fig. 1. The dotted resistors represent leakage paths between anode-grid and grid-cathode in a triode valve.

parison with electrons and some move towards the cathode. At normal operating temperature the cathode is surrounded by a dense cloud of electrons known as the space charge. When the cathode temperature is lowered, this space charge density becomes rather low. Positive ions arriving in the cathode vicinity tend to be neutralised by the space charge, but should the electron density be insufficient, the ions will penetrate to the cathode surface (4). By virtue of their mass and velocity a number of ions can inflict considerable damage by sputtering away the cathode coating. The extent of this damage by ion bombardment also depends upon the density and composition of residual gases, the applied electrode potentials and the condition of the cathode surface. Since ion velocity depends upon applied plate potentials it is usual to limit anode voltages to a maximum of 1750 volts in valves utilising oxide-coated cathodes.

If by some mischance filament volts become so low that the cathode cannot supply the peak emission required, more gas will be evolved because of the increase in anode dissipation.

High filament temperature. At high filament temperatures the rate of evaporation of barium from the cathode surface will be increased; this will of course reduce valve life. Some of this barium, together with barium oxide, may settle on the valve grid. The result of this is that the grid itself may emit electrons (grid emission). Since the grid is usually in close proximity to the cathode, it will also run hotter, which once again is conducive to grid emission. It is recommended that filament voltages of oxide-coated cathode valves be maintained at plus or minus 5% of the rated operating voltage.

The Carbonised Thoriated Tungsten Filament

This type of filament is mainly incorporated in valves from 100w. to 5 kW anode dissipation. The filament is made from tungsten wire, which has a small thorium oxide content. During the manufacture of the valve a layer of tungsten carbide (W_2C) is formed on the wire surface. The purpose of this layer is to reduce the rate of evaporation of thorium, thereby increasing valve life. The thorium oxide (ThO_2) is reduced to thorium by "flashing" the filament to a high temperature (about 2800°). Some of this thorium diffuses through the carbide layer to form an emissive layer on the carbide surface (5).

Should the filament operating voltage be insufficient, the rate of diffusion of the thorium through the tungsten carbide will be too slow and the emissive layer will soon be used up. On the other hand, if the temperature is too high the layer is quickly evaporated. Either *low* or *high* filament voltage, therefore, may be expected to *shorten* valve life. Previous remarks regarding gas and ion bombardment also apply to this type of emitter. In practice filament voltages should be maintained within plus or minus 5% of the rated value.

The Pure Tungsten Filament

Although it is doubted if many amateurs are running valves incorporating pure tungsten filaments, a few words about these would perhaps be in order.

The tungsten filament is used extensively in large transmitting valves. Its life is governed

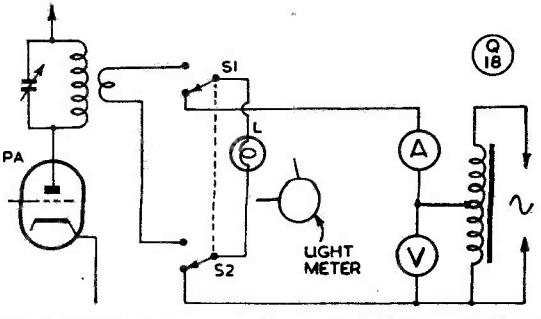


Fig. 2. Illustrating a comparison method of determining RF power output. It is sufficiently accurate for all practical purposes.

by the rate of evaporation of the tungsten: this in turn depends upon the temperature at which it operates. Tungsten filaments are normally designed so that they supply just the peak current required by the valve electrodes. A filament voltage increase of 5% may be expected to reduce life by as much as 50% (6). Under-running will increase life considerably, but this limits the peak current to less than that demanded by the electrodes and will result in excessive anode dissipation which may cause valve failure.

It is customary to label valves utilising tungsten filaments individually with the filament voltage which gives the required peak emission without life reduction due to excessive evaporation.

Negative Grid Current

The grid leak method of obtaining negative grid bias may often trap the unwary, especially when using valves not designed specifically for transmitter operation. There can exist a negative or reverse grid current which flows in opposition to the normal positive grid current. Where circuits utilising grid leak bias are in operation, the effect of this negative grid current is to reduce the negative grid bias.

The resultant bias $Vg^{11} = Vg^{1} - Ig.\ Rg.$

where Vg^{1} the original bias in volts.
Ig the negative grid current in amps.
Rg the grid resistance in ohms.

One can see from the above equation that should Ig or Rg be large, it will be possible greatly to reduce the negative grid bias and thereby cause excessive anode dissipation.

There are three main sources of negative grid current (7).

Positive Ion Current. Residual gases in the valve become ionised by electron bombardment. Some of the ions produced fly to the control grid. This produces a negative grid current, which is a function of the degree of vacuum within the valve. Obviously, any mishandling which may affect the degree of vacuum by liberating gas, will increase the ion current. In turn, this will reduce the bias (where grid leak bias is employed) increasing the anode dissipation and producing more gas. The effect is cumulative and unless prevented in time, the valve will be destroyed.

Interelectrode Leakage. Leakages between valve electrodes also cause reverse grid current. Internal leakages may be caused by metallic deposits in insulating materials and by the precipitation of evaporated metals upon insulators. Again, care in operation will prevent the possible formation of excessive leakage currents. Leakages external to the valve are equally important and may be caused by dirty valve sockets, bases, envelopes or excessive humidity.

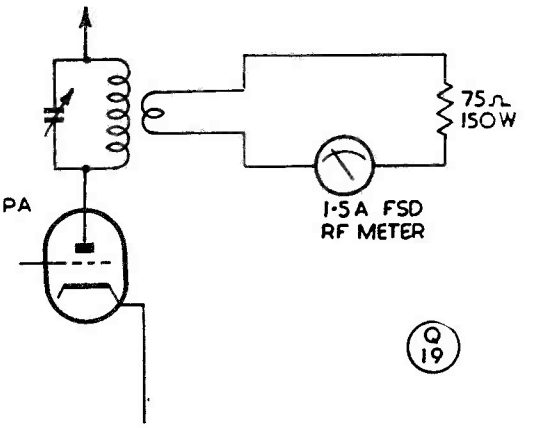


Fig. 3. Measurement of RF power output using a standard resistance, as explained in the text.

Grid Emission. Should the temperature of the control grid become too high, the grid may be sufficiently hot to emit primary electrons. Once more a reverse grid current will result. Cathode materials such as barium, barium oxide, or thorium, precipitated on the grid, all tend to reduce the temperature at which grid emission occurs. Care should be taken, therefore, to prevent too much grid drive and too high filament, anode or screen grid temperatures in order to minimise this phenomenon.

Valve manufacturers take great care to confine all negative grid currents to a safe value before allowing their products to leave the factory.

Heater-Cathode Insulation

The heater in the heater-cathode type of valve is covered with a thin coating, usually of alumina, for insulating purposes. Where cathode automatic bias circuits are employed and the heater chain is earthed, fairly large potentials may exist between the heater and cathode. These potentials may be high enough to cause puncturing of the heater-cathode insulation. Manufacturers usually quote the maximum allowable potential which may exist between these electrodes. Where this is not given a reasonably safe maximum is 100 volts.

Bulb Failure

A certain amount of radio frequency loss occurs in the glass envelope of the transmitting valve. At excessive ratings these losses,

together with possible bulb bombardment from stray electrons escaping from the assembly, and the increased heating from valve electrodes, may cause the bulb to soften and "suck in."

Whilst every effort is made to match closely the coefficients of expansion of the materials used in the glass-to-metal seals of transmitting valves, a course of compromise usually has to be adopted. The expansion coefficients vary with temperature. Whilst a particular glass and metal may match reasonably at normal operating temperature, they may not match at all well at the higher temperature which excessive rating may produce. The strain set up may be sufficient to cause seal cracking which will destroy the vacuum. It should be borne in mind that operation at frequencies higher than for which the valve is intended, is synonymous to overloading.

Measuring Output Power

Nowadays most radio amateurs possess sufficient test equipment to ensure that electrode potentials and currents are within limits. It is not always known, however, what is the anode dissipation at which the valve is operating. To assess this accurately is difficult where small radiation cooled valves are involved. If the stage efficiency is measured, however, and is found to be of the order of 60% or greater, it may be assumed that the dissipation is not excessive. It should be borne in mind that the valve itself will operate at an even greater efficiency, since a certain amount of power is lost in the circuitry. The stage efficiency may be assessed by measuring the power output of the stage in question and calculating from the following formula:—

$$\text{Efficiency} = \frac{\text{Power Output}}{\text{Power Input}} \times 100\%$$

In principle the measurement of power output in the frequency range 1.7 to 30 mc is very simple. In practice it is a little more involved. A useful approximation may be obtained by taking two electric lamp bulbs, both rated at the anticipated power output of the stage under consideration. One lamp is then coupled into the stage: the other is illuminated from the supply mains. Any serious deficiency in output power will be noted from the difference in brilliance of the two lamps.

A more accurate method is illustrated in Fig. 2. The lamp is coupled into the power amplifier stage until the required anode current is drawn. The light-meter reading is noted and the transmitter switched off. The double-pole change-over switch S1, S2 is thrown and the lamp brilliance adjusted by the variac until the same light-meter reading is obtained. The power output is equal to the product of the voltage and current applied to the lamp. Provided that it is possible to vary the lamp voltage over the required range, it is quite permissible to use a heavy duty potentiometer or variable resistance in place of the variac. The position of the light meter or lamp must not be moved when taking readings and care should be taken to ensure that surrounding illumination does not vary.

A further method, shown in Fig. 3, is to dissipate the output from the transmitter into a known resistor (non-inductive and of suitable wattage) and measure the current through it by means of a thermo-ammeter.

The power output $Wo = I^2R$

where I = the current through the resistor (in amps) as measured by the thermo-ammeter.
R = the value of the resistor in ohms.

In all three methods care should be taken to adjust the link turns of the coupling coil for optimum results.

In conclusion, provided one is very careful to observe all the manufacturer's ratings, the possibility of valve failure or short life need not be feared. Those who overload their valves now know what they may expect! To those who do not, the writer trusts that this article has made interesting reading.

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BACK NUMBERS, VOLUME X

Casual readers, and those who have only recently become subscribers to *Short Wave Magazine*, who with this issue will have the complete Index to our last Volume, should note that we have available some back number copies of all issues of Volume X—that is, from March, 1952, to February, 1953. While they last, copies can be supplied at 2s. each on application to: The Circulation Manager, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

Getting on Seventycems

CRYSTAL-CONTROLLED CONVERTER FOR 430 MC

F. SMITH (G2DD)

This article simplifies the approach to the 70-centimetre converter problem, describing an easily-made crystal controlled unit which will accept CC signals in the 432-438 mc range. Once set up, no further tuning is required, and if the constructional details are carefully followed, results should be obtained with ease and certainty. Several models have been built, and the design has been well tested. The author has covered his particular development of the flat-line principle as described here by Prov. Patent No. 3187/53.—Editor.

IT has for long been the opinion of the author that the population of the 70-centimetre band would be much greater if it were not for some of the problems on the receiving side, notably " Plumbing." The little converter about to be described involves no plumbing ; no trimmers dangling about untidily in the oscillatory chain ; no chasing harmonics, or the band, as the right thing just happens throughout ; no frequency checking as long as the crystal oscillator stage is right to start with. The IF output on 17 mc comes within the range of more receivers than does the often adopted 27 mc, although there is nothing to stop one from modifying this part of the job and selecting the appropriate crystal frequency to suit ; this is 7740.6 kc for the 17 mc IF, or 7555.5 for 27 mc. Furthermore, there are no injection difficulties as the mere proximity of the lines to each other does the trick without any other coupling.

The first stage of the oscillatory chain is the first half of a 6J6 working as a harmonic generator—a crystal of 7740 kc provides the order of 23 mc right away. The second half of the same valve triples into the 69 mc region, whilst the second 6J6 provides 139 mc and finally 417.96 mc. which is close enough to the required 418 mc for practical use. With this slug tuning arrangement it was never possible to find more than one peak in any stage and the one found was always that required—it is as easy as that.

It will be seen from the photograph on p.749 of the February *Short Wave Magazine* that the slug tuned process permits extremely neat regimentation of the coil forms along the shorter sides of the box. On the oscillatory side the 750 $\mu\mu$F midget mica condensers can be run along the base of the form and anchored to a tag which is held by one of the fixing screws. Note also how the earthy ends of the coils are bent up, scraped and tinned, to make supports for the live side of the these condensers as well as the 22,000-ohm HT feed resistors R1 to R4.

The IF amplifier is a 6AG5 in a conventional circuit with both input and output coils slug-tuned. The thin brass screen (26g.) is arranged so that tag No. 4 of the valve holder can be slightly twisted to rest flush with it and then soldered to it. The centre " pip " of the valve holder is also soldered to the screen.

Construction and Testing

The box shown is a standard Eddystone $4\frac{3}{4}$ in. x $3\frac{3}{4}$ in. x 2 in. die cast job, but the sketch is sufficiently dimensioned so that any chassis of adequate capacity may be used without affecting the disposition of the parts.

The crystal holder (F.T. $\frac{1}{2}$ in. spacing type) can be made from two pieces of paxolin, suitably drilled, and two of the valve leg clips taken from a wafer-type octal valve socket. (*See* sketch.) The box should be drilled to the approximate dimensions of the sketch, from which it will be noted that only the centre location points are given for coil forms, coax sockets, and so forth—no one should have any difficulty with the rest of the holes. Actually, these centre holes are $\frac{1}{4}$ in. diam. to give clearance to the coax socket probes and to allow the coils to be tuned from outside the box. It should also be noted that the upper fixing hole of the IF input coil is likewise $\frac{1}{4}$ in., and the chassis bushed so that the fixing screw becomes a lead-through with a soldering tag inside and out for connecting the diode current meter. If the valve holders are positioned as shown and wired as numbered on the circuit the grid resistors and coupling condensers will go down neatly.

After drilling the chassis the first component to be fitted is the oscillator coil, complete with its 750 $\mu\mu$F condenser. Next fit the crystal holder and then the two 6J6 valve holders. Since the photograph was taken valve holders without screens have been tried as the resistors and condensers can then be wired on to them outside the box and the whole inserted as a unit ; make sure that these holders are of the

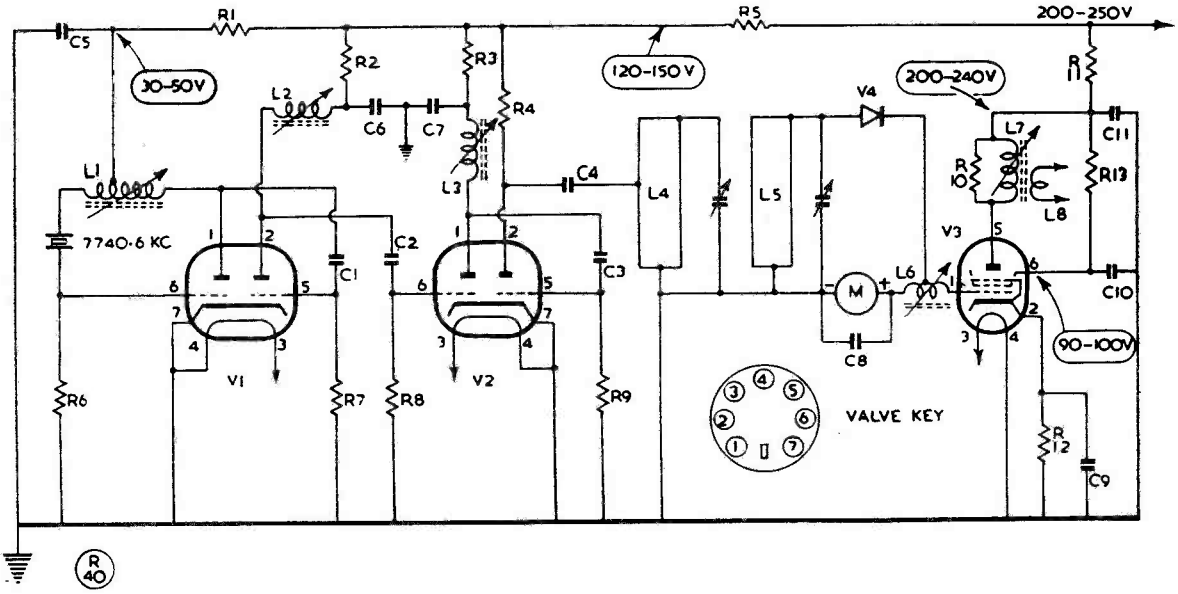

Fig. 1. Circuit of the Simplified 70-Centimetre Converter designed by G2DD. Elements marked L4, L5, are the brass strips for which dimensions are given in the coil table, the variable capacities across them being the air-spaced trimmers. The aerial coupling is arranged as described in the text.

type which are slung *under* the chassis. (The other kind can be stripped and reversed, of course, but this is no fun after the components have been assembled.) Follow with coils L2 and L3, completing each circuit in turn and preferably testing on the way. Always see, when testing one stage, that the coupling condenser to and the grid resistor in the following stage are connected up. Next, fit the oscillator flat line to the underside of the chassis top and then the mixer line to the appropriate side of the box, arranging them so that their adjacent edges run parallel to each other at a distance of 3/16 in. to $\frac{1}{4}$ in. apart. Following round in sequence come the grid coil and anode coil of the IF amplifier, which should both be wired up completely before the brass screen is fitted. Incidentally, this valve holder is of the half-screen type and is mounted on top of the chassis, so will have to be wired in position.

Checking Through

Once the crystal oscillator stage is working correctly there is just no need for frequency checking at all, it simply being sufficient to ascertain that there is "some soup" in each stage, and if so it must be of the right flavour. A most useful device for checking for RF can be knocked together almost as quickly as it can be described: It consists of a loop of fairly stout enamelled wire, say 16g., about six inches long and $\frac{3}{4}$ in. spacing, connected in series with the crystal diode and current meter prior to the latter components being actually used in the set. Once a full scale, 500 μA, reading is obtained on this device from the 139 mc stage, with feed condenser connected to the final line,

Table of Values

Fig. 1. Circuit of the G2DD 430 mc Converter.

C1, C2	47 $\mu\mu$F, midget Ceramicon	R6	10,000-ohms, $\frac{1}{4}$w.
C3, C4	22 $\mu\mu$F, midget Ceramicon	R7-R9	47,000 ohms, $\frac{1}{4}$w.
C5, C6, C7	750 $\mu\mu$F, midget mica	R10	25,000 ohms, $\frac{1}{4}$w.
C8, C9, C10, C11	.001 μF, midget mica	R11	2,200 ohms, $\frac{1}{4}$w.
R1-R4	22,000 ohms, $\frac{1}{4}$-w.	R12	220 ohms, $\frac{1}{4}$w.
R5	15,000-20,000 ohm 2w. according to HT.	R13	82,000 ohms, $\frac{1}{4}$w.
		M	0-500 μA meter
		V1, V2	6J6, or equivalent
		V3	6AK5, or 6AG5
		V4	CV102, CV103, or equivalent Silicon Diode

(Resistors R6 to R10 inclusive may be of lower values)

COIL TABLE

L1—22 turns 22g. enam. close-wound on $\frac{1}{8}$in. Alladin former.

L2—6 turns 20g. enam. close-wound on $\frac{1}{8}$in. Alladin former.

L3—2 turns 20g. enam. on $\frac{1}{8}$in. Alladin former, slug-tuned.

L4—16g. brass strip, $\frac{1}{8}$in. by 3in. long, spaced $\frac{1}{16}$in. clear of chassis, tapped 1$\frac{1}{4}$in. from earthed end.

L5—16g. brass strip, 1$\frac{1}{8}$in. by 3$\frac{3}{8}$in. long, spaced $\frac{1}{16}$in. clear of chassis Aerial tap is 1$\frac{3}{4}$in. from earthed end, and xtal diode tap as near open end as possible.

L6—22 turns No. 32 DSC close-wound on $\frac{1}{8}$in. Alladin former, centre-tapped and slug-tuned.

L7—37 turns 32 DSC close-wound on $\frac{1}{8}$in. Alladin former. slug tuned.

L8—4 turns over-wound at earthy end of L7.

the diode can be put into its socket on the mixer line, a lead taken from the end cap to the meter and the meter down to ground. Both lines can then be trimmed on the meter before any of the IF stage is even fitted. Set the mixer line trimmer to about $\frac{1}{8}$ in. open and tune the oscillator line until a flicker is seen on the meter, then tune up both lines for maximum current. This is not the final position, of course, as the mixer will thus be set to the oscillator frequency of 418 mc, but it is near enough to keep in touch with what is happening as the converter is completed. A reading of 300 μA is possible depending upon the sensitivity of the crystal diode, although the final current at which the set seems to work best will be found to be between 60 and 120 μA.

So far so good. The IF stage may now be completed and connected to the input of the main receiver which should be set at 17 mc. First switch off the oscillator chain (easiest way is to remove the crystal) then peak up the output IF coil for maximum S-meter reading on the main receiver—or noise, if there is no meter—then peak up the tapped input coil in a similar manner. Switch on the oscillator again and plug in the aerial, when a drop in diode current will be noticed of about 25% or more. The converters made so far have shown no particular discrimination between 300-ohm feeder with one side earthed and 50-ohm coax, the existing tapping point seeming to be equally good for either.

The initial tuning up may be done conveniently on any crystal oscillator stage which provides a harmonic in the region of 435 mc: the author used the oscillator in the two-metre rig, with all following stages off, and this in a TU type box and about 6 ft. from the converter still necessitated backing off the RF gain on the main receiver.

Results

By general standards the author's QTH is pretty awful, being at the bottom of a basin-like depression in the local terrain of Stanmore, with high ground practically all the way round the compass, rising to between 100 feet and 300 feet above the aerial at less than half-mile range in some directions. Nevertheless, at the very first look round on the prototype of this 70-centimetre converter, G5DT at about 20 to 25 miles away came in at a strength which just paralysed the main receiver, and immediately afterwards G4RO at about 14 miles was S4/5 R5 phone off the back of the beam. The most difficult path of the regular contacts is that to G2WJ at 35 miles with a lot of high ground in a direct line between the stations, rising from 200 to 250 feet above either QTH. Results along this path were extremely gratifying as a R5 phone signal was received at S3/4; this is nearly as good as the average using the standard converter which has a lighthouse RF stage. The RF output from G2WJ was only in the region of half a watt at the time.

Special Notes

The socket for the mixer diode is a valve leg clip taken from an international octal wafer type holder—the same as used for the sockets in the crystal holder. It is soldered on to the mixer line as near as possible to the end without preventing access to the trimmers. The clip for the cap end of the diode is an octal valve top cap.

The aerial contact on the mixer line is taken from a Yaxley-type wafer and is soldered to the line so that the hollow of the spoon-shaped end peeps through a $\frac{1}{4}$ in. hole in the line. The

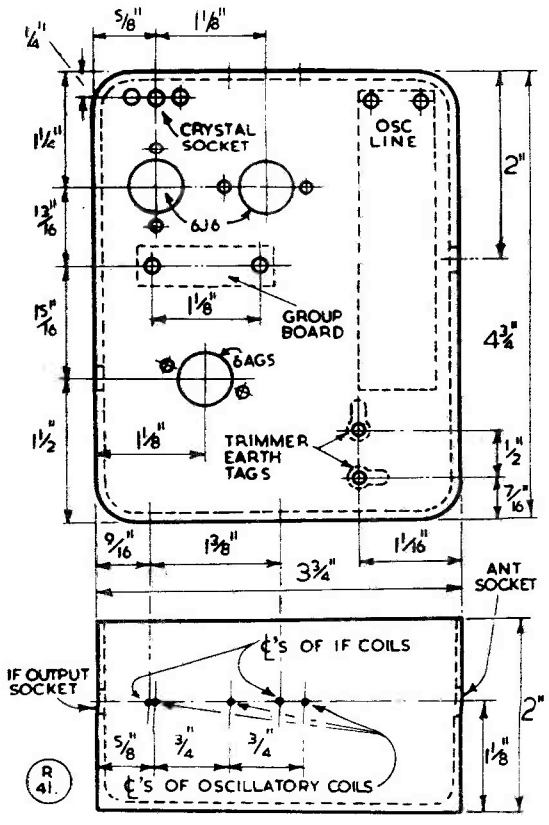

Fig. 2. Drilling detail and dimensions for mounting box for the G2DD Converter. It can be one of the standard Eddystone shapes.

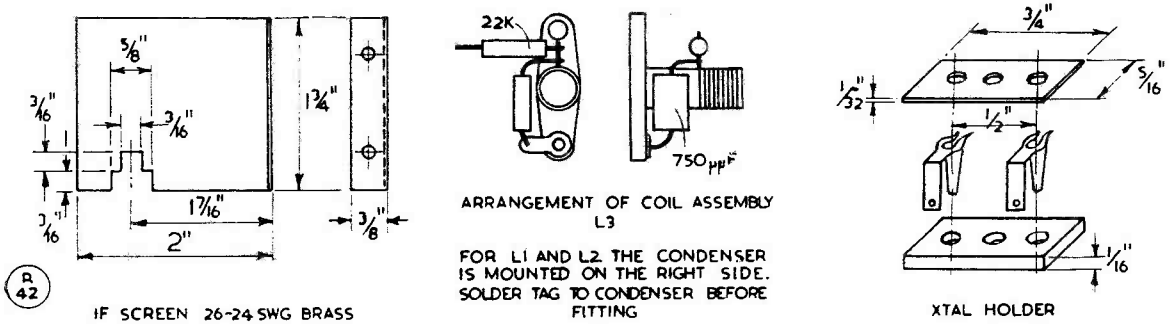

Fig. 3. Constructional details for screens and mountings for the G2DD 430 mc converter. Photographs of the model appeared on p. 749 of the February issue.

centre probe of the Belling-Lee coax connector is slightly shortened so that it pushes up nicely into the hollow of this contact as it is bolted into position.

No instability can be tolerated in the IF amplifier so this stage must be constructed very carefully, although there is not much likely to happen which a 25-ohm to 47-ohm grid stopper will not take care of effectively without undue detriment to the working of the converter. It is recommended that all tags and valve holders be tinned before use.

WORLD-TIME CLOCK

The photograph shows a new world-time clock which has just been put on the market by Smiths Electric Clocks, Ltd. It shows the time in 23 of the principal cities of the world; an inner dial is divided into night and day segments, and reads 0-24 hours in quarters. The outer circle carries the names of the towns, with an arrow pointing to the time. The price of this interesting device, which eliminates all those tiresome calculations involving so many hours before or behind GMT, is £5 9s. 11d., of all leading electrical supply stores.

THE 1953 RADIO EXHIBITION

The 20th National Radio Show will be held at Earl's Court, London, again this year, the dates being Wednesday, September 2, to Saturday, September 12. An even bigger effort is to be made to attract buyers and interested visitors from home and overseas. The value of the radio industry's export business last year was nearly £25 million.

TECHNICAL DATA SERVICE

A technical data service for the benefit of engineers engaged in the design of radio and industrial electronic apparatus has been introduced by The General Electric Co., Ltd.

This service, which covers Osram valves, G.E.C. cathode ray tubes, Germanium crystals and associated electronic devices, consists of the distribution of technical data sheets as they are published.

The initial distribution comprises a loose-leaf binder and the complete series of data sheets issued up to the current date. All subsequent data sheets are forwarded to the subscriber and the overall cost is 7s. 6d. Additional binders can be supplied at any time, the price being 7s. 6d. each.

The information provided meets the full needs of the designer and is published in a standardised form which allows easy and quick reference to be made. Application forms can be obtained from the Osram Valve and Electronics Dept., The General Electric Co., Ltd., Kingsway, London, W.C.2.

VHF BANDS

A. J. DEVON

More Winter Openings Maintain Activity—

Good Contacts on Seventycems—

Reflections on the Aurora—

Station Reports and News—

70-Centimetre Activity List—

WITH a short month and something of a lull in conditions, there is not a great deal to discuss in the way of DX on Two—nevertheless, activity has been quite well maintained, and movements claimed for the Tables total 16 by the 25 correspondents reporting.

During the period to February 15, the best days for GDX working were January 16, 17 and 29; the 16th was exceptionally good in the Midlands area, and on the 29th the F's were getting through to the London stations. The evening of the 29th coincided with a Thursday VHF Session—or should it be the other way round!—with the result that there was a much higher level of activity than during any ordinary week-day evening when conditions are simply "normal."

All this applies, of course, to Two Metres. On the other band, the event of outstanding interest was a first QSO on 430 mc between G2XV (Cambridge) and G3BKQ (Blaby, Leics.); this was on January 23, about midnight, and the distance is 60 miles. (It will be remembered that in our last the possibility of such a contact was mentioned). They started on CW, and then went over to phone, with reports varying from S6 to S9 +. This is a fine piece of work, on which both operators will have the congratulations of all the 70-cm clan. G3BKQ has also worked G3GZM over about the same distance—*see* notes later under "Seventycems."

While discussing the 430 mc band, we might draw attention to the important article by G2DD in this issue, describing his "sure-fire" CC converter which, it is hoped, will assist many operators to open up on Seventycems. Readers can be assured that this is a well-tested design, and G2DD will be glad to assist anyone who encounters any serious difficulty in getting it going. This is the converter pictured on p.749 of the February issue—it should do for the 430 mc band what G2IQ's famous all-6J6 job has done for Two Metres.

Aurora Echoes

The subject of Auroral reflection was first discussed in these pages in our issue for April, 1947, in particular connection with the Aurora opening on March 8, 1947—this, of course, was when we had the five-metre band. It was then suggested that an Aurora Opening " . . . . amounts to the appearance, electrically speaking, of a very effective reflecting curtain in the Far North . . . . the outstanding characteristic of the phenomenon was the fact that . . . . the usual T9 signals came down to a rusty T5 or even T3 . . . . if this effect is evident, stations in any direction can be worked with the beam aimed North-West . . . . " and so on, all written and composed by none other than your present A.J.D.

In the *Times* of January 23, 1953 (some six years later) there are a few paragraphs discussing *radar* reflection from the Aurora Borealis and some experimental work to be done this year on the subject; the account goes on to say that in about the autumn of 1947 Prof. A. C. B. Lovell, of Manchester University, "succeeded in receiving a radar echo from the Northern Lights."

What it all amounts to is that some months before Professor Lovell's experiment, amateurs in the 5-metre band had already used the Aurora Borealis as a reflecting curtain for *communication* purposes, and the phenomenon of Auroral reflection—as discussed and explained in this column—was clearly understood by all VHF operators of that time, who were always on the look-out for Aurora appearances to obtain unusual GDX contacts on the 58 mc band. In fact, it became standard practice to aim beams North when Aurora manifestations were in progress, and the results were always the same.

Getting right down to the immediate present, there was an Aurora display (of no great magnitude, apparently) on January 18 last, but, so far as we have been able to trace, nothing much happened in the way of unusual GDX—or rusty notes—on the 144 mc band. The moral of this story is that we should not forget about Aurora Borealis as a possible means of obtaining reflections on Two Metres, and as displays of the Northern Lights are not infrequent from now until about the early autumn, all VHF operators should be ready to aim North when Aurora reflections seem to be occurring. The way to recognise these reflections—even if you cannot actually see the Lights—is by the fact that beams tend to lose directivity except on very local signals, that DX stations not normally heard start coming in strongly with notes that are markedly "fuzzy," and that it is found to be easiest to work any station (even those behind you, or well off the correct line-of-shoot) with the beam aimed into the North. If you should hear some juicy DX signal when this phenomenon is occurring—say, an OZ in the Midlands—it would be no use shooting East; you would probably find he was coming in better from a direction a little west of North. The rustiness of the note is—we originally suggested—due to "phase distortion and multipath interference, caused mainly by a high degree of scatter" (*see* p.104, *Short Wave Magazine*, April, 1947). Phone is, of course, so distorted as to be practically unreadable.

It is only when Aurora B. is very intense that the Lights are visible to the naked eye in the southern part of the country, but they are seen from Scotland quite often.

We hope these notes on yet another way of working GDX on the VHF bands will interest the newcomers, and remind all operators to make full use of the effect whenever it occurs. And naturally, we shall be very glad to have detailed, factual reports on individual experiences when Aurora reflection does take place.

The Station Reports

G6CI (Kenilworth) says that with him January 16 was the exceptional evening, with all stations well up in signal strength and several newcomers worked for the first time. It is of particular interest that Brian also adds that on this occasion " Beam directivity was very flat and quite large changes in direction made but little difference to signal levels, in or out."

Freddy of G5ML (Coventry) is " still pumping out the RF on Two," and to some effect, as he has recently installed a pair of Eimac 4/65A's in the PA, running the full 150 watts ; with this, and the 16-element stack up at 45 ft. from 22 ft., results generally are much improved. G5ML is an early-evening operator, and with schedules to the North and South-West, his beam does not get round in the London direction very often. During the period January 10-29, six new stations were worked. He would like to open a schedule with a station in the London area for 1850-55 (nightly, if possible) and asks anyone who would care to take this up to get in touch. G5ML is working the 100-mile distances without difficulty, so this would be an interesting direction for him ; his frequency is 144.42 mc, and he is there from about 1830 to 1930 most evenings.

G3IOE (Newcastle - on - Tyne) starts by saying " this is the liveliest January I have ever known on Two Metres." The evening of the 16th was good up there, too, when G3AOO (Denton, Manchester) and G5YV were both S9. G2FO (Stockton-on-Tees) is a regular contact for G3IOE, and GM3EGW is almost always audible on his schedule with G2FO—but GM3EGW does not hear G3IOE. The latter is on almost every evening two weeks out of three, but is moving to 144.3 mc to avoid some possible QRM on his present frequency ; a new transmitter is in hand, running EF91-EL91-QVO4/7, and another converter is also being " thought of "—either the G6VX design, or a G2IQ job using

TWO-METRE ACTIVITY REPORT

(Lists of stations heard and worked are particularly requested for this section, set out in the form shown below.)

G6RH, Bexley, Kent.

WORKED : F8AA, 8GH, 8KF, G2AVR, 2BMZ, 2FJR, 2FZU, 2FNW, 2HDZ, 2HIF, 2KF, 2UQ, 2PU, 2XV, 3AAN, 3BKQ, 3DIV, 3EOH, 3GBO, 3GOP, 3GSE, 3GWB, 3GZD, 3IAI, 3IIT, 3NL, 3WW, 4GT, 4MW, 5DS, 5RW, 5YV, 6CW, 6UH, 6WU, 6YU, ON4BZ.

HEARD : G2BZ, 2WA, 3AOO, 3BNC, 3EHY, 4HT, 6PG, 6SG, 8OU. (*All January 13 to February 5*).

G3IIT, Trumpington, Cambs.

WORKED : G2AHP, 2ALL, 3CNT, 2FFG, 2FZU, 2XV, 3AEP, 3AKU, 3AVR, 3BK, 3BLP, 3EDD, 3GIT, 3GJZ, 3HVO, 3HXO, 3WW, 4AU, 4DC, 4MW, 5IG, 5UM, 5YV, 6CW, 6QN, 6RH, 8SY, ON4BZ. (*January 1 to February 8*).

G2HIF, Wantage, Berks.

WORKED : G3FAN, 5NF, 5YV, 6CW, 6RH.

HEARD : G3HSC. (*Thursday January 14, 2000-2230 only*).

WORKED : G3GBO, 3IOO, 6RH.

HEARD : G3BLP. (*Thursday, January 22, 2000-2230 only*).

WORKED : G6RH, 8DM.

HEARD : G3FUM, 4SA. (*Thursday, February 5, 2000-2230 only*).

SWL Towgood, Bournemouth, Hants.

*HEARD : **0-50 miles**:* G3FAN,3HVO. ***50-100 miles**:* G2AHP, 2FFG, 2HDZ, 3DJX, 3FIH, 3GBO, 3HBW, 4GR, 4SA, 8DM. ***100-150 miles*** : G2FNW, 3GZM, 8KL. ***150-200 miles**:* G2FZU, 5RW. ***200-250 miles**:* G5YV. (*Thursday, January 29, 2130-2350 only*).

G3YH, Bristol.

WORKED : G2AOK/A, 3DJX, 3DLU, 3EHY, 3FRY, 3HSD, 3IAI, 3IEI, 3MA, 5ML, 8ML.

HEARD : G2AHP, 2BUJ, 2HCG, 2HCZ, 2HQ/P, 2XV, 2YB, 3ANB, 3CGE, 3DKZ, 3FIH, 3FUM, 3GBO, 3HXO, 3IIT, 3WW, 4AP, 4MW, 4SA, 5DS, 6RH, 8DM, 8KL, 8MW, 8OU, 8PX, 8SY. (*January 14 to February 10*).

G5DS, Surbiton, Surrey. NGR 51/185665.

WORKED : G2AIH, 2ANT, 2CNT, 2DTO, 2FFG, 2HDZ, 2UJ, 2UN, 2WA, 2XV, 3ANB, 3BVU, 3DLU, 3EOH, 3GBO, 3GDR, 3GHI, 3GJZ, 3GZD, 3HAK, 3HVO, 3HWJ, 3HZK, 3IEI, 3IEX, 3ION, 3IOO, 4KD, 5BC, 5JO, 5LK, 5NF, 6CW, 6PG, 6RH, 6TA, 6XH, 6XM, 8PX, 8SY, ON4BZ.

HEARD : G2AHP, 2AIW, 2BMZ, 2BRR, 2BZ, 2DDD, 2DUV, 2FJR, 2FNW, 2FTS, 2FVD, 2HCG, 2MV, 2NM, 2PU, 2UQ, 2WJ, 2YB, 3AEP, 3AJR, 3BKQ, 3BLP, 3CNF, 3CWW, 3DIV, 3DJX, 3DKZ, 3EGV, 3ENI, 3EYV, 3FAN, 3FIJ, 3FSD, 3FUH, 3GHO, 3GSE, 3HAZ, 3HBW, 3HCU, 3HGR, 3HIF, 3HSC, 3HXO, 3IAI, 3IIT, 3ION, 3ISR, 3MI, 4AU, 4GT, 4HT, 4MW, 5LQ, 5RW, 5QB, 5UD, 5UM, 5YV, 6CI, 6JP, 6LR, 6QN, 6UH, 6WU, 6YU, 8CK, 8DM, 8DV/A, 8MW, 8OU, 8VZ. (*January 14 to February 11*).

G3DLU, Weston-Super-Mare, Somerset.

WORKED : G3FIH, 3YH.

HEARD : G2AHP, 3AUS, 3BLP, 3CGE, 3DJX, 3FAN, 3FRY, 3GBP, 3GOP, 3HSD, 3IAI, 3MA, 4GR, 4SA, 5BM, 5DS, 6VX, 8DA, 8OU. (*January 14 to February 10*).

G3HBW, Wembley, Middlesex.

WORKED : F8AA, 8GH, G2AHP, 2FFG, 2FVD, 2WA, 3AGR, 3ARL, 3FIH, 3GBO, 3GJZ, 3GSE, 3HXO, 3HZK, 3IEX, 3IUK, 3NL, 4GT, 5LK, 5UM, 5YV, ON4BZ.

HEARD : G2AVR, 2DDD, 2FNW, 2FTS, 2FZU, 2HCG, 2HQ/P, 2JU, 2NM, 3ANB, 3BKQ, 3BVU, 3DIV, 3FAN, 3HVO, 3IAI, 4GR, 5RO, 6CW. (*January 15 to February 1*).

SWL Towgood, Bournemouth, Hants.

*HEARD : **50-100 miles*** : G2AHP, 2AIW, 2AVR, 2BMZ, 2BUJ, 2DDD, 2DTO, 2FFG, 2FTS, 2FVD, 2HDZ, 3BLP, 3BVU, 3DJX, 3DKZ, 3DLU, 3EBW, 3EGV, 3GBO, 3GDR, 3HBW, 3ION, 3IRA, 3NL, 4KD, 4SA, 5BC, 5DS, 5LK, 5NF, 6RH, 6TA, 6VX, 8DV/A, 8OU, 8VZ. ***100-150 miles**:* G2HCG, 2PU, 2XV, 3AEP, 3ANB, 3BKQ, 3GHO, 3GZM, 3HAZ, 3IAI, 3WW, 4MW, 5ML, 6YU, 8KL. ***150-200 miles*** : F8NW, G2FJR, 2FZU, 3IOO, 5RW, 6CW. ***200-250*** miles : G5YV. (*January 10 to January 28 only*).

G2HDZ, Pinner, Middlesex. NGR, 51/126886.

WORKED : G2BMZ, 2CNT, 2DDD, 2DSP, 2FNW, 2FTS, 2FZU, 2PU, 2WA, 3AGR, 3BNC, 3DIV, 3EBW, 3FAN, 3GBO, 3GHI, 3HVO, 3ION, 3IOO, 3ISA, 3MI, 3NL, 4GT, 4OT, 5BC, 5DS, 5DT, 5RW, 5YV, 6CW, 6LR, 6RH, 6XH. (*December 4 to February 7*).

G2BRR, South Woodford, London, E.18.

WORKED : F8AA, G2AHP, 2AVR, 2DTO, 3ANB, 3BPM, 3EYV, 3FUH, 3GZD, 3HGR, 3SM, 4AU, 4OT, 5NF, 6OH, 6PG, 6SG, 6TA, 6WU, 6YP, 8DV/A.

HEARD : F8GH, 8JR, 8KF, 8NW, G2AIH, 2BMZ, 2DGW, 2FFG, 2FJR, 2FZU, 3AFP, 3AGR, 3AVU, 3BHS, 3BRQ, 3FAN, 3FIH, 3FIJ, 3FQS, 3GBO, 3GHI, 3GJZ, 3GOE, 3GXV, 3HBW, 3HCG(?), 3HL, 3HWJ, 3HXD, 3IEX, 3IL, 3IOD, 3WW, 5DS, 5SK, 5UM, 5YV, 6QN, 6RH, 6UH, 8IL, ON4BZ. (*All January 1 to February 1*).

SWL Whitmill, Harrow Weald, Middlesex.

HEARD : F8GH, G2AHP, 2AIW, 2ANT, 2AVR, 2BMZ, 2DDD, 2DTO, 2DUV, 2FNW, 2FTS, 2FZU, 2HCG, 2HDZ, 2HIF, 2JU, 2MV, 2PU, 2UQ, 2WA, 2WJ, 2XV, 3AGR, 3ANB, 3ARL, 3AUS, 3BKQ, 3BLP, 3BNC, 3BPM, 3BRG, 3BVU, 3CVO, 3DIV, 3EBW, 3EGV, 3FAN, 3FO, 3FSD, 3FUM, 3GBO, 3GHO, 3GSE, 3GWB, 3GZB, 3HAK, 3HBW, 3HCU, 3HWJ, 3IAI, 3MI, 3SM, 3ZI, 4DC, 4KD, 4MW, 4OT, 5BC, 5DS, 5DT, 5LK, 5NF, 5QB, 5RO, 5SZ, 5YV, 6LR, 6QN, 6RH, 6TA, 6WU, 6XH, 8DV/A, 8IL, 8OU. (*All heard January 6 to February 2*).

SWL McBrayne, Westcliff-on-Sea, Essex.

Under 50 miles : G2AIW, 2AVR, 2BCB, 2FTS, 2UJ, 2WJ, 3ANB, 3BLP, 3GHI, 3HBW, 4AC, 4AU, 4OT, 5DS, 5NF, 6LL, 6PG, 6RH, 6TA, 6UH, 6YP. ***50-100 miles**:* G2FFG, 2UN, 2XV, 3BK, 3DIV, 3GBO, 3GWB, 3IAI, 3WW, 4MW. ***Over 100 miles*** : G3FAN, ON4BZ. (*All heard during January*).

70-Centimetre Band Only

SWL Whitmill, Harrow Weald, Middlesex.

HEARD : G2DD, 2FKZ, 2MV, 2QY, 2RD, 2WJ, 3FP, 4RO, 5CD, 5DT, 5RD, 6NF, 6YP. (*All logged January 11 to February 2*).

G2XV, Trumpington, Cambs.

WORKED : G2FKZ, 2WJ, 3BKQ, 4MW.

HEARD : G3FUL, 3GDR, 5IG.

12AT7's instead of 6J6's.

Round to the South, with G4SA reporting from Drayton, Berks.—he evidently missed the good periods, as he remarks that conditions with him have been "somewhat poor." However, he has regular contacts with G3FAN (Ryde, I.o.W.) and G2HCG (Northampton) and has also managed a new county, so is fairly satisfied.

G2HIF (Wantage, Berks.) discusses mainly the Thursday VHF Sessions, and his own results will be found in the Activity Report. January 15 was a good night, with G3FAN, G5YV and G6CW worked; January 22 not nearly so good in terms of conditions, but with more activity; February 5, local regulars only. G2HIF can now run 80 watts into a pair of 8012's, but, as he expected, found it gave him only one S-point gain over the usual 25 watts. He is keeping a regular phone schedule with G6RH (Bexley, Kent) and would like to hear from anyone else wanting a sked any time during the period 2000-2230 on Thursdays.

In Leighton Buzzard, Beds., G5RZ is now fully equipped for Two Metres, with a G2IQ converter into a B2, a 12-element stack (as recently described in *Short Wave Magazine*) and 20w. to an 832. Some contacts have been made, but as yet there has not been time for regular appearances on the band.

G6FO (Maids Moreton, Bucks.) is ready again with a new transmitter running 75 watts to a 3E29 and giving, on the bench, about 40 watts RF out. But the beam is down for reconstruction and the converters need attention, so his signal will not be heard again for a little while yet.

London News

G5DS (Surbiton) puts in a useful calls heard/worked list, and goes up three in Annual Counties, with G3GJZ for Suffolk, G3HVO for Dorset and G3JON for Gloucester; he also has a fine total of stations worked, at 417. From G3HWJ, also of Surbiton, a first report, with a note of particular thanks for all the help he has had from G5DS in getting him going. G3HWJ started in March last, and at the moment runs 18 watts to an SCR-522, with a modified G2IQ converter into an S.640; a 16-element stack completes the picture. Results to date are 23C worked All-Time, and 21C in the Annual table—and very nice, too. G3HWJ hopes to be on regularly now that he has got himself settled on the band.

G2AHP (Perivale) was glad to get a good R5 QSO with G3AUS (Torquay) during the month, and also worked G3GJZ (Newmarket) and G5ML (Coventry); other new ones for him were G2DDD, G3BUN, G3FFG, G3IEX (Uxbridge), and G6PG (Dartford, Kent)—all helping to push the score along. G3HBW (Wembley) found conditions good from January 15 to about the 25th, with an improvement again on the 29th. During the period, he worked three F's and ON4BZ, while on the 29th G4GR (Marshfield, Mon.) was heard at RST-589, but could not be raised. G2HQ/P, up near Sheffield, would probably be interested to know that throughout the morning of Sunday, 18th, he was RST-569 at G3HBW, who called him continually without avail. G3HBW is another to show progress in the scoring, with G3NL for Worcester, G3F1H for Somerset, and G3GJZ—who seems to have been working most of the stations active on the band.

For those who favour early-evening working, G2BRR (South Woodford, E.18) is there 1900-2030 daily, on 144.63 mc, with locals G6SG on 145.020 mc and G3GZD on 144.65 mc. Both G2BRR and G6SG have new receivers with 12AT7's in the Cascode mode, which are giving very satisfactory results — though they are both confined to indoor beams. Stations on the East Coast regularly active and workable from the Woodford district are G3ANB (Brightlingsea), G4OT (Malden, Essex) and G4AC (Chelmsford).

G2HDZ (Pinner) goes up in Annual Counties—nice to hear from you again after some time, OM—and is another of those who have recently increased power; he is getting 60 watts into a 3E29 in place of the 832, and so far results have been very satisfactory. On January 14, G2BMZ (Torquay) was raised for a good QSO.

With G6RH (Bexley, Kent) the evening of January 29 was the high spot of the period, with F8AA, F8GH, F8KF and ON4BZ worked. Consistently good signals with him are G2FNW (Melton Mowbray), G3DIV (Eastbourne), G3WW (March, Cambs.), G5RW (Ilkestone, Derbys.) and G5YV (Leeds), the latter being workable most nights.

East and West

From the Cambridge direction, G3IIT (Trumpington) sends in a calls heard/worked list, and remarks that he is now trying a new converter; this runs RF 6AK5, mixer 6AK5, 6C4 oscillator with 11.7 mc crystal, with 12AT7 multiplier. His transmitter is still the 832 with 15w. input.

G2FJR, of Sutton Bridge, Lincs., is right in the flood area, but came through safely, though he is now 6 ft. b.s.l.! Both G2ALB and G2FNW made generous offers of help and hospitality, if needed, for which G2FJR was deeply grateful. On the VHF theme, he points out that he is still operational and looking for new counties from those who might be wanting Lincolnshire: his frequency is 144.3 mc, the location is 9 miles west of Kings Lynn, and he is there every evening from 1830 onwards. At the moment, the beam is only 14 ft. up, but "when the weather improves," G2FJR hopes to increase this to 35 ft. or so. An improvement already effected is a 12AT7 self-neuted RF stage for the converter, on which he can now resolve carriers which previously could not even be heard without the RF amplifier.

G3YH, of Bristol, goes up one

PARTY ON THURSDAYS

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with G3IAI for Northants., and from Weston-s-Mare G3DLU reports activity for about one hour on each of 22 evenings between January 14 and February 10. In spite of this, he feels conditions have been poor; with him, more stations have been heard than worked. Some new beam construction is in hand, including a second Yagi to be used for reception only and having a grounded-grid RF stage up in the dipole. It will be extremely interesting to hear how this works out; we shall be glad to have full details in due course.

VHF operators along the South Coast will be glad to know that GC2CNC (Jersey, C.I.) is on again, his frequency being 145.13 mc; operating times are 1910 onwards and again after 2230 most evenings, also during Sundays—and, furthermore, he undertakes to be there for the Thursday QSO Parties. As at February 12, the only signal heard on the band by GC2CNC was an unidentifiable CW station at 1924-28 on the 11th, calling CQ and fading rapidly. Anyway, it's a start, and we hope that by next month we shall have some positive results to report from our most southerly VHF station. During this coming season, GC2CNC should do well—he has a good location, and will be in great demand! We foresee GC/EI and GC/GI contacts as soon as conditions serve.

Some Seventycem Items

The G2XV/G3BKQ contact has already been mentioned, but this is not G3BKQ's only DX on the 430 mc band. He and G3GZM, of Tenbury Wells, Worcs., have also QSO'd twice—on January 16 and 23—and as the distance is about 60 miles in the other direction from Cambridge, these contacts fall in the same bracket as the G2XV/G3BKQ QSO. It now seems to be a matter of G2XV working G3GZM for a new point-to-point record to be set up on the 430 mc band. G3GZM is not ideally located, so that his results are all the more interesting and praiseworthy.

In the meantime, G3BKQ is working hard to improve his equipment, particularly in the receiver and aerial feeder departments. His regular 70-centimetre contacts, as catalogued last month, are still being maintained—the stations he gives are: G2BVW, G2FNW, G2XV, G3APY, G3GZM, G3HAZ, G5SK and G6YU.

G2HDZ (Pinner) reports that his 70-cm receiver is still working and his total of stations heard is now six, all locals. When the weather improves, he is to tackle the problem of a more suitable aerial for this band.

G2XV (Trumpington) writes to say that he is now "more or less permanently settled" on 435.240 mc, and asks whether it is not time we published a list of really active 70-centimetre stations, giving location, frequency and operating times. He also suggests that there may now be sufficient interest in this band to make it worth while staging a contest, with some *simple* system of scoring (!). Well, we are fully in agreement with him as to the first suggestion, but as regards a contest, it seems to us that 430 mc is still somewhat in the formative stage—that is to say, while there are far more stations on than ever before, most of them are still in process of getting the gear just-so, and finding out what can be done on 430 mc from their particular locations. Therefore, we feel that the time to lay on a contest is not just yet—though, of course, it can easily be arranged if there is a real demand for it. The outdoor season is approaching, and there is certain to be a good deal of /P work this year, so that the lines for a possible contest to help open up the band suggest themselves—a summer-time week-end event, open to fixed and /P stations, with scoring on a straight mileage basis. Anyway, there it is on *that* point—what do people think?

As regards a 70-centimetre activity list, this is a matter of operators letting *us* know where they are, what they are doing, and when. As we would be very glad to organise this forthwith, will all who are active on 430 mc send us details under the following heads: (*a*) Call-sign; (*b*) Location; (*c*) Gear used and operating frequency; (*d*) Aerial system; (*e*) Times of operation; (*f*) Best distances so far worked:

TWO METRES

ALL-TIME COUNTIES WORKED LIST

Starting Figure, 14
From Fixed QTH Only

Worked	Station
60	G3BW
58	G3BLP
57	G2OI (349)
56	G3EHY (365), G8SB
55	GW5MQ
54	G6NB
53	G2AJ (519), G5YV (364)
51	G2HIF (200), G3WW, G4CI
48	G3ABA (282)
47	G2NH, G2HDZ, (331), G4SA, G5DS (417), G5WP
46	G4HT (476), G5BY, G5MA
45	EI2W (132) G2XC, G3FAN (315), G5BM, G6XM (356), G6YU (195)
43	G3BK, G3COJ, G5DF
42	G5BD
41	G2FQP, G3BA, G3DMU,
40	G3CGQ, G3HAZ, G4RO (256), G5JU, G8KL, G8OU
39	G2IQ, G3VM
38	G3APY, G8IL (300)
37	G2FNW, G3HBW
36	G3CXD, G3GHO (170), G6CB (312), G8IP
35	G2AHP (335), G2FZU (118)
33	G2FCL (117), G3FZL, G5ML (145), G6CT (136)
32	G2FVD, G8IC, G8QY
31	G2FJR (103), G3HXO, G5RP
30	G2HOP, G3BKQ, G5NF, G6TA (206)
29	G3AGS, G3AKU, G3BJQ
28	G3FIJ (143), GM3BDA, G8VR
27	G3BNC, G3DAH, G3GSE, G3HCU (152), G6GR
26	G3CFR (125), G3FIH, G3GBO (289), G4MR (189)
25	G5SK
24	G3FD, G3FXG
23	G3CWW (260), G3HWJ, G4LX, G5PY
22	G3AEP, G3ASG (150), G3BPM, G3FRY, G3GOP(122), G3HII, G5MR (128), GM3EGW
21	G6XY
20	G3EYV, G6PJ
19	G3SM, G5LQ (176)
18	GM3DIQ
17	G3DLU
16	G2AOL, G3FEX, G3FRE, G3YH, GC2CNC
15	G2DVD, G3IWA,
14	G2DHV, G3GYY, G3ISA

Note: Figures in brackets after call are number of different stations worked on Two Metres. Starting figure for this classification, 100 stations worked. QSL cards are not required to verify for entry into this Table. On working 14C or more, a list showing stations and counties should be sent, and thereafter added to as more counties are worked.

and (g) *very important*, call-signs of all other stations known to be on 430 mc.

This will enable us to compile a first list, which can be added to and kept up-to-date as more stations come on—just as we did in the early days of the two-metre band. Some of the information under the suggested headings we have already, but the essential data on operating frequencies is nearly always missing. It will be tidier to make a clean start, with authentic details.

VHFCC Elections

Since our last issue, the following have been elected to membership of the VHF Century Club: G2AVR, Netherfield, Sussex, No. 139; G3HVO, Parkstone, Dorset, No. 140.

All those who have worked 100 or more stations on the VHF bands, and have the QSL cards to prove it, are eligible for the certificate of membership of the VHF Century Club. Cards should be sent in by registered post, with a check list; the certificate is issued and the cards returned within a few days.

Calls Heard and The Tables

This month we show what we hope is another interesting selection of calls heard and worked—and, once again, we would remind all readers that their lists are requested for publication under the "Activity Report" heading, to help build up the general picture of what is happening on the VHF bands. Everybody glances through calls heard—and it is this which will prove it to you that your list would be of interest to somebody else.

The Tables are amended up-to-date as reported to us by February 14, and it will be noted that there are again some new entries in Annual Counties. But there could be a good many more, so all active operators are asked to keep us informed on this, too.

In Conclusion

And that brings us to the bottom of the pile for this month. Closing date for the next issue is again tight—it must be **March 13 latest**, for appearance in the April issue. Please send all your VHF news, views, ideas and suggestions to: A. J. Devon, "VHF Bands," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. CUAGN on April 3—and don't forget that 70-centimetre report if you are active on that band.

PARTY ON THURSDAYS

Do you come on for the VHF Sessions, 2000-2230 every Thursday evening? There is always someone to work, on both bands. And please let us have a log of stations heard and worked. CU Thurs.!

TWO METRES

COUNTIES WORKED SINCE SEPTEMBER, 1, 1952

Starting Figure, 14

Worked	Station
42	G3WW
33	G5DS
31	G2HDZ, G4SA
28	G3FAN
27	G5YV
26	G3GHO
25	G3HBW, G3HXO, G3IOO
23	G2AHP, G8IL
21	G3HWJ, G4RO, G6TA
19	G2FJR
18	G6YU, G8DA
16	G5ML
14	G2FCL

Note: This Annual Counties Worked Table opened on September 1st, 1952, and will run until August 31st, 1953. All operators who work 14 or more Counties during this period are eligible for entry in the Table. The first list sent should give stations worked for the counties claimed; thereafter, additions claimed need show only stations worked in each county as they accrue. A certificate is given for all VHF operators who work 40C or more in the year, for which QSL cards must be shown. Cards are not, however, required for entry into the Table.

Eliminating VFO Drift

CONSTANT RUNNING WITHOUT RECEIVER BREAK-THROUGH

A. H. WICKHAM (GM3IAZ)

STABILITY of frequency is the keynote of good transmitting. This fact is recognised by all experienced amateurs who know that reliable communication depends on a controlled frequency which does not drift between overs, and a receiver with good selectivity at the other end.

As an HF generator, most amateurs prefer to use a variable frequency oscillator. It has flexibility and allows placing of a carrier where it can be most effective. But most beginners—and some experts—find difficulty in its use arising from the fact that it is not easily possible to leave a VFO switched on during reception. Screening of a VFO is seldom fully effective and the small amount of leakage causes interference on the receiver.

This means that the VFO must be switched off during reception and on for transmitting, with consequent gradual change of frequency every time the valve electrodes heat up.

To remedy these conditions, many special circuits have been evolved with the aim of rendering valve capacity negligible, either by reducing its effectiveness or by compensation.

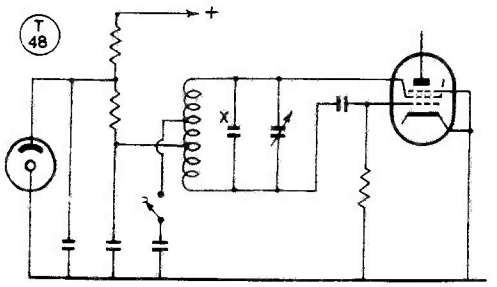


Fig. 1. A standard circuit is used for this VFO, the function of the switchable fixed condenser being to shift the frequency off the working channel under operating conditions.

Such circuits are tricky to adjust and sensitive to alteration and valve change.

In making the VFO now being described it was decided to attempt a departure from accepted practice in order to obtain the greatest stability possible in a circuit which is simple and not temperamental. By allowing the HT to flow continuously through the oscillator valve during reception, the drift due to warm-up is avoided. It would only be necessary to de-tune the VFO during reception and find a means for accurately and quickly retuning for transmitting.

Theoretically this can be done quite easily by switching a small value of capacity across the main VFO tuning, but switching of this type, at high HF potential and impedance, is best avoided. Slight mechanical variations such as light pressure on the VFO panel can cause the note to vary considerably due to movement of the switch leads. The mechanical construction would have to be very rigid for such an arrangement to be completely successful.

The Approach

By using low impedance switching the previous objections are overcome. A VFO was made up using a straight Hartley oscillator with a 6AG7 valve, as in Fig. 1. A tapping two turns up (or down) from the earth point on the tuning coil was taken *via* a switch to a 0.003 μF condenser which was earthed on the remaining terminal. When switched in, this condenser is equivalent to a small capacity in parallel with the main tuning capacity of the VFO and has the effect of moving the frequency slightly more than one band-width. Thus the VFO, which works on the fundamental frequency of 3.5 mc. has its frequency changed to 3.1 mc. The harmonic range of 7.0 mc. is changed to 6.2 mc. and 14.0 mc. to 12.4 mc. and so on, leaving the receiver clear bands on which to work. If the VFO was last used on 14.3 mc. the switched frequency would be 12.7 mc. and clear of the channel.

Operation

The station is now operated as follows. First, both the receiver and the VFO are switched on and allowed to settle. When a call is heard to which a reply is to be sent, the VFO (only) is switched to the "transmit" position and tuned to zero beat and then switched back to "stand-by." When the calling station is ready to receive, the VFO is again switched on plus the main HT to the power HF stages.

And so on. The power to the VFO is *never switched off* and it is found that after the first three minutes' warm-up the frequency does not waver by an amount detectable by any ordinary means.

Fig. 1 shows the circuit adopted. No attempt has been made to use other than the Hartley circuit, but for those who prefer the ECO arrangement that shown in Fig. 2 should give equal results. The condenser "x" is the normal large capacity ballast condenser of about 0.0005μF. Other constants for the circuits are not critical. A voltage regulator is shown in both circuits as a safeguard against mains fluctuation.

The VFO described has been in operation for some months. Since its introduction many compliments on frequency stability have been received—including the U.S.A. QSL cards received are consistently marked T9x and it has been found much easier to hold DX in spite of QRM, QSB and low power.

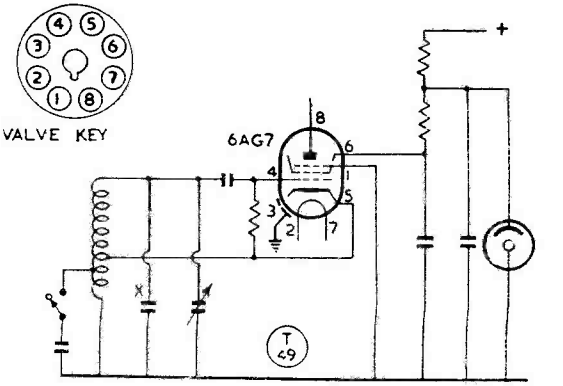


Fig. 2. The arrangement of Fig. 1 applied to another type of VFO. The basis of the idea is to be able to keep HT on the VFO, with the valve oscillating normally, but to prevent beating in the receiver on the operating channel. The effect is a high degree of VFO stability, as there is no HT switching, and therefore no change in valve temperatures and no variation in HT loading.

SERVICE ENGINEER TRAINING

Prior to the installation of each new television transmitter, The General Electric Company, Ltd., has, through its local branch, organised courses of instruction for service engineers in the area to be covered by the new station.

Following this practice, plans have been made for a series of courses to take place in the N.E. area of England and in N. Ireland in time for the opening of the stations at Pontop Pike and Belfast.

In N.E. England the courses commence on Mondays and last for five days. They include lectures on television technique, demonstrations of setting up procedure and practical work. Three further courses are to be run at weekly intervals. At Belfast a similar series of four courses commences on March 2, 1953. Here a maximum of 12 engineers is acceptable for each course.

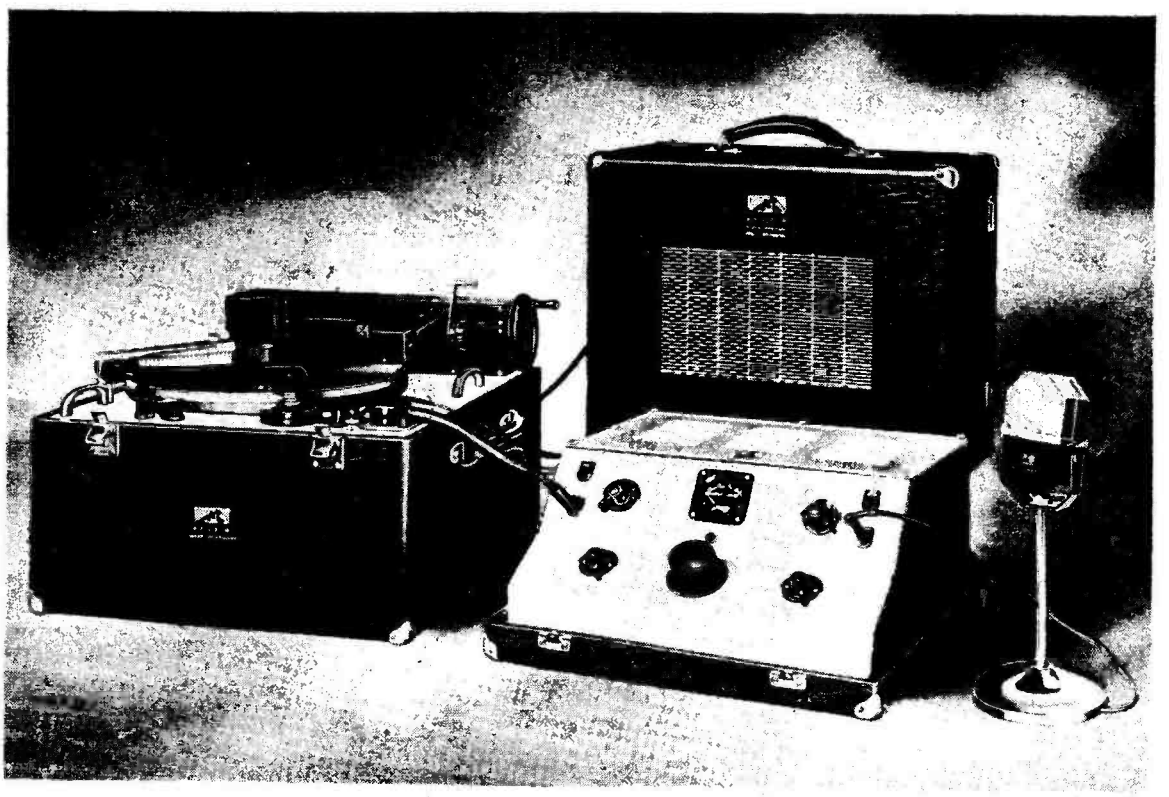
These courses have been organised by the G.E.C. branches at Newcastle and Belfast, to whom interested dealers in the areas should apply.

DOUBLE TETRODE FOR UHF WORKING

A new high performance Double Tetrode, especially suitable for use on the UHF wave-bands recently allocated for Business Radio, Radar-Sonde and Television-Link equipment, is now available from the Communications and Industrial Valve Department of Mullard Ltd. It is the QQVO3-20, and is intended for wide-band operation as an RF Class-C power amplifier or multiplier in low-power mobile transmitters working at frequencies up to 600 mc. At 200 mc the QQVO3-20 is capable of providing a power output of 42 watts. Under reduced input conditions, 22 watts can be obtained at 400 mc and approximately 12 watts at 600 mc. As a result of new and important design features, the QQVO3-20 has the outstanding advantages of high anode efficiency, excellent power gain, low filament consumption and small physical dimensions; and it is of all-glass construction. Its small size and low power consumption makes the new valve of particular value for use in compact mobile communications equipment. It is constructed on the B7A base.

UNITED STATES AMATEURS IN AUSTRIA

The QSL Bureau for the OE13's (amateurs of the United States with the American Forces in Austria) is now established and cards should be addressed as follows: OE13 QSL Bureau, Signal Section, USFA, APO 168, c/o Postmaster, New York City, N.Y., U.S.A.



The H.M.V. Portable Recording Equipment, Type 2300H. This is completely self-contained and self-powered, requiring only a plug-point for operation.

AMATEUR GUIDE TO VALVE SELECTION

A book which should prove of considerable interest to radio amateurs has recently been issued by Mullard, Ltd. It is entitled *The Amateur's Guide to Valve Selection.*

Not only does this book assist amateurs in the selection of suitable valves and tubes from the Mullard range, but it also indicates under what conditions they should be operated in order to achieve optimum performance. The book, therefore, has special value for radio amateurs who wish to construct their own equipment.

It has not been possible in a book of this size to include all the ratings, characteristics and operating conditions for every Mullard valve in current production. However, an attempt has been made to include essential technical details on all valves and tubes currently being used by professional designers, which are recommended for use by the radio amateur. These valves and tubes are arranged in table form, thus making it an easy matter to select the correct type for any particular circuit. The tables are followed by typical operating conditions for each application. General recommendations concerning valve and tube operation are also included.

In addition to the tables and other technical data relating to valves and tubes, a section is included which gives full details of a number of circuits for battery and mains-driven receivers and amplifiers that have been designed to achieve optimum performance from the valves and tubes used.

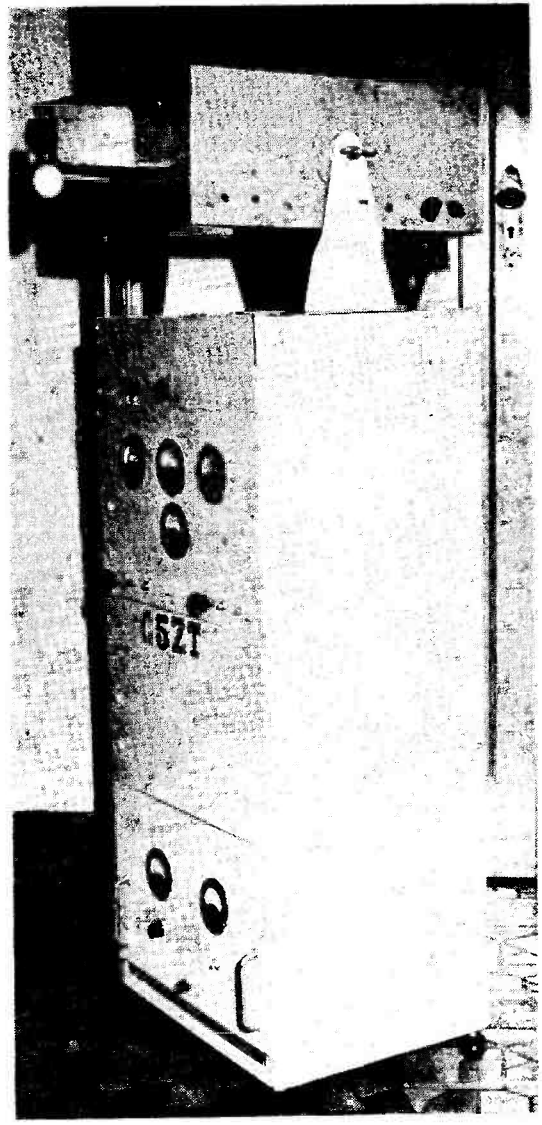
The book can be obtained from radio and television retailers at a price of 1s. 6d. per copy. Retailers can obtain stocks from their Mullard wholesalers.

★ ★ ★

AMATEUR TELEVISION STATION G5ZT/T

In the June 1952 issue of *Short Wave Magazine* we described the successful experimental work being undertaken by G5ZT, of Plymouth, in the field of amateur TV transmission ; the first two-way television QSO was also reported, between G3BLV/T and G5ZT/T. Since then, the latter has carried on vigorously and is now transmitting TV daily in the 430 mc band. The photograph shows his latest equipment—compare with the assembly of different units in use last year, as pictured on p.208 of the June issue. The new transmitter as shown here is the complete TV station, making a much neater and more effective job, and saving a great deal of cable work. The design of this transmitter is such that the picture it radiates can be taken on any standard BC TV receiver equipped with a simple 430 mc converter and an aerial cut for the 70-centimetre band. As G5ZT says, "This saves a lot of complication at the receiving end, and owners of ordinary TV sets can become viewers on amateur television transmission with very little trouble."

The equipment as illustrated here consists of: Top, complete camera unit on tilting frame, using 5527 Iconoscope, with frame and line time bases and video amplifier ; the first panel carries the 430 mc transmitter ; the metered panel is the video amplifier and screen modulator for the 430 mc transmitter ; the next deck contains the EHT power supplies ; and the lower chassis is for the electronically stabilised low-voltage power supplies. The cabinet itself is on castors for easy camera swinging, and the only external connections are to the 430 mc aerial and the AC mains power point.



The complete TV transmitter now being operated on the 430 mc band by G5ZT/T of Plymouth, Devon. Pictures radiated by this equipment can be received on a standard BC TV receiver with the addition only of a simple converter and 430 mc aerial.

G5ZT is to be congratulated on this very fine piece of amateur TV equipment, which is in regular operation and giving good results in the Plymouth district. He is probably the only amateur in the world who has got beyond the "frig and fiddle" stage and is able to transmit a good picture with reliable gear that really does work.

Random Jottings by the Old Timer

ONE of the results of the painful overcrowding of our bands in this post-war phase of Amateur Radio is the spotlight which it throws on some of the other users thereof. It seems strange to note, at times, that one can tell an amateur signal from the others by its general cleanness and good quality. Very creditable to the amateur fraternity, but, inevitably, reflecting rather poorly on the others! If you want concrete examples, compare the average Top-Band amateur phone with the average trawler. The sad thing is that "fish-fone" is what it is, only because the operator insists on half-swallowing the microphone and bellowing into it. Seeing that 100 per cent. modulation is achieved long before this point, and that any increase merely *reduces* the intelligibility, something should be done about it. If it is impossible to impress on trawler skippers that there is no need to shout, then surely the sets could be adjusted so that the loudest bawling only produces 100 per cent. mod.?

TOP-BAND DX

Once more we are having the thrill of hearing signals across the Pond on our Top Band, and very nice they are to listen to. We must not forget, though, that they were first heard and worked thirty years ago! True, the conditions were somewhat different, in that British stations were using powers up to, and even above, 250 watts—but, as an off-set to that, receivers at both ends were much poorer. Nearly all the signals heard then were logged as "AC" or "RAC"—hardly a "DC" among the lot, and the "T" code hadn't been invented. Ah, those days of chemical rectifiers! Our log for 1922 and 1923 shows some fifty stations from U.S.A. and Canada, forty of whom were using real honest-to-goodness raw AC (and that *means* raw—with no attempt at rectification). In these days of technical perfection, every single one is T9, powers are lower, receivers and aerials are much better—but it still isn't too easy!

THOUGHTS ON RECEIVERS

The average amateur does not have the opportunity to compare four or five types of receiver side by side; in fact, he doesn't even change from one type to another very often. When he *does* try another make, it often makes him dissatisfied with his own, but this is not, as a rule, due to any fundamental inferiority. It is merely the sad fact that one's own receiver can slowly go out of alignment and condition without being suspected of it. Gradual deterioration over three or four years can wreak havoc with the performance, especially on the score of selectivity, and one is brought up with a jerk by trying something different. Moral—have a check-up once in a while and see whether selectivity on (*a*) Phone and (*b*) CW is what is was when that receiver was the apple of your eye.

AND TRANSMITTERS, TOO

The same sort of thing goes on in the transmitter, naturally. But it is easier to spot, particularly if you use that most useful instrument—the aerial ammeter. We all know that the actual reading, in itself, doesn't mean a thing; you can double it by adding a few feet of wire, or cutting a few off from the aerial. It is different on all bands, and varies in different parts of the bands. But for any particular frequency there *is* a standard reading, which should be repeatable at any time, and if it has fallen off there must be a reason for it. Either the PA emission is down, or the drive has dropped off, or the loading conditions are wrong. Treat the aerial ammeter as a *performance meter*, and it will warn you of almost anything that can go wrong with the works.

CHINESE CODE

Much could be said about the various non-amateur stations that one hears on the 80-metre band late at night. One likes to think that they are not British (they come up to a maximum as the British stations are becoming weaker), but wherever they hail from, they leave a lot to be desired in the way of tone and stability. Here, again, we have the situation in which you can instantly pick out an amateur signal by its T9 note and steady operating, while, all round it, are chirpy T7 things that creep, crawl and go boomp in the night. Some of them, by the way, send Morse that is quite unreadable to the uninitiated—is it a kind of "code within a code"? One can't help thinking that they would be very difficult to copy in the event of an emergency—which is surely what they are chiefly intended for?

TIME SIGNALS

How useful our friend WWV is to us—at any minute of the day or night we can get a time and frequency-check from him, unless conditions are quite abnormal. When he isn't audible on 20 or 15 mc, you can usually find him on 10 or 5 mc, and throughout the nights the 5 and 2.5 mc signals are really strong. The 20-mc transmission is a good pointer to the state of the 21-mc band, but who is it that persistently jams that frequency with a raucous modulated-CW affair that sounds too bad to be a signal and too good to be a jammer? There is often some difficulty in finding the 20-mc WWV, even if he is quite strong. And his propagation forecasts are enormously useful, but one should always remember that they apply only to the North Atlantic path.

The Other Man's Station

G3HTB

THIS month we discuss one of the much more newly-licensed stations—G3HTB, operated by M. P. Squance at 14 Bendigo Road, Dewsbury, Yorks., who first came on the air in September, 1951. He gained his experience and acquired his interest while serving with Royal Signals.

The main activity at G3HTB is CW on Eighty and local nattering on the Top Band—but equipment is available for operation on all bands 1.7 to 14 mc. In the photograph, at left, is the 160-metre CW/Phone transmitter, which runs Clapp 6V6 VFO-6J5-TT11, choke controlled by a speech-amplifier/modulator consisting of an SP61-6J5-6V6 arrangement, and used with a "crystal insert" microphone fitted in one of those old Post Office candlestick stands—incidentally, still one of the neatest ways of mounting a desk microphone. The output on 1.7 mc is taken into the Collins coupler standing on the transmitter.

For the bands 80-20 metres, a separate transmitter is provided, entirely self-contained, consisting of a Clapp 6V6 VFO into a TT11, with an 807 PA running 50 watts; as telephony is not at present used on these bands, no modulator is necessary. This particular transmitter is built into a modified GO9 cabinet, the GO9 itself being a design excellently adaptable for use on our frequencies; as far as possible, the original circuitry in this box has been retained, as it covers the amateur bands. Again, output on the three bands is *via* a Collins coupler.

On the receiving side, G3HTB has a B.36, with a National 1-10 for VHF listening, and a Class-D Wavemeter for frequency checking.

The station as pictured here occupies a small bedroom because, says G3HTB, "Radio activity in the living room is outlawed by the XYL"—and how right she is! *Future plans include the provision* of two-metre gear, which is to be the next constructional job. In the meantime, VHF activity is confined to listening round on the One-Ten. As a matter of interest, we might add that G3HTB uses this photograph on his QSL card.

The Month With the Clubs

Some time back a well-known Club made the allegation that, although dozens of Clubs talk about their transmitter in their notes, very few of these call-signs are ever heard on the air. Certain it is that, even at the time of "MCC," it seems difficult to bring more than about 30 of them together, and then some of these are private stations.

We therefore invite all Clubs with an active transmitter of their own to send us the following information next month: (A) Call-sign; (B) Normal operating frequency or frequencies; (C) Regular times of operation, if any. We suggest that, even if there have been, up to now, no regular operating dates and times, Clubs should endeavour to fix a regular period during which their call-sign will definitely be on the air—preferably on the Top Band.

We will be glad to print the list of these regular times (and days of the week) in order that Clubs CAN make a point of getting in touch with one another on the Top Band, or even 3.5 or 7 mc.

If you have a regular weekly session, therefore, let us know. If you have not, try to fix one, corresponding with a Club evening. We are convinced that much more could be done in the way of getting together via radio, to the mutual benefit of many Clubs and Societies.

Apart from reports this month, we acknowledge the following Club publications: CLIFTON *"Newsletter,"* STOCKPORT *"News Bulletin,"* S.R.C.C. *"Monthly News,"* PURLEY *"News-Sheet,"* and *"QLF,"* WEST KENT.

Reports follow, from 21 Clubs; deadline for next month is **first post on March 11**, *and for the following month first post on April 15. Address all items to "Club Secretary," Short Wave Magazine, 55 Victoria Street, London, S.W.1.*

Liverpool & District
Short Wave Club

Two recent events have been the Goodmans' Hi-Fi lecture and demonstration, and a talk on Computing by Mr. Hancock. G3BWR was first in a Frequency Measurement Contest held by the Association of North Western Radio Societies. All "unattached" amateurs and SWL's are asked to get in touch with the Hon. Sec. or to look in at a meeting—every Tuesday, 8 p.m., at St. Barnabas Hall, Penny Lane, Liverpool, 15.

Reading
Radio Society

Attendance averages 20 members per meeting, and recent lectures have covered Tape Recording, Two-Metre Receivers, Hi-Fi Reproduction and FM. A successful Dinner and Social was held on January 9, and the AGM will be on March 28. Meetings are at the Abbey Gateway, Reading, on the second and last Saturdays of the month.

Coventry
Amateur Radio Society

The big event in February was the Twenty-first Anniversary Dinner on the 27th. The future programme is as follows: March 16, Lecture by G6YU; March 30, Mathematics Lecture by T. R. Theakston, B.Sc.; April 13, "Readers' Digest."

Brentwood & District
Amateur Radio Society

The AGM was held on January 16, and new officers elected for the 1953 season. Note address of new Hon. Sec., in panel. Meetings continue every Friday, and it is hoped to have the Club Tx running more often.

Edinburgh
Amateur Radio Club

Meetings are held every Wednesday, 7.30 p.m., in the Club's own premises at 16 Bothwell Street, off Easter Road. Full details of membership, etc., may be obtained from the Hon. Sec. (*see* panel for address).

Barnsley & District
Amateur Radio Club

The Annual Dinner was held in January, and 59 amateurs, wives and friends participated in a very enjoyable social evening. Many prizes were kindly contributed by wireless and electrical firms.

Southend & District
Radio Society

This society now has the use of a fine electrical laboratory in the Municipal College for its fortnightly meetings. At the AGM on January 23 the officers for the coming season were elected, and Mr. J. E. Nickless, G2KT, was made a Vice-President. The new Chairman is Mr. J. L. Goss, G3ILG. An interesting lecture recently was on "Industrial Electronics," and at the meeting on March 6 the subject is to be "Commercial Receivers."

Warrington & District
Radio Society

At the AGM, in January, G3FGI was elected Chairman and G2FCV Secretary (note panel for his Qth). Future lectures, on the first Tuesday in each month, will cover Teleprinters (G3EXG), "Random Radiations" (G8TR) and The CRO and its Applications (G3FGI). Ragchew and business evenings are held as usual on the third Tuesday of each month.

Stockport
Radio Society

After nearly twelve months, the Club has a very satisfactory membership, and looks forward to even better things in the coming year. The next meeting after publication is on February 17, when G3AOO will give a lecture and demonstration with Model Aerials. The AGM will be held in March.

Slade
Radio Society

Recent meetings have covered RF Heating and Radio Mathematics, and one evening has been devoted to a discussion on TV and Sound Broadcasting. On March 6 there is a talk on Radio Fundamentals, and on March 20

Cathode Ray Tubes for TV. Both meetings will be at Church House. Erdington, beginning at 7.45 p.m.

Ravensbourne Amateur Radio Club

Lectures and practical work take place on Wednesday evenings, 8 to 10 p.m., in the Science Room, Durham Hill School, Downham. The Club Tx, G3HEV, is now licensed for full power and telephony. New members will be welcomed.

Portsmouth & District Radio Society

The regular Tuesday meetings continue, and have included a Film Show, a Junk Sale, and a talk on Micro-Wave Valves. Members also joined with the Southampton Group for a lecture on TVI. New members will be welcomed at the meetings—Tuesdays at the Royal Marine Signal Club, Eastney Barracks, Portsmouth.

British Two-Call Club

The Club President for 1953 is Major Macdonnell, G8DK, and the Vice-President Major Drudge-Coates, DL2RO, who has held a great variety of calls since he was Y-DCR (India) in 1927. Seven members of the Club have held *six* calls, and total membership is now 109.

This was the team operating G3AFT for Grafton in our recent Club Contest ("MCC"), in which they have participated every year since its inception. Grafton always make it a Club affair, with as many as possible of the members lending a hand—even if it is only making tea! In this photograph, 1st operators are in the front row, left to right: G3IFS, G3HZL, G2AAN, G3RX and G8PL. 2nd operators, back row, left to right; SWL's Russell and Lassman, G3AFC, G2DUP, G3HEA, SWL Cons, and G2CJN.

QRP Research Society

QRP skeds are now being arranged between members, and SWL co-operation is invited in reporting on them. It is also proposed to organise a Society Net on the first Sunday of each month, between 3500 and 3545 kc, CW only. Work proceeds on a "QRP Receiver," and there is also a VHF section, under the leadership of GC2CNC. All QRP enthusiasts are invited to get in touch with Hon. Sec. (*see* panel).

Though a small organisation and rather remotely located, the Ixworth Radio Club is very active. For a Handicrafts Exhibition at Bury St. Edmunds recently, they had stand for G3CZY A, with a display of receiving and transmitting gear. Photograph shows G3CZY at the microphone.

Midland Amateur Radio Society

At a recent meeting a discussion took place on "Modern Trends in Amateur Radio" and was much enjoyed. Meetings are held on the third Tuesday at Imperial Hotel, Birmingham (note name and address of new Secretary, in panel).

Radio Society of Harrow

Meetings continue every Friday evening in the Science Lab., Roxeth Manor Secondary School, Eastcote Lane. The March programme includes: March 6, VK3PD on "VK-land"; March 13, Practical; March 20, S-meters (Hivac Ltd.); March 27, Practical. The Club Tx is being rebuilt on the Practical nights. Visitors always welcome.

Derby & District Amateur Radio Society

Forthcoming events are as follows: March 11, Talk, "The Amateur and Home Repairs"; March 18, Open Evening; March

25, Demonstration, "Frequency Measurement"; March 27, Committee Meeting. All meetings at 7.30 p.m. in the Club Room, Derby College of Art, Green Lane —with light refreshments at 8.30 p.m.

Cambridge & District Amateur Radio Club

The March meeting will be held at 8 p.m. on Friday, the 13th, at the Jolly Waterman, Cambridge. It is the AGM, and members are reminded that any proposed alteration to the rules must be received, in writing, by the Secretary at least 14 days before the meeting.

Army Apprentices' School Radio Club

Two new members are Burmese students, apprentice tradesmen from the Burma Army passing through the school. They are very keen to learn "ham procedure," and their Morse is coming along. G3HOS, the Club Tx, succeeded in working OH3NY recently on the Top Band.

Gravesend Amateur Radio Society

At the AGM, Mr. E. C. Woods, G3FST, was elected Chairman for the coming twelve months. The Hon. Sec. was re-elected. Membership has risen from 20 to 51 members, and the financial position is satisfactory. It is hoped to get the Club station on the air shortly, from 66 Burch Road.

Leicester Radio Society

A very successful Dinner and Dance was held on January 23 at the Empire Hotel. On February 3 members were given a Film Show with three interesting items from Philips Ltd. Another similar show is booked for March 3. All future meetiugs will be at the Holly Bush Hotel, Belgrave Gate, Leicester, on the first and third Mondays.

NAMES AND ADDRESSES OF SECRETARIES REPORTING IN THIS ISSUE

ARMY APPRENTICES' SCHOOL : F. A. Hall, G3GBU, Tels. Dept., A.A.S., Arborfield, Reading.
BARNSLEY : P. Carbutt, G2AFV, 33 Woodstock Road, Barnsley.
BRENTWOOD : J. S. Thornton, G3FQQ, 18 Western Road, Billericay, Essex.
BRITISH TWO-CALL CLUB: G. V. Haylock, G2DHV, 63 Lewisham Hill, London, S.E.13.
CAMBRIDGE : T. A. T. Davies, G2ALL, Meadow Side, Comberton, Cambs.
COVENTRY : K. Lines, G3FOH, 142 Shorncliffe Road, Coventry.
DERBY : F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby.
EDINBURGH : D. B. R. Black, 16 Edina Place, Edinburgh.
GRAVESEND : R. Appleton, 23 Laurel Avenue, Gravesend.
HARROW : S. C. J. Phillips, 131 Belmont Road, Harrow Weald.
LEICESTER : W. N. Wibberley, 21 Pauline Avenue, Belgrave, Leicester.
LIVERPOOL : A. D. H. Looney, 81 Alstonfield Road, Knotty Ash, Liverpool, 14.
MIDLAND : P. L. Hunt, G3FWB, 39 Antrobus Road, Birmingham 21.
PORTSMOUTH : L. Rooms, G8BU, 51 Locksway Road, Milton, Portsmouth.
QRP RESEARCH SOCIETY : J. Whitehead, 92 Ryden's Avenue, Walton-on-Thames.
RAVENSBOURNE : J. H. F. Wilshaw, 4 Station Road, Bromley, Kent.
READING : L. Hensford, G2BHS, 30 Boston Avenue, Reading.
SLADE : C. N. Smart, 110 Woolmore Road, Birmingham 23.
SOUTHEND : G. Chapman, B.E.M., 20 Leigh Hill, Leigh on Sea, Essex.
STOCKPORT : G. Phillips, G3FYE, 7 Germans Buildings, Buxton Road, Stockport.
WARRINGTON : G. S. Leigh, G2FCV, 49 School Road, Orford, Warrington.

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WANTED: RCA 4331 Transmitters. — P.C.A. Radio, Cambridge Grove, Hammersmith, W.6. *(Telephone : Riverside 3279).*

WANTED: Two B2 Receivers. State price and condition. — Reply P.O. Box 184, KITWE, Northern Rhodesia.

FIVE-YEAR accumulation of clean Amer. and Brit. resistance/condenser boards offered at clearance price ; 2-lb. parcel 2/6, post 1/- ; other parcels as free list (S.A.E.). VALVES: 931A, 35/- ; 725A, 25/- ; 836, 10/- ; 6K7G, LH63, H63, 4/6 ; VR65, VR91, 3/6 ; VR92, 6H6, 2/- ; 954, 1/6. Post 4d.—THE RADIO SERVICES, LR, BULLINGHAM, HEREFORD.

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45/- EACH paid for valves Type 813 ; 25/- each 832 ; 20/- each 931A, etc. Also wanted urgently : BC610 Transmitters, etc. Highest prices paid.—Details to Box 1202, *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

CRYSTAL MICROPHONE INSERTS, brand-new, by famous manufacturer. Aluminium diaphragm and hermetically-sealed unit. Excellent frequency response coupled with good sensitivity. Ideal for use with amateur transmitters and tape recorders. 10/6 each, post and packing paid. Cash with order only, to : Trusound, Ltd., 196 Kingsley Road, Hounslow, Middlesex.

12AT7, 12AU7, 12AX7, 6J6, 9/- ; 6AM6, 6BA6, 6X4, 7/6 ; 6AL5, 6/6 ; EF92, EAC91, 6C4, 6/- ; 954, 3/-. — Skillman, Franchise Street, Weymouth.

WANTED : BC610 Hallicrafters, ET4336 transmitters, SX28's, AR88's, receivers and spare parts for above. Best prices.—P.C.A. Radio, The Arches, Cambridge Grove, W.6.

WANTED : RCA Speech Amplifiers, Type MI-11220 J or K, and aerial tuning units BC939A. Coils and tuning units for BC610 transmitters.—Offers, stating quantity and price, to P.C.A. Radio, The Arches, Cambridge Grove, W.6.

QSL CARDS, neat, attractive ; reasonable prices. —Samples, Lovedee, BRS.15643, Mill Street, Barwell, Leicester.

SITUATIONS VACANT

£50 A YEAR TAX FREE BOUNTY is paid to electronic artificers joining special section of the Army Emergency Reserve. Men with City and Guilds Final Certificate in Telecommunications and Radio and up-to-date experience in current electronic engineering practice will be needed to maintain electronic instruments controlling fire of anti-aircraft guns which protect vital centres of Great Britain should war break out. By joining the AER a man will not only be playing a vital part in the defence of this country, but will also know his exact role in the event of war. Minimum rank, Staff Sergeant. Minimum of 15 days' training per year with Regular Army rates of pay in addition to bounty.—Further details from DDME, Anti-Aircraft Command, Glenthorn, Stanmore, Middlesex; or the War Office (AG.10/EA9), London, S.W.1.

MINISTRY OF CIVIL AVIATION.—Radio Mechanics required at aerodromes and radio stations in various parts of United Kingdom. Special training courses for keen mechanics with basic qualification. Interesting work in progress providing electronic aids to navigation. Prospect of permanent pensionable posts. Rates of pay (London) from £290 per annum at age 19, to £385 at 25, rising, subject to qualifying test, to £475, plus pay addition of 10%. The rates are slightly lower for the provinces. Candidates, aged 19 or over, with practical experience in maintenance of radio or radar equipment, should apply to Ministry of Labour and National Service, Barnsbury Road, London, N.1, quoting Order No. King's Cross 576.

TRAINEE required immediately for production testing of high-grade telecommunication aerials. Applicants should be to H.N.C. standard and preferably have some knowledge of aerial theory.—Apply in first instance by letter, stating age, salary required, and experience, if any, G.S.V. (Marine & Commercial) Ltd., 395 High Street, Chatham, Kent.

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RADIO OFFICER required by Nigeria Government Posts and Telegraphs Department for one tour of 18-24 months in the first instance, either (*a*) On agreement with a prospect of permanent and pensionable employment on salary £750, rising to £1,175 a year (including expatriation pay) or (*b*) On a temporary contract basis on salary £807, rising to £1,269 a year (including expatriation pay) with a gratuity up to £37 10s. 0d. according to salary for each 3 months' service. Commencing salary according to age and experience. Outfit allowance £60. Free passages for officer and wife and assistance towards cost of children's passages or their maintenance in this country. Liberal leave on full salary. Candidates must possess a Postmaster-General's Certificate in Radio Telegraphy, or an Air-Operator's Certificate or an equivalent Service qualification. They must have a thorough grounding in I.C.A.O. codes and procedures and have had recent experience with an administration or air operating company outside West Africa in operating wireless and direction finding ground stations for air services.—Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4 Millbank, London, S.W.1, quoting on letter M.29270G. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration.

SITUATIONS VACANT—*continued*

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WANTED: Marconi Magnetic Detector ; D.E. and Multiple Tuners ; 101, 106, 107 and 112 Receivers ; Fleming Valves ; Coherers ; and other early wireless gear, valves and literatures.—FRANKLIN WINGARD, Rock Island, Illinois, U.S.A.

EDDYSTONE 680 Receiver, 15 valves, matched speaker, S-meter, crystal filter, etc., as new. Cost £106 ; sell nearest offer to £60.—Macwhirter, 10 Marshall Avenue, Willerby, Hull. *(Phone : Kirkella 58612).*

HALLICRAFTERS S39A for sale ; 0.55-32 mc, AC/DC/Batt, portable communications Rx, with manual ; £18 o.n.o.—J. S. Haggart, 10 St. Johnstoun's Bdgs., Charles Street, Perth.

LABGEAR 150-watt p/pull, 7 and 14 mc coils, holder and swinging link, 30/-. Transformers, all 200/250 volt input. RTS 1000-0-1000 120 mA, and 2.5-0-2.54 amp. £1; Thermador potted, 680-0-680 250 mA, 25/- ; ditto, 2.5 amp. CT 10 amp., twice, £1. Eddystone 3½in. SM dials, black, 10/- each ; Eddystone 1500-volt split stator 40 + 40, 15/- ; ECO M1 19467A 1-10 mc, modified as per *Short Wave Magazine*, £5.—Low, Moulin, Balmoral Road, Blairgowrie.

SMALL ADVERTISEMENTS. READERS—*continued*

MCR-1 Receiver. £5; B2 Transmitter, without power/pack, £4 10s. 0d. Both in good condition and complete with all coils.—Box No. 1204. *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

AMATEUR, moving shortly, has the following for disposal: American Transmitter made for Amateur use, completely enclosed safety switching; dimensions, 35in. x 19in. x 13in.; VFO/Xtal. band switching; built-in aerial tuning, switched for each band; Phone/Cw; built-in 'scope; £100. 1131 Modulator, less output valves, £6 10s. Walkie Talkie MK.18, £4. W/T Type 67, 50/-. Valve Tester with manual, £10. HF receiver, Model P58, 280/600 mc. £8. 1131 fil. transformer, 15/-. Dipole with 30-ft. co-ax, 20/-. Copper wire 14G, approx. 200 ft., 12/6. Enamelled wire, 9 thou. thick, offers for 38 reels. Selsyn motor, brand-new, 15/-. 1132 power/pack, £3. S.A.E. all enquiries.—Box 1218, *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

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FOR SALE: Army 12 Set; Top, 80, 40, 20 Tx; also BC312, converted mains pack, S-meter. Amateur must sell. What offers?—Box 1207. *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

SALE: BC342N, no xtal, otherwise perfect; 230/110 auto transformer, speaker, Simmonds xtal filter, 100 kc and 1000 kc xtals. Meters: 100 mA (2) 0.5a RF (2), 500μA (1); new unboxed 807's (7). Amateur-made power/packs, 300v./60mA, 450v./100mA; £20 or nearest.—G3HFF, Southview, Chalford, Stroud, Glos.

SALE: 600-0-600 250mA, new, 50/-; Choke 7H. 250 mA, 10/-; 24v. DC, 1½ r.p.m. motor, reversible, 20/-; P/Pack, 24v. DC 2½A, fully metered, 50/-. Pair 50v. power Selsyns, 20/-; pair 50v. Reptr. Selsyns, 12/6; Monitor Xtal Type 4A, complete, P/Pack and valves, 70/-; pair 2API's + screen, 25/-; ex-RAF GPO Type table mike, 10/-; new RF27, 30/-; new Clydon Tx variables, 200 $\mu\mu$F and 500 $\mu\mu$F, 5/- each. T.U. Unit variables, state wants; 3TU Vernier drives, 6/-; 3 807's, 20/-; 7 9001's, 20/-. Fil. Trans., new, 5v. 4a., 6v. 4a., 5v. 2a., 20/-. New Genemotor, 28v.-540v. at 250 mA, 10/-; 115v. fan motor, silent, 10/-. Eleven 2μF 600v. metal cond., 7/6. Twelve .25 μF 600v. metal cond., 7/6. Hallicrafter 455 xtal, 7/6. S.A.E. enquiries. Each item plus half postage.—Box No. 1219, *Short Wave Magazine*, 55 Victoria Street, S.W.1.

SALE: Eddystone S640; requires re-align; £15. Valves: 829B with holder, 25/-; Eimac 15E, 30/-; 1 mc Xtal (spare for BC221), 20/-.—Box No. 1214, *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS—*continued*

AR 88LF, excellent condition, S-meter ; recent overhaul and re-alignment by communications engineer ; £45.—Box 1210. *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

FOR SALE: One Hallicrafter SX28 Receiver in perfect working order ; must sell ; best offer.—Box No. 1209. *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

SALE: 1116A Receiver, £8 ; also valves: TP25, VP23, HL23DD, PEN25, U403, PEN383, VP133, IT4, 3S4, 5/- each.—B. Cheffings, Grimoldby, Louth, Lincs.

BARGAIN: Self-contained Table-top CNY2 Transmitter ; 15w. Phone, 20w. CW on 160-80-40 ; good condition ; with superhet receiver, microphone, key and new handbook ; 240v. fully metered, ready to use. First £12.—G3HHZ, Kemble, Gloucestershire.

FOR SALE: R1155 for AC mains, with Power/Output Pack, £12. — Ridgway, 115 Woodland Way, Winchmore Hill, London, N.21.

GOING UHF. For Sale: Two 6ft. racks with modulator, TZ40's Class B, Power/Packs, etc.; Tx 813's p/pull ; 10-15-20 metres. Single 813, 40 and 80 metres ; 1000v. and 500v. power/packs, bias unit, etc. Offers for above? AR88 LF in excellent condition, £50 ; any trial ; buyer collects. S.A.E. for further details. — G8CD, 28 Tinderley Grove, Almondbury, Huddersfield.

FOR SALE: Hallicrafters SX28A with handbook; best offer over £75. Panoramic Adaptor PCA-2, T200, £20.—Box 1212. *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

MCR1 Receiver, all coils 20-3000 metres, power/pack, 97-250 volts AC/DC, £5 10s. 0d., carriage paid.—Box No. 1211, *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

BRS going VE2: R1155, R109, R1132, Type 3 Power/Pack, G5NI Oscilloscope, plus stack of converters, 130 6.3 valves, and components. Offers? Send S.A.E. for list.—Cauthey, Highfield, Denham Lane, Chalfont St. Peter, Bucks.

EDDYSTONE 750, well maintained, contest winner, £42 10s. 0d. Buyer collects.—Smith, 79 Greencourt Road, Petts Wood, Kent *(Orpington 6010)*.

SALE: Two Pye 45 mc IF strips, OK, £2 each ; also two television focus and deflection coil units, £1 each.—A. Sullivan, The Wilderness, Baldock, Herts.

CNY1 Transmitter/Receiver, 1.5 to 8 mc, complete with cables, key, mike, wavemeter, control unit for AC or 12-volt operation ; £15.—Box No. 1213, *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

NINE VOLUMES *Short Wave Magazine*. Complete series from No. 1 (1937) to February, 1952, £4 10s. 0d.—G2FWA, 72 Kimberley Road, Croydon.

O-MAX Transmitter B4/40 ; offers over £30? TU units 5, 6, 7, 8, 9, 10, new and cased, £1. Wirek Recorder, Model "A" ; offers?—GM3GBM, Aberdour, Fife.

BC*348 built-in P/Pack ; 5/10 converter ; Top* Band VFO ; rack-built transmitter ; 500-volt 200 mA power/pack ; £28. Separate, or exchange for TV.—98 London Road, Newbury.

FOR SALE: Class D, No. 1, wavemeter, good condition ; best offer? WANTED: Enclosed 6ft. rack and telescopic plywood mast.—Box No. 1216, *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS. READERS—*continued*

EDDYSTONE 740, speaker, £28. No offers. Buyer collects. W. London.—Box 1215, *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

SALE: Eddystone S504 with speaker; guaranteed in first-class condition; £30 or near offer?—34, Birchway Avenue, Blackpool.

FOR SALE: NEW HRO SENIOR, TABLE MODEL; NINE GC COILS, POWER/PACK-SPEAKER COMBINED, MANUAL, TROPICALISED; SET OF SPARE VALVES; £45. ALSO EDDYSTONE 740 WITH S-METER AND SPEAKER, MANUAL, £38. CONSIDER EXCHANGES. VIEW BRADFORD.—BOX No. 1217, *SHORT WAVE MAGAZINE*, 55 VICTORIA STREET, LONDON, S.W.1.

WANTED: Bendix Type telescopic, tripod base, light-weight aerial mast.—Cole, Saracen's Head, Daventry.

RCA/BC224B Receiver, similar BC348 converted, £15; Bendix BC221D frequency meter, as new, £30 or offers?—Pratt, Hoyland Vicarage, Barnsley.

EMIGRATING: S640, £16. FB German RF-OSC-MIX-2IF-audio filter, EL2 output, ten valves, snip, £15. B2 complete, £12; Class D, £5; Gang-tuned 40w, 80m, Tx, £5; Decca twin-speed desk, £10; pair boxed 813, £4; 160/80 Tx MO-PA CW/Phone, 6L6-807 plus modulator, £5. S.A.E. details.—G3AGQ, Gomeldon, Salisbury.

WANTED: Speech clipper filter unit, electronic keyer with paddle, 2-metre xmtr, xtal converter and aerial system. No heavy stuff, pse, as taking abroad; prefer genuine Amateur-built unwanted gear. Details and prices.—ZC4DT, 31 St. Margarets, Rottingdean, Sussex.

BC221 mod. AC, £25 0s. 0d.; T1154 40/80, 6L6 ECO, anode mod., £5; 1131 modulator, UM3, £8 10s. 0d.; 1131 power/packs, 1000v, 500 mA, £8; TZ40's, 30/-; 35T's, 35/-; PT15's, 10/6; 20-metre Tx, p/pull 35T's. Offers? Please enclose postage.—G3LR, 369 Dill Hall Lane, Church, Accrington, Lancs.

FOR SALE: CR100 coil pack, tuning cond. and manual, £4. WANTED: AR77 cabinet and chassis in any condition, but must have dials, drives and tuning conds.—G2BGZ, 95 Kenilworth Crescent, Enfield, Middlesex.

S740, Eddystone, mint, £30; matching speaker, £2; BC342, £16; BC453, brand-new, £4; Collins Tx T47/ART13, VFO, xtal calibrator, broadband doublers, 813 PA, Pi-network, 811 mod., Sp. Amp., in Table-top cabinet, with circuit, and calibration book, plus doubler for 21/28 mc, built-in per Collins instructions, £50. 1000v, 400 mA power supply, very heavy duty, suitable ART13, £14. WANTED: Clean issues *CQ*, 1948-June, 1952, inclusive.—Parker, 9 Cheltenham Road, Broadway, Worcs.

R107, EL32 output, muting circuit and speaker removed, panel socket provided for speaker, £10 10s. 0d.—Sainthouse, 81 Saltwell Place, Gateshead 8, Co. Durham.

EX-R.A.F. 145 VFO, with original power/pack, 2-7.5 mc. Any reasonable offer. Buyer collects.—P. Butler, 2 Whybourne Crest, Tunbridge Wells, Kent.

WANTED: "IF" Transformer for R107 set, or cash 107 receiver. Will pay your price.—A. Woodroffe, 9 Spring Road, Riddings, Derbys.

SALE: Rotary Converter, 230v. DC/110v. AC by steps to 250v. AC (Auto Transformer); 750-watt output; complete with starter, suppressor, etc. Nearest £16.—Jones, GW3HAW, Lamorna, Westbourne Road, Penarth, Glam.

SMALL ADVERTISEMENTS. READERS—*continued*

BC 312 — Xtal filter. Xtal calibrator, S-meter, £12; 829/3E29 new, £2; 815, £1; 1¼in. CRT. £1; 0/50 microamp meter, new, £1; Xtals. 100 kc, 7/6; 250 kc. 7/6; 60w. Mod. Xfmr., £1; Midget commercial Tx 3-8 mc. mains operated, complete. £3.—Box No. 1220, *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

G2DD 70 cm Converter. Basic Kit comprising drilled box, flat lines, oscillator coil, IF coils, screen, Xtal holder, coax. socket, power connector, tag boards, 54/6; complete kit, less crystal and valves, £5 5s. 6d.; finished job air tested to order.—Smith, 74, Braithwaite Gardens, Stanmore, Middx.

"CITY SLICKER." Bendix Tripod Mast, for sale. Offers? WANTED: Steel Mast, Commercial 2-metre Yagi; Valves EL91, EF91, C64, B7G and Mullard QV40-7 valves. Liverpool.—Box No. 1208, *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

SALE: Transformers. One RCA 2000-0-2000 800 mA, £5; one 2.5-0-2.5v. 10 amps. twice. 30/-; one 350-0-350 250 mA, 30/-; one 6.3v. CT 6 amps. and 4v. CT 2 amps., 30/-. Choke 15H 500 mA. £1. Pair of 866's. £1.—39 Leominster Road, Birmingham, 11.

FOR SALE: Hallicrafters HT-11 VFO/NBFM Exciter; 3.5 to 28 mc band-spread calibration, optional NBFM or switched Xtal control; output min. of 4 watts up to 14 mc, 2 watts on 21 and 28 mc; sufficient drive all bands for QRO PA. Complete, self-contained, with auto trans. supplied, instruction manual; price £40 (carriage extra).—Box 1221, *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

FOR SALE: Bendix 639-A VHF Receiver. 100 to 150 mc, calibrated dial; 6AK5 RF, mixer, osc., dblr., 3 IF, AVC, ANL, audio; rack-mounting cabinet. Complete with separate rack unit comprising power supply, speaker, Cascode pre-amp. for 144 mc (6AK5-6J4); excellent condition. Price £25 (carriage extra).—Box No. 1222, *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

FOR SALE: Webb's Pre-selector, 3.5 to 28 mc; Eddystone plug-in coils, two 6AB7 valves, black crinkle cabinet; no pwr. supply. Very quiet and efficient. Price, £5 (carriage extra).—Box No. 1223, *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

SALE: RX 1155/N Internal Amplifier, S-meter, power/pack; 6-volt Transceiver, Type 21; Qualtape Recording Desk in cabinet. All excellent condition. No reasonable offers rejected.—Ellison, 57 Dovehouse Lane, Solihull, Birmingham.

HRO-M RACK-MOUNTING with 2 B/S and 2 G/C coils and original AC P/Pack, £30; Class D W/meter, unmodified, in transit case, £5 10s. 0d.; Type 145 oscillator, £2; 50 ft. U.S.A. 2in. diam. Dural mast in 4ft. 6in. sections, all guys, strainers and base-plate, £5; pair 50v. magslips, transformer and instruction book, £2; new boxed 813's (2), 50/- each; 866's (2), 20/- each.—G3CIF, J. F. Rogers, 35 Oak Road, Caterham, Surrey.

FOR SALE: HRO Coils, all ranges, 30/-; HRO Senior, 4 G/C coils power/pack (needs slight attention), £17 10s. 0d.; RCA oscilloscope, perfect, 110-vole primary, £17 10s. 0d. WANTED: AR88, QRO transmitter, ET4336 or ET4332; also ART13, any U.S.A. Test equipment, 813's. Will collect.—Box No. 1222, *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

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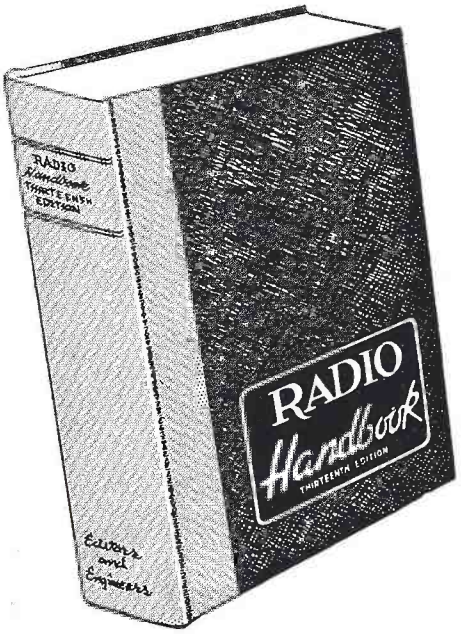

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