

The

SHORT WAVE

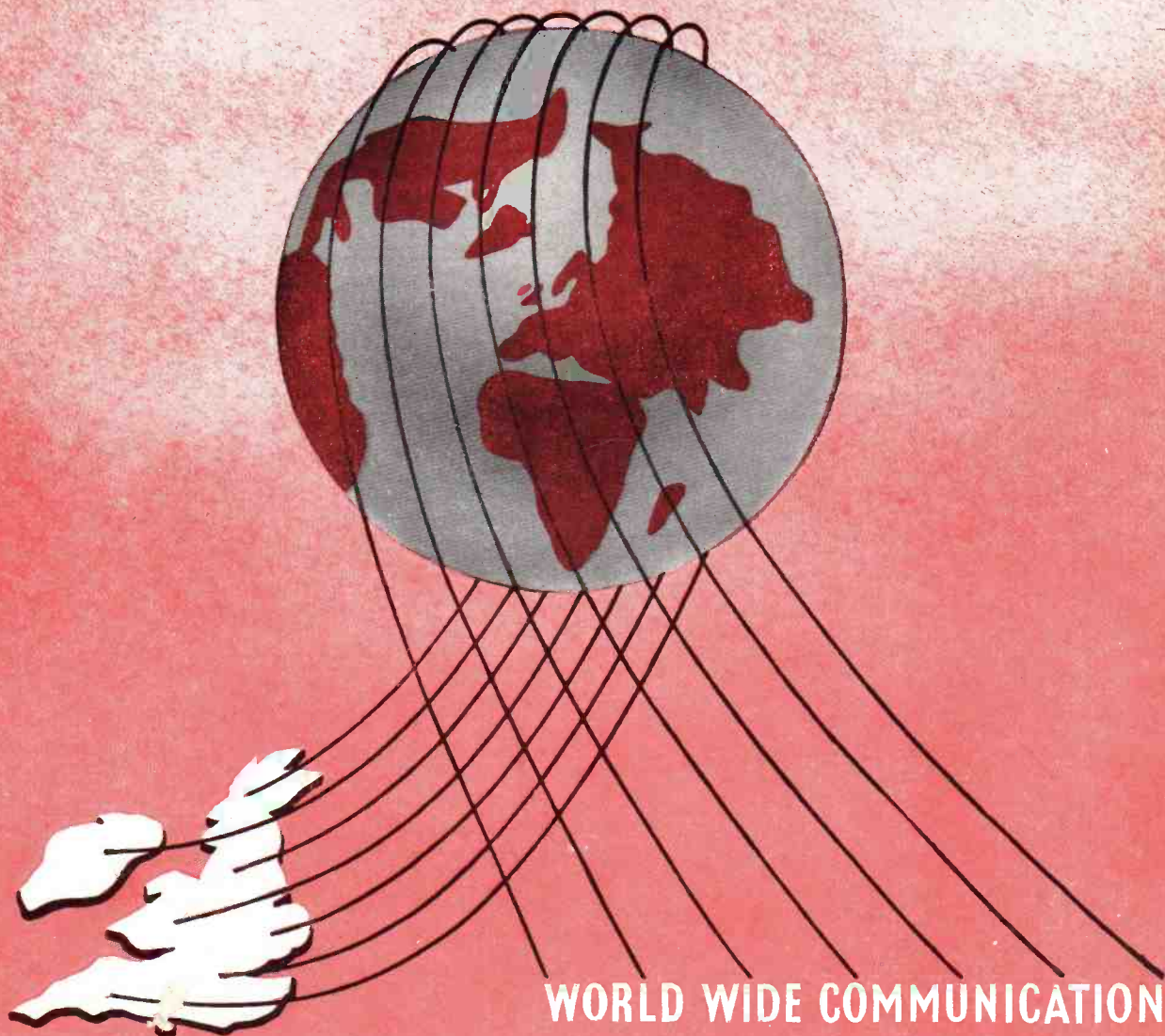
Magazine

2/6

VOL. XIV

FEBRUARY, 1957

NUMBER 12



WORLD WIDE COMMUNICATION

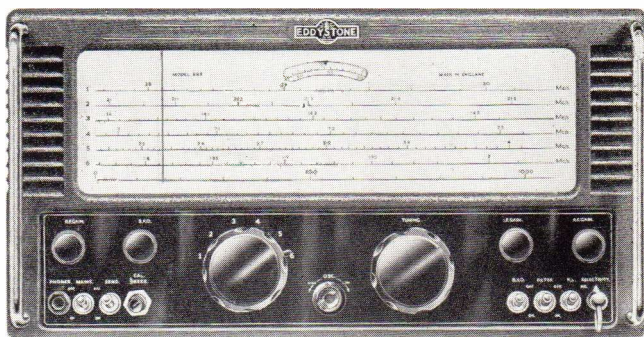
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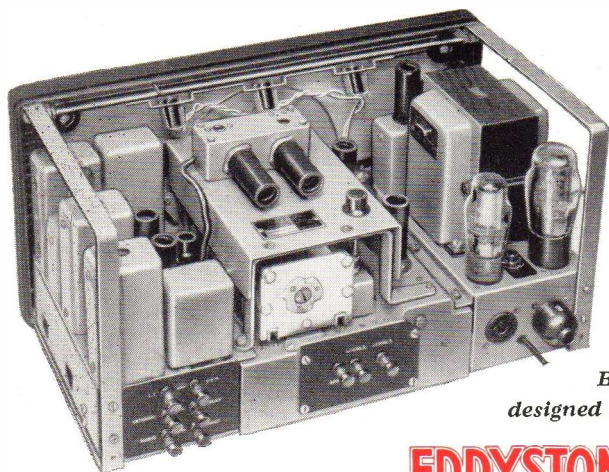
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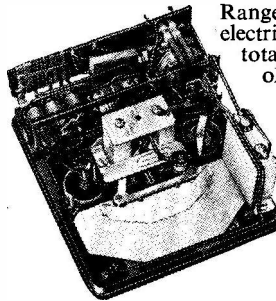
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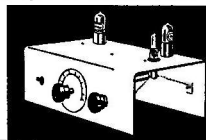
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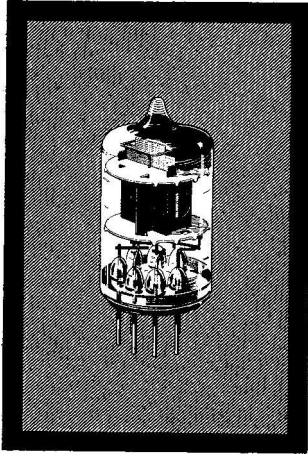
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Services type number
CV2522

Heater

Vh 6.3 V
Ih 175 mA

Capacitances

	With shield	Without shield	
cg1-a	< 0.02	< 0.025	pF
cg3-a	0.7	0.7	pF
cg1-h+k+g2 +g3+a+s	4.0	3.9	pF
cg3-h+k+g1 +g2+a+s	3.4	3.3	pF
ca-h+k+g1 +g2+g3+s	3.0	2.2	pF
cg1-g3	< 0.15	< 0.15	pF

Characteristics

Va	120	120	V
Vg3	-3.0	0	V
Vg2	120	120	V
Vg1	-2.0	-2.0	V
Ia	3.6	5.2	mA
Ig2	4.8	3.5	mA
gm (g1-a)	1.85	3.2	mA/V
gm (g3-a)	810	470	μA/V
ra	-	110	kΩ
Vg1 (Ia=10μA)	-	7.5	V
Vg3 (Ia=10μA)	-10	-	V

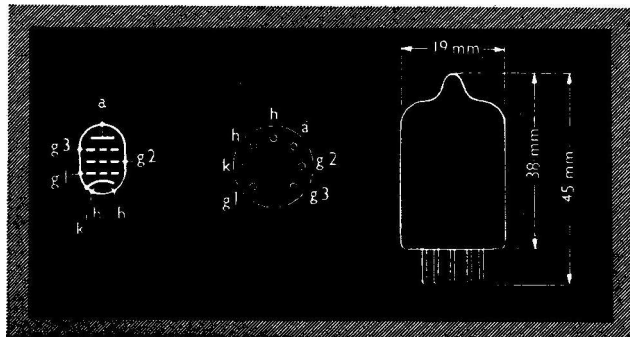
Limiting Values

Va max.	180	V
pa max.	1.7	W
Vg2 max.	140	V
pg2 max.	750	mW
Vg3 max.	27	V
Vh-k max.	90	V

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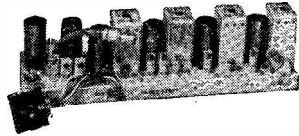
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MINIATURE I.F. STRIPS



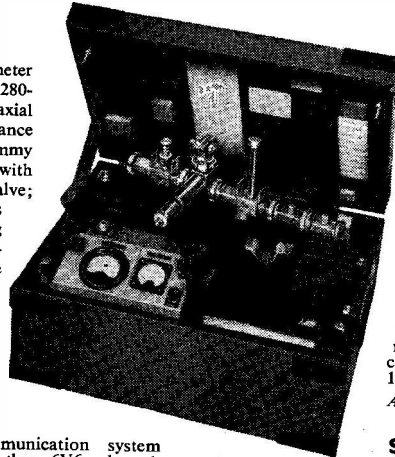
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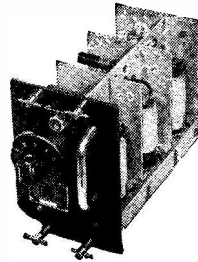
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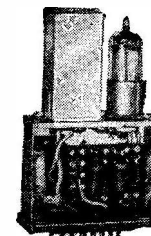
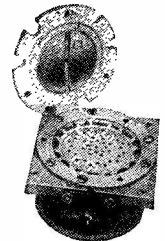
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The SHORT WAVE Magazine

E D I T O R I A L

Wheel *While the art of Amateur Radio develops and changes with the times — above all else, we must have progress in techniques — the essential pattern of amateur activity remains the same. Coinciding with the remarkable improvement in propagation conditions, we are back on the DX theme, with communication for its own sake the main interest of the great majority of active operators.*

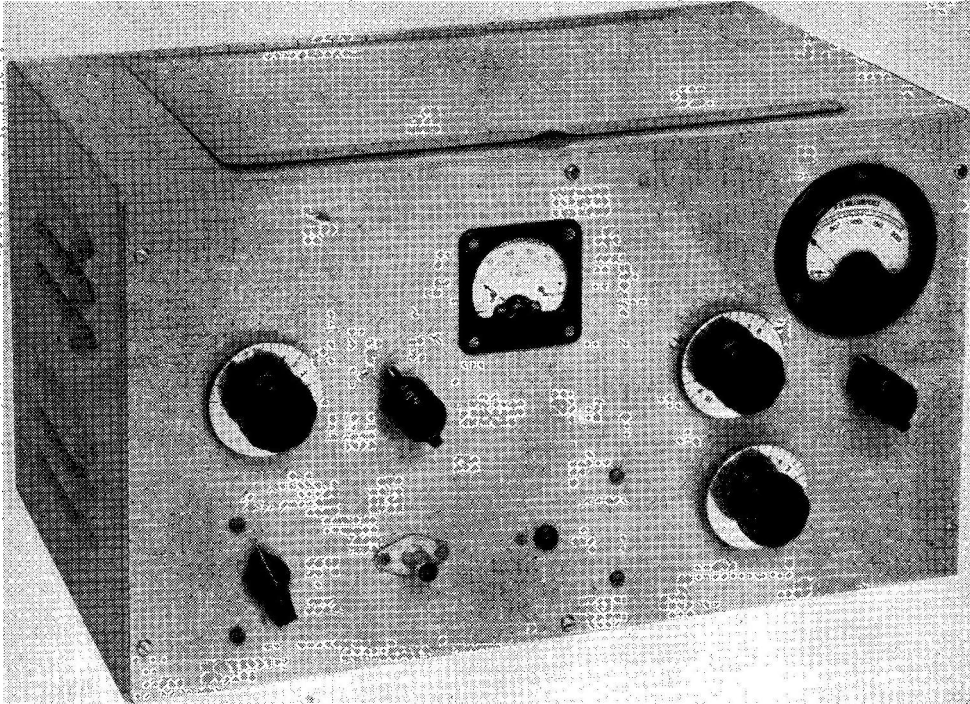
This is as it should be, because the basic conception, the reason for the existence, of Amateur Radio is that of “being able to communicate at will with one’s fellows, either across the parish or across the world.” It is this that, in nearly every case, inspires the original application for a licence — to go on the air and talk (using that word in the sense of either CW or phone) is what most of us want to do, and why we ever thought of becoming radio amateurs at all. Communication is, always has been, and always will be, the dominant influence in all Amateur Radio activity.

Once this first urge has been satisfied to greater or less degree, the individual nearly always tends to branch off in some direction of specialised interest. It might be pure experiment, or an unending series of constructional efforts, or band specialisation, or the collection of DX trophies — or any one of the wide variety of possible lines of activity which together go to make up the whole fascinating field of interest and endeavour open to the radio amateur.

But the interesting thing is that the great majority of amateurs always come back, sooner or later, to having spells of pure communication activity. The original inspiration has never left them. This is one reason why, for instance, so many VHF call signs can now be heard on the DX bands, and why there has been a re-awakening of active interest (coinciding, of course, with the improvement in DX conditions) in those who for some years have apparently lain dormant.

It can be said, in fact, that Amateur Radio is coming back to communication as its chief interest and its main activity — which is now on a grander and a wider scale than ever before.

*Arthur Fothergill
G6FO.*



General appearance of the PT-15 Transmitter for 3.5, 7 and 14 mc, fully described in the article. The PA, consisting of a pair of PT-15's in parallel, can be run at 150 watts on 3.5 and 7 mc, and output at reasonable efficiency is obtained on the 20-metre band.

PT-15 PA Unit

BAND-SWITCHING RF
AMPLIFIER FOR 80, 40
AND 20 METRES

J. N. WALKER (G5JU)

USED under correct conditions, the PT-15 valve lends itself well to a transmitter operating on the not-so-high frequencies. The valve has two definite advantages. One is its inherent stability, which permits a certain amount of latitude in layout and allows it to be used under circumstances where other valves would tend to "take-off." The other advantage is its low filament consumption, permitting all the LT current for the PA and the earlier stages to be drawn from an ordinary small mains transformer with an output of, say 6.3 volts, 4 amperes.

For quite a long time the writer used a pair of PT-15 valves in a transmitter on the HF bands with excellent efficiency and good all-round results. This was in the days of open chassis construction and the valves were run in push-pull, band changing being effected by plugging in suitable grid and anode coils. There is no doubt that fair efficiency could be secured on the higher frequencies with a built-up screened transmitter using the same basic (push-pull) design, but for one thing it would inevitably be somewhat bulky, and for another (and the more important) there are many design problems which would have to be overcome in the way of band changing a push-pull PA stage when switches and built-in coil assemblies have to be used.

In the present design, two PT-15 valves are connected in parallel, permitting a dissipation of 60 watts and allowing the transmitter to be operated at the full 150 watts input. A rather unusual method of construction has ensured

a compact assembly, of which more later. The output circuit is of the popular pi-network type and three bands are covered. The transmitter works really well on 7 and 3.5 mc and it is intended mainly for those two bands. Fair results are obtained on 14 mc, and with more drive, the efficiency could undoubtedly be stepped up on this band also. With various minor modifications at the front end, increased drive can be secured on 14 mc and hints on this point are given towards the end of the discussion.

Circuit

The unit consists of exciter and PA stages and is intended for operation with an existing VFO and external power supplies. The VFO should be capable of supplying a few volts at low impedance, but a high impedance output can be accommodated by feeding directly into the grid of V1, assuming the capacity of the connecting cable can be tuned out. As designed, the input is at 3.5 mc, but if modifications for improved performance on 14 mc are

This assembly features the PT-15, a valve which — though it is now listed only as a “replacement” type — is in fact an attractive proposition for amateur-band working because it has excellent characteristics, is of very robust construction, and is cheap and easy to find as “surplus.” It will be well-known to many readers as the choice for the PA in the famous T.1154 aircraft transmitter. Here, the PT-15 is used in quite a different way, but full advantage is taken of its potentialities, and the result is an RF amplifier which can be run at the full 150 watts on three bands. With the DX possibilities now to be found on 40 metres, this transmitter will be of particular interest among the more recently licensed who are looking for something better to build.—Editor.

made, it will be necessary for the VFO to give an output on 7 mc also.

The first valve is a Brimar 6AM6 (or equivalent), operated as a triode-connected cathode follower. Although it provides no actual voltage gain, this valve does confer

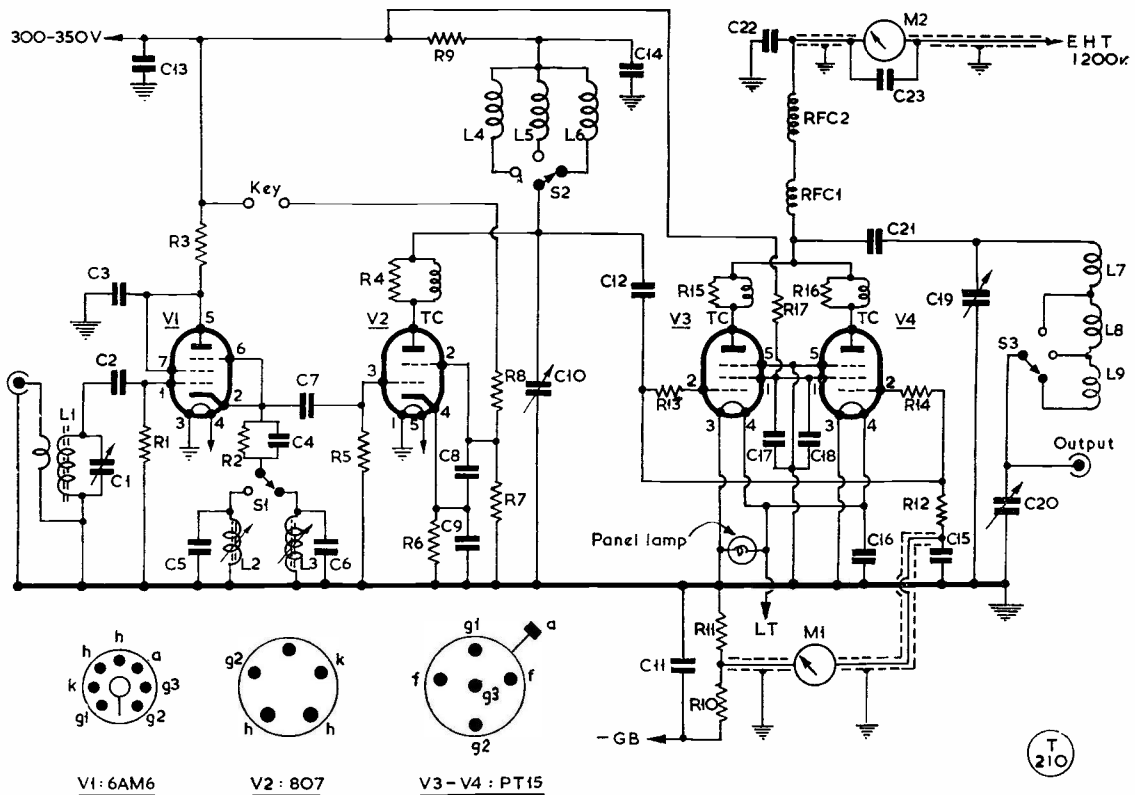


Fig. 1. Circuit complete of the three-band PT-15 Transmitter, designed and described by G5JU. If constructed as shown here, it requires only drive from an existing VFO for operation on 3.5, 7 and 14 mc. Ample RF output is given, and the transmitter is particularly effective for CW working on 40 metres.

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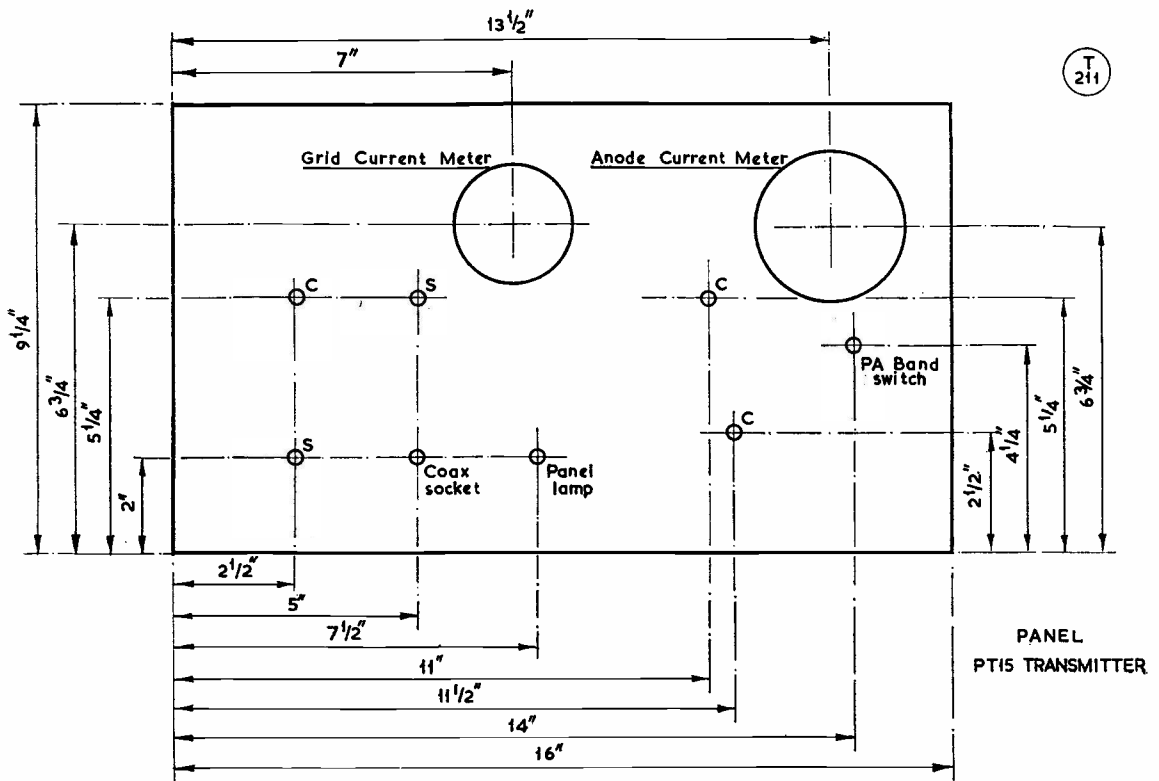


Fig. 2. Panel drilling detail and layout for the PT-15 PA Unit, as described and illustrated in this article.

Table of Values

Fig. 1. Circuit of the PT-15 RF Amplifier

C1 = 30 $\mu\mu\text{F}$ Trimmer (Philips tubular)	C19 = 230 $\mu\mu\text{F}$ variable
C2, C12 = 100 $\mu\mu\text{F}$ silvered mica	C20 = 1000 $\mu\mu\text{F}$ variable
C3, C8, C9, C11, C13, C15, C17, C18 = .005 μF ceramic (Cascap)	C21, C22 = .005 μF moulded mica, 2200 volt.
C4, C7, C14, C16, C23 = .002 μF moulded mica	R1, R7 = 100,000 ohms $\frac{1}{2}\text{w}$.
C5 = 200 $\mu\mu\text{F}$ silvered mica	R2 = 1,000 ohms $\frac{1}{2}\text{w}$.
C6 = 400 $\mu\mu\text{F}$ silvered mica	R3 = 470 ohms $\frac{1}{2}\text{w}$.
C10 = 140 $\mu\mu\text{F}$ variable	R4, R13, R14, R15, R16 = 12 ohms $\frac{1}{2}\text{w}$.
	R5, R8 = 27,000 ohms $\frac{1}{2}\text{w}$.
	R6 = 330 ohms 1w.
	R9 = 200 ohms 1w.
	R10 = 6,500 ohms 2w.
	R11 = 2,700 ohms 2w.
	R12 = 4,700 ohms 1w.
	R17 = 470 ohms 1w.

several advantages. In the first place, it acts as an efficient buffer between the VFO and the exciter stage. The main advantage, however, is that the low impedance output is across the grid circuit of the 807 driver valve, as a consequence of which the 807 runs with complete stability, even as a straight amplifier.

The cathode circuit of the 6AM6 is made frequency selective, but at low impedance (high C to L ratios). Any high-order harmonics present in the VFO output are thereby largely

by-passed in the cathode circuit and thus much attenuated. The damping imposed by the 6AM6 cathode and 807 grid and grid leak result in a broad-band characteristic and these two circuits are set up to the mid-band frequency and thereafter left alone.

The grid of the 807 is driven at either 7 or 3.5 mc, as selected by switch S1. The anode circuit is switched and fully tuned on three bands—14, 7 and 3.5 mc. A moderate L-to-C ratio is employed, the variable condenser C10 being nearly at maximum capacity at 3500 kc. The individual electrodes of the two PT-15 valves are connected in parallel, but with separate grid and anode stoppers to each valve. These have been included as a precaution against parasitic oscillation, but quite possibly they could be omitted.

The components forming the output circuit are enclosed in a compartment formed by the chassis, cabinet and a screening plate—see photographs. Precautions against TVI include using screened leads, reducing harmonics to low levels, and extensive decoupling. As described, the transmitter is intended for CW operation, but by including an audio choke in

the lead to the screen grids, and possibly also reducing the values of some of the by-pass condensers where these are across the audio modulation, e.g., C17, C18, C21, C22, the transmitter becomes suitable for straight-forward high-level plate modulation.

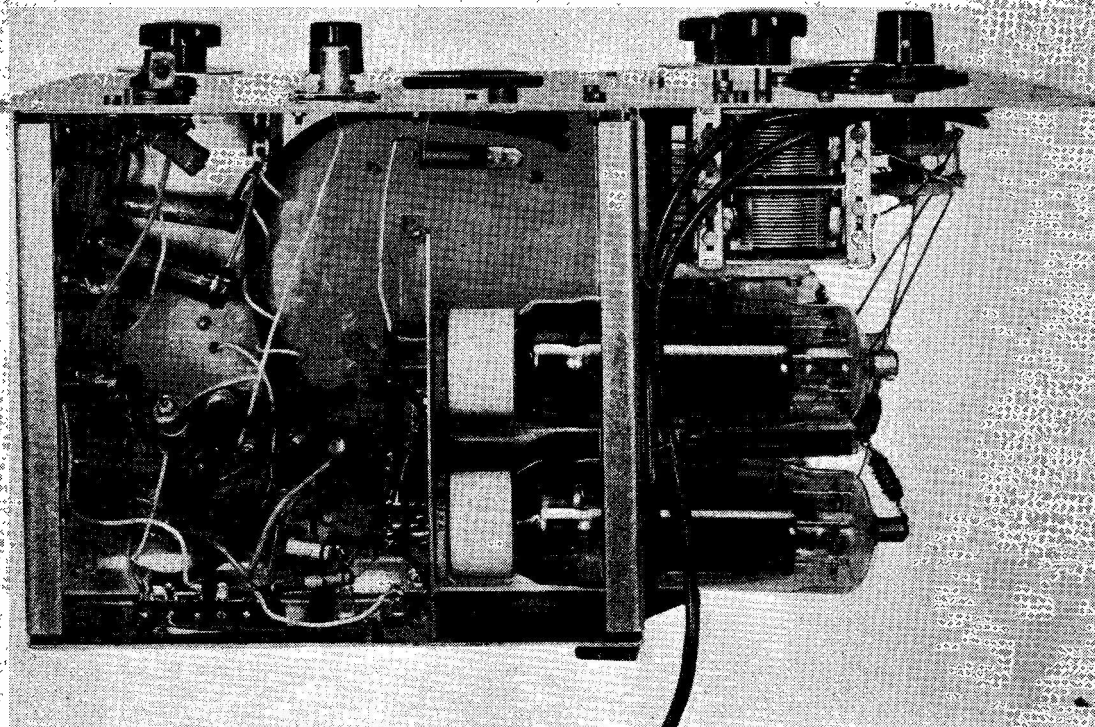
Construction

The transmitter is housed in a cabinet measuring 16in. by 9in. by 9in. This is available from Philpott's of Loughborough. PT-15 valves are somewhat large physically (their only real drawback) and, to accommodate a pair of them in a comparatively small cabinet, an unusual system of construction has been adopted. The chassis is foreshortened—it is actually 9in. long—and the PT-15 valves are mounted through one side of it, so that the base sections are screened whilst the top envelopes project through into the PA tuning compartment. The valves lie horizontally and are located so that the major dimension (excluding length) of the internal electrodes is vertical. Two holes, each two inches in diameter, are cut out of the side of the chassis,

giving just adequate clearance to the valve envelopes, as shown in the drawing. Set back underneath the chassis and three inches from the wall is an aluminium screen measuring 6in. by $2\frac{7}{8}$ in., and on this are fitted the PT-15 valveholders, in positions which centre up with the large holes. Pin 2 (the control grid) on each valveholder is nearest the floor of the chassis.

LIST OF PARTS

Cabinet and Chassis, as per drawings and text	Philpott's
Valves V1 6AM6 (Brimar); V2 807 (Brimar) V3 and V4 PT15 (G.E.C.)	
Valveholders 1 x B7G; 1 x mA. 5-pin; 2 x British 5-pin.	
Meters M1 20 or 25 mA. F.S.D.; M2 200 mA. F.S.D.	
Variable Condensers C10 140 μ F max (Eddystone 586)	
C19 230 μ F max (Eddystone 835)	
C20 1,000 μ F max (500 + 500 μ F Twin—BC "Surplus" type)	
Switches S1 single pole change-over	
S2 single pole three-way Yaxley	
S3 double pole three-way Yaxley (ceramic)	
Dials Cat. No. 842 Eddystone	
Switch Knobs Cat. No. 877 (S2, S3); Cat. No. 841 (S1) Eddystone	
Coil Formers L1 $\frac{1}{8}$ in. diam. dust-cored Aladdin	
L2, L3 19/32in. polystyrene dust-cored Cat. No. 847 Eddystone	
L4, L5, L6, 1in. diam. bakelite Cat. No. 646 Eddystone	
L7, L8, L9 on one $2\frac{1}{2}$ in. diam ceramic Cat. No. 1090 Eddystone	
R.F. Chokes RFC1 see text; RFC2 Cat. No. 737 Eddystone	
Bracket to hold C10 Cat. No. 708 Eddystone	
Extension Control for C10 Cat. No. 1008 Eddystone	
Stand-off insulators Cat. No. 1019 Eddystone	
Miscellaneous:—top cap connectors for V3, V4: coaxial cable; coaxial sockets: dial lamp and holder: tag strips.	



Construction underneath of the PT-15 Transmitter described by G5JU. The method of mounting the PA valves provides the screening, ensuring complete stability and full RF output at good efficiency on 40 and 80 metres. The double-section condenser in view is the pi-tank loading capacity C20.

The ceramic coil-former is mounted on and away from the side screen which is attached to the chassis, this screen measuring 8½ in. by 4½ in. plus flanges for bolting to chassis and panel. The coil should be as clear as possible of other components and the photograph of the interior will prove a guide in this respect.

The drawings indicate the positions of the other major components. How C20 is mounted will depend on the particular condenser used and it is only necessary to ensure a clear space for the moving vanes. As shown, switch S3 is close up against the panel, but, where possible, it would be better to use a switch with spacing rods bringing the wafers some two inches from the panel, so shortening the connecting wires. Another point about this switch is that two sets of contacts are used in parallel as quite a heavy RF current may be carried by these contacts. This connection is not indicated in the circuit diagram, but is the reason why a double pole switch is specified. Choke RFC1 is light in weight and is held between the junction of R15, R16, and C21, and a stand-off insulator attached to the side of the chassis. The other choke, RFC2, is held to a second stand-off insulator, from which a screened lead—actually ¼ in. diameter coaxial cable which stands up to the high voltage—

is taken to the anode meter. From the latter a long length of similar cable is used as the HT lead and passes out through the rear of the chassis to the power unit. C22 is bolted to the rear wall of the chassis.

If the output is taken at low impedance to an aerial tuning unit—as is recommended—a length of coaxial cable is brought out direct from the stator of C20, the outer of the cable being earthed to the rotor of C20. Otherwise the lead from C20 can be taken to a ceramic lead-through insulator fitted to the rear of the cabinet. So much for the PA compartment.

Constructional details of the exciter section can be gleaned from the drawings and photographs. The input coil L1 is fitted reasonably near V1 and the cathode coils mount conveniently on the wall of the chassis. Provisional details of these coils are given later, but latitude in the form of construction is quite permissible.

The components forming the anode tuning system of the 807 valve (V2) are all mounted above the chassis, to obtain good screening from both the input and output circuits. One end of the coupling condenser C12 is soldered direct to the stator of the tuning condenser C10 and the other wire taken down through a hole in the chassis to the PT-15 grid stopper

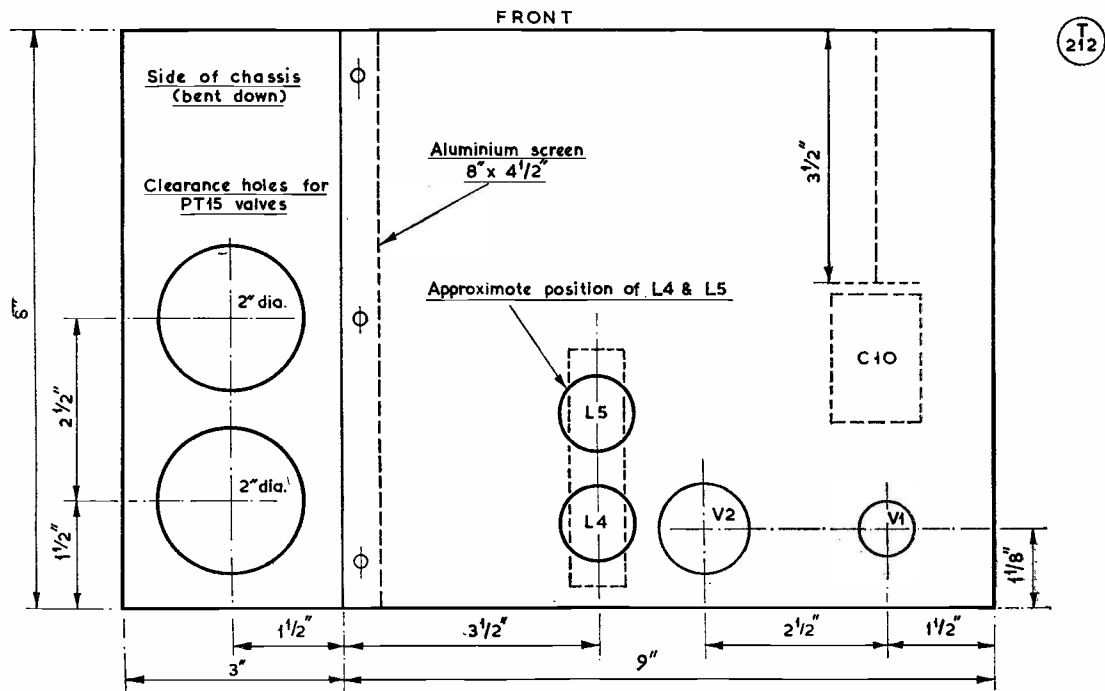
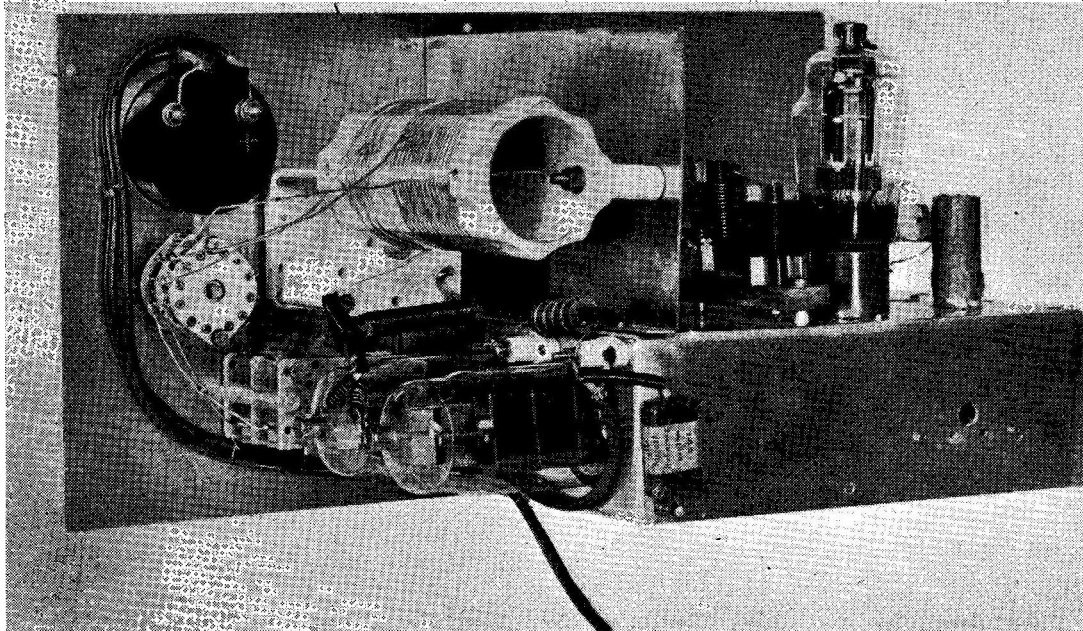


Fig. 3. The chassis constructional plan, which should be checked with the various photographs of the completed transmitter unit. Metal-work to the specification given here and in Fig. 2., and a suitable cabinet, can be obtained from Philpotts of Loughborough.



Half-rear view of the Transmitter, showing general construction and the mounting of the PA tank coil. The valve on the right is the 807 driver, with the 6AM6 buffer in the screening can. This general layout should be followed to ensure full screening. As G5JU suggests, it might be better to mount the wave-change switch on extending rods to bring it nearer the tank coil, thus shortening the connections.

resistors. It was expected that this lead would need screening and also that a small metal plate might be necessary to shield the PT-15 grid pins, but the stability is excellent without these precautions. Although possibly an unnecessary refinement, shielded wire (again coaxial cable) has been used for the leads to the grid current meter, mainly to prevent radiation being picked up.

The stopper resistor R4 at the anode of the 807 and also those at the anodes of the PT-15 (R15 and R16) are overwound with six turns of 18 gauge enamelled wire.

The key leads terminate at a tag strip from which a lead is taken out through the rear of the cabinet, but it may suit many to fit an insulated jack on the front panel and terminate the key leads there.

A source of negative bias is required to hold down the PT-15 valves when drive is off, and the actual value of R10 will depend on the voltage available. The working bias for CW operation is 90 volts (assuming 1000 volts on the anodes and about 300 on the screens), and of this about 60 volts will be derived from the flow of grid current through R11 and R12. Hence, a standing bias of about 30 volts

should be developed across R11, entailing a current of roughly 11 mA through it and therefore through R10. In the writer's case, the total applied voltage is 100 volts, so a value of 6,500 ohms is given for R10, dropping 70 volts or so. The PT-15 valves may not cut off completely with the key up but this is no disadvantage. The valves will still be operating in the Class-C mode, the dissipation will be well below the maximum, and the HT regulation will be improved through the "bleed" current flowing.

One further point is that, for the sake of simplicity, the suppressor grids of the PT-15 valves are directly earthed and are therefore at zero volts. But the valve makers recommend a positive bias of 40 volts on the suppressor grids when operating Class-C and some may wish to arrange the circuit accordingly. The necessary bias can be conveniently obtained by a potentiometer across the lower HT supply—values of 26,000 ohms and 4,000 ohms will serve. In this case a by-pass condenser of .002 to .005 μ F will be needed to hold the suppressor grids to earth potential as regards RF.

Setting Up

A grid dip oscillator is a most useful instrument to have handy during the initial setting-up process and will save much time, as well as ensuring the circuits are on the correct frequencies.

The input circuit L1/C1 is resonated, by rotation of C1 and if necessary by adjustment of the dust core (normally fully in), to a frequency near 3550 kc. With S1 in the position to add the V1 cathode loading to the coil, the core in L2 is rotated to show resonance at about 7100 kc. S1 is then moved to the 3.5 mc position and L3 similarly adjusted to 3550 kc.

If no GDO is available, resonance of the two circuits L2/C5 and L3/C6 can be judged by setting the cores for maximum drive into V3, as observed in any of the usual ways, e.g., maximum volts across R5, or maximum RF output as shown by a neon lamp. In the case of L1/C1, resonance is indicated by a rise in the anode current of V1. The applied voltage will be of the right order when V1 is taking an anode current of between 10 and 12 mA.

The procedure thereafter is as with any similar transmitter. On 80 metres S1 is set to bring in the 80-metre cathode coil, L6 is tuned with C10 for maximum grid current into the PT-15 valves (up to 12 mA, but 8 to 10 mA is quite satisfactory) and the output circuit adjusted in the normal way. Assuming the output impedance is 72 to 80 ohms, C20 should be at nearly maximum capacity on 80 metres and proportionately less on the other two bands. On 20 and 40 metres the L2/C5 combination is used and the other circuits tuned to resonate on whichever band is selected.

Improvements For 14 Mc Operation

The PA can be loaded up to the full 150 watts on 40 and 80 metres, but on 20 metres it will be found that the RF output falls off beyond an indicated 100 watts or so input. If greater power is wanted on this band, the first stage will need modifying as suggested

COIL DATA

L1	95 turns 34 SWG wire (coupling winding 10 turns at low potential end)	$\frac{3}{8}$ in. diam. dust-cored former.
L2	12 turns 26 SWG,	19/32in. diam. dust-cored former
L3	20 turns 26 SWG,	19/32in. diam. dust-cored former
L4	7 turns 18 SWG,	1in. diameter former
L5	16 turns 18 SWG,	1in. diameter former
L6	30 turns 22 SWG,	1in. diameter former
All the above close wound except L4 which has slightly spaced turns. Also it will be appreciated that the correct number of turns for L2 and L3 will be different if formers of different diameter are used.		
L7, L8, L9	All wound on a ceramic former, 2 $\frac{1}{2}$ in. diameter.	
L7	4 turns, spaced one groove,	16 gauge wire.
L8	a spacing of 4 grooves allowed,	then 6 turns added.
L9	9 further turns, forming a continuous winding with L8.	
RFC1	60 turns 26 gauge enamelled wire on a length of $\frac{3}{8}$ in. diameter polythene rod or tube.	
RFC2	Standard 2.5 millihenry choke.	

below.

An additional tuned circuit should be added at the input to V1, tuned to 7 mc and fed from a VFO giving an output on 7 mc. (Another coil, similar to L1, but with about half the number of turns, should prove satisfactory, the coupling winding having five or six turns). A switch will also be necessary to change over from the 3.5 mc to the 7 mc circuit, and it can well form part of S1 so that the 3.5 mc L1/C1 combination is switched in for 3.5 mc operation and the other coil on 7 and 14 mc.

"Magga Dan" MAKES IT

Almost exactly two months after leaving London River, the Commonwealth Antarctic Expedition supply ship *Magga Dan* reached Shackleton Base on January 14 to relieve the advance party, left there twelve months earlier. This party includes VP8BO, chief radio man with the Expedition, who is now well established with his Cossor-manufactured R.A.F. T1509 transmitter and a rhombic aimed on the U.K. If all goes well, we should quite soon be hearing VP8H and VP8HI, amateur calls allocated to

operators at the Royal Society's Base at Halley Bay, who went out with the *Magga Dan* on her present trip. They have a 750-watt transmitter suitable for frequencies up to 25 mc. Though there will not be a great deal of time for Amateur Radio either at Shackleton or Halley Bay, it is expected that VP8BO, VP8H and VP8HI will be on the amateur bands (mainly 14 mc, in all probability), whenever possible. We acknowledge the R.A.F. Amateur Radio Society's *QRV* as the source of some of these details.

Monitoring the Modulator

USEFUL SIDE-TONE CIRCUIT

P. M. CARMENT, M.B.E.,
Assoc. Brit. I.R.E. (G5WW)

OTHER people, in common with the writer, have probably felt the need to be able to monitor the output of a high power modulator on a pair of headphones, either when it is connected to the PA or to a dummy load. In fact, a dummy load for the modulator is essential to avoid unnecessary radiation of the carrier whilst adjusting or testing the modulation.

The tracing of an intermittent crackle fault made the introduction of such a device a "must" at G5WW. Basically, the requirement is for a dummy load that can be switched into circuit instead of the load represented by the modulated PA stage. The circuit diagram of such a device is shown in Fig. 1. However, this does not provide any means of monitoring the audio signal. This can be achieved by inserting a low value carbon resistance, R2, in series with one side of the modulation transformer secondary, matters being so arranged that the voltage developed across this resistance is of a suitable amplitude for giving a comfortable headphone signal. The headphones must not be connected directly across the resistance because they would then be at PA HT voltage above ground when monitoring with the transmitter on. The safest method is to use an isolating transformer T with the headphone winding earthed. The final circuit arrangement is shown in Fig. 2.

Values to Use

Now for some details of component values; the modulator dummy load, R1, should preferably be a non-inductive resistance having the same value as the load presented by the PA. For a high-power modulator producing 75 watts or more of audio this presents quite a problem as such resistances are costly. It was solved by using three 25-watt 230-volt electric lamp bulbs in series. Theoretically, this arrangement is not ideal because the resistance of the lamps varies with the filament temperature. At full brilliance the resistance for these lamps will be approximately 6000 ohms, which may or may not be a correct match for the

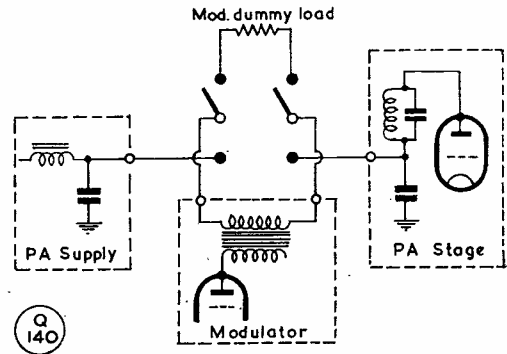


Fig. 1. Basic circuit for the modulation monitoring device described by G5WW.

modulator. (The cold-filament resistance is only about 600 ohms.) In practice, however, this has been found to be of no disadvantage and also has the distinct advantage that the lamps give a visible indication of audio output. The hot resistance of the lamps can be calculated from the formula $R = \frac{E^2}{W}$

$$R = \frac{E^2}{W}$$

If desired, the resistance, R1, can be increased by increasing the number of lamps, which will also increase the power handling capacity of the load. Alternatively, a higher resistance can be obtained by using lower wattage lamps. This would suit a smaller modulator. Conversely, the resistance may be decreased by using fewer lamps or higher wattage lamps. The value of the headphone take-off resistance, R2, will to some extent depend on the power output of the modulator, but a 50-ohm 1/2-watt carbon resistor has been found to provide a suitable level over a wide range of outputs. The headphone safety trans-

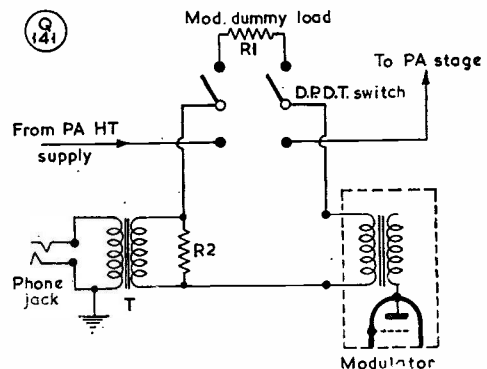


Fig. 2. Final circuit for the audio monitor, values for which are given in the text. It has been found that almost any small transformer can be used for T, and enough side-tone is given with an ordinary 5 : 1 item across a resistor R2 of only 20 ohms.

former is a 1:1 output transformer of the type normally used in the anode circuit of a valve. Capacity coupling can equally well be used but does not provide the same degree of safety.

In operation a headset is plugged into the jack and the modulator output is monitored by these phones irrespective of whether the DPDT switch is connecting the modulator output to the dummy load or to the transmitter. If the radiated quality is reported to deteriorate this will give an instant check on whether the fault is in the modulator or the PA stage.

PA Conversion for SSB

SWITCHED LINEAR RF AMPLIFIER

From Notes by DL2TH

THOSE who, going in for SSB, already have an existing PA which may consist of a pair of 807's in parallel (a very popular type of RF final amplifier) might be interested in this "conversion" of just such a PA stage to work on either SSB, CW or AM phone.

Assuming the usual 600-700 volts HT and the need to economise in construction time and parts (to say nothing of avoiding duplication on the PA side), the only additional power items required for this conversion are a 300-volt stabilised supply (this is not a "must," but it is desirable) and a source of fixed bias; this is necessary for the SSB linear amplifier circuit considered here.

Some of the Factors

At DL2TH, it was thought desirable that CW working and high-level AM operation should continue to be available on the existing PA (in case the SSB approach was not a success!). Because a separate speech amplifier and VFO-driver unit were already in use, the SSB exciter would have to replace these as the drive source. (As an additional economy, the speech amplifier stages in the SSB exciter are also used for the modulator drive when on AM phone.)

The transmitter can now be visualised as a band-switched PA using a pair of 807's in parallel, with clamper control *plus* external grid bias, driven by a multiplier unit using Labgear wide-band couplers. For AM, this PA is modulated in the usual way by two 807's in

If the fault proves to be in the modulator the dummy load is switched in and monitoring facilities are available whilst the fault is traced.

In concluding, it must be emphasised that the lamp bulb load described—although perfectly satisfactory for aural tests with headphones—is not suitable for precision measurements of the modulator characteristics. If the device is also to be used for this purpose the load R1 must consist of a constant value non-inductive resistance correctly chosen to match the modulator output impedance.

zero bias Class-B, with appropriate power supply. The additional item on the PA unit itself is the "function" switch, connected as shown in Fig. 2. This can be a "surplus" item and should have plenty of contacts.

What was required was that this PA should be either (a) driven AM or CW, or (b) driven SSB.

Circuit Arrangement

The circuit of Fig. 1 is representative of almost any parallel-807 arrangement, whatever form of grid exciting connection may be used. This is modified to Fig. 2, in which the negative grid voltage is applied in the SSB position of the "function" switch, and set by the 10,000-ohm potentiometer R2. This adjustment should be such that standing current in the 807 PA is 35 mA when undriven. (When switching over to CW or AM phone, R2 must be re-adjusted to give the correct grid current under normal operating conditions.)

Resistor R1 helps to stabilise the input impedance when working in the SSB mode and

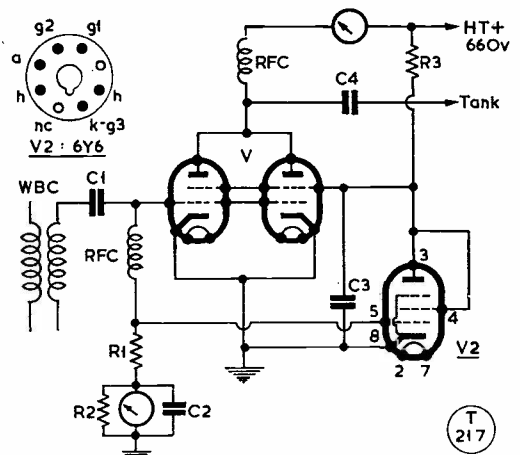


Fig. 1. Typical circuit for an 807 PA with the valves in parallel, with clamper control. A pi-network tank circuit is assumed.

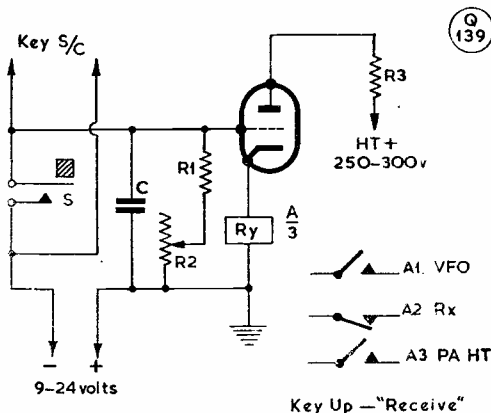
Automatic Change Over

KEY-CONTROLLED VALVE RELAY

A KEY-OPERATED delayed-action system commends itself to those who want break-in working without being tied to keying the oscillator stage. While the arrangement described does not afford full break-in, in the sense that the receiving end can stop the sender whenever desired, it nevertheless contributes considerably towards the intelligent operating standard demanded by present-day conditions. It allows frequent *automatic* listening pauses during which the receiving station can indicate whether or not interference has come up.

The Circuit

To work the system, a separate triode valve (run off the transmitter HT because of the small current consumption), has a relay in its cathode and a delay network across its grid. To actuate the cathode relay, bias is applied to the valve by means of a small battery and one pair of auxiliary contacts fitted to the key. This cuts off the valve, which ceases to conduct, and thus activates the relay.



The circuit discussed in the text. The delay, set by R2 and the value of C, is adjusted to hold the relay on at normal keying speed. Almost any valve capable of passing enough current to actuate the relay will be found suitable.

Table of Values

Key-Controlled Valve Relay

C = 0.1 to 2.0 μ F	S = Push-button switch
R1 = 500,000 ohms	V = Any triode (see text)
R2 = 1 megohm	Key S/C = Secondary contacts on key (see text)
R3 = 50,000 ohms	
Ry = Relay (see text)	

The main contacts are free to key any desired stage of the transmitter. Not being concerned with the formation of "dits and dahs," application of bias can also be made by a bug-key if two pairs of auxiliary contacts are fitted to an upright of insulating material held by the paddle-screw. The cathode relay can be connected to actuate a second relay that switches off the receiver HT, swings the headphones from receiver to monitor, switches on the transmitter and changes over the aerial. If during transmission a pause is then made with the key open, the relays automatically reverse the whole process back to the "Receive" position.

Push to Talk

For telephony the system can be manually operated if a push-button is wired across the auxiliary contacts. Additional relays can be contrived quite easily and cheaply for the control of any additional circuits that may be required. The valve can be chosen to pass enough current to operate the cathode relay in the hold-on condition, and the actual HT voltage controlled by R3. The delay is determined by the C, R2 combination, and should be adjusted by experiment.

FREQUENCY COVERAGE — TA-12D

Further to the note on p.577 of the January issue, G3FMT (Surbiton) has been good enough to point out that this was not quite correct as stated. Channel 1 in the TA-12D is 1200-1540 kc—the point here is that Ch.1 is always the LF band in any mark of TA-12, but this band is not always 300-600 kc. The LT requirement for an unmodified TA-12 is, of course, 24 volts, and not as given.

In describing his own TA-12 modifications, G3FMT says that he changed the LT for 12-volt working by wiring the VFO section heaters in parallel and then series-paralleling the two 807's in the PA with the 807 buffer and its associated dropper resistance. Coverage was obtained (in G3FMT's conversion) on Top Band, 80 and 40 metres by means of padders and series condensers in the VFO section. The PA tank output capacity has been increased to about .001 μ F, which is necessary for the 1.8 and 3.5 mc bands.

TELL THE POST OFFICE, TOO!

We are asked by the licence-issuing department of G.P.O. to remind readers that they should conform to the requirement under Note (a) on p.4 of the Licence when changing their address. Scrutiny by the Post Office of the "New QTH" lists regularly published in *Short Wave Magazine* has disclosed that some readers, while informing us of a change of address, have not taken the same action with the G.P.O. This is a contravention of the licence.

Sensitive Absorption Wavemeter

MODIFICATION NOTE

E. COHEN, M.Sc., Grad.I.E.E.

VERY useful instrument which is at present available on the market is an absorption wavemeter sold by Chas. H. Young Ltd. The circuit is as shown in Fig. 1. The detector is a small 3v. flash-lamp bulb loosely coupled to the main frequency determining circuit L1, C. The manufacturers have calibrated the instrument in three frequency ranges and the actual amateur bands are marked as broad regions in the photograph.

The wavemeter as supplied is as shown in the illustration but without the meter, germanium rectifier and filter. The lamp indicator occupies the hole in the cylindrical cover where the rectifier can be seen. For transmitters with a large radiative field the instrument is quite adequate, but for finding the frequency of low powered oscillators it was felt that a more sensitive detecting system could be used with advantage. A lamp detector, moreover, possesses the disadvantages of requiring much tighter coupling to the frequency source with perhaps consequent frequency-pulling, and owing to its greater loading on the circuit will tend to broaden the tuning.

The modification consists in replacing the

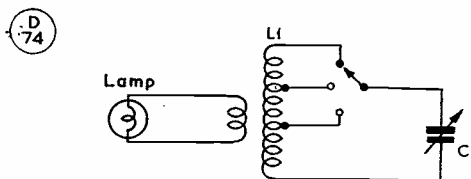


FIGURE 1

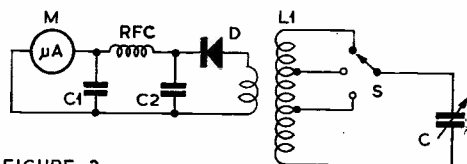
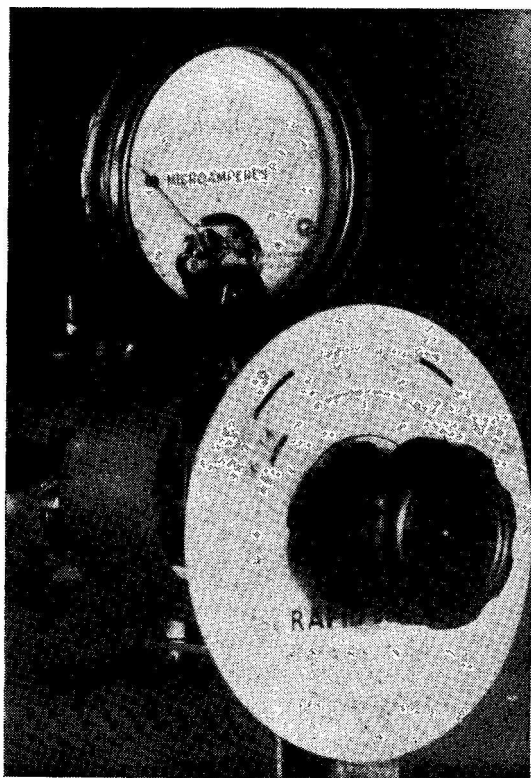


FIGURE 2

Fig. 1. represents the wavemeter as bought. Fig. 2. is the modified circuit, in which C1, C2 are .001 μ F, S is the wave-change switch, D the germanium rectifier, and M a 500 μ A meter. The utility and sensitivity of the instrument are greatly increased by the suggested modification.



The instrument after the modification as described in the article. The knob on the left is for the wave-change switch — see circuit.

lamp by a glass enclosed germanium rectifier, a filter unit and a microammeter which is mounted immediately above the protective cylindrical cover and slightly in front of the tuning dial—see circuit and photograph. The germanium rectifier is further protected by mounting it in a rubber grommet. The writer has used a 500 μ A meter and has found the modification to be much more sensitive than the normal lamp detector method. The filter circuit is conventional and is fitted in immediately behind the wavemeter. Resonance is easily obtained on the appropriate frequency range by adjusting the condenser for maximum deflection of the meter. Although not shown in the photograph, a miniature open circuit jack can be included for monitoring modulated transmissions. Finally, the usual precautions against burning out meter and rectifier must be observed by using the wavemeter at a proper distance from the frequency source.

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SHIPS AND COAST STATIONS

SYSTEM, PROCEDURE, OPERATING FREQUENCIES AND GENERAL ORGANISATION

N. P. SPOONER (G2NS)

This is another in our series of general-interest articles, covering some of the activities outside the amateur bands but in the same part of the spectrum. It is hardly realised that even in these days of high-speed automatic working, an immense amount of vital traffic is still handled on CW sent and received at hand speeds. Ships and coast stations of the marine radio networks operate mainly on W/T and are now almost the only large commercial users of the Morse Code that still remain. From the information given in this article the shipping channels can be located on any general-coverage short wave receiver.—Editor.

WITH a few exceptions, sea-going British ships registered in the U.K. are placed in one of three classes and their radio installations licensed and regulated accordingly by the PMG and the Minister of Transport. These categories are as follows: Steamers at sea for more than 16 hours between two consecutive ports and licensed to carry more than 250 passengers are in Class One; all other passenger steamers and cargo ships of 1600 tons and upwards, Class Two; cargo ships of 500 tons and upwards but under 1600 tons, Class Three. Their main, emergency and lifeboat transmitters and receivers must conform to certain technical requirements and comply with a rigid design specification, making the manufacture of marine radio equipment a highly specialised undertaking.

The main W/T transmitter for Class I and II ships must be adjustable for CW and MCW transmission on 410, 500 and 512 kc and on two other frequencies chosen from 425, 454, 468 and 480 kc. It must key manually at high speeds, and automatically for alarm and distress signals. It must have a minimum range for Class I and II respectively of not less than 175 and 150 miles, permit one-operator frequency-changing within 10 seconds and full-power operation from cold within 60 seconds. The main receiver must be muted and protected for BK working and provide headphone reception, with sensitivity down to 100 micro-volts on A1, A2, A3 and B (spark) transmissions where authorised between 15 and 20 kc and from 100 kc to 25 mc. Emergency transmitters for Class I and II are required to have a minimum range of not less than 150 and 100 miles respectively and must be capable of emitting MCW on 500 kc. Wide-band emergency receivers must provide headphone and loudspeaker MCW and spark reception from 488 to 513 kc.

Some Requirements in Detail

Class III ships have to carry a spot-frequency main R/T transmitter with a maximum carrier power of 100 watts and adjustable for phone or MCW, when required, in the frequency range 1600-3800 kc. One of the switched or push-button selected spots must be the small-craft distress and calling frequency of 2182 kc, with four other controlled frequencies between 1600 and 2850 kc, two between 3500 and 3800 kc and one anywhere between 1600 and 3800 kc. A limiter to prevent over-modulation is necessary and speech peaks must be kept to between 80 and 95 per cent., the frequency response of the microphone and transmitter together "not varying by more than 7.5 dB from a value that rises at the rate of 6 dB per octave from 250 c.p.s. to 2500 c.p.s." Push-to-talk must be incorporated, and if in addition a voice-operated change-over system is used, the operating lag has not to exceed 10 milli-seconds or the release lag be less than 150 milli-seconds or more than 200 milli-seconds.

This transmitter must have a minimum range of not less than 100 miles (emergency transmitter, 75 miles), it must permit one-operator frequency-changing within 10 seconds, radiate solely on spot-frequencies, key at high manual speeds, and give visual indication when ready. The main receiver must be spot-frequency switched for headphone and loudspeaker phone and MCW signals with inputs down to 50 micro-volts.

With fixed lifeboat equipment, a 24-volt battery-operated transmitter must emit MCW on 500 and 8364 kc, key at reasonable manual speeds and permit an unskilled person to transmit alarm and distress signals by automatic keyer. Controls must be few and simple and permit adjustment while wearing thick gloves. The lifeboat mast must support a single-wire aerial at a height of not less than 22 feet above waterline, the metal hull being used as an earth connection which, in the case of wooden lifeboats, should be a bare copper plate measuring at least six square feet. Portable gear must be powered by hand generator, be constructed as a single watertight unsinkable unit that can be dropped from a height of 30 feet into water without damage, must have an alternative collapsible stayed mast giving the aerial a height of at least 16 feet and an "earth" wire with sinker for putting overboard. The built-in transmitter must have a minimum power of not less than 3 watts, be on full power within 30 seconds of commencing hand-generator rotation and permit alternative mast erection and automatic keying of alarm and distress signals by an unskilled person. The associated spark receiver is expected to give headphone reception of MCW and spark from 488 to 513 kc and if provided with an HF range, CW and MCW on any frequency between 8266 and 8745 kc.

Operator Establishment and Watch-keeping

A ship's classification decides the provision of operators, also affected by whether auto-alarm apparatus is carried; this, set during off-duty hours, is actuated by the alarm signal from a ship within range and in distress. A selector, working in conjunction with an auto-alarm receiver, accepts dashes and spaces of a certain duration only, and

rings a warning bell on the bridge, in the radio room and in the radio officer's cabin. When fitted with auto-alarm, Class I ships carry two operators; Class II, one operator; Class III, one operator. Without auto-alarm, Class I must carry three operators; Class II, three operators if at sea for more than 48 hours between two consecutive ports, and two if for less than 48 hours; Class III, one operator.

Watch-keeping hours are determined by the ship's classification, the zone she is in and the auto-alarm. Without auto-alarm, Class I and II keep continuous night and day watch and Class III, eight hours as specified for the zone. EXAMPLE: *Zone A* (Eastern Atlantic Ocean, Mediterranean, North Sea and Baltic), Class III, one operator, no auto-alarm: Hours of watch keeping, 0800 to 1000, 1200 to 1400, 1600 to 1800, 2000 to 2200 GMT (an eight-hour day worked two-on, two-off). With auto-alarm, Class I keeps a 16-hour watch according to its zone, and Class II and III eight hours.

The proficiency certificates issued to radio officers are First-Class, Second-Class and Special for W/T, with General and Restricted for R/T.

Message-handling ("traffic") is carried out according to strict priority: Distress calls, messages and traffic; Urgency (XXX); Safety (TTT); Direction-finding; Aircraft; Shipping and Weather; Government priority telegrams; Service telegrams (radio-communications); all other communications.

Operating Procedure

Calling to establish contact takes place on a calling frequency and QSY then follows to a working frequency elsewhere. EXAMPLE: A ship (call ABCD) wishes to transmit four messages on 425 kc to a coast station, XYZ. It listens first and, finding the coast station to be disengaged, sends on the calling frequency of 500 kc: CT XYZ XYZ XYZ de ABCD ABCD ABCD QSY? 425 QTC 4 QSG? (QTC 4—"I have 4 telegrams for you," QSG—"How many shall I send at a time?"). If agreeable to 425 kc for working, the coast station replies: CT ABCD ABCD ABCD de XYZ QSY 425. The ship changes to 425 kc working frequency, calls the coast station again and perhaps enquires QSA?, to which the coast station might come back: QSA (1 to 5, signal strength report) QSG (1, 2, 3 or 4—the number of messages it is prepared to receive at a time). With ship-to-shore working, the coast station usually takes control; with ship-to-ship, the called ship. As 500 kc is also the international distress frequency, it is used *solely* for call and reply to arrange the QSY, continuous working being of the shortest possible duration. (Apart from 500 kc, all transmissions between 490 and 510 kc are prohibited). In the 90-160 kc bands, 143 kc is the calling frequency (CW only) and apart from this all transmission between 140 and 146 kc is likewise prohibited.

All procedure rules are designed to lessen interference and calls are sent not more than three times, except in the 4-23 mc bands where during poor conditions this may be extended to a maximum of 8 times.

Frequency Allocations

These bands are sub-divided and separate calling and working frequencies are reserved for various categories. They are: SHIP STATIONS, R/T (all given in kc) 4063-4133, 8195-8265, 12330-12400, 16460-16530, 22000-22070 kc. COAST STATIONS, R/T—4368-4438, 8745-8815, 13130-13200, 17290-17360, 22650-22720 kc. SHIP STATIONS, W/T (CW)—4133-4238, 6200-6357, 8265-8476, 12405-12714, 16530-16952, 22070-22400 kc. Calling is limited exclusively to 4177-4187, 6265.5-6280.5, 8354-8374, 12531-12561, 16708-16748, 22220-22270. (In Region II, band 2088.5-2093.5 kc is reserved for calling, W/T only).

Beginning at the LF end, each ship W/T band is again divided into passenger ship and cargo ship working bands of frequencies. PASSENGER SHIP WORKING FREQUENCIES, in kc, 4133-4177, 6200-6265.5, 8265-8354, 12400-12531, 16530-16708, 22070-22220. CARGO SHIP WORKING FREQUENCIES, in kc, 4187-4238, 6280.5-6357, 8374-8476, 12561-12714, 16748-16952, 22270-22400. COAST STATIONS, W/T—4238-4368, 6357-6525, 8476-8745, 12714-13130, 16952-17290, 22400-22650 kc.

Safety is the primary consideration of all. Medical advice can be obtained through all U.K. coast stations and a Special Service Station list carried by all ships names foreign radio services through which such advice can be given when in distant waters.

Safety Procedure

At 15 minutes and at 45 minutes past every hour GMT, *all transmitting ceases* and a 3-minute silence period is observed while watch is kept on 500 kc—the international calling and distress wave—for Urgency calls preceded by three repetitions of the group XXX (concerning the safety of a ship or of some person on board or within sight); for Safety calls preceded by three repetitions of the group TTT (concerning navigational safety and important meteorological warnings); above all, for Distress calls preceded by the *alarm signal* consisting of twelve four-second dashes separated by one second and sent (usually by automatic keyer) in one minute. If circumstances then permit, an interval of two minutes is allowed to elapse to give non-continuous watchers on ships within range (alerted by their automatic alarm system) time to reach their radio rooms and switch on their transmitters for a reply. The Distress Call itself then continues: SOS SOS SOS de ABCD ABCD ABCD and the Distress Message consisting of the distress call repeated again; the ship's position; nature of the distress; any other information to facilitate rescue and two ten-second dashes followed by the call sign, for direction-finding bearings to be taken by possible rescuers. Until an answer is received, the distress call and message (and the alarm signal if necessary) is repeated at intervals. Failing a reply, any other frequency and type of emission is tried and before total abandonment, providing circumstances permit, the transmitter is set for continuous emission.

Any intervening ship may re-radiate the distress message and alarm signal if the ship in distress cannot continue to do so or if the master of the relay ship

considers that further aid is necessary. In this instance the relaying ship would follow the distress message with *de* and its *own* call sign. Receipt of a distress message is acknowledged by sending the call sign of the ship in distress (*three times*), the word *de*, the call sign of the ship acknowledging receipt (*three times*), the group RRR, the distress signal SOS, all followed as soon as possible by the receiving ship's name, its position and the speed with which it is proceeding towards the ship in distress.

By sending QRT SOS, the ship in distress may impose silence on all other stations in the area; if necessary, any other ship near the one in distress may impose silence by sending QRT Distress followed by its *own* call sign. Until distress traffic has become well established, every ship and station aware of the circumstances must follow the proceedings even if not participating and then, when satisfied that all goes smoothly, resume normal traffic on condition that no interference is caused. Finally, when radio silence is no longer necessary and distress working has ended, the controlling station, *i.e.*, the ship in distress, the intervening ship or the one to which both may have delegated control of distress traffic, then signals to all: SOS CQ CQ CQ de EFGH (*call sign of sender, once*), 0335 (*message time*), NONSUCH (*name of vessel in distress*), ABCD (*its call sign*), QUM (*distress working ended*).

LF Band Procedures

The bands of frequencies most likely to interest us, as amateurs, are those we share on a non-interference basis with fixed, mobile (other than aeronautical mobile) and radio-navigation ("radio-location") services. With low-power mobile R/T stations in the 1605-3800 kc band, the urgency signal is the word PAN, spoken three times; the safety signal is pronounced SAY-CURE-E-TAY (French, *sécurité*); the Distress signal is MAYDAY (French, *m'aider*). Example of distress message: "MAYDAY, MAYDAY, MAYDAY, THIS IS NONSUCH" (*name of ship in distress*)—the whole spoken three times—"MAYDAY, MAYDAY, MAYDAY, This is NONSUCH, NONSUCH, 58 degrees 35 minutes North 5 degrees 20 minutes West, lost propeller, require tug assistance, drifting eastwards in gale."

British coast stations keep continuous watch on 500 kc (mainly for W/T calls) and on 2182 kc (mainly for R/T calls) and as far as practicable watch is kept on 2182 kc by mobile stations, for three minutes at the beginning of each hour GMT and at each half-hour, all transmitting then ceasing between 2167 and 2197 kc. For making primary use, during normal conditions, of the Wick, Cullercoats, North Foreland, Land's End, Seaforth and Oban group of coast stations, coasters and deep sea ships use a working frequency of 2009 kc as Channel 1 or 2527 kc as Channel 5; fishing vessels use 2104 kc as Channel 3 or 2548 kc as Channel 7 (plus an exceptional 3373 kc as Channel 9 for Wick only). The Stonehaven, Humber, Niton, Burnham and Portpatrick group are normally used by coasters and deep sea ships using 2016 kc as Channel 2, or 2534 kc as Channel 6; fishing vessels use 2111 kc as channel 4, or 2555 as Channel 8.

A coast station normally opens on its *higher* working frequency when communicating with a ship on Channel 1, 2, 3 or 4 and its *lower* frequency when working to a ship on Channel 5, 6, 7 or 8. Ships usually give the channel numbers when indicating the working frequency they propose to use. EXAMPLE: A coaster wishes to send a message on 2016 kc to Niton Radio, GNI. It calls on 2182 kc, the calling frequency, and indicates Channel 2. Niton replies on 2182 kc and, if agreeable, tells the ship to transmit on Channel 2 (2016 kc) and listen on 2628 kc (Niton's higher frequency, for Channels 1, 2, 3 and 4). The ship and coast station would then be transmitting respectively on 2016 and 2628 kc. With the Irish Republic and other coast stations outside the U.K., a ship calls first on 2182 kc and the actual working frequency to which QSY is made depends upon mutual arrangement.

In the Mediterranean and Western Indian Ocean only, the ship-shore frequencies for deep sea ships are 2090 and 2097 kc, with 2146 kc in the South Atlantic and Indian Ocean areas only. Coaster and deep sea inter-ship frequencies are 2241, 2246, 2301 kc, with 2421 in the Atlantic and Mediterranean only. Inter-ship frequencies for fishing vessels are 2226, 2231 and 2306 kc. A trawler and small craft W/T service uses 1606 and 1609 kc for inter-ship calling and traffic; 2042 and 2496 kc for fishing vessel ship-shore traffic, with 1623 kc for calling and working other categories.

Coast Station Frequencies

The main coast stations operating these W/T services are Wick GKR (fishing vessels only) on 1615 and 2842 kc, other frequencies being 432, 4245, 6415, 8675, 12565 kc; Stonehaven GND, 458 and 1618 kc; Humber GKZ, 441 and 1618 kc; Oban GNE, on 1622 kc; Irish Republic stations Malin Head EJM, 421 and 1618 kc; Valentia EJK, 429 and 1612 kc.

The actual W/T frequencies from which to expect nearby receiver IF break-through are those used by Stonehaven GND 458 kc, Cullercoats GCC 484 kc, Niton GNI 464 kc, Burnham GRL 476 kc and Portpatrick 472 kc. For appropriate treatment, refer to G8PG's article in SHORT WAVE MAGAZINE, December, 1956.

The traffic and the broadcast W/T frequencies on which may be heard weather bulletins and gale warnings from the other coast stations are: Wick GKR 432 kc, Humber GKZ 441 kc, N. Foreland GNF 418 kc, Land's End GLD 438 kc, Seaforth GLV 447 kc, and Irish Republic stations Malin Head EJM 421 kc, Valentia EJK 429 kc.

Ship-Shore Radiophone

Contact with telephone subscribers ashore can be effected when within about 150 miles of Wick, Stonehaven, Cullercoats, Humber, N. Foreland, Niton, Land's End, Seaforth, Portpatrick or Oban by the short-range R/T service, with connection to inland trunk lines. This is done by calling the coast station on 2182 kc and stating "Telephone call channel number . . ."; the coast replies on 2182 kc and indicates a working frequency; the ship makes QSY to this and passes the telephone exchange and number

required; the coast replies on the working frequency and the ship monitors the frequency until the subscriber is connected or the coast gives other instructions. The present 3-minute minimum charge is 10s. 6d. (coast station 7s. 6d., ship 3s.).

A long-range R/T service with liners is available to subscribers ashore by dialling INT and obtaining the International Radio Exchange in London. Some 47 liners are thus served—including the *Queen Mary*, the *Queen Elizabeth*, the *United States* (and the *Batory*!)—and routing is *via* Rugby, New York or Rome according to whether the called liner is in Zone 1 (Atlantic waters, North Sea, Mediterranean) or Zone 2, the limits beyond Zone 1. Charges are relatively high, the minimum being 36s. for a 3-minute conversation, rising to 86s. for a really DX connection.

A Commonwealth long-distance W/T ship-shore service is in operation by which defined areas of the world are covered by an area transmitter sending traffic to Commonwealth shipping during scheduled periods. Area receiving stations accept ships' HF traffic direct, or *via* point-to-point network when conditions are poor.

Reporting Movement

Coast stations expect to be informed of a ship's movements so that traffic can be disposed of in an orderly manner and as far as reasonable and practicable ship stations without fixed hours of service inform the coast of the times of closing and re-opening their service. When a ship arrives in port and is therefore about to close its service, it must inform the nearest coast station of the fact.

For listeners, some DX stations to search for on the allotted frequencies are: Capetown ZSJ, Bombay VTF, Sydney VIS, Awarua ZLB, Hongkong GZO, Singapore GYL and the U.S. naval shore stations Guam NPN, Pearl (Honolulu) NPM, Manila NPO and San Francisco NPG. Other interesting maritime frequencies include 156.8 mc, used for safety, calling, inter-ship and harbour control by simplex telephony (usually FM); direction-finding, usually on 410 kc; British radio beacons, operating between 285 and 315 kc and the Loran system (Long Range Navigational Aid), only too well known to Top Banders, which operates either on 1850 or 1950 kc in any particular area; it consists of a master station and a slave station in each group. The W's get the 1850 kc noises, we over here get the 1950 kc variety. Each station transmits signals with a set delay between them, the receiver allowing for the delay and measuring the difference between the two transmissions. The answer indicates the position line on a Loran lattice chart which is then crossed with a second position line from another pair of stations, the intersection giving the fix. The range is about 700 miles in daytime and 1400 at night, the general accuracy with an experienced operator being within about five miles. Loran is thus an extremely important navigational aid. The specialised type of receiver restricts its use to the larger tonnage ocean-going vessels, whereas the Decca system can be used by coasters and the Consol system only requires an ordinary receiver that covers 285-315 kc and a listener who can count the number of dots and dashes sent

in a given period from two different stations, for finding position lines on a Consol chart.

Call-sign Structure

All commercial ship stations have four-letter call-signs, the first one or two characters indicating nationality—the prefix system is, in general (though not entirely) much the same as for amateur stations. All commercial fixed land stations have three-letter calls, the prefix system being as for ship stations. (All civil aircraft have five-letter callsigns.)

The commercial version of what we know as the amateur Call Book in the *Berne List*, which gives detailed information—in the strictly radio context—about every ship, coast and aircraft station in the world, with a full schedule of frequencies and services. Though a standard issue for commercial stations, it is an expensive publication to buy privately—and is also something of a nuisance, because frequent amendment lists are sent out to all registered holders, and these amendments must be incorporated if the *List* is to be kept up to date.

In conclusion, seafaring readers are asked kindly to point out any major revisions that may have come into force without the writer's knowledge. His thanks are due to one anonymous collaborator and to G2LZ, G3IUG, G3JLH, G3JQX and G3KYU for verification of certain items, either by virtue of operating experience or possession of the appropriate documents. One final thought for county-chasers who find that strong MCW arouses strong feelings—the maritime mobile service, with Amateur Radio (and the aeronautical mobile service) represent the sole surviving users of the remarkable code originated by Samuel Morse. Elsewhere in the telecommunications world it has been completely ousted by two-way telephony and the clickety-clacking of the teleprinter!

PROMOTION INTO THE GOVERNMENT

It has for long been expected that Mr. Charles Ian Orr-Ewing, O.B.E., Member for North Hendon, would receive preferment in the political field. We are therefore very glad to offer him congratulations on his appointment as Parliamentary Under-Secretary of State, Air Ministry, in the new Government. In pre-war years, he was well known and active as G5OG, and is probably the first holder of an amateur licence to reach ministerial rank. The appointment is a most fitting one for another reason—during the war Ian Orr-Ewing served in the Signals Branch of the Royal Air Force, becoming a group-captain. Later, he had a senior executive appointment with Cossor, Ltd.

QSL BUREAU — Address Note

Readers entitled to full both-way use of our QSL Bureau, *i.e.* those who have paid a year or half-year subscription direct to us, are particularly asked to note that the full and only address of the Bureau is: *BCM/QSL, London, W.C.1.* Sending packets of cards to our office address involves us in double handling and extra postage charges, and also leads to some delay in dealing with the cards.

DX COMMENTARY

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

ANOTHER excellent month to record, with winter conditions still prevailing and the prospect of a further great improvement in DX as soon as the first sign of Spring arrives. We have not long to wait for what will probably be the liveliest DX season in living memory. One or two spectacular openings, during the otherwise quiet winter routine, have given us some idea of what to expect.

All bands have been well populated, and correspondence is voluminous; this preamble is being cut to the bare minimum so that we can get straight away with this month's report, beginning up at the HF end.

Cross-Band, Six and Ten

Anyone who can listen on Six metres and states that fact on ten-metre phone is likely to be very popular with the W's nowadays. The cross-band contacts between Six and Ten, first reported last month, have continued happily throughout the period.

G5JU (Birmingham) worked a whole pack on Christmas Eve, including W1, 2, 3 and 8. The highlight of the day was his reception of SSB phone from W1CLS, who was running *six watts*. W1FOS reported strong reception of BBC TV on 51.75 mc. On Christmas Day G5JU raised more of them, including a W4, and he heard VE1QY. December 30 was not a good day. Outstanding signals throughout the whole period were W1FOS, W1GKE and W1HDQ. January 6 gave a short opening, with a lot of American CW heard. G5JU suggests that G stations wanting to work cross-band should position themselves between 29400 and 29500 kc, to



G3KEP

CALLS HEARD, WORKED and QSL'd

avoid the appalling QRM lower down the band.

E12W (Dublin) was another very active station, and his log shows nearly 20 W's worked or heard on Six, plus VE1WL and VE1QY.

CN2AO (Tangier) listened on Six, and logged not only W1's on phone, but W5AJG on CW—at S9-plus. Many W's on phone were not identified because they were speaking fast and only signed once. Clear and distinct signing helps to get QSO's. CN2AO intends to put his 144 mc transmitter on 50 and 70 mc very shortly, with a 3-element beam.

(*Late Flash*, again from CN2AO, reports that on January 6 he logged W2YY1, 8HXT and 9VUL, all on CW at around 1615 GMT. He was using a ground-plane, an NC-173 and two RF stages with 6J6's in push-pull.)

Ten Metres

Despite appalling QRM in the phone band at times, *Ten* has been excellent on most days. At the CW end there is still a certain amount of peace and quiet, and scarcity of signals doesn't mean

that conditions are bad, because one or two real crackerjacks will suddenly appear from the most unlikely places.

G3HCU (Chiddingfold) stuck to phone and worked VE8, W6, LU, MP4, CR9, VK, ZL, ZD4 and VQ2, all during the first days of January. During the latter part of December he collected ZD6, VS6, VQ5, ZE, CE, VE6, VK's and "others too numerous to mention."

Three all-time new ones for G3BHW (Margate) were VP1EE, ZD1DR and ZP5JP, others worked including CR6 and 9, CT2, CX, TI, VP6 and the like—all phone. 'BHW says "It's been amazing to hear the DX coming in stronger than the locals in the 80-metre net."

GM3EOJ (Aberdeen) reports "nothing spectacular, but hoards of W's and VE's who sound like locals at times." G3DNR (Broadstairs) raised PY, EA8, IT, YO, UB5, 5A, CN8, ZD4, ZE and ZS.

G5BZ (Croydon) mentions all VE, all W, CR6, CR9, KP4 and KZ5, on phone. G2DC (Bulford) says "short-skip QRM during the mornings and W QRM later." All

W districts pound in from mid-day onwards, W6's and 7's often crashing through the wall of QRM set up by the East Coast. New ones worked were KH6 and a few odd Europeans, with a marked lack of signals from Oceania and the Far East. (This seems to be remedying itself as time goes on—we find them better every day.)

G3GZJ (London) worked I and 5A for new ones, as well as KP4, VE6, VS6 and PY. GM3BCL (Aberdeen) had quite a good month with CR9, HR, KA, MP4, OX, UA9, VK's, VP2LU, VP6's, VS6's and many others. He tells us that GM3EOJ, a mile away, will also be pretty active on the band this year. (See preceding page!)

On Ten, G5JU succeeded in working all W call areas in 1½ hours—this was on the evening of January 6.

Fifteen Metres

On days when Ten has been a little uncertain or dull, *Fifteen* has still been teeming with signals from all over. It now takes a really bad day to quiet this band down—a pleasant change from not so long ago, when it took a really good one to liven it up!

G5BZ didn't think conditions were very startling, but nevertheless raised all W, all VE, KL7, VK's, KH6, KZ5, KG1 and UD6. G2DC again mentions the lack of signals from Oceania and the Far East, and finds the whole band dominated by W's from the afternoon onwards. New ones for him included VP2LU, ET3UR, FA, UO5 and UG6. Others worked were VE5, 6 and 7, and a few VK's and ZL's.

G3GZJ collected EL1P for a new one, also VO, VE6, KP4, VK and ZS on phone. GM3EOJ winkled out VS6DN and VU2JA on CW; phone brought him JZØPC, VK's, VP2LU and ZL. He heard and called DU1AS (phone), but didn't get him.

GM2DBX (Leven) raised BV1US on phone, and got his QSL by air mail. But he says a greater thrill than any new country came when he gave an SM station a ride on his back to work the latter's first VK on phone—within the hour the

bell rang, and there was the SM *on the landline* to say thanks in person. That three-minute QSO seemed very short!

G3BHW is still not TVI-proofed, but new gear is under construction. During his restricted hours his phone has raised BV1US (also received his air mail QSL), JZØPC, KR6GT, CR9AL, CR7, MP4, ZD2 and ZD6, together with a lot of the usual stuff.

G3HCU collected XE1H, KV4BQ, SV1AE and a bunch of VK's and ZL's, but spent little time on this band compared with Ten. Up to date he has raised 148 countries on 21 mc, and reports he had a total of 1686 QSO's during 1956.

G2DMR (Clitheroe), a newcomer to the band, records consistent results, particularly when conditions seem so poor that most stations quit it. In his first few weeks he raised CR6 and 9, HK, HZ, KL7, KZ5, LU, OA, OQ, PY, UC, VE, VK, VP6, VQ, ZD4, 6 and 8, ZE, ZL and ZS. This with 20 watts and an end-fed long wire.

G3FPQ (Bordon) raised LX1HR and 3W8AA on CW; phone QSO's included CP1CJ, KR6GT, VP2JC, VS1 and 2, VS4NW, VS6CL and ZD1DR. In the CQ

Contest (CW half) he scored just over 300,000 points—and then didn't get on the air again until Christmas!

G3JZK (Cambridge) had phone contacts with G3IDC/VS9, F9YP/FC, SVØWL, ZD4BC and ZD8SC. G3KHE (Birmingham) tells us that JZØPC is on 21450 kc phone most days. Eamonn, the first op., is looking for EI contacts, and Bob, the second op., wants someone from his home county, Kent. Also, G3KHE says that VE5DU is on with 30 watts most evenings around 1700, looking for contacts with Sheffield.

DX on Twenty

With the other HF bands in their present state, *Twenty* is being somewhat neglected as a possible carrier of DX. There seems to be no lack of it on the band, except at times when short-skip makes the whole thing too difficult, but the fact remains that this band is gradually being "drained" by the two higher ones.

G3BHW stuck to CW for the month, and raised FB8BR (a new one), FY7YF, ZD9AE, ZD6BX, ET2ET, MD5AMO and many more common ones. G3BHW finds the short-skip trying, but says that the third layer down is usually pretty interesting.

G5BZ does not agree about



“. . . Funny how it becomes quite an obsession with some chaps . . .”

Twenty's falling-off, and contends that it is still the best DX band; at any rate, his bag includes KH6, UI8, ST2NG (now closed down and gone to VS9), OQ5, KL7's, ZD8JP, VE8's, MP4 and LU2ZS (Antarctica). G5BZ not only thinks Twenty is the best band, but prophesies that it will *always* be the best.

Best DX for GM3EOJ, on CW, was ST2NG, UAØRK, JA, KH6's, VK's, VP8BK, ZL3BB — and FY7YF as a "gotaway." G3DNR finds the band still interesting, and he collected CR6AI, ZL's, ZS and F9SF/FC. G3JZK raked in JA6AK and TF3SG.

G2DC is another staunch supporter of 20 metres, which he thinks is coming back into its own as *The DX band*—mainly due to remaining open on practically all occasions, including stretches after midnight. VE5, 6 and 7 signals have been plentiful and good, with a sprinkling of VP's adding to the spice of generally interesting DX. Outstanding ones have been VE6NX, 6VK and VE7GI, and, around 2300, VP2LU often peaking at S9. Far East and Oceania, on the other hand, have become scarce again.

Forty and Eighty

As usual, there is little apparent interest shown in these two bands. *Forty* does still carry the DX, and G3INR (Hereford) worked VP2LU there. G3JZK, on the same band, raised UC2KIA, UP2KBC, UF6KAF and UL7KAA—and he says it is well worth watching in the evenings. But, as he adds, "An alarming trend on the 41-metre band is indicated by the appearance of Moscow B/C using SSB—perhaps it gets through the other QRM better that way."

G2DC confirms that if one scratches for it, there is DX on *Forty*. He mentions W6's and 7's during the 0600-0800 period (good ones are W6DFY and W6MOT). He worked all W districts as well as UA9DA, UH8IA, RAEM, HZ1HZ and VP2LU. No real change in *Eighty* was noted, except that W's can now be worked pretty easily between 0600 and 0800—all districts but W7 have been raised.

G3HQX (Mitcham) mentions a

UAØ on *Forty* as the only QSO worth noting.

Those seriously interested in CW DX on 40 metres—and they are many—are advised to try a few early morning sessions; there is a lot to be heard and worked during those couple of hours before breakfast.

Top Band DX

The Trans-Atlantic Tests this season confirm the general trend for DX to become more difficult on these "long waves" as the sunspot cycle progresses. The odd contacts between the Old Reliables continue, but they are not easy, nor are signals strong except on the solitary freak occasion.

GM2BUD (Ayrshire) tells us that his appearances on 1802.5 kc working W1BB were due to a pre-arranged sked for the purpose of giving W1BB his first GM contact. The frequency was mutually chosen as the most likely one to be free of QRM on the other side. They made it at the second attempt, on December 16.

SWL Iball, of Worksop, is a listener who has always specialised in Top-Band DX, and he sends a very interesting and comprehensive log, from which we extract the following: December 16,

EL1C heard at 0630; W's also coming in. December 23, a W was heard around 1910-1920 kc. and the call-sign WØYFR was mentioned. December 31, ZB1HKO appeared around 0500. R.I. finds conditions very erratic, and as we used to see his logs 'way back in 1951, we can confirm that things are very different today.

The phoney of phoneys was abroad on December 23, when G5JU was answered by "AC5PN" at 2225 GMT, giving QTH as "Thimpu, Bhutan," using "drob" and giving name as "Cheawns." An hour later G3PU (Weymouth) met the same joker, who said he was running 1 kW and promised to QSL by air mail; he was RST 459 at G5JU, and 579 at G3PU. Both G5JU and G3PU also worked EL1C, who was genuine, of course.

On January 20, G5JU managed four W's, but with difficulty due to noise and general QRM. It would seem that for the time being the Top Band has "had it" as a DX channel.

Top Band GDX

So many Top-Band enthusiasts already exhibit their WABC on the shack wall (145 of them to

FIVE BAND DX TABLE
(POST-WAR)

Station	Points						Countries	Station	Points						Countries
		3.5 mc	7 mc	14 mc	21 mc	28 mc				3.5 mc	7 mc	14 mc	21 mc	28 mc	
DL7AA	791	105	167	223	161	135	234	G3GZJ	230	18	43	65	67	37	104
W8KIA	690	61	145	265	109	110	265	G3JWZ	227	47	57	61	35	27	91
G5BZ	676	64	118	239	148	107	245	GM3EFS	224	26	45	98	32	23	109
G3FPQ	587	62	83	184	156	102	203	G3JLB	220	36	37	57	50	40	94
G3DO	564	24	46	218	128	148	236	G3IUW	216	31	38	66	59	22	101
W1VG	536	25	115	190	114	92	199	MP4BBW (Phone)	207	1	5	54	89	58	112
W6AM	499	30	58	269	86	57	269	G3JVJ	190	23	60	53	37	17	84
G2YS	439	65	83	145	93	53	162	G2DHV	182	19	26	115	10	12	117
GM2DBX (Phone)	411	34	31	158	97	91	172	DL2ZO	177	2	43	98	33	1	106
W6AM (Phone)	338	13	32	233	39	21	233	G3JZK	148	14	28	34	57	15	78
G3INR	310	45	57	119	58	31	130	DL2ZS	131	2	31	82	15	1	92
JA1CR	304	15	49	167	63	10	168	G3DNR	129	10	21	65	14	19	66
G6VC	303	30	40	134	62	37	140	G3HQX	131	9	36	34	33	19	64
GM3EDU	298	43	59	113	47	36	135	G3HEV	70	10	21	17	20	2	44
G3BHW	295	14	32	130	66	53	152	G3IDG	63	11	14	9	8	21	30

date) that the sport of county-chasing is not quite so riotous as it was. However, there are a number of new aspirants always coming up, and there is now a certain amount of European DX to go for. As we write this, we understand that the YU's have just been issued with special licences for 160 metres, so there will be another new country for the boys.

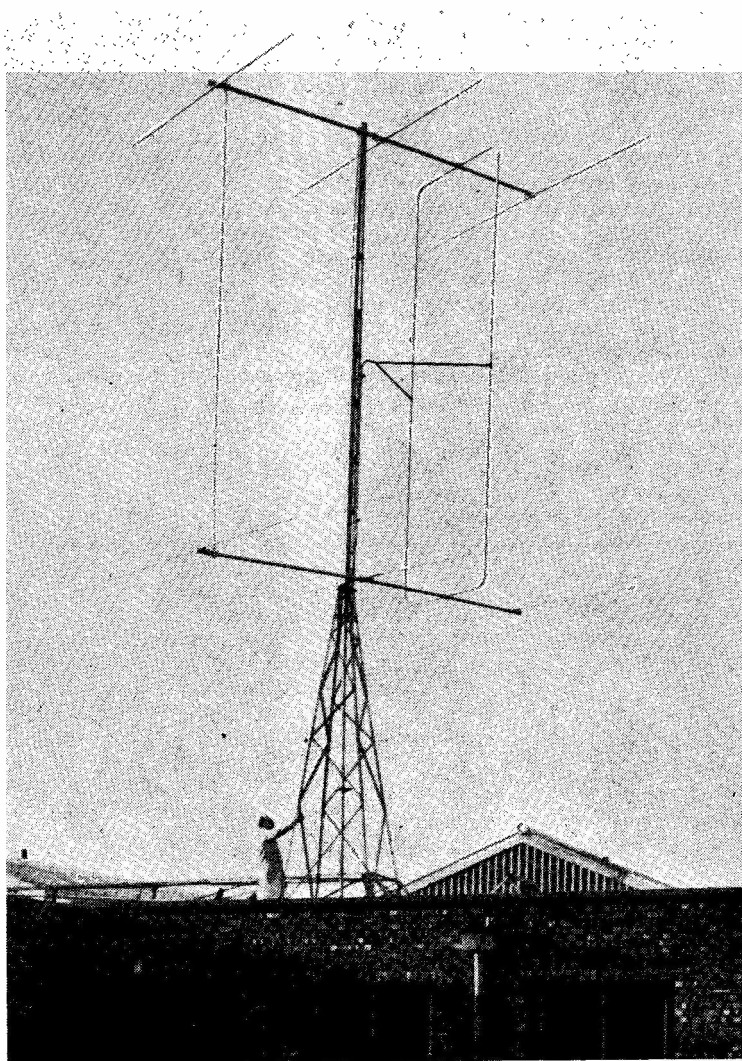
GM3KLA (Shetlands) has worked HB9IN and OK1BN, both with 5 watts, but he says he is on the air very little these days. G3KYU (Bournemouth) raised DL2UY, HB9IN, four OK's, GD3UB and G3ARS (Rutland).

GM2BUD says he is the only station active in Ayrshire, and he will be around most Saturdays from 2230 until midnight. G3HGY (Coventry) applies (successfully) for his WABC, and on glancing through the list he sees that he owes 15 counties to G5PP/P on the latter's various perambulations!

G2DC spent a few hours on the band, using a VFO only and an input of 0.7 watt; with this he worked fourteen counties, but no DX, although he heard W3RGQ, EL1C and many OK and HB stations. This effort makes G2DC our only six-band reporter this month and, for that matter, over many months.

G3KEY (Birmingham) rigged up a single EF50 as an ECO and connected the aerial straight to the anode, keying the HT supply. With this and two watts input he got a 55/69 report from OK1KKR and 569 from HB9IN. His aerial had no insulation at all, one end of the 300-ft. wire being wrapped round a tree and the other jammed in the window frame! There was no tuned circuit between the anode and HT—just an RF choke. This doesn't exactly qualify as a QRP record, New Zealand having been worked on less than one watt (*not* on this band!), but it does show what can be done with the minimum of RF.

G3KOG (Ulceby) raised DL2UY and HB9T and also collected GM3COV for Caithness. G2NJ has had a report on his 160-metre signals from an SM listener in Apled.



G2HCG, Northampton, describes this as "the biggest aspidistra in the world" — his new 28 mc slot-fed 3-over-3 beam, with which he is boring holes in the W6's on ten-metre phone. The slot is 19 ft. 2 ins. high by 6 ft. 4 ins. wide, constructed of 1½ in. dural tube. Each arm of the delta is 5 ft. 1 in. long and feed is by 75-ohm coax through a balun; the SWR is 1:1.3 and the gain about 11 dB. G2HCG is, of course, the well-known aerial designer, who is also very active on the VHF bands.

Mail from Overseas

KP4KD (San Juan) has just worked FB8BR for his No. 220 in the post-war series, and tells us that he has discarded his former P/P 813's and now uses a Viking II with a maximum of 150 watts. Six new countries have come his way since the change, so he doesn't regret it. He confirms that the FCC have withdrawn 160-metre privileges from KP4, KV4 and several of the South-

Eastern States owing to Loran activities.

DL2ZS has had a burst on phone, working ZL, VK, W's and EL for his first contacts. He finds conditions best on Twenty in the early mornings; in the late evenings it is almost dead with him. But short-skip has made possible some very good contacts with G's.

ZE3JO (Salisbury) now admits that he must have been about the 8th VQ1 to operate from

Zanzibar! His original claim (to having been the third) was made in good faith and based upon what was thought to be reliable local information. Never mind — no harm done. He tells us that ZE5JJ and ZE6JB are very active on SSB, and also that the ZE's are allowed to use 70.2 - 70.4 mc for this year only. (We take this as *pukka gen!*—*Editor.*)

DL2ZO is now on detachment with the U.S. Army in Germany, and has sat for the necessary test for a DL4 call, which he expects any time now. Before leaving DL2ZO he operated on Top Band for a week and had 106 contacts with HB9, OK, DL, G, GM, GI and GW (35 counties in the U.K.). He and DL2ZK are hoping to get Luxembourg on the map again,

with the main objective of putting out an LX call on Top Band in the Trans-Atlantic tests. Finally, on a QRPP note, DL2ZO reports that he heard G3CSZ/TTX working G3JVR at 0036 on January 12, 1826 kc; signals were RST 229.

Writing from Scarborough, ex-4S7AM says that he was on out there for three years, using a CO-PA and a single crystal on 14 mc, but even at that managed 70 countries, most of which have been confirmed. On the subject of present activity from Ceylon (regarded as good DX from many countries), ex-4S7AM says that the only stations on at all regularly now are 4S7GE and 4S7YL; some ten of the active 4S7's have returned to the U.K., where they find their licences issued in Ceylon are not recognised by our authorities—so ex-4S7AM is taking the R.A.E. in May, and hopes to be up with a G call in due course. He adds that he will QSL anyone missing his card if they will write him at: 35 Newlands Park Avenue, Scarborough.

W8KIA reports again for the Five-Band table, with a score which puts him into second place. Writing from Adelaide, GW3LJW, who is chief radio officer of the m.v. *Agamemnon*, says he spends a good deal of time listening, mainly on 20 metres, when he finds the G-VK path good between 0730 and about 1000 GMT in the mornings; being unable to operate /MM, GW3LJW consoles himself with experiment and construction—and as his ship is mainly engaged round the coasts of Australia, he has come to know several VK's very well indeed. Their kindness and hospitality, says GW3LJW, is overwhelming.

Miscellany

On the vexed question of QSO's with the Russian districts, it is obvious that most of our readers are very strongly in favour of making as many of them as possible. The general argument is that the operators at the U.S.S.R. end don't really know what is going on in the world outside, and any sign of a boycott from the democracies would be

interpreted in quite the wrong way. Another point of view is that we condemned their Government for closing them down for five years, and some of us made every attempt to persuade them to break their own regulations, so why should we cold-shoulder them now?

Frivolous comments on the spate of locally-produced DX certificates includes two from G6LB (Chelmsford), who would like to see a WAWWWW (Worked All Wogga-Wogga on a Wet Wednesday) and an HAHAH (Heard All Hillbillyville at Hogmanay) with a special endorsement if it was half-day closing...

GI3HXV (Belfast) points out, concerning the WAYUR Award mentioned last month, that contacts with stations in *each* federal republic of YU must have been made on at least *two* bands.

G3KXT (Croydon) has deserted the Top Band for a while now that he has completed his "DX Pilot" and "Hunter," with which he is very pleased, having recently worked ZL on 21 mc for 35 minutes, with a 5-8 report both ways... G2NS reports hearing DL1LB calling "CQ fr YLCC YL's only," on 21 mc CW. That's selective calling, if you like!

It is interesting to note that on January 20, G5JU worked W's on the five bands 1.8, 7, 14, 21, and 28

TOP BAND COUNTIES LADDER

(Starting Jan. 1, 1952)

Station	Confirmed	Worked
G2NJ	97	97
G5JM	97	97
GM3EFS	96	96
G3JEQ	95	95
G6VC	94	94
G3HEK	90	94
G3GGS	90	92
G2AYG	88	89
G3JHH	88	88
G3FNV	85	90
G3BRL	84	84
G3AKX	80	82
G3KEP	80	81
G3DO	74	75
G3KOG	73	78
G2CZU	69	69
GM3KLA	66	68
G3KOC	65	67
G3COV	60	65
G3EJF	60	64
G2HDR	60	60
G3KYU	52	55
G2HPF	45	60
G3ICH	42	58
G3KXT	36	42
G3KNG	35	46
G3JZP	35	43
G3KNQ	24	34
GM2BUD	12	25
GM3COV	9	34

21-28mc MARATHON, 1956

Final Placings

Station	Total	21 mc	28 mc
G2CDI (Phone)	158	151	108
G3HCU (Phone)	136	125	86
G2DC	127	115	71
VQ4RF	111	74	80
G5BZ	103	87	59
G3KHE (Phone)	102	93	35
GM3BCL (Phone)	97	19	95
MP4BBW (Phone)	97	81	58
GM2DBX (Phone)	82	74	39
G3GGS	82	47	58
G3GZJ	68	66	35
ZB1HKO	42	39	19
G3JWZ	40	34	23
G3JVJ	39	37	17

mc—he didn't think of trying Eighty till it was too late!

The ZL Special

More about the "ZL Special" from G2YV (Cannock), who has put up one built with 300-ohm ribbon and fed with 80-ohm flat twin. He finds the angle of radiation pretty low, and estimates the back/front ratio at 20 dB. On 21 mc phone he has been working VP8BP, VK's and an FF8 mobile near Dakar. G2YV is now building the tube version, using semi air-spaced 80-ohm co-ax with a velocity constant of 0.75 for phasing, and a spacing of .097 instead of 0.1 at 135 deg. out of phase. Further details are promised when the DX starts rolling in

DX Strays

At the extreme end of practically every published list of Countries and Prefixes (including our own, on p.300 of the *August 1956* issue) you will find Wrangel Island. It sounds like a last despairing cry—the only hope for anyone still looking for a new country. Now we understand that UAØKSI and UPOL2 are actually operating from that rare spot. Location, plumb on the International Date Line and 72 deg. N. And don't be put off by "Vrangelya Ostrov" — it's the same place.

Jan Mayen, another northerly spot, has been subject to rumours. We were told some time back that LA9LF/P and LA9LG/P would be operating therefrom, but now we understand that the Norwegian authorities have never issued these calls Likewise we understand, *via* UA1OE, that there is no activity whatever on Franz Josef Land.

From April 1 all present calls in Labrador and Newfoundland are being withdrawn. The new series will be two-letter calls, VO1 for Newfoundland and VO2 for Labrador SVØWT says there is no present activity from Crete, but he hopes to go there for a week this spring ZK2AB is said to be a pirate, but ZK2AD has been assigned to a ZL and will be genuine OHØNA and ØNB were due to be operating from the Aaland Is. by



Well-equipped station of VS2EF, Sungei Buloh, Malaya, first licensed in 1953; so far, more than 90 countries have been worked. The transmitter is a G8VB-Tiger, there are two receivers (HRO and AR88D), and the auxiliary items include a record player, sound projector and a typewriter — for filling out QSL cards. VS2EF can be found on 7 and 14 mc phone.

mid-January, and this will now count as a new country.

Cryptic message *via* W4HYW and G6PJ says "HH2OT is back in port after a period of 3 years, but will be off again next week. QSL's *via* W4HYW please." (But we don't quite know which way round to take this!)

MDSADZ/5AMO/5DNQ were genuine, and active from Port Said during six days in December, CW only. G3ADZ (Havant) says the cards are being printed and a 100 per cent. QSL service is assured, but there will be a slight delay owing to business and domestic chores which have piled up.

The call VQ6AB has just been allotted to Sgt. D. Higgins, R. Signals, Hargeisa, British Somaliland, and he hopes to be on 80 and 40 right away with a single 807 and a 40-metre Windom. Operating hours will be 2000-2300 GMT; he tells us that VQ6AA has recently returned there from the U.K. and intends to get going on the HF bands.

ZL5AA, 5AB and 5AC are New Zealand stations in Antarctica, but ZLØXX is a pirate FW8AA is said to be on every day at 1340

GMT (probably 14 mc) PJ2ME will be on 14 mc every night around 2100 All VK's on Macquarie and Heard Islands should by now be signing VKØ.

Contests

The 22nd ARRL International DX Competition (*see* page 590, January issue) will be running on February 10-12 and March 9-11 (Phone week-ends) and February 24-26 and March 23-25 (CW week-ends).

The 1957 French Contest is timed for March 2, 1200 GMT until March 3, midnight (CW) and the same times April 13-14 (Phone). This is an opportunity for those who are chasing the DPF Award (French Provinces) and the DUF Award (French Union Countries). Usual rules—RST (or RS) plus the serial number of the QSO. French stations identify their provinces with a number (REF section) and an abbreviated form of the province or country *e.g.* F8DU/15/1F (15th section, Ile de France) or FA8BG/OR (REF section Oran, Algeria).

[over

W A Z MARATHON, 1957*All Bands*

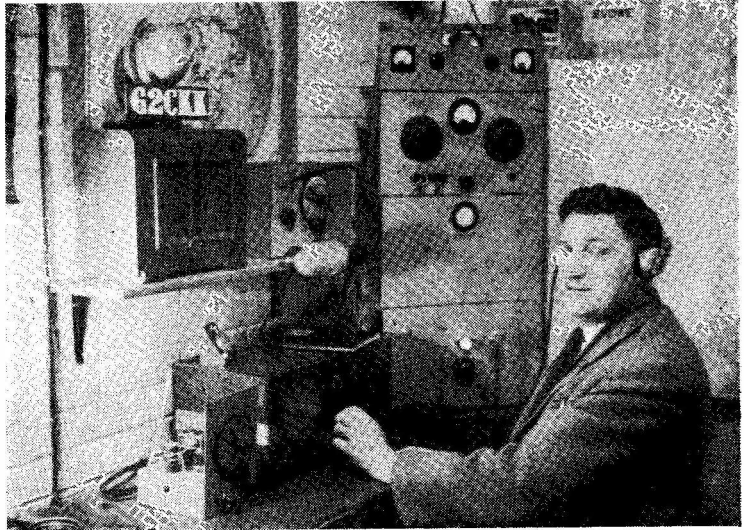
<u>Station</u>	<u>Zones</u>	<u>Countries</u>
GM3EOJ	27	37
G5BZ	26	58
G3BHW	25	35
G3HCU	17	25
G2DC	15	17
GM3BCL	13	22
G3JWZ	12	29
G3INR	10	10
GM2DBX	6	27
G3HQX	6	21
G3GZJ	5	7

The final edition of the 1956 Marathon, 21 and 28 mc, appears herewith. Congratulations to G2CDI on his decisive win, with the highest figures in all three columns, 28 mc, 21 mc and Total; also to G3HCU, the enthusiastic runner-up. Highest-scoring CW station was G2DC, not far behind.

The 1957 Marathon (Zones and Countries) has attracted quite a nice batch of entries despite the fact that these first published scores cover only about the first 14 days of the year. The figure of 27 Zones in 14 days suggests that the scoring will be pretty rapid! Get your entries in for the next appearance of this ladder, and please note that you can't just pop up half-way through the year—April will be positively the last month for accepting new entries.

More DX Flashes

The raft *Tahiti-Nui*, FO8AP/MM, was last reported at 33.54 S., 142.42 W., at 0530 on January 9, QRG 14333 kc; anyone calling



Neat layout of G2CKK, Folkestone, who was first licensed AA in 1939. He joined, pre-war, the old Civilian Wireless Reserve, members of which did such outstanding work during the war, and after service with the R.A.F., started on the air as G2CKK in 1946. The transmitter is 6J5-807 VFO driving a 6L6-807 doubler/PA on 20, 40 and 80 metres. The aerial is a 66ft. top, fed Windom fashion, and gives very good results on 7 and 14 mc. Operation at G2CKK is CW-only, and he is always ready to work anyone, DX or local.

them is asked to make it 10 kc above or below the frequency . . . UM8KAA is now on 14 mc, UL7GA on 7010 kc and UI8KBA 14080 kc . . . XW8AC is on 14130, around 1200 GMT . . . 3W8AA is very active on 21 mc, low end, mornings.

VP2AH, heard during December, was apparently not a good one . . . From *JDXRC* we note the following interesting ones worked by JA's on *Forty*: VR1AI, VS9CG, K4AQL/KG6, VP7NS, KR6RT, VS2DW, VS6NS, OASH, HP3FL, KH6KD, KL7CGA, KW6CH. Just to show that *Forty* still is a DX band in some parts of the world!

Thanks and acknowledgments this month to the West Gulf DX

Club, North and South Calif. DX Clubs, W6YY, REF and JDXRC. We should also like to thank a number of SWL's for letters and lists of calls heard, but we much regret that we haven't space to print such lists in connection with this feature. On the other hand, information as to interesting calls heard is always very useful.

Next month's deadline is **first post on Friday, February 15**. Please address everything, as usual, to "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. Overseas readers note that the following deadline will be *March 15*. So we sign off with the usual 73, Good Hunting, and BCNU next month.

INTERNATIONAL AMATEUR LICENCES ?

As amateurs of one country can, in many instances, already obtain licences under the prefix of another—e.g., G in ZB1, ON in OQ5, F in FQ5 and so on—while G's will also be given DLØ and (the latest of these relaxations) LX5 calls on application, it would seem that it should be possible for general international licence conditions to be formulated, on the lines of the International Driving Licence. It is a thought, anyway, even if a long way off—and nothing will happen unless the proposal is

put forward by somebody. For those who may be interested in visiting Luxembourg, the sole condition for an LX5 licence (for an amateur already licensed under his own administration) is a stay of one month; if the stay is to be shorter than this, he uses his own call suffixed /LUX—which may even be a more attractive proposition. It's an idea for those who are thinking of going abroad mobile this summer, but remember that there may be Customs difficulties to surmount in countries *en route* to LX.

SHORT WAVE MAGAZINE

DX AWARDS AND CERTIFICATES

SOME FACTS AND FIGURES

SINCE the *Magazine* originated the awards known as the WNACA, FBA, WFE and WABC, in the spring of 1952, there has been a steady outgoing of these Certificates to all parts of the world.

We thought that an investigation of facts and figures connected with these claims and awards might be interesting, and we naturally linked with this small piece of research the later Certificate, to wit the very popular WBC, which is *not* available to British amateurs at all.

One should, of course, also mention the *Magazine* DX Award, which surely remains the most difficult in the world. This MDXA requires more than usually successful operation on five bands, including the qualification of three continents and fifteen countries on One-Sixty. Only four stations in the whole world have as yet been able to claim it — G2PL, G8KP, W2QHH and W8KIA.

WABC

The most popular award, numerically, has been the WABC ("Worked All British Counties"). Qualifications for this are the working of not less than sixty British Counties on the 160-metre band only. A total of 145 WABC's has been issued, out of which G claims 120, GM 12, GI 5, GW 4, and GC, HB, OK and OH one each. The overseas claimants were HB9T, OK1HI and OH3NY, all of whom deserve much praise for their outstanding work on this none too easy band, at their sort of distance.

WNACA

Next in numerical order comes the WNACA ("Worked North American Call Areas"), with a total of 124 issued to date. The requirements are the working of all ten U.S. Districts, the nine Canadian Districts, *plus* Alaska, Newfoundland and Labrador, and the WNACA is naturally not available to amateurs in any of the countries or districts mentioned.

It appears to be a very difficult award for VK and ZL amateurs to achieve, particularly the former, of whom only one (VK3XO) has ever collected it.

WNACA's are divided as follows: G, 38; SM, 13; DL, 10; OH, 8; GM and ZL, 5; ON, 4; EA, F, I, OZ and PY, 3 each; CM, CN, GI, GW, KP4 and LA, 2; and CE, CR6, CT, EA8, EI, GC, HB, HC, OK, OQ, VK and ZP, one each. As this list shows, the award has gone to 30 different countries in all.

FBA

When the Four-Band Award was initiated, it was necessary to work at least twenty countries on each of the four bands—80, 40, 20 and 10 metres—as they were then. The introduction of 15 metres has made another band available and the award has become much easier to obtain.

It is very popular with European stations; indeed, the only claimants from outside Europe have been five W's, two KP4's, two 4X's, a CR6 and a ZE. Honours are divided between 20 G's, 15 DL's, 6 SM's, 5 W's, 4 EA's, 3 OZ's; EI, F, HB, I, KP4 and 4X have two each; and CN, CR6, GI, GM, IS, OE, OY, PA, YU and ZE one each.

WFE

On the difficult side is the Worked Far East award, necessitating the production of eighteen QSL's from Far Eastern countries, of which about 23 are available but some inactive. The 25 WFE's issued up to date have gone to nine W's, four G's, four VK's, two ZL's, and one each to DL, HB, OK, PY, SM and 4X.

WBC

Lastly, we come to the WBC ("Worked British Counties"), awarded for contacts with not less than

Table I

Country	Total	WNACA	WBC	FBA	WFE	WABC	MDXA
G	184	38		20	4	120	2
SM	35	13	15	6	1		
W/K	30		14	5	9		2
DL	26	10		15	1		
GM	18	5		1		12	
OH	11	8	2			1	
EA	10	3	3	4			
OZ	9	3	3	3			
GI	8	2		1		5	
ZL	8	5	1		2		
F	7	3	2	2			
OK	7	1	4		1	1	
GW	6	2				4	
I	6	3	1	2			
ON	5	4	1				
PY	5	3	1		1		
KP4	5	2	1	2			
HB	5	1		2	1	1	
VK	5	1			4		
4X	5		2	2	1		
CN8	4	2	1	1			
LA	3	2	1				
EI	3	1		2			
DL2	3		3				
VE	3		3				
CM/CO	2	2					
CR6	2	1		1			
GC	2	1				1	
VU	2		2				
ZE	2		1	1			
PA	1			1			
YU	1			1			
LU	1		1				
CE	1	1					
CT	1	1					
EA8	1	1					
HC	1	1					
OQ	1	1					
ZP	1	1					
IS	1			1			
TI	1		1				
ZB2	1		1				
ZD2	1		1				
OE					1		
OY	1				1		

fifty British Counties, irrespective of band used. As the WABC is virtually a "Britain only" award, compensation was made by devising the WBC for overseas stations only.

It certainly has acquired a truly international flavour; since its institution in December 1955, the 67 WBC's issued having gone to 22 different countries. SM heads the list with 15; next come W with 14, OK with 4, and DL2, EA, OZ and VE with 3 each. F, OH, VU and 4X each have two; and CN, I, KP4., LA, LU, ON, PY, TI, ZB2, ZD2, ZE and ZL each have one.

The final analysis shows that some 440 SHORT WAVE MAGAZINE DX Certificates have gone out to no fewer than 45 countries of the world. The complete distribution is shown in Table I. From this and the rate of claiming, it is quite evident that these Awards are neither too easy for the experienced amateur nor too difficult for the operator of average competence who is beginning to feel he knows his way about the bands. Thus, one of our objectives in instituting the Awards has been attained—that of striking a balance between the absolute beginner and the highly competent DX operator.

Conditions and Claims

An Award takes the form of a signed and counter-signed certificate suitable for framing. The conditions governing the issue of each SHORT WAVE

MAGAZINE DX Award were set out in full on p.246 of our July 1956 issue. A complete list of U.K. Counties (for WABC and WBC) was given on p.20 of the March 1956 issue.

Though no charge is made for the Certificate itself, all claims must be accompanied by sufficient in stamps for return postage and packing. (In the case of overseas claimants, five IRC's should be enclosed.)

SPECIAL NOTE: Overseas Claimants Only. Cards need NOT be sent with the original application, which must, however, include a full check list—band, call-sign and date for each station worked—to justify the claim. From the check list, all or any cards may be called in for scrutiny, or details asked for in relation to particular contacts. In no case can a Certificate be issued without proofs, or evidence considered good and sufficient that the claimed contacts have been confirmed. From overseas applicants (only) claims duly certified by the Hq. of the Amateur Radio organisation for the country concerned can be accepted. All overseas claims must be accompanied by five IRC's.

In the interests of their readers or members, overseas Amateur Radio periodicals are asked to note the foregoing, so that claims can be made correctly and dealt with expeditiously.

L.H.T.

A. M. HOUSTON FERGUS, G2ZC

HIS CONTRIBUTION TO AMATEUR RADIO

A Memorial Note

It is with the deepest regret that we have to report the death, on Christmas Eve after a long illness, of A. M. Houston Fergus ("Fergie"), G2ZC of Farnham, Surrey. He was 63 years of age. Our photograph shows him in his garden shortly after the war.

The sad event of his passing will not be news to members of the First-Class Operators' Club, of which G2ZC was for long the distinguished honorary secretary. Indeed, as one of the old timers of Amateur Radio, his experience went right back to 1922, when he used the Army call TBA from Jersey, C.I. on 440 metres "and the other bands open to amateurs at the time"—broadly, this meant the whole spectrum below 200 metres!

He moved to the mainland in 1923, when he became G2ZC, and operating successively from Hindhead and Churt, he finally settled in Farnham in 1946. Always a keen CW-only man and staunch upholder of the ethics of Amateur Radio, the principles on which the F.O.C. is based made a strong appeal to him when the question of the revival of the Club was being discussed in these columns during the latter part of 1946. In October of that year, at the invitation of the Editor of SHORT WAVE MAGAZINE, he consented to act as

honorary secretary of the First-Class Operators' Club, and thereafter was unremitting in his labours for its well-being and healthy development. In September 1949, G2ZC was joined by the late G5PS—whose death was recorded in our August 1956 issue—as assistant honorary secretary.

During his tenure of the secretaryship, G2ZC handled a voluminous correspondence—he always was a great correspondent, and took a keen delight in letter-writing. Much of this was with his present biographer and, so far as the correspondence concerns F.O.C. matters, it is still extant. Through it all shines his enthusiasm for Amateur Radio in general and the F.O.C. in particular. It was at his suggestion that some notes were prepared on the beginnings of the First-Class Operators' Club and, since G2ZC was so closely associated with its post-war revival, it is worth recording them briefly here in the interests of historical accuracy.

The idea of the First-Class Operators' Club was conceived originally by the late R. B. Webster, G5BW of Eastbourne, about the middle of 1938. Some months later, at his request, SHORT WAVE MAGAZINE undertook to sponsor the Club and give it regular publicity support. Accordingly, the very first

F.O.C. notes appeared in our issue for September 1939, with the late John Hunter, G2ZQ, as the original president, and a total membership of 70. The September '39 issue was, of course, our last before the outbreak of war—and nothing further was said or done about the F.O.C. until nearly seven years later when a note, inspired by one of the original members, appeared on p.296 of the July 1946 issue of *SHORT WAVE MAGAZINE*. Among those who responded to this was "Fergie" himself. At that time, it was not at all clear how the Club was to be managed, or even whether it would be possible to revive it at all. Because of the war, all records had been lost, and there was not even a copy of the original membership list available.

Since it was quite evident from the general response that there was sufficient interest to warrant the revival of the Club, it became the responsibility of the Editor of *SHORT WAVE MAGAZINE* to suggest procedure. Accordingly, a constitution was drafted, a set of rules formulated, and the extent to which *Magazine* support—stationery, certificates, printing and publicity—could be given was decided. The honorary secretaryship was then offered to G2ZC (though he always said it was pressed upon him!) and in November 1946 the first of a long series of regular F.O.C. notes in *SHORT WAVE MAGAZINE* was published. These continued to appear until December 1951, by which time (it is recorded) "the register shows a total membership of close on 350, spread over 32 countries."

Throughout this long period, the closest personal contact was maintained between G2ZC and the present writer; during the first year or two, so far as any financial support was required, it was provided by the *Magazine*, which at that time also met the cost of all printing. Quite soon, however, the membership grew sufficiently to enable the Club to stand on its own feet, as it does today.

Though the official F.O.C. connection with *SHORT WAVE MAGAZINE* was broken early in 1952, and G2ZC gave up the joint secretaryship shortly afterwards, the association between "Fergie" and the writer continued, until there came a time when, through illness, he was no longer able to attend to the telephone or see visitors. The F.O.C., which by now has a long history, is still imbued by the ideals of its originators—indeed, the rules and con-



Taken just after the war, this photograph conveys very well the kindness and enthusiasm that were the outstanding characteristics of G2ZC, who was licensed and active for more than 30 years.

stitution today remain much as they were drafted by the present writer, in collaboration with G2ZC, more than ten years ago. The F.O.C. is a monument to "Fergie's" integrity and enthusiasm as a radio amateur, and his years of devoted service to the Club. We are glad to offer these lines as a tribute to his memory.

A.J.F.

EXEMPTIONS FROM THE R.A.E.

Readers are reminded that there is a very comprehensive list of exemptions—civil, professional and Service—from the Radio Amateurs' Examination or the Morse Test, or both, in the case of suitably qualified applicants for an amateur transmitting licence. A copy of this list can be obtained by request to: Radio Branch, Radio & Accommodation Dept., Hq. G.P.O., London, E.C.1.

WALL CHARTS — "Principles of Radio"

We are informed by Educational Productions, Ltd., of East Ardsley, Wakefield, Yorks. that their very successful series of three wall charts, produced for E.M.I. Institutes, can be obtained for 10s. post free. These charts, recently re-issued, deal with first principles by means of coloured diagrams. They are eye-catching, easy to follow, and good value for money as an educational aid.

Short Wave Magazine covers the whole field of Amateur Radio

SSB Topics •

TECHNICALIA, ACTIVITY & OPERATING RESULTS

• Conducted by R. L. GLAISHER, G6LX

EVEN in these days of intensive amateur Single-Sideband activity, the ability of low-power SSB to out-perform Double Sideband of much greater power is a never-ending source of wonderment, even to the old-established sidebander. This superiority, which is so marked under poor band conditions, is usually attributed to the increase of effective power which is available when the full power of the transmitter can be directed into one sideband instead of splitting it between the carrier and the two sidebands. In practice, this provides a power increase of 6 dB, and if, in addition, a selective single-sideband receiver is used, a further gain of 3 dB in signal-to-noise ratio is obtained for the system.

This, however, is only part of the story, as it is not generally realised that SSB is relatively unaffected by selective fading. In DSB systems it is necessary to maintain the exact phase relationship between the two sidebands and the carrier, otherwise correct receiver demodulation will not be achieved and distortion and loss of readability will result. This is what happens under conditions of multi-path propagation when phase and amplitude variations cause difficulties due to selective fading.

In the SSB system, only one sideband is transmitted, and variations show up as a flutter or echo on the received signal which cause little or no loss of actual intelligence. This advantage is only apparent when conditions are poor and provides a further power gain which is equivalent to between 2-6 dB of transmitted power.

Thus, under ideal conditions the little "barefoot" 10-watt SSB exciter will "talk" as loudly as an 80-watt A3 transmitter, and, when conditions are poor, it is superior to DSB equipment of nearly twice this rating.

For those interested in learning more about the latest SSB techniques, the *Proceedings of the I.R.E.* (U.S.A.) for December, 1956, is "must" reading. This is a special issue devoted entirely to Single-

Sideband and contains articles dealing with the history and applications of SSB, the design of linear amplifiers, receivers, sideband generators and a mass of other useful information of interest to the sidebander.

Another interesting article, dealing with the application of SSB to Forward Scatter techniques, appeared in the December issue of *Electronics*. Although not strictly in the amateur field, it is very readable and provides an insight to the problems of generating high-power SSB at frequencies around 650 mc. A very interesting comparison is made between SSB and FM under multi-channel multiplex conditions.

VHF Single-Sideband

Following the note in the October "Topics" covering the 144 mc SSB system in use at ZL3AR, a further suggestion has been sent in by W2UOX. After trying the extra mixer stage recommended by ZL3AR, he decided to explore the possibility of using the final 832 in his SCR-522 as a cathode-coupled mixer. He reports that the results are excellent and the modified 522 has ample output to drive an 829B to 300 watts peak power. The circuit is basically as described for the ZL3AR mixer with the 14.3 mc SSB signal fed to the cathode of the 832 through a 500 $\mu\mu\text{F}$ condenser. The cathode of the mixer is returned to earth by means of a normal 2.5 mh RF choke.

Another 144 mc SSB modification to the SCR-522 that is finding favour in the States has been suggested by W5AJG. It is somewhat similar to the W2UOX circuit except that the 14 mc SSB input is fed into the screen circuit *via* a link and tuned circuit. W5AJG points out that it is necessary to apply some cathode bias to the final 832 so as to obtain correct mixer operation. The circuit is shown in Fig. 1. The 14 mc drive is of about 5-watt peak level.

Both these modifications have been tested on the 6J6-5763-832 144 mc exciter at G6LX, and there seems little to choose between them. The W5AJG circuit does, however, appear to require slightly less sideband input for efficient mixing.

Query Department

A mixed bag this month. First, SWL Barnes (London, N.W.3) asks if there is any published information on the B & W series of Miniductors which are often specified in constructional articles published in magazines from the other side of the Atlantic. He adds that it is very frustrating to be confronted with a circuit diagram that lists the coils as: "So many turns of B & W Miniductor-type XYZ," with no clue as to the diameter or turns per

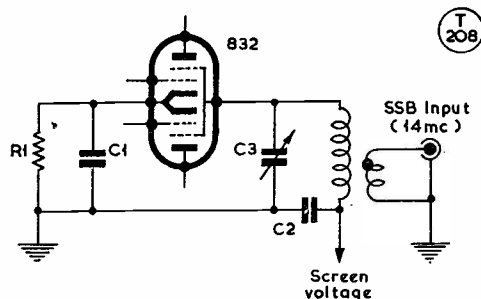


Fig. 1. The W5AJG 144 mc SSB mixer; the tuned circuit is peaked on the 14 mc SSB frequency. Values are: C1, C2 .005 μF ; C3, 50 $\mu\mu\text{F}$; and R1 500-ohm, 10-watt.

inch. This is not really a sideband problem, but as so many sidebanders have run into this difficulty in the past, it seems a good idea to give details of these most useful components. Table I should help.

G3ABJ (West Sussex) and G4IX (Dorset) would like the circuit of the QT-1 anti-trip unit which is supplied as an extra to the Multiphase series of excitors. The circuit is shown in Fig. 2.

Next, G6KI (Birmingham) is confused about the method of power measurement adopted by the G.P.O. for SSB transmitters. He asks how he can be sure that he is not exceeding the permitted power as laid down in his licence.

It is very true that there is considerable confusion on this point, which has not been helped by the various methods described by operators who are as bewildered as the questioner. The procedure used at G6LX (which complies with the G.P.O. requirements) is as follows:—

The transmitter is first adjusted so that the DC input to the final amplifier is exactly 150 watts when a 1000 c/s tone is fed into the audio input circuit. The "Y" input (vertical plates) of an oscilloscope is loosely coupled into the amplifier output circuit by a link, so that the 'scope pattern fills about one-third of the tube face in a vertical direction. With the tone removed and with normal speech input, the 'scope pattern should not be allowed to exceed twice the vertical deflection obtained with the tone input. If there is any sign of limiting on the 'scope pattern under these conditions, the speech level must be reduced to a point where the voice peaks are clean and sharp.

Grounded-Grid Operation

The new Lakeshore Industries GG linear amplifier uses four 6CN6 pentodes in parallel grounded-grid. The 6CN6 is nothing more or less than our old friend the Mullard EL38, which has been re-numbered for sale in the U.S.A. Originally designed as a television line-output valve, Lakeshore use it with 1250 volts on the plates in the now conventional

pentode ground-grid connection (all grids to earth with the drive connected to the cathode). At DL4SV (Munich) a similar final is under test using four EL34's in parallel with 1000 volts. First indications are that results will be excellent, but more drive is needed.

Several readers who have tried the "lazy man's driver" described in the December "Topics" have pointed out that the suppressor grid of the 6AG7 should be returned to earth rather than the cathode, as shown in the circuit diagram. At G6LX a 6L6 was originally used, and when the change to a 6AG7 was made, the suppressor was left tied to the cathode. A subsequent check with the suppressor grounded certainly indicates that it is easier to drive on the higher frequency bands and gives slightly more output.

News and Views

G2DFX is a prospective sidebander who is experiencing difficulty in obtaining suitable close-tolerance components for phase-shift networks. If anyone can help, he can be contacted at The Pharmacy, High Street, Eynsham, Oxon. G8WS (South Croydon) has a new receiver on the stocks which will use cascaded half-lattice crystal filters and selectable sideband switching. G3BFP (Shirley) has been presented with a Collins 250 kc mechanical filter and cannot decide whether to incorporate it in a new receiver or a new sideband generator. What a decision to have to make—pass it this way, OM, and it will be put to good use! In passing, it should be mentioned that the 250 kc filter is as used in the

Table of Values

Fig. 2. The QT-1 Anti-Trip Circuit

C1 = .005 μ F	R4, R5 = 100,000 ohms, $\frac{1}{2}$ w.
C2 = .05 μ F	R6, R7 = 1 megohm, $\frac{1}{2}$ w.
C3 = 0.1 μ F	T1 = Small speaker
R1 = 1 megohm taper	transformer with hi-
R2 = 10,000 ohms, $\frac{1}{2}$ w.	imp. winding on
R3 = 1,000 ohms, $\frac{1}{2}$ w.	grid side.

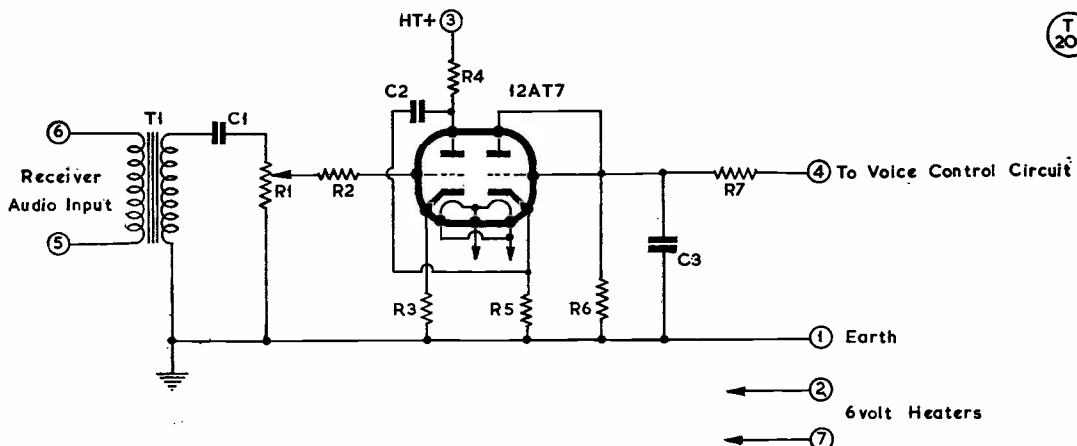


Fig. 2. The QT-1 anti-trip circuit, supplied as an extra in the American Multiphase series of excitors. The numbers 1-7 are the pin connections to go to the octal socket in the Multiphase unit.

Table I
*Details of "Barker and Williamson"
 Miniductors*

(Miniature Inductance Coils)

No.	Dia. inch	Turns per inch
3001	$\frac{1}{2}$ "	4
3002	$\frac{1}{2}$ "	8
3003	$\frac{1}{2}$ "	16
3004	$\frac{1}{2}$ "	32
3005	$\frac{3}{8}$ "	4
3006	$\frac{3}{8}$ "	8
3007	$\frac{3}{8}$ "	16
3008	$\frac{3}{8}$ "	32
3009	$\frac{3}{4}$ "	4
3010	$\frac{3}{4}$ "	8
3011	$\frac{3}{4}$ "	16
3012	$\frac{3}{4}$ "	32
3013	1"	4
3014	1"	8
3015	1"	16
3016	1"	32
3900	2"	8
3907/1	2"	10
3905/1	2 $\frac{1}{2}$ "	6
3906/1	2 $\frac{1}{2}$ "	8

KWS-1 and is much superior to the 455 kc type in respect of skirt selectivity.

G4IX (Parkstone, Dorset) is ex-VS6CX and admits to being the trigger to the sudden surge of SSB activity in Hong Kong. It seems that VS6BJ was first on the air, but then ran into various troubles. The VS6CX-VS6DA combination was on next, closely followed by VS6CW (GW3IVS), and then VS6BE with his KWS-1. G4IX is at present working on a new exciter using miniature techniques. The sideband generator is of the full-lattice type, using nine crystals in the filter and "out of pass-band" rejection circuits. He asks if there is a simple explanation as to why the speech quality in a filter transmitter is de-graded when the carrier is inserted for 100% modulation.

Have you checked 173 kc recently? The "Voice of America" station operating on this frequency is now transmitting "Compatible Single-Sideband"

which, with carrier, allows a peak-power output in excess of 2500 kW! Located in Munich, this station is the highest powered SSB transmitter in the world.

G3GCK is experiencing trouble with his G3GEN exciter and would like to exchange notes with anyone using this type of sideband generator. The address for correspondence is 4 Westwood Street, Peterborough. From Tripoli, 5A2TP points out that his QTH is Box 372, and not as published.

SM5AQW (Uppsala) is the DX contributor to the *SSA Magazine*. After a recent spell of DX chasing on A1, he is now back on SSB and has been co-operating in the SSA sideband project (see December "SSB Topics"). He recommends the PL36 as a good high-level mixer.

ZD4BF, writing from Guernsey in the Channel Isles, is due to return to the Gold Coast (Ghana after March 6) and hopes to be on again later this month. DL2TH paid a flying visit to the U.K. just before Christmas; he is due for promotion and a posting in the near future, but so far has no idea whether it will be home or overseas. Another Christmas visitor to the U.K. was VE3EGO (ex-G3IXL), who spent the holiday with his family in Kent.

W4NQN (Miami) is now using a modified version on 28 mc of the "ZL Special" beam described in the December issue of *SHORT WAVE MAGAZINE*. He passes along the tip that a link-coupled VFO will often provide considerably more output if the link is tuned. He is using a one-turn link parallel tuned with a 400 μ F condenser to increase the injection to his 28 mc sideband exciter.

A relative newcomer to sideband, GM3CIX (Glasgow) is using a phasing exciter driving push-pull 807's. Another newcomer is OZ7DR in Copenhagen; a confirmed CW operator (he says A3 gave him a pain), he is very enthusiastic about SSB and has rebuilt his final for Class-AB2 linear operation.

G3ILD (Darlington) is on 160-metre sideband with an EL84 linear and has been putting a first-class signal into London. G3HAE (Stockton-on-Tees), G3IRP (Morden), G3FHL (Salop), G3BFP (Shirley) and G6LX are also active on the band.

DX Notes

The effectiveness of SSB in crowded band conditions was again demonstrated when the Strategic Air Command of the U.S.A.F. carried out a further global SSB test during the period December 9-17. This, the fourth of the tests, was conducted on a 12,000-mile route that included stops in Paris, London, North Africa, the Azores and the West Indies. The C97 Super-Stratocruiser aircraft was piloted by General Curtiss LeMay, who is himself KØGRL, and amongst the "crew" members were W1AEO, K2AAA, W2KR and W4FB, who came along for the ride.

Two separate SSB installations were used during the test: An Eldico SSB-100A with SSB-1000 linear amplifier, which provided the main amateur interest as K2AAA/Aeronautical Mobile on 14 mc; and a second station having the new general coverage Eldico SSB-100MIL transmitter in conjunction with the

latest Collins R-390A receiver; this latter combination provided communication mainly on the military frequencies.

Although working to a very tight programme, several of the "crew" members managed to fit in quick visits to a few of the sidebanders in the London area.

While on the subject of aeronautical-mobile operation, VQ4EO reports that he is building a transistor SSB exciter which, when complete, will be fitted in his private Auster aircraft; 14 mc operation is planned. Another A/M expedition on the books is scheduled by W4LIB and KØGRL for early March. Big-game hunting in Africa is the excuse, and both fixed and air-mobile operation can be expected, with some activity from at least one new country for sideband.

Present activity on SSB from Africa includes VQ3AC (14 mc), ZE6JB (14 mc), VQ4EO and VQ4EU. VQ5EK and VQ4BP both have transmitters but are held up for lack of suitable crystals for heterodyning to 14 mc. VQ4ERR has a Viking Pacemaker on order and should be heard soon.

During December the Spanish authorities cancelled the Sideband ban, and EAØAC has been joined by EA4BF, EA4CX and EA9AR. Several other Spanish stations are building equipment, and activity is promised from EA6 and EA8.

W6ITH reports that HA5BB had a sideband transmitter ready to go when "events forced him to leave Budapest." He escaped with his family and is in France awaiting permission to go to the U.S.A. Also from the other side of the Curtain we hear that the authorities are encouraging SSB, and several stations have been reported on, including UB5KFG, UF6KA and UAØKBD. All these are "Klubs." Someone has suggested that the latter station is using a KWS-1 left over from one of Art Collins' A/M trips!

From Formosa one of the BV1US stations has changed to SSB and has been reported on 14163 and 21198 kc crystal controlled. G3ILD reports that he is active every Monday, Wednesday and Friday afternoon, 1400 GMT, and is looking for Europeans on his own frequency. W9MOW visited VU2RX in Bombay and left him a 20A exciter. W6KUY/MM (s.s. *Pacific Transport*) tried to deliver a sideband transmitter to DU7SV, but the Customs there refused him permission to take the equipment ashore. He is due to return to the Philippines this month and now has the correct papers.

ZL3IA is looking for G/SSB contacts on 28650 kc every Sunday morning. KX6BU is hoping for Europeans on 15-metre SSB and can be found on the high end around 1000 GMT. KM6AX is on 75-metre sideband with a converted BC-610; he is building a high-level mixer for 14 mc operation and should be on soon. VR2CG is now back in New Zealand and is working G's with 8 watts peak to a curtain rod aerial on 14 mc; his new call is ZL3DX. Old Timer ZL3LE has converted to SSB and is on 15 and 20 metres.

KA7EG is on 28490 kc and JA1AEA on 7100 kc. In recent weeks both these sidebanders have worked

SSB COUNTRIES-WORKED LADDER

(Starting Date January 1st, 1954 — Two-Way SSB Only)

STATION	3.5	7	14	21	28	Total
K2DW	0	0	65	0	0	65
W3ZP	0	0	65	0	0	65
DL4SV	17	0	56	6	0	61
VE4NI	0	0	61	0	0	61
ZL3PJ	0	0	61	0	0	61
ZS6KD	0	0	60	10	5	61
G6LX	16	3	55	44	9	60
VK3AEE	0	0	60	0	0	60
G3MY	16	0	53	7	0	57
OH20J	0	0	54	0	0	54
ZL3IA	0	0	50	12	6	52
G3BXI	0	0	46	43	2	50
HR2WC	0	0	45	37	0	50
G3GKF	0	0	1	47	1	47
G3A00	0	0	46	0	0	46
DL2TH	10	0	43	17	2	46
OZ3EA	0	0	45	0	0	45
GW3EHN	5	0	45	2	2	45
AP2BP	0	0	44	3	0	44
VQ4EO	0	0	41	20	5	41
G3AUB	13	2	36	0	0	39
G3GKG	9	0	29	0	2	34
GW2DUR	4	0	34	0	0	34
G3BFP	11	0	21	15	0	32
GM3CIX	5	0	31	0	0	31

Five-band scores only included. Corrected to January 6, 1957.

into Europe. DL4SV reports that YA1AA has a sideband rig and will be on soon.

Recent newcomers to Sideband include CN8MM, HP1EH, HR1EZ, TF2WOK, TG9AD, VE6EN, VK6MK, VP7NQ, VP9HH, YU1AD, XE2JK and ZD4CF.

Information for these notes was provided by: K2DW (*CQ Magazine*), DL4SV, G3BFP, G3GKF, G3MY, G3ILD, VE3EGO, VE4NI, VQ4EO, W2KR, W4NQN, W6ITH, K6GMA, ZL3IA, ZD4BF, KH6EM, and SWL's Amie, Leslie and Williamson. Our thanks to them all.

It is too early for any comment to appear here on the January SSB Contest, but we shall be very glad to hear of the results and experiences of those who took part in this first event of its kind.

Next appearance of this piece will be in the April issue, for which we hope to have your news, views and comments by February 28, addressed "SSB Topics," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

INDEX TO VOLUME XIV

This will be a free loose supplement with the March issue of *Short Wave Magazine*, which starts Vol. XV. As in previous years, the Index will be fully cross-referenced.

WERE you there on the evening of January 21, when we had one of the most remarkable manifestations ever experienced on the two-metre band? There was a wonderful display of Aurora Borealis, or "Northern Lights," visible right down into the Midlands, during that evening, and, as the papers put it next day, "reception of TV signals was seriously affected."

This was sufficient to alert many of the VHF fraternity so that, fortunately, there was a very fair level of activity and enough two-metre stations on throughout the U.K. and Northern Europe for the effect of the display to be pretty fully investigated.

The point of particular interest is that this is the first time that it has been possible to relate two-metre propagation results, over a wide area, directly with Aurora Borealis on the grand scale. Its influence and effect have been suspected on previous occasions, but not definitely proved (on two metres), either because activity was too low or the Lights themselves not of any great degree of intensity. Of course, old hands on the VHF bands know all about results on five metres during these displays—and, indeed, the effect and the reasons for it were first propounded in these columns as long ago as April 1947. It was said then "... an Aurora Opening amounts to the appearance, electrically speaking, of a very effective reflecting curtain in the Far North . . . contacts made and stations heard with beams north-west, instead of on the true bearing . . . all operators reported the band [five metres] noisy from the north . . . outstanding characteristic of the phenomenon was the fact that all signals went fuzzy . . . usual T9 notes came down to a rusty T5 or even T3 . . . due to distortion and multipath interference caused by a high degree of scatter . . . when this peculiar condition is evident, as shown by pronounced noise and dirty notes, aim the beam in that direction."

That was written nearly ten years ago and (so far as anyone has been able to trace) was the first explanation of the effects of

VHF BANDS

A. J. DEVON

Aurora Opening, January 21—
Characteristic Propagation
Phenomena—
Good DX Over a Wide Area—
General Results, and
Current Comment—

the Aurora Borealis on VHF. The same result was repeated on many subsequent occasions.

Coming right down to January 21, 1957, they were the effects you would have found on two metres during the period approximately 2100 to 2245 GMT. Apart from our own observations at the time, followers of this piece have given enough information to enable quite a clear picture to be built up of what actually happened, during that rather short period.

Results and Observations

The two-metre band was quietly normal until about 2100, when those who were on began to notice that phone signals sounded odd and CW signals not T9. Then the band appeared suddenly to be full of signals, all at great strength but with very rough CW notes and almost unreadable phone—all the stations operating at the time, over all the U.K., suddenly became audible to one another, in many instances being a first hearing. The difficulty was to work them! (Incidentally, this proves the point about the level of activity so frequently

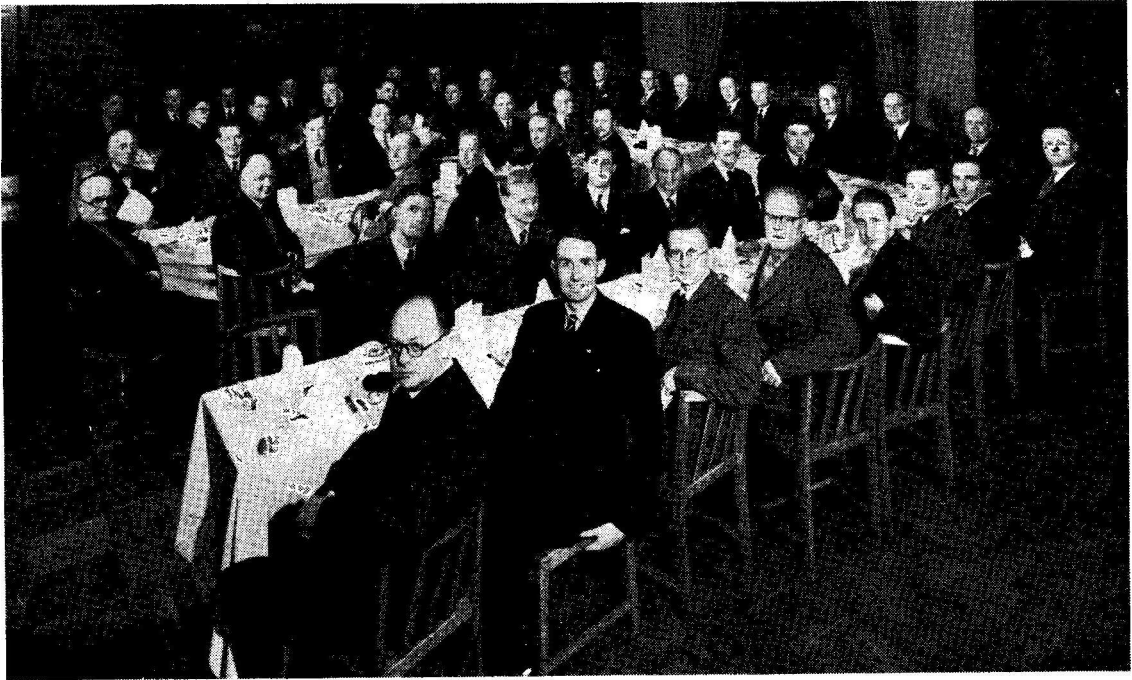
made in this column: that there are always stations on, even if the band sounds dead.)

There was a high level of noise from the north, and those who had the clue, heading their beams north-west (the actual best direction) found that all signals, including even semi-locals, were coming in much more strongly from that direction than on the true heading. For instance, with G3KHA (Bristol), ON4BZ in Brussels was nearly T9 on his proper bearing, but with the G3KHA beam north-west he was T1, or worse, though very much stronger. DL3YBA (Hanover) was on, working G's quite easily with beams north-west, and giving a T7 note; he disappeared with magical suddenness at about 2240. One of the best DX contacts reported was DL3YBA with GW8UH in Cardiff. GM6KH was RST-557 with G3JHM right down in Worthing. At just about the same time, 2235, ON4BZ was getting, for a few minutes, an S9 signal with a very rusty tone from GM6KH. By 2245, Guy reports, the band was back to normal again at ON4BZ; he likens the tone of the DX signals heard to "steam loss in an old locomotive"! As good a description as any of the T-quality of all signals on the long, *i.e.* north-westerly, path.

As can be imagined, during the opening, which was effectively not more than an hour and a half's duration, a great number of quick contacts were made, but not all were worked to a conclusion—a station was called, came back, but perhaps was not heard again. What with listening to what was going on, and trying to make contacts, with everyone excited and in something of a hurry, there was a certain amount of confusion—but no doubt about the results or what was happening.

It was, of course, a tremendous experience for those who had never been in on an Aurora Opening before, and of intense interest to anyone who, having had five-metre experience and knowing what it was all about, was able to make full use of the opening.

Probably, due to the very short period between this remarkable



The London VHF Dinner on January 11 attracted an attendance of nearly 50, including some well-known VHF personalities. G5BD is fourth from the left nearest camera, and G3FZL 6th from left. G2FKZ is on the left in the second row, and G5CD second from right at the top table. On his right is G5KW who won the IARU VHF Contest; G3HBW, third from the left in the front row, was second in this event. At the far end of the top table are G2UJ and G2AIW. The dinner was organised by G4KD, and Dr. Smith-Rose of the National Physical Laboratory was the guest of the evening.

occurrence and our dead-line for this issue, we have not yet had all the reports that could have been made. We hope, therefore, that these will come through in time for the next issue, so that all the detail can be correlated. It is, indeed, very important that this should be done, because a practical result of this sort has an obvious bearing on the researches being conducted in connection with the International Geophysical Year. Only amateurs, by reason of their numbers and their "spread," can produce experimental proofs of this kind.

And let it never be said that "VHF is dead in the winter"! This Aurora Opening is only the beginning. There will be more displays of Northern Lights. The checks are quite easy, even if you never see the ethereal and quite terrifying Aurora glow, with its streamers of coloured light shooting hundreds of miles into the upper atmosphere—if you are watching TV, the picture will become distorted, with bad interference effects, and you will find

the two-metre band very noisy on a north-westerly beam heading.

The Period in General

Apart from January 21, VHF conditions were quite good during the three previous days. Several new stations have appeared during the month, and there was a very reasonable level of activity (considering all things) on both VHF bands.

The usual run-of-the-mill contacts have continued, with groups of stations working out their own particular problems while keeping an eye on conditions. G3LHA (Coventry) is now organised with /P equipment, all the gear, Tx and Rx, being built into an ASB8 case 13 ins. by 6 ins. by 5 ins. and weighing about 10 lbs. all up. Operating from Hillmorton, near Rugby, early in January, he worked or heard about a score of stations, including PE1PL. On the home front, the G3LHA problem is TVI; this is being countered by modifications to the transmitter.

G2CIW (Cambridge) has rebuilt the front end of his AR77 to

incorporate 6CB6 RF and 6U8 mixer-oscillator, the receiver being intended to cover only 24 to 30 mc, purely to accommodate VHF converters; one result is a noticeable improvement on 70 cm. G3KHA was glad to have a solid phone contact with G3LHA, and mentions G3GZO and GW3HAW as new stations heard. G3GSO (Derby) reports two more for the All-Time, and G3DLU (Sheffield) says his version of the YU1AD converter (described in our December issue) is very promising. G3DLU asks why, in the coil data, "we were not given the dimensions for L6 and L8?" The answer is that they depend upon the IF chosen! For 8 mc, he finds L6 should have about 45 turns on a ½-in. dust-iron cored former; as regards the coupling between L1 and L2 (another point that has been raised) this should be for "best results"—if necessary, make the whole L1, L2 circuit resonant.

SWL's Smith (Hoxne, Suffolk) and Stokes (Ruislip) both report; the former heard only five different

stations in the month to January 19—he says that even the aircraft have not been so numerous! On the other hand, SWL Stokes, using an R.1392A receiver, logged 30S between December 17 and January 17, mainly in the London and Home Counties area. The Monday “activity nights”—an idea first suggested in this space some years ago, and effective in promoting activity when they were started—are certainly bringing stations on in the London area. The great drawback of a scheduled “activity period” (as we used to call them) is that an opening might be missed if it happens not to fall on an “activity night” (which it practically never does!). On the other hand, *anything* that brings stations on is obviously a good thing, and we are not in any way disparaging the London area’s Monday effort. And Monday, January 21, was certainly a very lucky break for all concerned!

G3HBW (Bushey) has been running, for some time now, a regular 70 cm schedule with G5BD (Mablethorpe), a distance of 122 miles, or “4½ times optical.” The tabulated results, for the period December 11 to January 20, are most illuminating. What it comes to is that G3HBW’s 70-centimetre phone is R5 most of the time, with a maximum signal level of S9, and when they cannot get through on phone, G3HBW is readable on CW, his worst report in that period being RST-429. G3HBW/G5BD check on two metres, and then change over to Seventycems, their time being 8.30 p.m. (nearly every evening) and frequencies: G3HBW, 144.89, 434.67 mc; G5BD, 144.41, 435.52 mc. Here, therefore, is a regular schedule on both bands, over a very good distance, which can be followed by anyone along the path.

The point G3HBW makes is that these results prove it is quite possible to work over reasonable distances consistently, *provided good gear is used*; this also means using reasonable power. Arnold has what he says is “an honest 60w. of RF” on 430 mc. He thinks that the main propagation mechanism must be tropospheric scatter—if so, more power

would increase signal level and improve consistency. Note that all these comments apply to 70 centimetres. On two metres, the G3HBW-G5BD path is good for S9+ phone both ways at almost any time.

G3JHM (Worthing) will soon be on all four bands, as he is installing gear for 4 metres, using “a special SCR-522 tuning 65-95 mc.” His 23 cm gear is with G3GDR for the time being. Of course, G3GDR - G3JHM also work 70 cm together, in a direction opposite to G3HBW-G5BD, but over what is probably a more difficult path, even though the distance is shorter.

Efficiencies at UHF

Discussion about the right frequency area to use on the 23-centimetre band continues—though the matter is, naturally, regarded as settled by those who have established themselves in the area they happen to favour!

A useful and very interesting contribution to this controversy is now made by G3JHM; arising from the comments here on the efficiency factor, he has carried out some tests with a DET-24 on 1200 and 1300 mc. His finding is that the falling-off in RF output by reason of the difference in frequency is only about 10%. G3JHM asks “Is this worth bothering about?” On the face of it, probably not. All the London stations have agreed to use 1296-1300 mc, so the South Coast people will conform. Well, right or wrong, it is a decision, and it remains now to see what other 23-cm operators have to say about it. G3JHM remarks that he is in full agreement with the comments attributed to G3HBW in this space last month.

Of course, what now complicates the matter a little is that the extension of the band to 1325 mc makes straight trebling from 430 mc a practical proposition.

Four-Metre Notes

We were very glad to hear from EI2W (Dublin) that the EI’s are now being licensed for the band 70.575 to 70.775 mc, by special application individually. Henry has the first ticket, with a certified

crystal frequency of 70.662 mc, and should be on by the time this appears in print; he will be there 0730-0830 GMT daily and in the evening whenever the possibilities look promising. Incidentally, the ZE’s are now licensed for 70.2-70.4 mc (same band as ours). As it is probable that there will be DX openings north-south before they occur east-west—on the analogy of the early 50 mc results with South Africa—it is much to be hoped that there will actually be ZE 4-metre activity.

Further investigation of the Trans-Atlantic possibilities on 4 metres discloses that our 70.3 mc spot frequency falls right in the American TV Channel 4, which is 66-72 mc, with vision on 67.25 and sound on 71.75 mc. This immediately poses a serious interference problem for the W/VE’s—unless it happens that Ch.4 is quiet in the Eastern United States during their mornings (this we do not at the moment know). In any event, the W/VE’s have been alerted as to U.K. interest in this new band, and, over here, we now know that there is American TV sound to be heard on 71.75 mc, as a possible check on conditions, in the same way that American stations are receiving our TV on the U.K. Channel 2. All very confusing—it looks as if it will be the BBC and the NBC who will get the first cross-band 50/70 mc QSO—on TV!

And as if to underline the potentialities of 70 mc, we have had reports that high-power European phones on 21 mc are being heard in this country on the *fourth harmonic*, around 85 mc. At such a time, the 4-metre band would obviously be wide open for an F/G contact 72/70 mc. (One really needs a general-coverage VHF receiver to keep in touch with all the possibilities!)

In Conclusion

And that is it for this month’s offering—short but, in its way, one of the most important and interesting reports ever presented in “VHF Bands.” Even if there is not another Aurora Opening before **February 20**, send in all your *gen* by that date to: A. J. Devon, *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

High Performance Converter for the 23-Centimetre Band

FULL CONSTRUCTIONAL DESIGN

Part I

A. L. MYNETT, B.Sc. (G3HBW)

It is probably true to say that, from the amateur if not from the professional view-point, the 1250 mc band is in that "twilight zone" where recognised VHF techniques, applicable to 144 and 430 mc, have to be discarded so far as the RF side is concerned. Our 23-centimetre band is, therefore, of great interest because it offers considerable scope not only for experiment as regards the gear, but also for the investigation of its propagation characteristics. The author of this article is a well-known exponent of the art of VHF and has himself made a large contribution to developing the 1250 mc band, both as a designer and an active and capable operator—that unique combination which is found almost only among competent radio amateurs. His article—to appear in three parts—will be of great interest to all VHF workers, because it offers a 23 cm receiving unit of proved performance. But, in the nature of things, construction is not easy, since it calls for both VHF know-how and mechanical aptitude. At the same time, sufficient constructional detail is being given to enable the mechanical side to be worked up in collaboration with anyone who has the average model engineer's workshop facilities.—Editor.

THIS converter was designed to meet the need for an effective receiver "front-end" for the twenty-three centimetre band.

It cannot be claimed that it is a particularly easily constructed piece of gear but, nevertheless, it should be capable of producing just about the best performance obtainable on the band until valves capable of being used efficiently in RF stages become readily available.

When the initial attempts at designing a receiver for 23 cm were made, it was decided to employ the usual superhet converter-communications receiver arrangement which had proved so satisfactory on the lower VHF

bands. It seems unnecessary labour to build a complete receiver, because a communications receiver is such an excellent IF and AF unit, especially if it contains refinements like an effective noise limiter and a crystal filter.

As has already been mentioned, suitable valves for use in an RF stage are not at present generally available for the actual frequency-range to be covered by this converter (though they are made, as "specials"). The all-important input circuit is, therefore, a crystal mixer, in a coaxial circuit. Local-oscillator injection is from a crystal oscillator and frequency multiplier chain, as used on the lower frequency bands. The mixer feeds a conventional IF head amplifier, arranged to give the lowest possible noise factor and to make this more or less independent of the performance of the main receiver.

A mains-operated power pack is also built into the equipment.

General Arrangement of the Converter

It can be seen from the photograph that the converter consists of two sub-chassis mounted inside a main chassis so that their top surfaces are against the underside of the main chassis (Fig. 1). One sub-chassis contains the entire local oscillator (Fig. 2), whilst the other serves to house the IF head amplifier and mixer assembly (Fig. 3).

The power supply unit is accommodated in the space remaining on the main chassis. Two large rectangular openings are cut in the top of the latter, each a little smaller than the respective sub-chassis, to allow these to be bolted to it, using short 6BA brass screws passing through clearance holes in the main chassis and into tapped holes in each sub-chassis.

The mains transformer is mounted on top of the chassis; all other components pertaining to the power-pack, including the two contact-cooled metal rectifiers, are inside. The mains input socket is at the rear of the main chassis and two toggle switches at the front serve to switch the mains input and the converter HT respectively. A rectangular slot is made on the front of the chassis, through which the aerial-matching stub protrudes and is enabled to slide up and down. Aerial input and IF output Belling-Lee sockets are mounted together on the side of the main chassis.

Note that the holes for mounting the mains transformer and smoothing choke have not been detailed in the drilling plan (Fig. 1), as the position and size of these will obviously depend upon the particular component used.

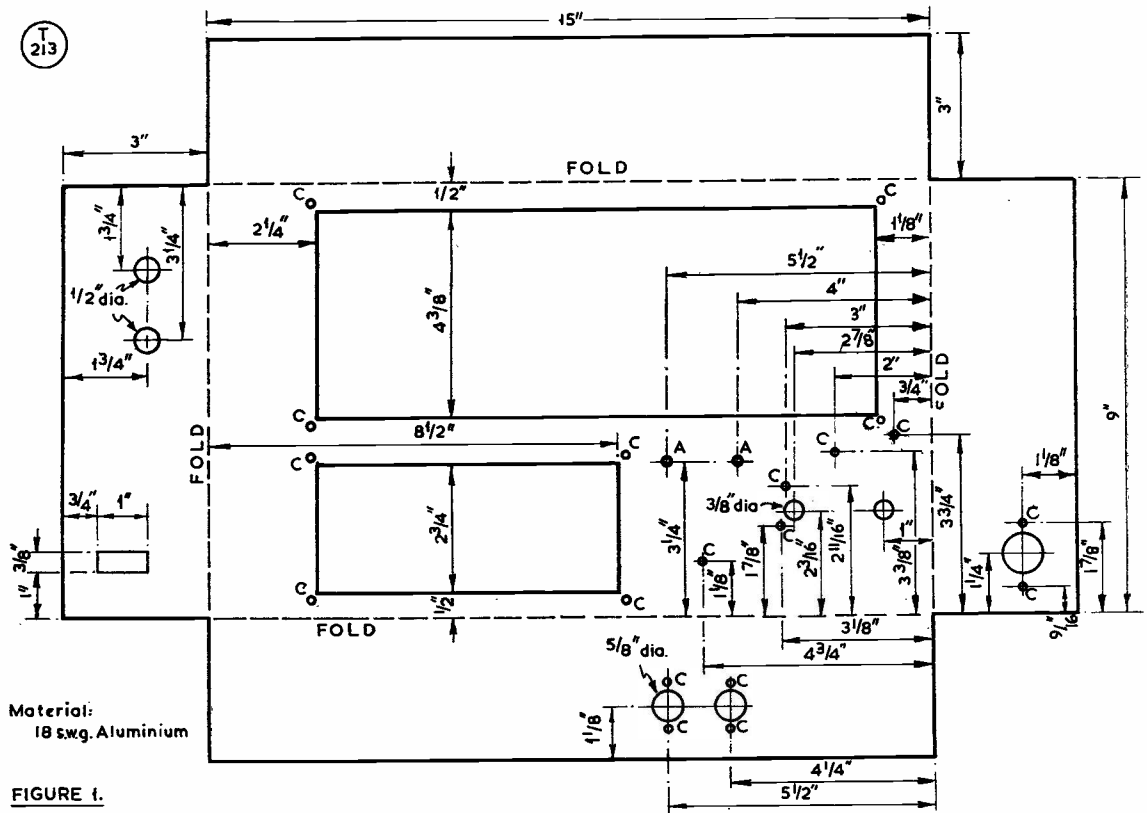


Fig. 1. Dimensioned drilling plan for the main chassis of the 23-centimetre converter designed and described by G3HBW in the accompanying article.

Drilling Key to Figs. 1, 2 and 3

- "A" — No. 11 drill, (2BA clear).
- "B" — No. 26 " (4BA clear).
- "C" — No. 32 " (6BA clear).
- "D" — No. 42 " (8BA clear).

NOTE: All distances measured from side of chassis where not otherwise indicated.

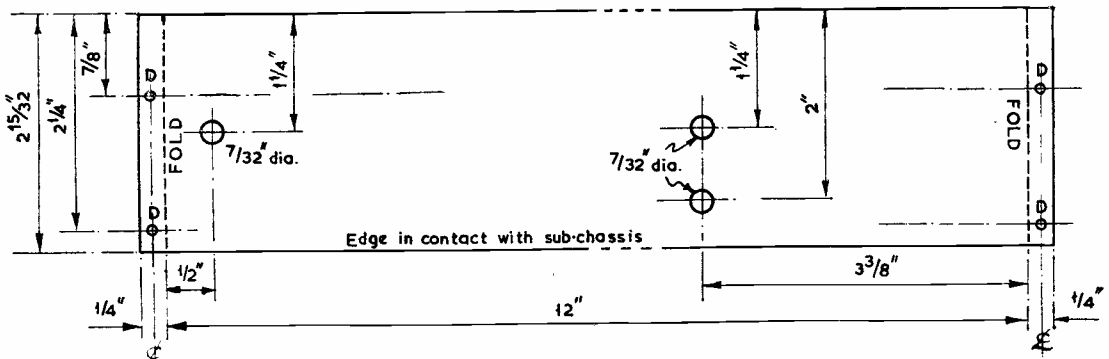


Fig. 2B. Construction of the internal screen and cover for the local oscillator sub-chassis. This drawing should be read with Fig. 2A.

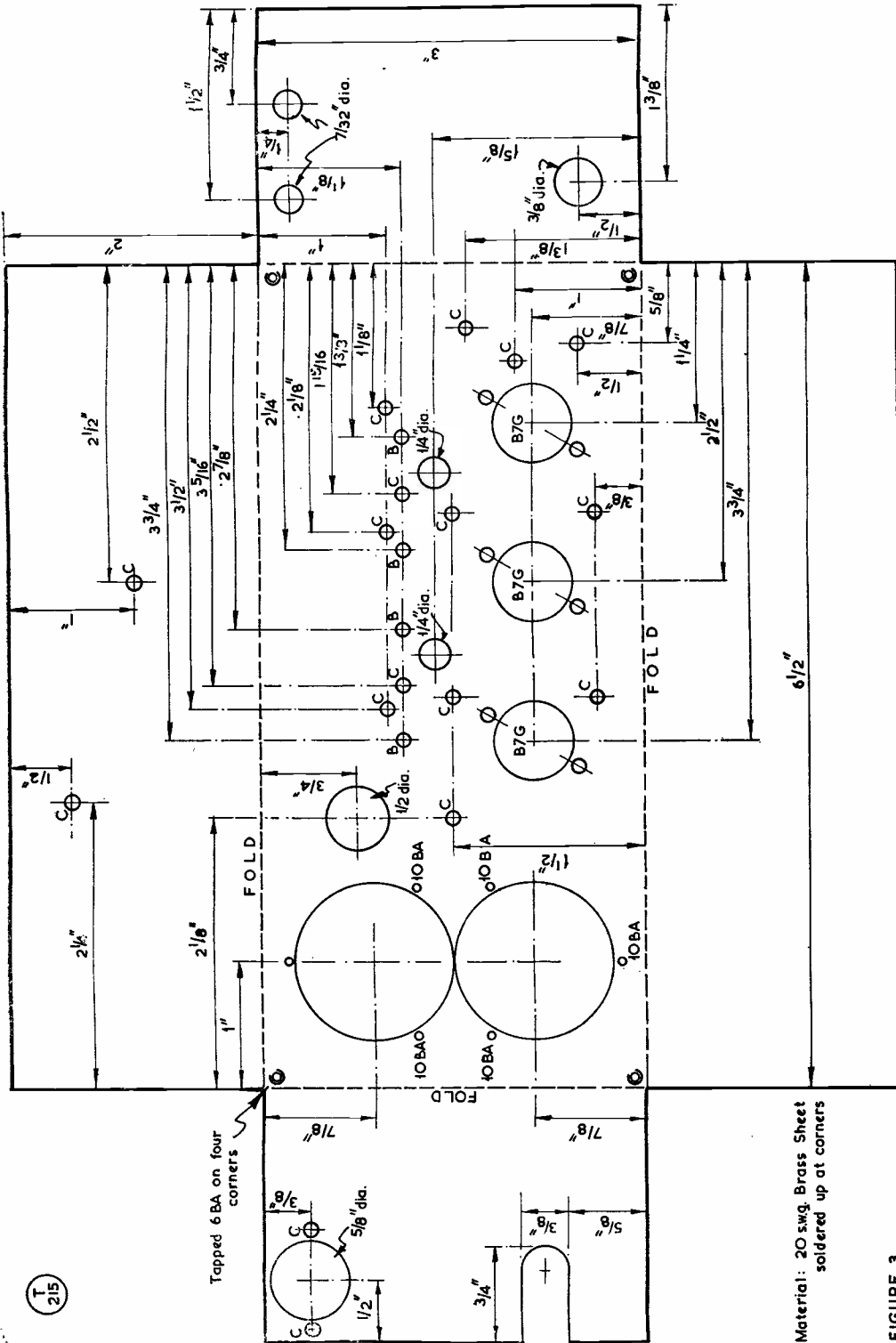


Fig. 3. Mixer and IF amplifier sub-chassis drilling detail for the G3HBW 1250 mc converter described in the article.

The Local Oscillator

It was decided to use a first IF in the region of 30 mc so that the separation between signal and oscillator frequencies would be sufficiently great. The final local oscillator frequency, therefore, must be near 1270 mc, if the most-used portion of the 23 cm band, *i.e.*, 1296 to 1300 mc, is to be covered. However, any other local oscillator frequency, within reason, can be produced merely by using a different crystal frequency from that suggested. If, for instance, it is desired to work lower in frequency—around 1260 mc, or perhaps to take advantage of the recent extension of the band, from 1300 to 1325 mc—this can easily be accomplished, as all the tuned circuits in the unit should cover the required frequencies.

For the purpose of this discussion, the final output frequency will be taken as 1269 mc in order that the band 1296 to 1300 mc can be tuned with an IF of 27 to 31 mc on the main receiver.

The complete oscillator unit comprises the crystal oscillator and a chain of four multiplier stages (Fig. 4).

The first stage goes off on 35.25 mc using an overtone circuit, either with a crystal the

TABLE I

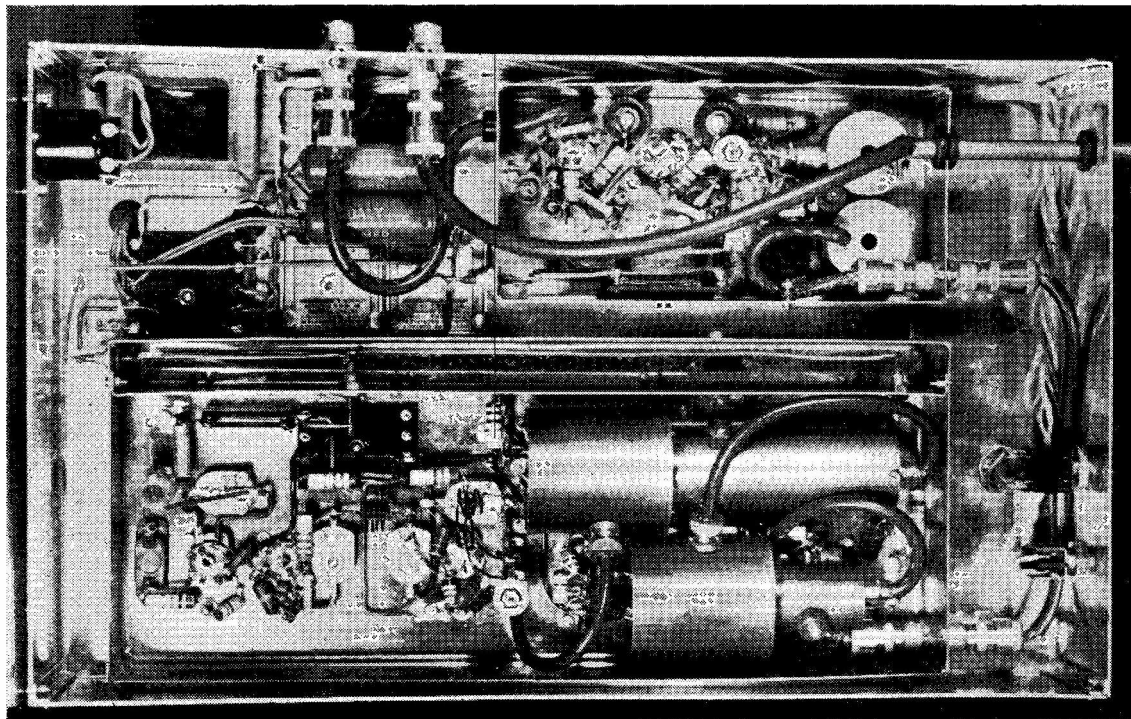
COIL DATA

(The Oscillator Chain)

- L1 = 11 turns, 30 SWG DCC, close wound on $\frac{1}{2}$ in. polystyrene former, unslugged. Tapped 5 turns up from grid end—*see* text.
- L2 = 5 turns, 18 SWG enam., $\frac{1}{2}$ in. dia., $\frac{3}{8}$ in. long, self supporting, turns spaced evenly, tapped $1\frac{1}{2}$ turns from V3 grid end.
- L3 = $3\frac{1}{2}$ turns, 18 SWG enam., $\frac{3}{8}$ in. dia., $\frac{3}{4}$ in. long, self supporting, turns spaced evenly, centre tapped.
- L4 = Link, 2 turns, 18 SWG enam., $\frac{5}{16}$ in. dia., close wound, tightly coupled into centre of L3.

fundamental of which is around 7.05 mc (operating on its fifth overtone) or else one near 11.75 mc, on its third overtone. The valve is a 6C4 in the well-known Squier circuit, although one-half of a 6J6 could probably be substituted with some slight gain in output and frequency stability, especially with a poor crystal. This latter should preferably be in a holder of the FT243 type.

The oscillator coil, L1, is wound on a modified half - inch diameter polystyrene former. The type specified in the parts list is ribbed and also has two longitudinal ridges,



Construction underside of the G3HBW converter for 23 centimetres. The GL446A cavities are lower right. A unit form of assembly has been adopted, each item being constructed separately and fitted to the main chassis.

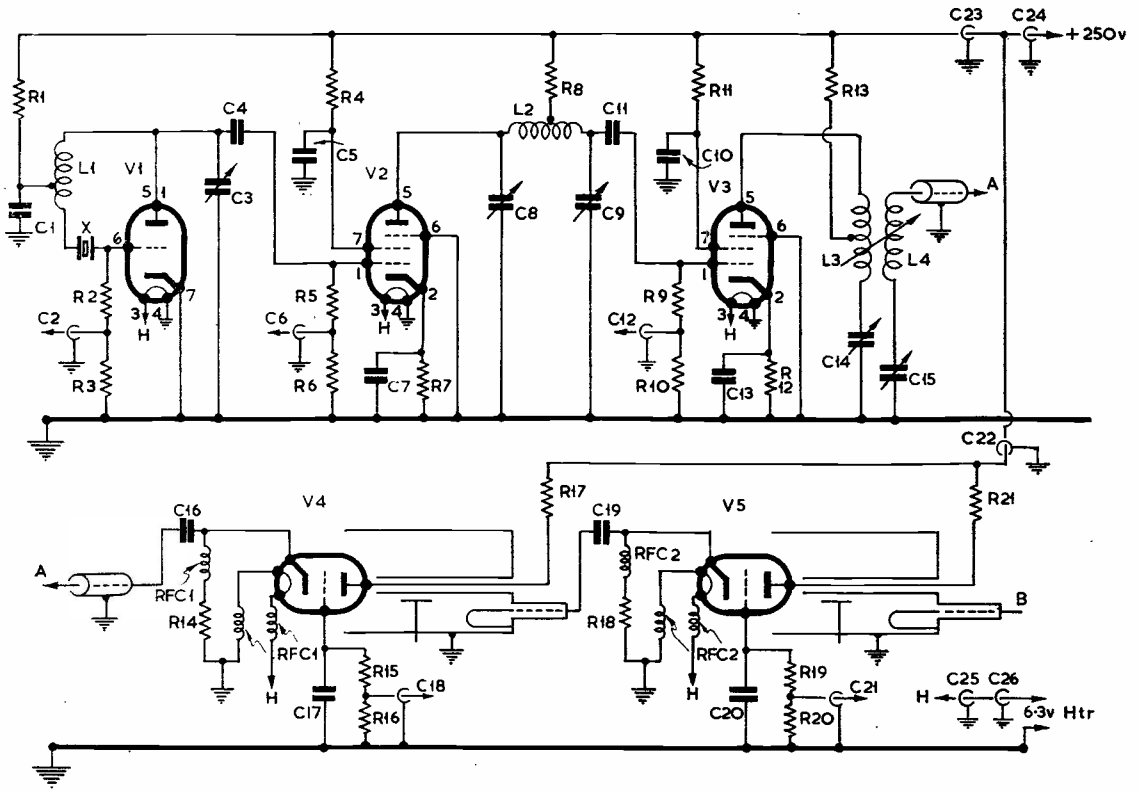
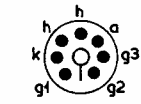


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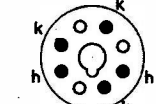
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V1 : 6C4



V2-V3 : Z77



V4-V5 : 446A

Fig. 4. Circuit of the oscillator chain in G3HBW's 23 centimetre converter ; all values are given in the table.

having holes bored along their lengths to permit anchoring of the wire. These ridges must be almost completely filed away, leaving only two holes at each end, per ridge. At the same time, the ribbing should be removed. The same treatment is applied to the formers for the IF head-amplifier coils, L5, L6, L7, L8 (Fig. 12 in a later part).

No iron-dust core is required in the oscillator coil former.

Pentodes are used in the early multiplier stages, in preference to triodes, such as the 6J6 and 12AT7, even though these would contribute some saving in space, as the pentodes drive-saturate better and give a larger output, which is all required to excite the last two stages correctly.

The first multiplier is a Z77 trebling to 105.75 mc, its anode being pi-coupled into the grid of a second Z77 as a doubler to 211.5 mc.

Table of Values

Fig. 4. Circuit of Oscillator Chain

C1 = .01 μ F Dubilier Mincap working	R2 = 10,000 ohms, $\frac{1}{2}$ w.
C2, C6, C12, C18, C21, C22, C23, C24, C25, C26 = .001 μ F feed-through capacitors	R3, R6, R10, R16 = 500 ohms, $\frac{1}{2}$ w.
C3, C8, C9 = 25 μ F air trimmer Ingersoll type 134	R20 = 33,000 ohms, $\frac{1}{2}$ w.
C4 = 30 μ F ceramic	R4 = 100,000 ohms, $\frac{1}{2}$ w.
C5, C10, C11 = 100 μ F ceramic	R5 = 220 ohms, $\frac{1}{2}$ w.
C7, C13 = .001 μ F ceramic	R7, R8, R12 = 6,800 ohms, $\frac{1}{2}$ w.
C14 = As C3 etc. but 2 of 4 moving vanes removed	R9 = 56,000 ohms, $\frac{1}{2}$ w.
C15 = 2 to 8 μ F Philips trimmer	R11, R19 = 22,000 ohms, $\frac{1}{2}$ w.
C16, C19 = Valve internal capacitance	R14 = 100 ohms, $\frac{1}{2}$ w.
C17, C20 = Part of circuit	R15 = 47,000 ohms, $\frac{1}{2}$ w.
R1 = 15,000 ohms, 6w. Welwyn vitreous	R17, R21 = 47,000 ohms, $\frac{1}{2}$ w.
	R18 = 22 ohms, $\frac{1}{2}$ w.
	RFC1 = 20 turns, 22 SWG enam., $\frac{1}{2}$ in. dia., $\frac{1}{2}$ in. long, self-supporting
	RFC2 = 11 turns, 18 SWG enam., $\frac{1}{2}$ in. dia., $\frac{1}{2}$ in. long self-supporting
	Xtal = see text
	V1 = 6C4 or $\frac{1}{2}$ 6J6
	V2, V3 = Z77 (EF91)
	V4, V5 = 446A

The output circuit at this frequency consists of a coil and a condenser in series, the coil having an earthy mid point, at RF.

The output is coupled into a short length of 72 ohm $\frac{1}{4}$ in. dia. co-ax. *via* a series-tuned link.

Miniature 25 $\mu\mu$ F air-dielectric trimmers are used to tune these coil and condenser circuits. They are mounted, inverted, on $\frac{1}{4}$ in. lengths of 3/16in. o/d, 5/32in. i/d brass tubing, by means of 6BA brass screws and nuts, so that the trimmers just clear the chassis. Quarter-inch holes are drilled in the latter to permit screwdriver adjustment of the trimmers from above.

The next two stages use disc-seal triodes, 446A's in grounded-grid coaxial circuits, cathode-driven. It has been found very difficult, up to the present, to obtain efficient operation of these later stages when using conventional pin-based valves, like the 6AF4 and 6AM4, although a great deal of work has been, and is being, done by several designers along these lines. It seems particularly difficult to obtain sufficient drive from the penultimate stage. The writer makes no apology, therefore, for suggest-

ing the use of disc-seal valves, at least until these problems have been solved.

The two coaxial circuits are very similar to one another. The anode-grid circuit of each stage is a coaxial line tuned by a capacity-disc. A similar tuned input circuit between cathode and grid is not very effective as it is shunted by the low input-impedance of the valve and it becomes very difficult to couple power into it. A far better arrangement is merely to attach the inner conductor of the driving coaxial cable to the cathode and the outer to the grid. It is convenient to do this in the case of the 446A as the cathode itself is coupled, *via* a capacitance inside the valve envelope, to an external metal shell, thus avoiding the need for external blocking condensers to prevent shorting out the bias. However, a grid-blocking condenser is still needed to allow grid-leak biasing to be used in addition to "fixed" cathode bias. Supply connections to the heater and cathode are brought out to a standard international octal base.

(To be continued)

R. F. G. THURLOW, G3WW

Elected this year's President of the Cambridge and District Law Society, Richard Thurlow has been Clerk of the Peace and Clerk of the Isle of Ely, County Council since 1935, and has also been Under-Sheriff for Cambridgeshire and Huntingdonshire every third year since 1937. Though his callsign dates from 1938, G3WW first became interested in Amateur Radio as long ago as 1922, and was building crystal sets at school (St. John's, Leatherhead) as early as 1919. The local station in those days was Croydon Airport! A son of the manse at Widford, Nr. Chelmsford, during the school holidays he was able to visit Capt. Eckersley at Writtle; this was before 2MT, of blessed memory, came on the air with a "regular programme." Post-war activity, after a spell on the DX bands, has been mainly on five and then two metres, on which G3WW is one of our best-known callsigns. At the present time, he can be heard on Ten, Fifteen and Top Band mobile as well as on VHF. Richard Thurlow is married, with a grown-up family, and now operates from Wimblington, Nr. March in Cambridgeshire.

CALL BOOK — WINTER EDITION

No. 4 of Vol. 34 of the *Radio Amateur Call Book* is now available for immediate delivery by our Publications Dept. This is the latest (Winter) edition and totals no less than 576 pages, of which nearly 400 are devoted to the American amateur listings alone. The G-section runs to some 23 pages and includes all new QTH's and changes of address published in our "New QTH" feature up to and

including the October 1956 issue of *Short Wave Magazine*. As usual, the *Call Book* is available in two editions, Complete and Abridged, the latter omitting only the Americans but covering the whole of the rest of the world from AC3 to 9S4. There are also the usual data and general-information pages, which are included in both editions.

It is interesting to compare the present issue with that dated Summer 1939, which was the last to appear in this country before the war. That edition had only 288 pages, of which the American lists absorbed 203 pages; the G-section ran only to 11 pages of actual full radiating callsigns. These figures show clearly the enormous development there has been in Amateur Radio all over the world in the eleven years since the end of the war.

Radio Amateur Call Book, Full Edition, price 37s. 6d.; Abridged, 17s. 9d. Both post free, of the Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

RADIO AMATEURS' EXAMINATION— May, 1957

Readers taking the next R.A.E. are reminded that their entry should go forward before the end of this month. Application to sit the Examination must be made through the candidate's school, local technical college or education authority. Quote Subject No. 55, City & Guilds. The fee for the Examination, which takes place on May 10, is 20s. In *exceptional* cases late entries can be accepted until March 19, at an extra 5s. Entries made after this, if accepted, will be charged an additional 20s. So be on time!

NEW QTH's

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

- G3IXI**, K. H. Landon (*ex-4S7KH*), 3 The Green, H.M. W/T Station, Flowerdown, Winchester, Hants.
- G3JBR**, D. P. Tipper, 23 Northstead Manor Drive, Scarborough, Yorkshire.
- G3JVD**, A. W. Hunter, 28 Cedar Grove, Redcar-by-Sea, Yorkshire.
- G3KIW**, G. W. Jenner, Albacot, Loudwater Lane, Rickmansworth, Herts.
- G3KVF**, V. A. Frisbee, 17 Delacourt Road, Blackheath, London, S.E.3.
- G3KVM**, P. R. Cavanagh, 136 Duchess Road, Sheffield, 2, Yorkshire.
- G3LDD**, W. E. Dodd, 130 High Street, Brentford, Middlesex.
- GC3LFJ**, H. R. Mesny, Elmwood Lodge, Mont Cambrai, Jersey, Channel Islands.
- G3LHE**, G. Viner, 34 Middleborough Road, Coventry, Warks.
- GW3LIY**, R. W. Price, Tylhurst, Montpelier Park, Llandrindod Wells, Radnorshire.
- GW3LJN**, E. A. Herbert, Cambrian House, High Street, Llandrindod Wells, Radnorshire.
- GW3LJP**, A. W. Mills, 14 Tan-y-fron, Crossgates, Llandrindod Wells, Radnorshire.
- G3LKK**, A. R. Taylor, 22 Ashton Road, Newton-le-Willows, Lancs.
- GW3LKL**, R. Pugh, Ullswater, Temple Street, Llandrindod Wells, Radnorshire.
- G3LKO**, D. W. Fisher (*ex-YI2DF*), 153 Bridge Road, Slade Green, Erith, Kent.
- G3LKP**, N. Temperton, 132 Fareham Road, Gosport, Hants.
- GW3LKQ**, J. G. M. Bundred, Rosslyn, Gorsedd, Holywell, Flintshire.
- GM3LKY**, P. Cohen, 38 Drumby Crescent, Clarkston, Renfrewshire.
- G3LKZ**, O. Jackson, West Witton, Whitburn Road, Cleadon, nr. Sunderland, Co. Durham.
- G3LLE**, K. Webster, 28 Athelstan Road, Handsworth, Sheffield, 13.
- G3LLI**, R. M. Chessher, 47 Caudwell Villas, South Shields, Co. Durham.
- G3LLK**, J. A. Gale, 1b Bartholomew Street, Newbury, Berks.
- GM3LLP**, B. M. Watson, 1 Corse Terrace, West Kilbride, Ayrshire.
- GW3LLU**, M. J. Ely, 84 Brynswelon, Bryn, Llanelly, Carmarthen.
- G3LLV**, J. A. McElvenney, 17 Havelock Square, Broomhill, Sheffield, 10. (*Tel.: Sheffield 25396*).
- G3LLX**, L. R. Reeve, 33 Cray Road, Foots Cray, Sidcup, Kent.
- G3LMD**, J. C. Craig, 352 Liverpool Road, Southport, Lancs.
- G3LMO**, Sgt. N. G. Cooper, c/o Sgts.' Mess, R.A.F. Station, St. Mawgan, nr. Newquay, Cornwall.
- G3LMQ**, J. T. Hamer, 52 Seagrave Road, Coventry, Warks.
- G3LMR**, J. K. Eley, 4 Mellor Road, Western Park, Leicester, Leics. (*Tel.: Leicester 88636*).

CHANGE OF ADDRESS

- G2AH**, H. K. Bourne (*ex-GM2AH*), c/o British Joint Services Mission, P.O. Box 165, Benjamin Franklin Station, Washington, D.C., U.S.A.
- G2BLZ**, C. W. Strong, 2 Station Road, Goudhurst, Kent.
- GC2CNC**, E. Banks, c/o Dept. of Agriculture (Agricultural Economics), Victoria Chambers, Conway Street, St. Helier, Jersey, Channel Islands.
- G3CAZ**, J. J. Springate, Haslemere House, Chandag Road, Keynsham, Somerset.
- G3COI**, J. Worthington, 43 Mount Road, Penn, Wolverhampton, Staffs.
- G3CUH**, E. H. Butcher, 4 Crowsfield Cottages, West Hanningfield, nr. Chelmsford, Essex.
- G3DPH**, W. E. H. Harris, 4 Glanville Place, Kesgrave, Ipswich, Suffolk.
- G3DUZ**, B. Froggatt, 30 High Street, Warwick, Warks.
- GM3EDZ**, T. Hughes, 53 Ancroft Street, Glasgow, N.W.
- G3ESO**, A. D. Underwood, B.E.M., 4 Earls Road, Amesbury, Wilts.
- G3FRV**, R. G. B. Vaughan, 8 Woodford Place, Preston Road, Wembley, Middlesex.
- G3GAD**, W/O J. A. Hopkinson, c/o Sgts.' Mess, R.A.F. Station, Stanmore Park, Stanmore, Middlesex.
- G3HHR**, A. L. Thwaites, West Garth, Rushley Mount, Hest Bank, nr. Lancaster, Lancs.
- G3HQB**, E. Dales, 6 Ryegate Road, Sheffield, 10, Yorkshire.
- G3JBK**, H. E. Duthie, c/o Home Office Wireless Depot, Ashcott, nr. Bridgwater, Somerset.
- G3JJZ**, 4174054 Cpl. Newton, D. J., Hut 116, 3 Wing, R.A.F. Station, Locking, Weston-super-Mare, Somerset.
- G3JQG**, T. Seatter, B.E.M., 3 Birch Road, Ambrosden, Bicester, Oxon.
- G3KAY**, F/Sgt. R. J. Lang, c/o Sgts.' Mess, R.A.F. Station, Upwood, Ramsey, Hunts.
- G3KQN**, J. R. Walton, 17, Wilmore Road, Billingham, Co. Durham.
- GM3KSJ**, S. Bungard, 7 Anderson Place, Orbiston, Bellshill, Lanarks.
- G3KTH**, M. J. Darkin, 151 Doe Quarry Lane, Dinnington, Sheffield, Yorkshire.
- G3KUA**, J. Rae (*ex-GM3KUA*), 58 Heath Road, Holtspur, Beaconsfield, Bucks.
- G3KUN**, J. B. M. Hain, 11 Wyld Way, Wembley, Middlesex.
- G3KWR**, M. Ward, 1 Bilsdale Grove, Southcoates Lane, Hull, Yorkshire.
- G3LCJ**, R. J. E. Mills, c/o 15 Saddington Road, Fleckney, Leics.
- G3QJ**, J. S. Dunn, Garden Reach, Carr Lane, Riddlesden, Keighley, Yorkshire.
- G4HP**, H. C. Doherty, Farm Gate, Oathall Road, Haywards Heath, Sussex.
- G4HQ**, F. D. Roberts, 33 Albion Hill, Loughton, Essex.

THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for next month's reports : FEBRUARY 15)

FROM these regular reports on Club activities and meetings it must appear to an outsider that the whole organisation of local Clubs lives and works to a strict routine of A.G.M.'s, lectures, demonstrations, discussions and an occasional visit to a place of interest. Perhaps this is correct, in the main, but we do know that several Clubs manage to think up other activities to relieve the monotony of a constant round of "normal routine."

We should be most interested to hear, from Club Secretaries, of any bright ideas that their own Clubs have tried out, and whether they have been successful or not.

Examples that come to mind are : An evening on which every member brings along some home-built piece of gear and gives a five-minute talk on it ; a meeting at which a number of (very broad) subjects are written on cards and drawn from a hat—the drawer to do his best to talk on the said subject for a few minutes ; an evening of talks by members on their own jobs, whether connected with radio or otherwise.

Bailleul are delighted with the result of MCC (they were second). They promise Stourbridge, the winners, "a real fright" next year. A two-metre group has now been formed, with Tx and beam almost completed. The February *REME Magazine* will carry an article featuring Bailleul, with photographs of the workshop equipment and transmitting gear.

Bradford will meet on February 12 to hear about Oscilloscopes (Mr. G. F. Craven), and on February 26 for a talk on Transformers (Mr. P. Howarth). Both meetings 7.30 p.m. at 66 Little Horton Lane.

Cheltenham recently held their A.G.M. and elected a new secretary (see panel for details). They meet every Wednesday, 8 p.m., at St. Mark's Community Centre, Brooklyn Road, Cheltenham.

Clifton report that their Christmas Party was a great success. The Constructional Contest was won by G3FNZ (813 HF-bands transmitter), with G3FVG (Two-metre transmitter and receiver) as runner-up. Forthcoming meetings are on February 8 (to be arranged), February 15 (Constructional Evening) and February 22 (talk on Tape Recorders, by Messrs. Grundig). All at 7.30 p.m. at 225 New Cross Road, S.E.14.

Cray Valley are holding a Brains Trust and Quiz on February 26, 8 p.m., at the Station Hotel, Sidcup. Their A.G.M. will take place on March 26—same time and location.

Crystal Palace now meet regularly on the first Tuesday and third Saturday of each month. February 16 is the date for the A.G.M., at Windermere House,

7.30 p.m., and a week later, on the 23rd, the annual dinner will take place at the Half Moon Hotel, Herne Hill. It is hoped that members will support these events in full force—they should contact the secretary for details.

Gravesend, at their recent A.G.M., elected G3JLB president, G3HLF chairman, and G3JVU secretary/treasurer. Meetings continue every Thursday at 7.30 p.m.

Grimsby, after several years as a small group of licensed amateurs, has now widened its scope and enrolled a number of new members. Meetings are held fortnightly, and a suitable programme is being arranged.

Kingston report that they are very pleased to welcome back G3GVU as their secretary, after a long absence through illness. They have a full programme for 1957, including Morse and Theory classes. A recent auction sale was a great success. Next meeting, Thursday, February 21, at 7.45 p.m., and fortnightly thereafter at Penrhyn House, Kingston.

Mitcham announce their A.G.M. for February 15, and they hope to arrange a lecture for March 1. Recent events have been the Christmas Draw, a lecture on AC Theory, a Film Show and the Annual Constructional Contest. All visitors welcome to future meetings.

Newbury meet on February 22 to hear Mr. J. H. Etheridge (Cinema Television Ltd.) on The Flying-Spot Particle Receiver. The following meeting will be on March 22, and the subject will be Colour Television.

Norwich report several very successful meetings in the past few months, including Tape-Recorded lectures on TV1, Mobile Operation and Interplanetary Travel, Ragchew Nights, Open Nights, and the Annual Christmas Dinner all filled up the time-table. At the recent A.G.M., G3LFU was made chairman, G3HYJ treasurer, and G4KO secretary. Meetings are held at The Golden Lion, St. John Maddermarket, and new members will be welcomed, irrespective of age or status.

Plymouth meets every Tuesday evening, 7.30 p.m., at the Virginia House Settlement, Barbican. Business meetings, lectures and demonstrations are held on alternate Tuesdays. On February 19, G3GRA will be showing a film strip on Rectification. Morse classes continue at all meetings.

Rotherham get together on the first and third Wednesday of each month, 7.30 p.m., at the Rotherham Photographic Society, The Crofts, Moorgate. Please note the corrected QTH of the hon. sec., in panel.

lover

Scarborough held their A.G.M. and re-elected G8KU as hon. secretary, all members recording their appreciation of his long service in that onerous capacity. The Club has now acquired a nice receiver (courtesy G3KJY) and also has a 10-watt rig for 160 and 80 metres, phone and CW. Their call, G4BP, will be heard more often on those bands. Visitors and new members welcome every Thursday evening at the Club Room, Chapmans Yard, Waterhouse Lane.

Slade are meeting on February 15 for a demonstration of High-Quality Sound Reproduction; on March 1 they have a lecture on Circuit Applications of Transistors; and on March 15 a Brains Trust.

Wellingborough are to have a lecture and film on Valve Manufacture (Mullards) on February 21. On the 28th they will hear Mr. G. Abrams on Basic Audio Amplifiers. Both meetings 7.30 p.m. at the Silver Street Club Room.

Wirral will be meeting on February 20 to hear a talk by G3EGX on Beam Aerials. They are especially keen on recruiting young unlicensed enthusiasts, for whom they will arrange all necessary coaching for the Morse and Theory tests. All visitors and SWL's welcome to the meetings, at the Y.M.C.A., Birkenhead. Note name and address of new secretary (in panel).

Aldershot suffered a severe loss in the passing of Capt. A. M. H. Fergus, G2ZC, who was their president. They met in December to hear G6MB on his Antennamatch; Morse classes are still running and well attended. Meetings are held at The Cannon, Victoria Road, Aldershot, on alternate Wednesdays, the next being February 13.

Bournemouth held their A.G.M. and elected G3JLH chairman and G3KYU secretary. Membership now consists of 17 licensed amateurs and 18 listeners. Next meeting is on February 8, 7.45 p.m., at The Cricketers' Arms Hotel, Windham Road, Bournemouth, and the Annual Hamfest will be held on February 9 at Lee Motors Canteen, Jameson Road, Winton, beginning at 4 p.m. The following meeting will be on March 1, when G3JQX will talk on Radio Direction-Finding.

The **British Amateur Television Club** will be meeting on the second Thursday of each month at 10 Baddow Place Avenue, Great Baddow, Essex. On February 14, Mr. D. Lyon will be talking on Scatter-Propagation TV Transmitters, and on March 14 the subject is A Home-made 3-cm. Microwave Link, by Mr. P. Burrage.

Bury began its 1957 programme with a talk on Transportable Equipment, by G3IXC. At the March meeting, G8VF will talk on Receivers—March 12, 8 p.m., at the George Hotel, Kay Gardens, Bury.

Midland will be meeting on February 26 at the Midland Institute, Paradise Street, Birmingham, to hear Mr. J. A. Browning on Selenium Rectifiers. All interested amateurs are invited to attend.

Purley had to convene on January 18 for the continuation of the previous month's talk on Television, for which there was insufficient time at the one meeting.

Surrey (Croydon) held their annual dinner on February 1. At the next meeting, on February 12, G6JJ will be presenting a practical demonstration of Frequency-Measurement. During recent tests he has made readings within 50 cycles of the official GPO figure, so his demonstration will be backed by authority on the subject.

Thames Valley held their A.G.M. and elected G5LC president, G8SM vice-president, G3AIU secretary and G3IKC treasurer. The January lecture took the form of Personal Experiences of the Battle of the River Plate, by Lt.-Cdr. A. Monk, D.S.C., R.N. (Ret'd.). On March 6 the subject will be Transistors, and the speaker Mr. R. H. Vivian, B.Sc., A.M.I.E.E. A full programme has been arranged for the rest of the year. A cordial welcome is extended to all interested persons living in the area; meetings are on the first Wednesday, 8 p.m., in the Carnarvon Castle Hotel, Hampton Court.

Next meeting for **Worthing** is on February 11, 8 p.m., at the Adult Education Centre, Union Place, when there will be a film show. Another club to hold an A.G.M. during January was **Shefford**, officials elected being G2DPQ chairman, G3IXG secretary and SWL Seymour as treasurer. Meetings are every Friday, 8 p.m., at Digswell House; several new members have been elected, and more will always be welcome.

NAMES AND ADDRESSES OF CLUB SECRETARIES REPORTING IN THIS ISSUE:

ALDERSHOT: A. E. Redman, G2FNQ, 19 South Street, Farnham, Surrey.
BAILLEUL: T. Holbert, G3DXJ, B.R.S., Bailleul Camp, Arborfield, Berks.
BOURNEMOUTH: J. Ashford, G3KYU, 119 Petersfield Road, Boscombe East, Bournemouth.
BRADFORD: F. J. Davies, 39 Pullan Avenue, Bradford 2.
BRITISH AMATEUR TELEVISION CLUB: D. W. E. Wheele, G3AKJ, 56 Burlington Gardens, Chadwell Heath, Romford.
BURY: L. Robinson, 56 Avondale Avenue, Bury.
CHELTENHAM: F. J. Dickinson, G3HVB, 372 Old Bath Road, Leckhampton Hill, Cheltenham.
CLIFTON: C. H. Bullivant, G3DIC, 25 St. Fillans Road, London, S.E.6.
CRAY VALLEY: S. W. Coursey, G3JJC, 49 Dulverton Road, London, S.E.9.
CRYSTAL PALACE: G. M. C. Stone, G3FZL, 10 Liphook Crescent, London, S.E.23.
GRAVESEND: F. Allen, G3GVU, 4 Cobham Street, Gravesend.
GRIMSBY: J. Browne, G4XC, 245 Yarborough Road, Grimsby.
KINGSTON: R. S. Babbs, B.Sc., G3GVU, 28 Grove Lane, Kingston, Surrey.
LIVERPOOL: W. D. Wardle, G3EWZ, 16 Mendip Road, Liverpool 15.
MIDLAND: C. J. Haycock, G3JDJ, 360 Portland Road, Birmingham 17.
MITCHAM: D. Tilcock, G3JYV, 67 Fleming Mead, Mitcham.
NEWBURY: N.A.D.A.R.S., 83 Newton Road, Newbury.
NORWICH: D. Youngs, G3JIE, 53 Salisbury Road, Norwich.
PLYMOUTH: C. Teale, G3JYB, 3 Berrow Park Road, Pevelerell, Plymouth.
PURLEY: E. R. Honeywood, G3GKF, 105, Whytecliffe Road, Purley.
ROTHERHAM: J. H. Johnson, G3GCV, 2 West Street, Rotherham.
SCARBOROUGH: P. Briscoe, G8KU, Roseacre, Irton, Scarborough.
SHEFFORD: G. R. Cobb, G3IXG, 75 Ampthill Road, Shefford, Beds.
SLADE: C. N. Smart, 110 Woolmore Road, Birmingham 23.
SURREY (CROYDON): S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon.
THAMES VALLEY: K. A. H. Rogers, G3AIU, 21 Links Road, Epsom.
WELLINGBOROUGH: P. E. B. Butler, 84 Wellingborough Road, Rushden, Northants.
WIRRAL: H. V. Young, G3LCI, 9 Eastcroft, Road, Wallasey.
WORTHING: J. R. Toothill, 113 King's Road, Lancing, Sussex.

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BC 312, p/pack, £12 10s.; AR77, £20; RA1B, new, £12; AVO 7, £10; S27, reconditioned as new, £30; five assorted HRO coils, £3, or 12/6 each; 5-inch Spectroscope, less tube, £12 10s.; 40-metre crystals, 7/6 each; new Studio T Collaro insert, 15/-; 100-150 mc receiver, £5; ARR5FM receiver, unvalved, £1 10s.; new RCA 807's, 5/6 each; CR100, £10.—331 Brixton Road, S.W.9 (BR1 0852).

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BC-348, perfect condition; AC mains; with matching speaker; £18 (or £16 without speaker). Offers?—8 Westview Crescent, Chapel-st-Leonards, Lincs.

FOR SALE: Eddystone 640, fitted speaker; no other modifications, excellent condition. £16. Panda "Cub" Transmitter, hardly used, new condition, no modifications, £55. Eddystone Bug Key, new, boxed, 30/-.—Guy, 439 Broadwater Crescent, Longmeadow, Stevenage, Herts.

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£2 (OFFER): For complete recorded Morse Course, any make.—Box No. 1824, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: Tx 80-40-20-10 metres, xtal/VFO, 813 PA, 807 Mod., power supplies, in open 5-stage rack; RF-26 unit. Partly completed 2-metre equipment; 30 ft. alloy mast. Numerous small components, magazines. Offers (buyer collects).—Apply evenings, Mrs. Whiteoak, 220 Skipton Road, Colne, Lancs.

FOR SALE: Eddystone 750 Receiver, little used; performance and condition as new; first £50 secures.—Shattock, 35 Lonsdale Avenue, Cosham, Portsmouth.

S27D, externally rough and needs some attention, but working, £12; B2 Transmitter only, with four coils; offers? T1403, £5, or would exchange, W.H.Y.?—Details: GW3GIN, 50 Romilly Road, Cardiff.

SCR-522 Modulation Transformers, 10/-; 813, 25/-; 365 μ F V/C for Elizabethan or Z-match, 7/6; CR100 coil pack, V/C and all IF's, 30/-.—G31DW, 136 Beech Avenue, Swindon.

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SOS: Urgent—Would someone purchase complete QRO DX station of G3BES? Tools, books, stock, etc., £75, to enable sail VK6 end February.—Write 59 The Avenue, Harrow Weald, Middlesex.

SALE: Avo Valve Tester, perfect, £9; also large Avo Multi-meter, £10. **WANTED:** BC221 Frequency Meter; good price paid.—Gade, 425 Belvedere Avenue, Barkingside, Ilford, Essex.

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FOR SALE: (5G) 75w. CO/PA Tx, £5; BC-348Q internal P/Pack, bandspread, £14; 829B, £1; SX16 Rx, 520 kc-60 mc, manual, £12; RA-10B, P/Pack, £4 10s.; CR100 coil pack, condenser, IF's xtal filter BFO, 50/-; RCA 12-watt amplifier, 6 valves, P/Pack, £4; PCR2 P/Pack, less case, £6.—J. Dobson, G3HTU, 33 Thompson Avenue, Ormskirck, Lancs.

WANTED: Metal case for BC-221 frequency meter; also two Woden mod. transformers, UM1; state delivery, price.—109 Deneway, Newbury, Berks.

MINIMITTER, good condition, complete; 813 PA unit, less valve, 750v. PU. **WANTED:** Tape Recorder, bug key; offers or W.H.U.?—Box No. 1823, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: Over 50 QST, 1950-1956, good condition, £3 (or exchange WB/HF-1012, 10-inch speaker).—Swinson, 13 Coleford Bridge Road, Mytchett, Nr. Aldershot, Hants.

COMPLETE rack-built, all-band, 35w. Tx; Phone/CW; Wilcox Gay VFO, ATU; £14 (o.n.o.?)—G3KTY, 4 Shutlock Lane, Birmingham, 13. (HIG 4160).

SALE: Power Supply 1000-750-0-750-1000-volt., 250 mA, £5; Labgear W/B couplers, 80-10 metres, 7/6 each; Top Band VFO in Eddystone die-cast box, 15/-; 25w. modulator with power supply, £4.—G3ELJ, Claypool, Newark, Notts.

BC221, modulation model, commercial power unit, mint, £30; HRO Senior, 9 coils in cabinet, spare set valves, exceptional, £30; G.E.C. Miniscope with wobblulator (new), £10; HT-11, complete, £10; Variac, £3; HRO Vibrator Pack, £2. Delivered London; offers?—G2AC, Sleepy Hollow, Headley, Bordon, Hants. (Headley Down 3106).

BC-342, new front panel, totally enclosed, external power pack, £12. — G2AKR, 14 Finchley Grove, Manchester, 10.

WANTED: Transmitter, Type 1131L; must be in FB condition; 2-metre beam and Selsyns', 10, 15, 20, 40 metres Tx Phone/CW table topper.—Box 1827, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

ARMY 12 Transmitter, 160-20 metre, 30-40w., Phone/CW, £12 (exchange S.640, similar); Hambander, £5 (exchange Class-D).—17 Thelwall Lane, Warrington, Lancs.

WANTED: Eddystone S.640 or similar, in good condition (part-exchange Eveready "Skyking" portable, 3 months old).—Box No. 1828, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: DST-100 Receiver; also DST-100 Handbook.—Price and particulars to: G. Eaton, 54 Yoxall Road, Shirley, Solihull, Warks.

WANTED: CR100, good condition — greater London or Herts., to facilitate inspection.—20 Bramley Road, Southgate, N.14. (Barnet 3238 after 6 p.m.).

GEC BRT-400 Rx, in new, unmarked condition, £75. Exchanges considered.—80 Ellesmere Street, Mosside, Manchester, 16. (Mos. 2716).

SMALL ADVERTISEMENTS, READERS—*continued*

FOR SALE: BC-348 Rx, power unit, S-meter, with 10+15 metre converter, £20; ZC1, Mk. 1, G1, £5 10s.; Bendix TA-12C, £3 10s.; Army No. 12 Tx, 1.2-17.5 mc, complete with ATU, remote control unit, manual, £16; 1132 VHF Rx, with power supply, £3 10s.; two modulators, Class-AB2 and Class-B, complete 75-watt audio, using 807's, 6-foot 19-inch rack, 30/-. Hosts of small components and valves; must sell everything (any offer considered).—Box 1830, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

BOOKS, 15/- each: S36, HQ129X, HQ140X, RME-4300.—R. Grain, 15 Waverley Gardens, Grays, Essex.

BENDIX TA-12C Tx, with full instructions for amateur operation; as new; £3. — Contour House, Wood Lane, Kingswear, Devon.

R.1224A RECEIVER; excellent condition. £4 10s.; 22 Set, Tx/Rx, 12v. DC input, new condition, with carrier, £5 10s.; "Hearadio" light aircraft rig, Tx/Rx, 12v. DC P/Pack, ideal mobile, requires attention, £5 10s. Carriage extra all items. — L. Grout, 68 The Drive, Worthing, Sussex.

WANTED: Reasonably-priced R.1155 or similar type receiver. London area only. — 23 Lancelot Road, Welling, Kent.

WANTED: Brand-new or mint condition latest U.S.A. NC-300, SX-101 or similar. Fullest details, price, also matching speaker, to HRO-60T; also latest U.S.A. mobile Tx/Rx, complete.—Box 1831, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: 58 Set, all accessories, £4; new 813, £2; Vibrator No. 2, 6v. DC input, 230v. DC output, £1.—Carlisle, 65e Bridewell Drive, Carrickfergus, Co. Antrim, N. Ireland.

POWER UNIT, Type 247. 6.3 volt 3 amp. 500v. 250 mA-250v. AC input, new condition, £2 15s. *R.S.G.B. Bulletins*, March 1948-May 1956, £2. CRT types 5CP1 and VCR-138A, £1 each (both new). Q.C.C. xtals with certificates, 7128 and 7200 kc, 15/- each. FT-243 two-metre xtals (x 8), 7/6 each. New boxed valves: 832A (4), £1 2s. 6d. each; 832, £1. Tx magslips, 3in., quantity 2, £1 each (both brand-new). Quantity of 40 modern valves, £2 to clear. — G2FZU, 18 West End Crescent, Ilkston, Derbys.

RME-69 RECEIVER for sale, in perfect condition; just re-aligned; most capacitors changed; £25 (or near offer).—Hayes, 102 Bramdean Crescent, Lee, London, S.E.12.

EDDYSTONE 640, perfect, £16, with speaker.—R. Farley, 11 Caithness Gardens, Sidcup, Kent. (Pre-1925 gear wanted.)

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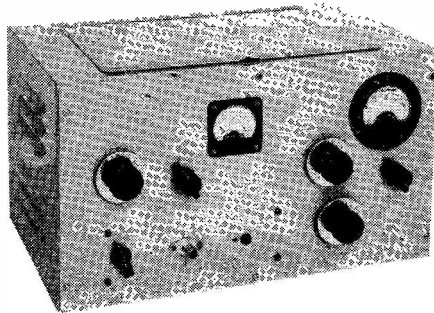
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WANTED: Receiver or Converter, continuous tuning 160 mc to 180 mc, sensitive.—Rigby, Melbrook, Branch Road, Mellor Brook, Nr. Blackburn, Lancs.

FOR SALE: Hammarlund Super Pro Receiver, £25; Sound Mirror Tape Recorder, £25; Webster Wire Recorder with crystal mike and accessories, £15; R.C.A. 12v. Mobile Transmitter, 6in. sq., £7 10s.; Bendix Mobile Transmitter/Receiver, Type 3801, size 13½in. long, 5in. deep, 5in. Hi., £7 10s.; Hallicrafter Sky rider Receiver, S.21, 5in. oscilloscope case tube, transformers, etc. (requires wiring), 50w. transmitter exciter, all bars, table-topper, £12 10s. Numerous valves, bases, coils, etc.—State your requirements to G2MF, 51 Townhead Road, Dore, Sheffield.

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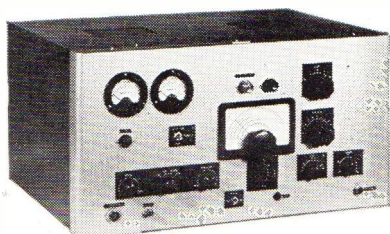
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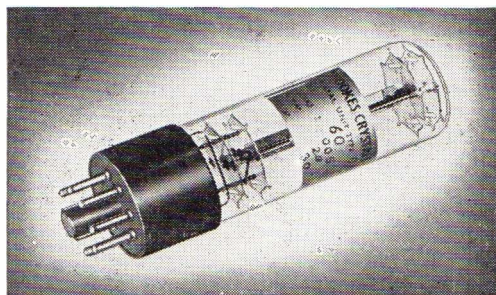
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Army Type 17 Mk. II

This well-known R/T Transceiver is offered complete with Valves, High Resistance Headphones, No. 3 Handmic and Instruction Book giving complete details and circuit, contained in strong cabinet. Variable tuning.

Frequency Range 44.0 to 61 Mc/s.
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Ideal for Civil Defence and communications.

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Calibrated Wavemeter for same 10/- extra.

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1A7GT, 1N5GT, 1H5GT, 1A5GT (or 1Q5GT or 3Q5GT) ...	37/6	Set
10 EF50 (Ex-Brand New Units) 5/- each ...	45/-	"
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12K8GT, 12K7GT, 12Q7GT, 35Z4GT, 35L6GT (or 50L6GT) ...	37/6	"
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Comprising the well-known BC625 and BC624A. Units complete with 17 valves, types: 2-832, 3-12A6, 3-12SG7, 3-9003, 9002, 6G6G, 12J5GT, 12AH7GT, 12C8, 6S57. The Complete unit is in very good condition, having very useful parts including Relays, Transformers, Condensers, etc.

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JUNCTION TYPE (Red Spot) (P.N.P.) Offered at less than half-price

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(Tested and complete with Data and Circuits)

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Just switch to your favourite Station. No Tuning, no Aerial or Earth. Pre-select 3 stations. Complete with all components and seven Transistors. 7 x 4 Elliptical speaker. Teletron Superhet Coils and I.F.T.'S. Powered by 7 $\frac{1}{2}$ v. dry battery which lasts for months. 150 Milliwatts output. All the above with Circuits etc. **£9/17/6.**

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 Ideal for signal tracing.
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Ideal for Tape Recording, Gramophone Amplifier, etc. Very sensitive. Guaranteed and Tested, **5/-**

INDICATOR UNIT TYPE 182A

Unit contains VCR517 Cathode Ray 6in. tube complete with Mu-Metal screen, 3 EF50, 45P61 and 1 SU4G valves, 9 wire-wound volume controls and quantity of resistors and condensers. Offered Brand New (less relay) at **67/6.** Plus 7/6 carr. "Radio-Constructor" scope circuit included.

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Size 7 $\frac{1}{2}$ in. x 6in. x 3in. Complete with Valves Type CV415, CV309, 2-6AM6, 2-7D9 and Quartz Crystal, 4,860 Kc/s. Fully wired with circuit. **£4/10/-** complete.

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Complete with 11 valves 8-SP61, 5U4G, VU120, VR92. As specified for inexpensive T.M.
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TRANSISTOR PUSH-PULL AUDIO AMPLIFIER (150 Milliwatts Output)

Build this Push-Pull Amplifier, which is ideal for Crystal or Magnetic Pick-up Amplification, Baby Alarm, Microphone Amplifier, etc. Powered by 6-volt Dry Battery lasting for months. Complete Kit of Parts including 4 Transistors and all Components, with Circuit (less speaker), **£4/10/-.**

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VCR139A. 2 $\frac{1}{2}$ in. C/R Tube. £1 15 0
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MINIATURE I.F. STRIP TYPE "373" 9.72 MEG.

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Containing VCR97 with Mu-Metal Screen. 21 Valves: 12-EF50, 4-SP61, 3-EA50, 2-EB34. Plus Pots., Switches, H.V. Cond., Resistors, Muirhead 5/M Dial. Double Deck Chassis and Crystal. Brand New. Original Cases, **67/6** carr. free.