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VOL. XVII DECEMBER, 1959 NUMBER 10

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The SHORT WAVE Magazine

Christmas

For the thirteenth successive year we are happy to have the opportunity of sending our greetings for the Christmas season to all our readers, at home and in the far corners of the earth.

During the last year or two there has been a large increase in the number of licensed radio amateurs, not only in this country but throughout the world as well. It is a fair claim that SHORT WAVE MAGAZINE has played its full part in this expansion. In writing these lines we feel we have the solid support of many thousands of keen readers, whose interests it is our duty and our pleasure to serve. And we hope it may truly be said that SHORT WAVE MAGAZINE mirrors all that is best in Amateur Radio.

For this coming Christmas Season and the New Year, our good wishes for their happiness and our thanks for their support to all who, at home and abroad, may chance upon these lines.

From the Managing Editor and Staff of

SHORT WAVE MAGAZINE

Half-Watt Transistor Transmitter

FOR CW/PHONE OPERATION ON TOP BAND

P. R. HORNE (G3JRH)

It is more than five years since the first articles to be published on practical transistor transmission appeared in SHORT WAVE MAGAZINE. *Since then, there has been a great deal of circuit development, and much has happened. Transistors for a wide variety of applications are now manufactured by the hundred thousand, and gradually their upper frequency limits and power handling capacity are being extended. In two or three years' time, commercial BC sound receivers will be all-transistor as a matter of course, and the use of transistors for receiver applications in the 100 mc region will be commonplace. While in Amateur Radio transmission we require in general far more RF power than is at present obtainable using transistors, this will not always be the case. Already there are readily available transistors capable of useful transmitting performances at low power levels—and QRP for its own sake has always been a fascinating by-way for most radio amateurs. This article describes a complete VFO controlled CW/Phone transmitter for operation on 160 metres, using transistors throughout.—Editor.*

TRANSISTORS have now advanced far beyond the stage when they were just curiosities, strictly for those who wished to experiment with something different, to the point where they can be applied to the transmitter as well as to the receiving side.

A transistor transmitter (TTx) of the sort described here would form the ideal basis for a small portable rig, which could be very light and compact. The whole Tx can be run from a couple of small low-voltage batteries, the "Ever Ready" PP series of batteries being very suitable for this sort of work.

The type of transistors at present generally available to amateurs in this country are all of one type—that is the germanium, PNP, alloy junction variety. In the early days, transistors were mostly of the point-contact type (and could be home-made) but these have now died out.

It should be noted about the transistors used in this Tx that they require a negative supply voltage and, except for a very small leakage current which flows under all circumstances, they must be biased with a small negative voltage between the base and emitter before they will conduct. This last point is very useful in transmitters as it means that should the drive to the PA fail for any reason, the PA collector current will cease to flow and not run wild like the anode current of a self-biased valve.

Circuit Design

In its general design the transistor Tx follows fairly closely on the lines of a conventional valve transmitter, and has as its line-up:—VFO/BA/BA/push-pull PA. The transistors used in the various stages are the V6/2R, V6/8R, V6/8R, 2 x V6/8R, all of these being "Newmarket Transistors" types.

The circuit of the RF side of the TTx is shown in Fig. 1, opposite.

The VFO

The VFO is the tuned-collector Colpitts arrangement. This circuit was chosen for its stability in operation and its constructional convenience. Its tuned circuit is formed by L1 and the combination of C3, C4 and C5. The fine tuning is done by C5; C3 and C4 control the amount of feedback in the oscillator and the quoted values have been carefully chosen to give the maximum stability. L1 has an inductance of 35 μH.

First Buffer Amplifier

This stage Tr2 runs in Class-A and is used mainly for isolation purposes, as there was slight chirp and drift without it. It is an untuned stage, the collector load being formed by RFC1.

Second Buffer Amplifier

This is a tuned stage and runs in Class-AB to give the required amount of drive power to the PA. A certain amount of control of the drive supplied to the PA can be obtained by adjusting the value of C8. The tuned circuit consists of L3 and C9; L3 has an inductance of 48 μH. The dust core in L3 is screwed into the centre of the core and left there, and tuning is done by C9 only.

The PA Stage

This uses two transistors, Tr4, Tr5, in push-

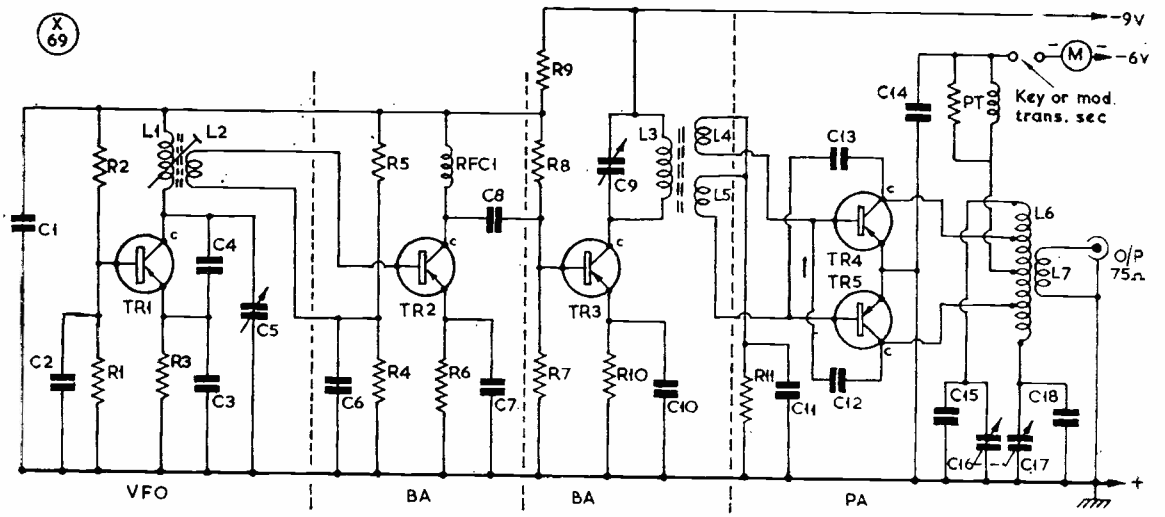


Fig. 1. Circuit of the 4-stage Transistor Transmitter for Top Band, designed and described by G3JRH. Running about half a watt in the push-pull transistor PA, G3JRH has worked 24 counties, and OK for the Continent. The circuit of the modulator is shown in Fig. 2 on p. 405.

pull and runs in Class-C. The necessary cut-off bias is provided by the combination of C11 and R11 ; this gives about 0·2v. of bias to the PA under the correct drive conditions. The PA tuned circuit consists of L6 and C15, C16, C17 and C18. The two collectors are tapped down the tuned circuit in order to get a reasonable Q for the tank circuit. It is essential to do this as transistors have a very low output impedance at this sort of power level. The PA tuning condenser, C16, C17, is of the type used for the tuning capacity in small pocket-portable receivers and has a maximum value of 118 $\mu\mu$F. This value is too low for satisfactory operation in the PA and therefore an additional 100 $\mu\mu$F is connected in parallel with each half. The PA stage is neutralised by the two capacities C12 and C13 ; it is sufficient to use fixed values here provided they are as given. L6 has an inductance of 90 μH total. There is an anti-parasitic trap, PT, fitted in the supply lead to the PA, and this consists of 40 turns of 36 SWG enamelled, close-wound on a 47-ohm $\frac{1}{4}$-w. resistor body. A useful method of fixing the end turns on the resistor is to cut two narrow rings from the outer sleeving of $\frac{1}{4}$-in. co-axial cable and it will be found that these can be neatly pushed on to the ends of the resistor, thereby securing the end turns.

It was found necessary to fit the parasitic trap as some of the paper condensers of the value used for decoupling the supply leads tended to cause parasitic oscillation at their self-resonant frequency

Table of Values

Fig. 1. Circuit of the RF Section of the TTx.

C1	= 1 μF paper	R3	= 5,600 ohms, $\frac{1}{4}$-w.
C2	= 0.1 μF paper	R4	= 1,200 ohms, $\frac{1}{4}$-w.
C3	= 470 $\mu\mu$F mica	R5	= 5,600 ohms, $\frac{1}{4}$-w.
C4	= 150 $\mu\mu$F mica	R6	= 270 ohms, $\frac{1}{4}$-w.
C5	= 30 $\mu\mu$F variable	R7	= 2,200 ohms, $\frac{1}{4}$-w.
C6	= 0.1 μF paper	R8	= 56,000 ohms, $\frac{1}{4}$-w.
C7	= 0.1 μF paper	R9	= 150 ohms, $\frac{1}{4}$-w.
C8	= 100 $\mu\mu$F mica	R10	= 82 ohms, $\frac{1}{4}$-w.
C9	= 250 $\mu\mu$F trimmer	R11	= 150 ohms, $\frac{1}{4}$-w.
C10	= 0.5 μF paper	RFC	= 2.5 mH RF choke
C11	= .01 μF mica	L1-7	= *see text*
C12	= 22 $\mu\mu$F mica	PT	= *see text*
C13	= 22 $\mu\mu$F mica	M	= 100 mA FSD
C14	= 0.1 μF paper	TR1	= V6/2R, Newmarket
C15	= 100 $\mu\mu$F mica		
C16, C17	= 120 $\mu\mu$F twin-gang, Polar type C78-22	Tr2	= V6/8R, Newmarket
		Tr3	= V6/8R-2, Newmarket
C18	= 100 $\mu\mu$F mica	Tr4, Tr5	= V6/8R-4, Newmarket
R1	= 33,000 ohms, $\frac{1}{4}$-w.		
R2	= 56,000 ohms, $\frac{1}{4}$-w.		

Coil Winding Data

The oscillator coil L1 is wound on a $\frac{3}{8}$-in. dia. Alladin former fitted with a dust-iron core. It has 50 turns of 36g. enamelled copper wire close-wound. The coupling winding L2 has 13 turns of the same, also close-wound, over the earthy end of L1.

The BA collector coil L3 is likewise wound on a $\frac{3}{8}$-in. dia. Alladin former and fitted with a dust-iron core. It has 60 turns of 36g. enamelled, close-wound. The coupling windings L4 and L5 each have 15 turns of 36g. and are close-wound in a bifilar fashion over the earthy end of L3.

The PA tank coil L6 is on a $\frac{5}{8}$-in. dia. paxolin former 2in. long and has 120 turns of 36 SWG enamelled copper, close-wound. It is centre

tapped, and is also tapped at 10 turns either side of the centre for the two collectors. The output coupling winding L7 has 10 turns wound over the centre of L6, with 5 turns wound either side of the centre tap.

The construction of the coils is shown in Fig. 6.

Modulation

The system of modulation employed in this transmitter is high-level collector modulation. This is the equivalent of anode modulating a pair of triodes, and the same rules as to modulator power rating and input hold good. The circuit of the modulator is shown in Fig. 2.

In the output stage of the modulator there is a single intermediate power transistor type V15/20IP, running in what is known as the Class-A "sliding bias" triode. This is a method of reducing the modulator current when there is no actual speech input, and the way in which it works is as follows: When a signal is fed to the modulator the diode D1 rectifies some of the output and applies it as bias to the output stage ; the value of bias and therefore the flow of modulator current are thus dependent on the level of signal applied, the modulator current increasing with more signal, *i.e.* speech, input.

The modulation transformer T1 is home-wound on the core and former of the type found in much surplus equipment as intervalve transformers. The transformer when rewound has a ratio of 1 : 1·3 from primary to secondary.

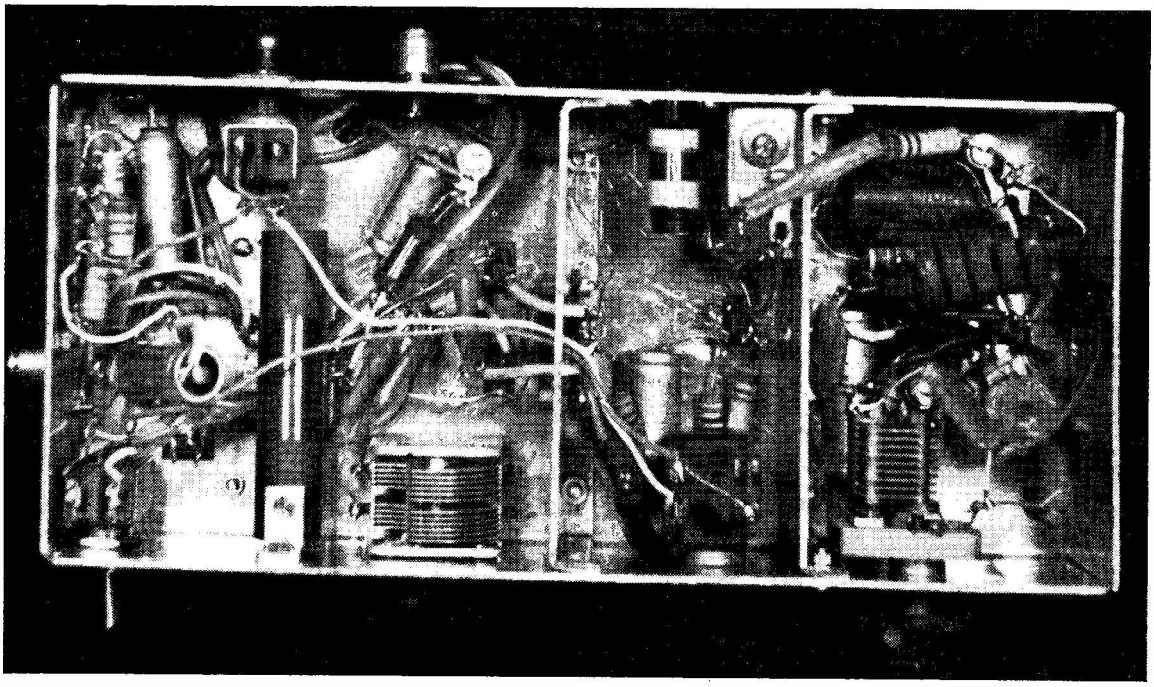
The transistor Tr1 is an emitter follower (this is more or less equivalent to a cathode follower) and serves to reduce the loading on the diode circuit ; it also amplifies the applied audio signal. The transistor used is a V10/50A.

The modulation transformer T1 has to be home-wound as no suitable commercial transformer exists. T1 is wound as follows: *Primary,* 450 turns of 30 SWG enamelled copper wire ; *Secondary,* 610 turns of the same ; *Diode winding,* 250 turns of 40g. enamelled copper.

Care should be taken to see that the phasing of the primary and diode windings are as shown on the circuit diagram, otherwise the modulator may tend to become unstable.

Speech Amplifiers

The level of speech amplification necessary will depend on what sort of microphone is employed. One of the most suitable is a magnetic type with an impedance of about 1,000 ohms. This will require a single-stage speech amplifier, as shown in Fig. 3. A carbon microphone will drive the modulator direct *via* a step-up transformer of about 1 : 4 ratio, as



Layout under-chassis of the Transistor Transmitter, with the VFO compartment on the right. The audio section is to the extreme left, with the PA tank coil and tuning condenser towards the centre. The circuit in detail is shown in Fig. 1.

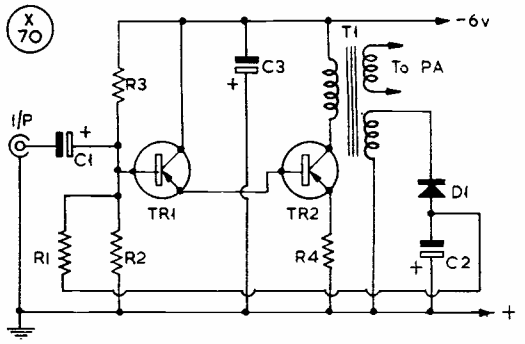


Fig. 2. Circuit of the modulator section for the Transistor Transmitter described by G3JRH. Various speech amplifier arrangements are suggested in Figs. 3-5 below.

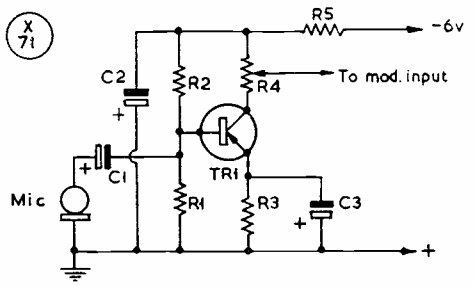


Fig. 3. Transistor speech amplifier circuit for use with a moving coil microphone.

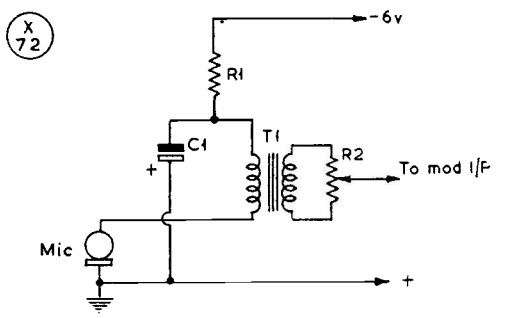


Fig. 4. The simplest arrangement is possible when using a carbon microphone for the Transistor Modulator.

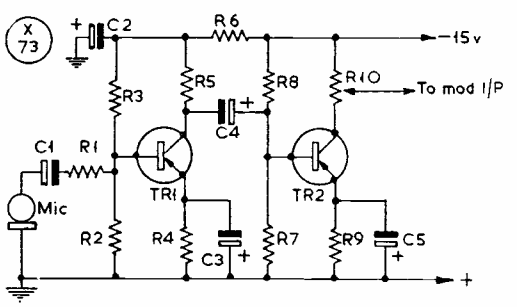


Table of Values

Fig. 2. The TTx Modulator

C1	= 2 μF 10v. elect.	D1	= CG12E, GEX34, OA71
C2	= 2 μF 10v. elect.	T1	= Mod. trans., *see text*
C3	= 50 μF 10v. elect.	Tr1	= V10/50A, Newmarket
R1	= 6,800 ohms, ½-w.	Tr2	= V15/20IP, Newmarket
R2	= 2,700 ohms, ½-w.		
R3	= 33,000 ohms, ½-w.		
R4	= 2 ohms, ½-w.		

Fig. 3. Speech Amplifier for M/C Microphone

C1	= 5 μF 10v. elect.	R4	= 5,000 ohms potentiometer
C2	= 10 μF 10v. elect.	R5	= 470 ohms, ½-w.
C3	= 10 μF 10v. elect.	Tr1	= V10/50A, Newmarket
R1	= 5,600 ohms, ½-w.	Mic	= 1,000 ohm magnetic type
R2	= 15,000 ohms, ½-w.		
R3	= 1,000 ohms, ½-w.		

Fig. 4. Using Carbon Microphone

C1	= 25 μF 10v. elect.	T1	= 1:4 step-up
R1	= 220 ohms, ½-w.	Mic	= Carbon type
R2	= 10,000 ohm potentiometer		

Fig. 5. Speech Amplifier for Standard Crystal Microphone

C1	= 0.1 μF paper	R5	= 27,000 ohms, ½-w.
C2	= 10 μF 25v. elect.	R6	= 1,000 ohms, ½-w.
C3	= 4 μF 10v. elect.	R7	= 47,000 ohms, ½-w.
C4	= 2 μF 25v. elect.	R8	= 120,000 ohms, ½-w.
C5	= 4 μF 10v. elect.	R9	= 8,200 ohms, ½-w.
R1	= 470,000 ohms, ½-w.	R10	= 10,000 ohms pot.
R2	= 82,000 ohms, ½-w.	Tr1,	
R3	= 220,000 ohms, ½-w.	Tr2	= V10/50A, Newmarket
R4	= 12,000 ohms, ½-w.	Mic	= Xtal

shown in Fig. 4.

If it is desired to employ a crystal type it is necessary to use a two-stage speech amplifier, as shown in Fig. 5. This is as used by the author; the first two stages are built into the same case as the microphone insert, with their 15v. deaf-aid battery and a push-to-talk switch. The microphone insert is one of the deaf-aid types, and the potentiometer R10 is the gain control.

Construction

Construction of the transmitter follows on conventional lines. In the model illustrated as built by the author the RF section and the modulator are on the same chassis. The photographs show the general layout, with modulator and RF sections separated. It is advisable to mount the little RF and AF transistors in sockets if possible, as this eliminates the need for soldering to the leads, with the possibility of damaging the transistor through overheating. The two RF transistors used in the PA are also fitted to the chassis by the clips provided by the manufacturer for the purpose. When mounting transistors in the sockets it is necessary to snip the leads off fairly short; they should be left

Fig. 5. A more sophisticated transistor speech amplifier, designed to work with a crystal microphone; this is the arrangement used by the author *(left)*.

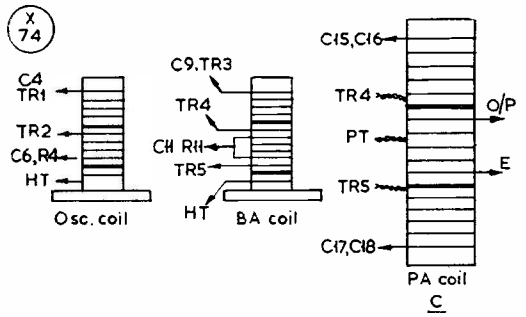


Fig. 6. Details for the Transistor Transmitter coil construction — see text for dimensions and values.

approx. $\frac{3}{8}$in. long.

The modulator transistor Tr2, Fig. 2, must be electrically isolated from the chassis because its collector is in contact with the case. One mica and two paxolin washers are supplied by the manufacturers for this purpose. The mica washer goes between the transistor and the chassis and the two paxolin washers are under the chassis between the chassis and the fixing nuts—*see* Fig. 7. The connections to the bases of the transistors are shown in Fig. 9.

Care should be taken to use paper condensers only for decoupling purposes in the RF section, as electrolytics are not effective at RF.

Setting-Up and Operating

There is very little actual setting-up to be done with this transmitter as it has been designed to be relatively independent of transistor characteristics.

The first thing is to check the VFO and adjust its frequency coverage against the receiver; when this has been done a dummy load of 75 ohms should be plugged into the PA output socket. This may be made up of two 150-ohm $\frac{1}{4}$w. resistors in parallel—or some similar combination to give 75 ohms rated $\frac{1}{2}$w. The key should now be pressed and the PA tuned to resonance; this is indicated in the usual way by tuning for "minimum plate current" or maximum dip; the BA should then be adjusted to give maximum collector current in the PA.

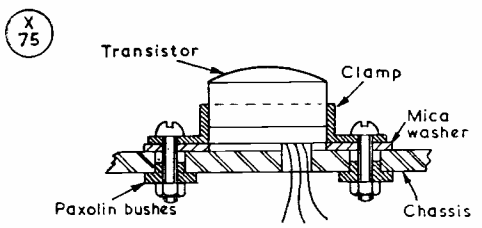


Fig. 7. Mounting of a "Newmarket" transistor for which certain fittings are supplied — see text.

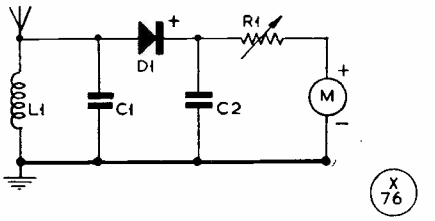


Fig. 8. In setting up the Transistor Transmitter, some sort of radiation indicating device is helpful. This is a crystal diode arrangement, the usefulness of which is not confined to this particular purpose.

Table of Values

Fig. 8. Suitable Radiation Indicator

C1, L1	= To tune Top Band	M	= 100 μA FSD
D1	= Xtal diode	C2	= .05 μF paper
		R1	= 100,000 ohms pot.

When this has been done the PA collector current meter should indicate about 84 mA: if it does not, the drive can be pushed up by increasing the value of C8 in Fig. 1 until the correct current is shown.

The TTx is now ready for CW operation and may be connected to a radiating load, with the aerial coupler adjusted to give the same loading as with the 75-ohm dummy load.

When phone operation is required the aerial coupling should be adjusted to give a PA current of 60 mA; this represents an input power of 360 mW with a −6v. supply. The drive to the PA should not be altered from that which was set for CW operation, as this also represents the correct level for telephony working.

A useful indicator when tuning up the aerial is a radiation monitor of the type shown in Fig. 8. This should be set up in such a way that maximum radiation *off the aerial* is shown with the meter on scale.

The speech amplifier gain control should be adjusted until the modulation just reaches 100%. This can be checked on a modulation meter, but a reliable check is when the reading given by the aerial radiation indicator increases

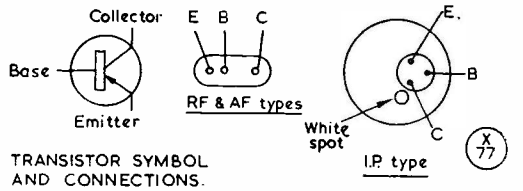
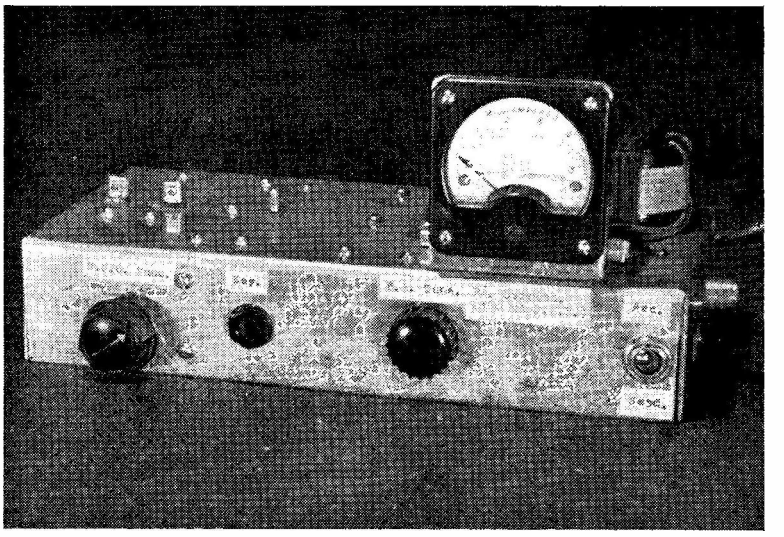


Fig. 9. Symbols and connections for standard transistors.

by 25% with a sustained note — such as a whistle — into the microphone.

The performance of the little transistor transmitter described here has been most rewarding. Most people who have been QSO'd with it have been amazed at what can be done with such little power. The whole secret, of course, is to use the best possible aerial, properly connected, and get every ounce of power into it. Using a 264-ft. end-fed wire, in strictly limited operating time, some 24 counties have been worked on Top Band, the best DX being 300 miles on CW and 220 miles on phone.

Finally, the author would like to thank G2BVM for much assistance in testing the transmitter.



General view of the G3JRH half-watt Transistor Transmitter for Top Band CW/Phone operation. The home-constructed modulation transformer is at right behind the meter, with the RF section of the transmitter to the left. A unit of this type, run from a couple of dry cells, would make an excellent mobile-portable rig. The design discussed here is capable of surprising results — as G3JRH is able to show.

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NEW MULLARD UHF TYPE — QQVO4-16

Not so many years ago, the idea of there being a standard production transmitting valve capable of giving 7 watts RF output in continuous service on 960 mc (say, 30 centimetres) would have been regarded as a pretty far-fetched notion. But the new Mullard QQVO4-16 meets this specification, being designed for such applications as RF amplifier or frequency trebler in low-power installations in the UHF range. It is a double tetrode, operating at 250v. HT and taking 70 mA total plate current in the push-pull Class-A connection. Limiting HT values at 960 mc are 400v., 90 mA.

ZL LICENSING PROCEDURE

Arising from the note on p. 240 of the September issue of SHORT WAVE MAGAZINE, we are informed that for the first 12 months, New Zealand amateurs are confined to the 80-160m. bands and certain VHF areas. To operate on the DX bands 10-15-20-40 metres, a ZL must hold an HF permit; for this, the qualifications are a CW operating speed of 15 w.p.m. and a log showing not less than 50 QSO's worked in the previous 12 months. The station must also be equipped for frequency checking, internal monitoring and modulation control. According to ZL1ATW, who is our informant on these matters, 160 metres is very little used in New Zealand.

UHF EQUIPMENT ON PRIVATE AIRFIELDS

It is announced that the latest aircraft company to instal Plessey UHF ground communication equipment at its private airfield, at Hatfield, is The de Havilland Aircraft Co., Ltd. The new installation provides for communication with aircraft during flying tests from the airfield. The Plessey AN/ARC-52 airborne UHF set (manufactured under licence from the Collins Radio Company, of Cedar Rapids, Iowa) is already being fitted in Service aircraft manufactured by de Havilland and other aircraft companies, and the installation by them of Plessey ground equipment means that they now operate similar equipment to that used by the Royal Air Force. The R.A.F. has adopted the Plessey UHF equipment as standard for both airborne and ground use. It consists of multi-channel transmitter/receivers which give instantaneous radio-telephone contact in the 225-400 mc band. With 100 kc spacing, 1,750 separate frequencies are available.

All-Band CW/Phone Transmitter

CONSTRUCTION OF THE RF UNIT — MODULATOR AND POWER SUPPLY UNITS

Part III

C. L. WRIGHT, B.A., B.Sc. (G3CCA)

Previous parts of this article appeared in our October and November issues, which should be referred to for continuity.—Editor.

Although the mechanical layout of the RF Unit can be followed from the photographs (*see* pp. 345, 349, November SHORT WAVE MAGAZINE) it can, of course, be varied to suit individual requirements. In the model as illustrated, following are the main constructional features:

The 20in. by 13in. heavy gauge aluminium front panel is bolted to a 17in. × 10in. chassis, 2in. deep. Strengthening straps constructed from $\frac{1}{8}$in. thick aluminium are fixed at each end of the chassis. The Geloso unit is flush mounted on the main chassis, 5in. from the control circuit end; the holing was done with a Davis file to the dimensions given in the manufacturer's leaflet. An aluminium strip is fixed across the rear end of the unit to lock it in position and prevent any movement occurring during operation. Tests have shown that the stability of the unit is greatly affected if it is not rigidly mounted.

The 6146 valve together with the 6061 (or 6BW6) clamp valve and all associated tuning circuits including the Geloso RF choke, are mounted in a $6\frac{1}{2}$in. square screening box. The height of this box is $8\frac{1}{2}$in.; it is located on the top of the chassis and constructed from $\frac{1}{8}$-in. thick aluminium sheets, as illustrated in Fig. 6. The tuning circuit components are mounted on the front panel of the screening box and not on the main RF unit front panel. The TVI filter capacitor C10, Fig 1B (*see* p.294, October) is assembled direct on to a small bracket located at the rear of the screening compartment. Self-tapping screws are used to fasten the screening box to the main chassis, making an RF tight compartment.

There is a tendency in amateur circles to use perforated zinc for ventilation purposes when constructing both screening compartments and cabinets. However, this material is unsuitable for such purposes because a corrosion known as "white rust" occurs in a very short time; drilled aluminium sheet has been used in this unit.

The VFO/driver and PA components located under the chassis are also screened; the screening compartment is constructed in the same manner as the RF screening box.

The control circuit is assembled on a $4\frac{5}{8}$-in. square aluminium sheet, cut-outs being made at one end to suit the relays used. (The original

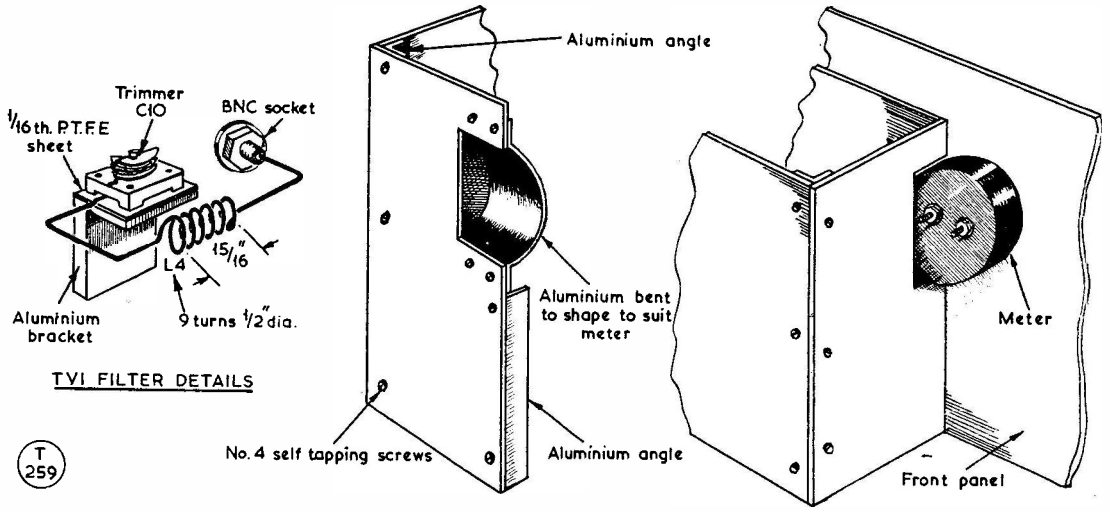
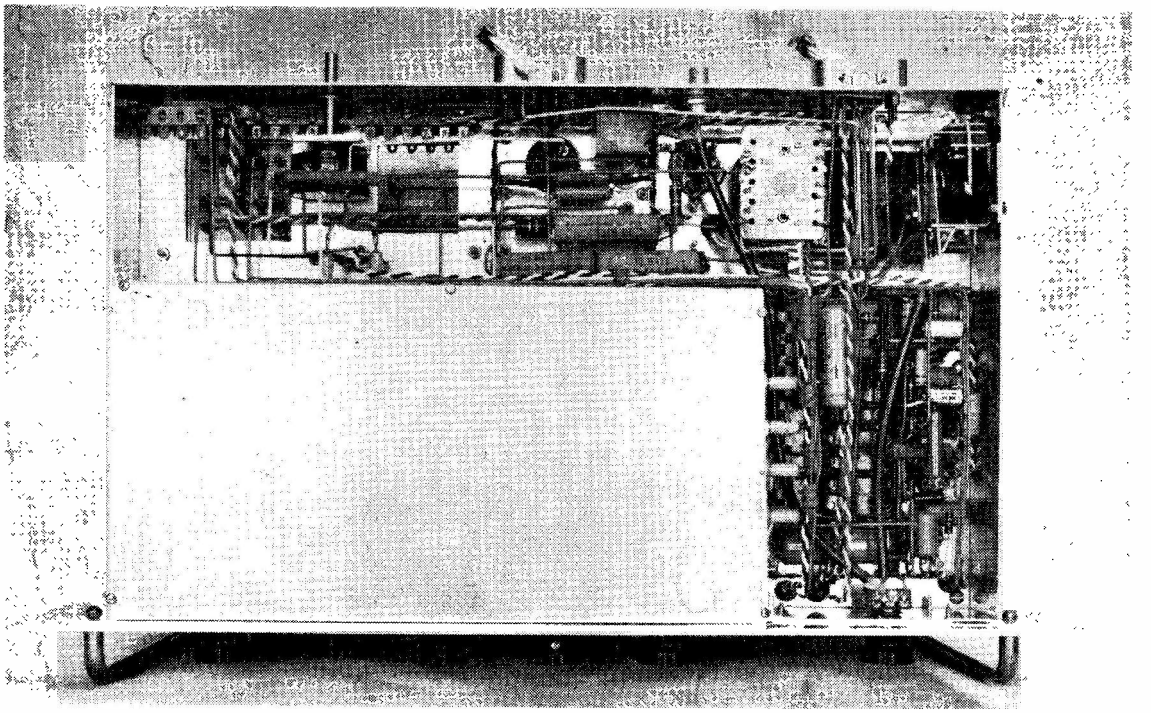


Fig. 6. Mechanical layout of the TVI filter (C10, L4 in the circuit on p.294 of the October issue) with screening box and meter mounting detail. For full TVI-proofing, it is essential to screen meters properly.



Neat wiring on the underside of the RF section of the G3CCA Transmitter. The screened compartment contains all the RF circuits, and connections into it are via feed-through condensers. On the extreme right of the chassis is the microphone pre-amplifier, with the audio filter circuits. The control relay is in the top right-hand corner.

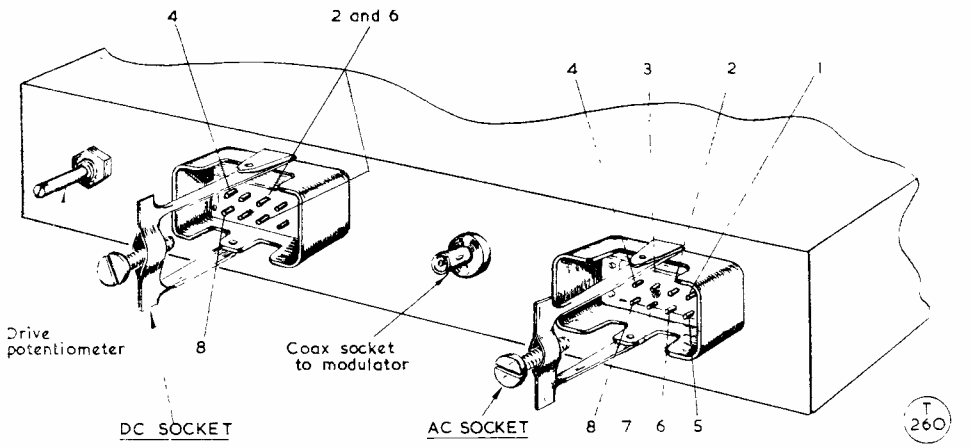


Fig. 7. RF unit plug mounting and wiring connections. Taking the DC socket, at left: 2, 6 to X2-X6 in PA control circuit; 4, earth; 8, to X8 in modulator. Connections to AC socket, right: 1, to No. 11 in control circuit; 2, to No. 13 in control circuit; 3, live side mains; 4, front panel light; 5, to No. 22 in control circuit; 6, earth; 7, mains neutral lead; 8, front panel light. For cross-reference to the main relay control unit, see p. 347 November issue.

control circuit, shown in the photographs, employs an ex-WD surplus transformer and a valve rectifier; this has now been superseded by a hermetically sealed "C" core transformer and a silicon rectifier.) A 16-way tag strip is mounted at the rear of the base plate; this is the distribution point for all leads to, and from, the control unit. The connection tags have been numbered in accordance with the system adopted throughout the transmitter; these numbers are indicated on the circuit diagrams. The completed control unit is finally mounted on $\frac{1}{4}$-in. hexagon rod $3\frac{7}{8}$in. long, tapped 2 BA at both ends.

The microphone pre-amplifier is assembled on the main chassis, underneath the control

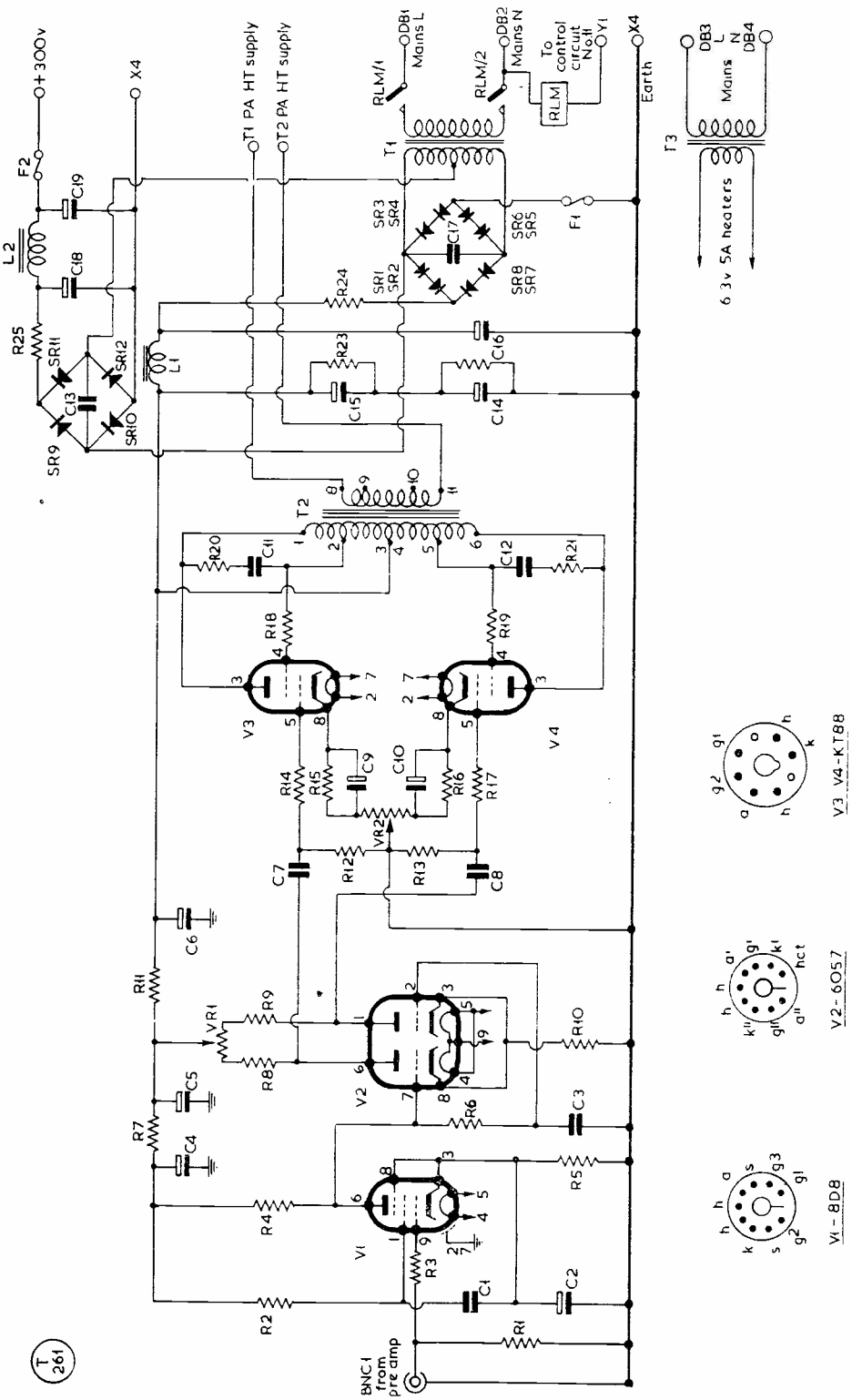


Fig. 8. Modulator circuit complete, with the associated power supply, using silicon rectifiers throughout — see text. These rectifiers can be substituted by conventional valve rectifiers, but more L.T. supply would be required for the valve heaters.

circuit. Screened P.T.F.E. valveholders are used and the valves inserted before assembling the control circuit on the supporting rods. As the valves in this transmitter have been "aged" for 100 hours, it is hoped that they will not require much replacement but should this be necessary, they can be changed by removing the four screws holding the control unit on the supporting rods. The latter, complete with all the connecting leads, can then be lifted clear of the rods and any faulty valves in the pre-amplifier easily replaced.

All the low voltage power circuit components are mounted at the rear of the main chassis: holes of the correct dimensions being cut in the chassis to accommodate them.

External voltages are taken in and out of the RF unit *via* "x" and "y" plugs at the rear of the chassis. These plugs are illustrated in Fig. 7 and comprise two Belling-Lee "Unitor" 8-pin plugs type L654/P, fitted with L654/R3 retainers. These can be replaced with ordinary octal plugs and sockets, but the "Unitor" type specified are strongly recommended.

Where it has been necessary to take a lead through a screening compartment, or the chassis, ·001 μF Dubilier type BPS643 feed-through condensers have been used. These assist in the reduction of TVI and ensure that no RF circulates in the DC circuits; further reduction is also achieved by eliminating "earth" currents from the PA screening compartment. This is accomplished by connecting together the two earthing points in the compartment with ½-in. wide copper braid.

Cabinet Work

Imhof extrusion has been used for cabinet construction, the panels being fitted to the frame work with $\frac{3}{16}$-in. Parker-Kalon No. 6 self-tapping screws instead of being "groove-locked" into position as recommended by the makers. The reason is because a heavier gauge aluminium than that specified for the extrusions has been used. This method of assembly can be recommended as it enables any panel to be removed if necessary without disturbing the extruded frame work; it also makes a very strong cabinet. The complete transmitter RF unit has been finished in a two-tone colour scheme using I.C.I. Belco Brushing Cellulose, with the extrusions white and the panels light grey. The cellulose was sprayed on the metal with a small hand spray-gun and the cabinet assembled when dry, taking care not to damage the sprayed surfaces. Black Decal transfers were used to identify the various controls, the former being "fixed" with white clear copal varnish after assembly on the panel.

Finally four rubber feet have been fastened to the bottom of the cabinet, and two handles made from $\frac{3}{8}$-in. dia. aluminium rod bolted to the front panel.

Modulator Section

The theme of the modulator design has been to reproduce the limited range of speech audio frequencies faithfully, as is necessary in modern amateur transmitting equipment (Fig. 8).

The audio signal from the microphone pre-amplifier (in the RF unit) is coupled to the

Table of Values Fig. 8. Modulator and Power Supply Unit *(opposite)*

Fig. 8. Modulator and Power Supply Unit

C1 – 0.05 μF paper tubular 500 v. wkg. T.C.C. type 543
C2 – 25 μF elect. 25 v. wkg. T.C.C. type CE59CE
C3 – 0.1 μF paper tubular 350 v. wkg. T.C.C. type 343
C4 – 8 μF elect. 450 v. wkg. T.C.C. type CE 90PE
C5 – 8 μF elect. 450 v. wkg. T.C.C. type CE 90PE
C6 – 8 μF elect. 450 v. wkg. T.C.C. type CE 90PE
C7 – 0.25 μF paper tubular 350 v. wkg. T.C.C. type 343
C8 – 0.25 μF paper tubular 350 v. wkg. T.C.C. type 343
C9 – 50 μF elect. 50 v. wkg. T.C.C. type CE100DE
C10 – 50 μF elect. 50 v. wkg. T.C.C. type CE100DE
C11 – 0.001 μF silvered mica 350 v. wkg. T.C.C. type SM2N
C12 – 0.001 μF silvered mica 350 v. wkg. T.C.C. type SM2N
C13 – 0.001 μF silvered mica 350 v. wkg. T.C.C. type SM2N
*C14 – 50 μF elect. 350 v. wkg. (Radiospares)
*C15 – 50 μF elect. 350 v. wkg. (Radiospares)
C16 – 16 μF elect. 600 v. wkg. (Radiospares "Hygrade")
C17 – 0.001 μF, moulded mica 1500 wkg. T.C.C. type M3GO
C18 } – 50 + 50 μF elect. 350 v. wkg. (Radiospares)
C19 }
*C14 *and* C15 *are P.V.C. tubular type with wire ends.*

R1 – 1 megohm H. S. Carbon: Painton type ± 5%
R2 – 1 megohm 1/2 watt ± 20% Carbon (Radiospares)
R3 – 5,600 ohms 1/4 watt ± 20% Carbon (Radiospares)
R4 – 220,000 ohms H. S. Carbon ± 5% Painton type
R5 – 2,200 ohms H. S. Carbon ± 2% Painton type
R6 – 1 megohm H. S. Carbon ± 1% Painton type
R7 – 220,000 ohms 1/2 watt ± 20% Carbon (Radiospares)
R8 – 150,000 ohms H. S. Carbon ± 1% Painton type
R9 – 150,000 ohms H. S. Carbon ± 1% Painton type
R10 – 68,000 ohms H. S. Carbon ± 1% Painton type
R11 – 22,000 ohms 1 watt Carbon ± 10% (Radiospares)
R12 – 470,000 ohms 1/2 watt Carbon ± 10% (Radiospares)
R13 – 470,000 ohms 1/2 watt Carbon ± 10% (Radiospares)
R14 – 10,000 ohms 1/4 watt Carbon ± 20% (Radiospares)
R15 – 470 ohms H. S. Carbon ± 1% Painton type
R16 – 470 ohms H. S. Carbon ± 1% Painton type
R17 – 10,000 ohms 1/4 watt Carbon ± 20% (Radiospares)
R18 – 220 ohms 1/2 watt Carbon ± 20% (Radiospares)
R19 – 220 ohms 1/2 watt Carbon ± 20% (Radiospares)
R20 – 1,000 ohms 1/2 watt Carbon ± 20% (Radiospares)
R21 – 1,000 ohms 1/2 watt Carbon ± 20% (Radiospares)
R22 – 100,000 ohms 1/2 watt Carbon ± 20% (Radiospares)
R23 – 100,000 ohms 1/2 watt Carbon ± 20% (Radiospares)
R24 – 20 ohms 2 watt Carbon ± 20% (Radiospares)
R25 – 10 ohms 1/2 watt Carbon ± 20% (Radiospares)
SR1–SR8 – Simet silicon rectifiers type 500 AS (Plessey)
SR9–SR12 – SenTerCel silicon rectifiers type FST1/4 (S.T.C.)
T1 – Mains transformer: Primary 200/250 volts 50 cycles
Secondary 0-260-500 volts 280 mA
(Gardner's Radio Ltd.)
T2 – Modulation transformer, Woden UM2
T3 – Heater transformer: Primary 200/250 volts 50 cycles
Secondary 6.3 volts 5 amps
(Gardner's Radio type LS4050)

L1 – 5H 250 mA Gardner's Radio type CS.5169
L2 – 10H 5 mA Gardner's Radio type CC.2234
BNC1 – Belling Lee BNC Coaxial connector
RLm – Series 100, 240v. 50c. coil, 2 pole relay.
F1 – Belling Lee minifuse holder and 500 mA fuse (anti-surge)
F2 – Belling Lee minifuse holder and 60 mA fuse
VR1 – 1,000 ohms 3-watt potentiometer
VR2 – 100 ohm Pre-set Potentiometer, Radiospares
V1 – Brimar 8D8 low noise Pentode
V2 – Brimar Trustworthy type 6057 twin triode
V3, V4 – Osram KT88 Pentode

first stage of the modulator V1, *via* BNC coaxial connectors and UR-43 cable. A Brimar 8D8 low noise pentode in a P.T.F.E. screened valveholder has been used in this stage, V1, Fig. 8; the value of the screen by-pass condenser C1 is chosen to give a sharp cut-off at the LF end of the audio range; this assists the filter in the pre-amplifier to attenuate all frequencies below 65 c/s. Should it be necessary to use a different type of valve in this stage, the value of the screen capacity may have to be altered in order to obtain the desired cut-off characteristic. The reactance of this condenser, at the cut-off point, should be equal to the dynamic screen-grid resistance of the valve.

To keep the background noise level to a minimum, Painton high stability carbon resistors types 72 and 73 have been used in both the first and second stages of this circuit.

The output from V1 is direct coupled to a Brimar 6057 (or 12AX7) connected as a differential amplifier: circuit balance is achieved by virtue of the potentiometer VR1 in the anode feed of V2. This system ensures that interstage phase shifts are kept to a minimum and when correctly adjusted, the total distortion in both V1 and V2 combined is very low, being assisted by the feedback introduced by the cathode circuit of V2. The DC levels of V2 are fixed by the cathode resistor R10, and it is essential that this should be a good one.

In the circuit of Fig. 8, the audio signal is only applied to the grid of one half of the double triode V2, the other grid of this valve being held at a fixed DC potential. Under these conditions the differential amplifier produces an output voltage at the anodes with the same characteristics as the conventional push-pull circuit; the overall gain, however, is lower, hence the need for a high-*mu* valve in this position. From these assumptions it can be seen that the output voltage of the differential stage will be affected if both sections of the double triode valve do not have identical characteristics.[7] Whilst this effect can be corrected to some extent by the inclusion of the balance resistor VR1 in the anode circuit, there is a tendency to upset the push-pull action and care is necessary when adjusting the amplifier to give a symmetrical output. If a "trustworthy" type valve is used, the differences between sections will be very small so that balancing can be easily achieved by connecting a high resistance voltmeter between the anodes of V2 and adjusting VR1 to give a zero reading with no signal applied to the input grid.

The output from the anodes of V2, Fig. 8, are coupled *via* C7 and C8 to the grids of the KT88 output valves; the latter are connected ultra-linear. This circuit ensures that the overall distortion is kept within reasonable limits and in this respect the modulation transformer plays an important part. It is essential that the transformer should be of the highest quality and have taps for obtaining the necessary screen connections. Even so, due to the high mutual conductance of the KT88 valves, precautions have to be taken to prevent parasitic oscillation occurring in the output stage; series resistors have therefore been incorporated in both the control grid (R14, R17) and screened-grid (R18, R19) circuits.

Minimum distortion in any output stage, at a given output, can only be achieved if the valves have identical characteristics and are operated under the same conditions. It is well known that due to manufacturing tolerances, any two valves of the same type may differ slightly in their electrical characteristics, so unless each pair of valves are matched, the ideal condition cannot be obtained. The employment of matched valves in any circuit presents difficulties when replacements are necessary, so it was decided in this modulator to combine the conventional ultra-linear circuit with a modified form of differential amplifier, thus producing a compensated ultra-linear output stage. (C.U.L.A.) The compensating resistor, VR2 in this case (Fig. 8) is in the cathode circuit of the KT88 valves.

This C.U.L.A. circuit was first applied by the author to a Mullard "510" audio amplifier during a series of valve experiments, with excellent results. The output transformer was a Gardner AS.7012 with adjustable screen taps. (All circuits incorporated in this modulator were tested in this low power device during the initial development stage.)

The modulation transformer is a Woden type UM2, connected according to the following arrangement to enable ultra-linear conditions to be obained:

V3 (anode) — connect to terminal No. 1.
V3 (screen) — connect to terminal No. 2.
V4 (anode) — connect to terminal No. 6.
V4 (screen) — connect to terminal No. 5.
KT88 HT feed: — connect to terminals No. 3 and 4 (joined together).

To enable the correct matching to be obtained for the 6146 RF valve, terminals 9 and 10 on the modulation transformer are joined together and terminals 8 and 11 connected in series with the 6146 HT supply, as shown in the PA power supply circuit, Fig. 10.

Balancing of the output stage is easily carried out with the aid of a high resistance voltmeter connected between the cathodes of the KT88 and earth. The correct operating bias is −50v. and the potentiometer VR2 should be adjusted to give equal cathode voltages, with zero signal input. An 100,000 o.p.v. Taylormeter was used for this measurement.

Silicon rectifiers are employed throughout this power unit—that is, in both the modulator and the PA HT circuits, and the relatively high cost involved is fully justified. It may be desired, however, to use standard rectifiers in place of the silicon bridge, and the necessary alterations can easily be made. The use of silicon devices as medium power rectifiers will be discussed later.

The mains transformer is a Gardner "Solent" with a 0-260-500 volt, 250 mA secondary, specially wound for DC bridge rectifier operation. A similar transformer can be obtained from Woden Transformers Ltd. If valve rectifiers are used, the chassis size will have to be increased to accommodate the larger transformers and the rectifier valves. The separate supply for the pre-amplifier circuit is not used with the valve rectifier, as shown in Fig. 9.

Valve rectifiers will require a heater supply, so that means the heater transformer (which in the circuits as shown only supplies the modulator audio valve heaters) will have to be replaced with a larger transformer to accommodate not only the rectifier heater of the modulator but also that of the PA 600-volt supply. A Gardner LS.4072 will meet the requirements; this transformer has three secondary windings giving (i) 6·3 volts at 4 amps for the audio valves, (ii) 5 volts at 3 amps for the modulator rectifier valve (Brimar 5R4GY) and, (iii) 5 volts at 3 amps for the PA HT rectifier (Brimar 5R4GY). With silicon rectifiers only one 6·3 volt supply is required, so a Gardner LS.4050 heater transformer is used. Whichever rectifier system is adopted, the primary of the heater transformer is con-

Chassis of the completed Modulator PA HT unit. At left nearest the front panel is the Modulator HT transformer. To near right at the rear of the chassis is the PA HT transformer. The CULA balancing potentiometer VR2 (see Fig. 8, and text) can be seen next to the KT88's, and on the extreme left is the modulation transformer.

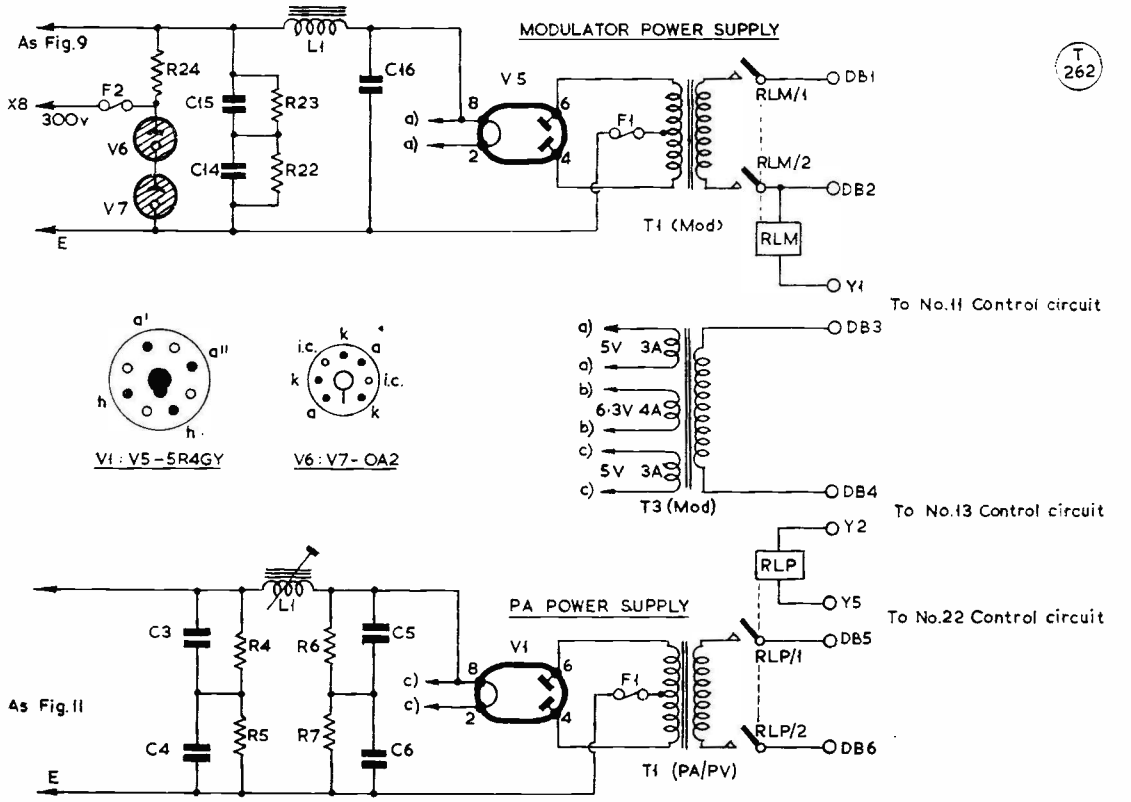


Fig. 9. A suitable PA/Modulator HT supply unit using valves in place of the silicon rectifiers suggested in the circuit of Fig. 8. While valves are cheaper and more readily available, the advantages of silicon rectifiers are that they are much smaller and require no LT supply, making for transformer economy. It is a matter of choice.

nected direct to the AC mains supply.

The primary of the HT transformer is connected to the AC supply through the relay contacts RLm/1 and RLm/2, the relay being operated by the control circuit in the RF unit.

A conventional smoothing circuit is employed and consists of a 5 henry 250 mA choke (L1, Fig. 9) in conjunction with a capacity filter C14, C15, C16. Series connected electrolytic capacitors C14, C15, enable both a high working voltage and a high capacitance to be obtained; a 100,000-ohm two-watt resistor R22, R23 (Fig. 9) is connected in parallel with each condenser to equalise the voltage across it.

PA High Voltage Supply

The British equivalent of the 6146 valve is rated at 600 volts maximum against the American rating of 750. This difference has resulted in some controversy and tests were carried out on valves of different manufactures: finally, a suitable 600v. circuit was evolved. The 6146 HT supply follows the same pattern as that used in the modulator and employs silicon rectifiers in a bridge circuit. As the peak inverse voltage of this system is in the region of 1,000 volts, two rectifier units are connected in series to form each arm of the bridge.

A Gardner "Solent" type transformer has again been used on account of its size. This has a secondary voltage of 510 volts r.m.s.

Table of Values

Fig. 9. Modulator/PA HT Circuit, modified for use with valve rectifiers

(NOTE.—*Components not listed are the same as those in the Modulator or PA HT supply circuits*)

Modulator Supply (ref. Fig. 8)
T1 = Woden or Gardner's Radio (specially wound)
Primary: 200/250 volts 50 c/s
Secondary: (screened from primary)
500-0-500 volts r.m.s. at 280 mA, potted version
T2 = Gardner's Radio Ltd., type LS4072
Primary: 200/250 volts 50 c/s
Secondaries (i) 6.3 volts 4 amps.,
(ii) 5 volts 3 amps.,
(iii) 5 volts 3 amps.
R24 = Delete R24 (Fig. 8) 20 ohms, and substitute 20,000 ohms, 10 watt in series with stabilisers
V5 = Brimar 5R4GY
V6, V7 = Brimar OA2 stabiliser
PA HT Supply (ref. Fig. 10, to follow).
T1 = Woden or Gardner's Radio Ltd. (specially wound)
Primary: 200/250 volts 50 c/s
Secondary: (Screened from primary)
600-0-600 volts r.m.s. at 200 mA, potted version
V1 = Brimar 5R4GY

and enables a DC voltage of 600 to be applied to the 6146 anode. The current rating of this winding is 200 mA.

For experimental purposes the above transformer was substituted by one with a secondary winding of 600 volts r.m.s. which, when used with silicon rectifiers, enabled 700v. HT to be obtained. This was applied to the anode of a Brimar 6146 valve operated under strict Class-C conditions for an initial period of 100 hours. The RF output from the 6146, connected to a dummy load, was measured with an RF wattmeter. Observations made over the initial period proved very interesting and further tests are being carried out with the object of applying the rated 600 volts to the valve when it is used for telephony. Until "life" tests have fixed the maximum permissible voltage for telephony, coupled with a reasonable life, it is not recommended that the British made valve be subjected to these excessive voltages for *long* periods. The DC input to the PA stage should therefore be limited to 60 watts on telephony and 90 watts on CW.

The silicon rectifiers may be replaced with a Brimar 5R4GY full-wave rectifier valve if desired, the circuit alterations being given in Fig. 9. A Woden swinging choke, type PCS.11, in conjunction with series-connected electrolytic condensers, is used in a conventional smoothing circuit; the condensers are fitted with voltage equalising resistors. The primary of the HT transformer is connected to the mains supply through the relay contacts RLp/1 and RLp/2; the RLp relay coil is energised *via* the control circuit in the RF unit.

(To be concluded)

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"DX ZONE MAP" NOW ON LINEN

Having been able to secure a quantity of linen-backed paper at a reasonable price, we can again offer our *DX Zone Map* on this more durable mounting. The print is necessarily limited, and your cost is only 11s. 9d. post free—if we have any left after the Amateur Exhibition! However, a small quantity is being held back for post orders, as the Exhibition will be over by the time you see this. In all other respects, the *DX Zone Map* is as previously exhibited, advertised and described—*see* p. 324, October issue SHORT WAVE MAGAZINE.

CORRECTION — "HEATHKIT DX-40U"

In the circuit on p. 352 of the November issue, the junction of SW3A-8/R24 should go to the top of R26, and not as shown.

RTTY PROGRESS

As mentioned on p. 364 of the November issue of SHORT WAVE MAGAZINE, one of the active protagonists for RTTY (radio teletype, or teleprinter) transmission is G3CQE, Norwich. He now writes that he has recently had several both-way RTTY contacts with VK3KF, lasting more than an hour, with printing well-nigh perfect. G3CQE uses an ex-G.P.O. type 3X printer, his terminal unit is three-stage only, and FSK working has meant having to add but one valve to his transmitter. Other recent DX QSO's G3CQE has had on RTTY have been with VE7KX and W2ZXM/MM—the run-of-the-mill contacts (which now have a more literal meaning for G3CQE!) have been so numerous that he has lost count of them! Interesting and successful three-ways have involved G3CQE-VK3KF-W6CG, all printing to one another—a "loop round the world," as G3CQE puts it. Several other U.K. stations are known to be getting ready for RTTY, but G3CQE looks like being the first U.K. operator to make WAC-RTTY, a distinction already held by VE7KX.

SMALL ADVERTISEMENTS — SERVICE TO READERS

It will hardly have escaped notice that the Readers' Small Advertisement columns have become an important feature of SHORT WAVE MAGAZINE, eagerly scanned by many prospective buyers on the look-out for bargains — and some very good bargains there are, too. The cost of these advertisements is kept low, because we regard small advertising as a service to readers—yet hundreds of pounds' worth of gear can, and frequently does, change hands through a notice costing no more than a few shillings. The current rate is 3d. a word, with a minimum charge of 5s. When sending in a small advertisement, please *write clearly*, and set the notice out to conform to the style shown in Small Advertisements in any issue of SHORT WAVE MAGAZINE.

SPECIAL NOTICE
PRICE INCREASE

Due to the continuing rise in production costs —which are outside our direct control—it has been found necessary to make a small increase in the cover price of SHORT WAVE MAGAZINE. With effect from the January 1960 issue, due out on January 1st, it will cost 2s. 9d. on bookstalls.

This increase will not, however, affect direct subscribers, for whom the annual subscription will continue at 33s. post free for a year of 12 issues ($5.00 U.S., and equivalent currencies), as at present.

We would like to assure readers that this increase is dictated solely by the outcome of the mid-summer printing dispute; this resulted in a rise in our cost of production, which we have already had to carry for some months.

DX COMMENTARY

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

IIIT

ALL the bands have at last come up to expectations, and DX has probably never been better than during the peak periods of the last month or so. The doldrums of the summer proved to be seasonal, as predicted, and the bands have shown a steady improvement ever since the fine weather left us. The interesting thing about the present situation is that *all* bands have improved so greatly—concurrently with the wide-open condition of Ten, we have real DX (such as ZL) workable on Eighty.

Make the best of it, all you newcomers to DX-as-it-should-be . . . it's pretty certain that the present conditions will not be surpassed, or even equalled, for another eleven years or so.

There have been many days during the last four weeks when it has been a real puzzle to know which band to operate. Ten and Fifteen have been equally good in the mornings (Far East, Pacific, Oceania); and again in the afternoons (mostly America); by the evenings Fifteen and Twenty have been neck-and-neck for assorted world-wide DX; around midnight Forty has been almost as interesting as Twenty, and probably more so by the small hours. And then in the early mornings one had to choose between assorted DX on Twenty, W's on Forty, or the chance of a ZL or something equally exciting on Eighty.

Finally, apart from all this, the Top Band has been just about as good as it could be. The first Trans-Atlantic crossing of the season has been made (*see* later paragraph), and GDX has been excellent, phone or CW, from as early as 1700 GMT, day after day.

CALLS HEARD, WORKED and QSL'd

The only person who could conceivably have any sort of grouse this month is the odd one who thinks DX has been *too* easy. Funnily enough, it hasn't! To off-set the wonderful conditions we have had increases in QRM on practically all bands, from the notorious "creepers" on Ten through the jammers and jingle-bells of the other HF bands to the strange soda-water-syphon noises on Eighty and more and more beaconry on One-Sixty.

However, receivers are a lot better than they were eleven years ago, and the volume of DX contacts being made is undoubtedly greater on this sunspot cycle than on the last. As for the next . . . we leave that to you. There may well be a "Worked The Planets" certificate for the VHF boys by then.

DX Gossip

The select few who worked VQ8APB will be relieved to hear that he was undoubtedly operating from St. Brandon Island, in the Cargados Carajos Group. The operator, VQ8AP, has worked from St. Brandon during August for the past three years, but with no success until this year. VQ8BBB is permanently stationed on Cargados Carajos, and hopes to be on regularly in spite of local power difficulties.

VP4WD is on the island of Tobago, not Trinidad (it's not a new one, as yet!) . . . Spitzbergen is hardly a rarity these days, since LA4CG/P, LA5AD/P, LA2TD/P, LA8FG/P and LA9RG/P are all working at the radio station there; they took over the transmitter formerly used by SM5WN/LA/P, who has now left. All QSL's *via* NRRL.

ZS6ASW hopes to be operating /ZS7 during early December, and should be on when you read this —14, 21 and 28 mc phone only. ZS6IF, meanwhile, expects to be signing /ZS8 from December 12 to 20. ZSØ (Walvis Bay) will *not* count as a new one—it remains in ZS3 territory.

MP4M (Muscat) is expected to be grouped with VS9O in Oman . . . HP9QP/CR8 was genuine, and was operating from a fixed location ashore; his cards have been received by W4IYC and should be distributed by now.

ZK1AU has left the Cook Islands for New Zealand, but when he returns in about three months he hopes to have better gear and a beam . . . There is a move to get some regular operation from the Tokelau Islands, ZM7, if a receiver and transmitter can be got together; a suitable character has been found who visits the islands for three months each year.

EL4A is operating on 7 mc, every Saturday at 0400 GMT; at other times he can be found on the other DX bands . . . VS4FC is said to be on 14100 kc at 1500-1600 GMT most days . . . VQ6LQ is on SSB, 14 mc . . .

From SWL P. Day (Sheffield): MP4QAO has been heard on 7015 and 7065 kc CW (2000 and 0200 GMT) . . . MP4QAD is on 14310 kc SSB (1500) . . . MP4MAE and 4DAA both work 14320 kc phone (1300 Sundays) . . . FK8AW is on at week-ends on 21100 kc CW (1045) . . . VR4BW is active, 14 CW . . . CR5SP on 28 mc phone (1430).

Andamans Expedition

Latest gen. on the promised activity from the Andamans is this: The call VU2ANI has been allotted to VU2AK, who hopes to have it on the air about the middle of December. A KWM-1 will be used on SSB and CW, maybe an AM rig as well, both with a Tri-Band beam. All QSL's, with stamped envelope or IRC, to W8PQQ—*QTHR*.

Lord Howe Activity

VK3ARX is returning to Lord Howe Island, and will operate as VK2FR, probably from November 15 onwards; the permanent holder of VK2FR has not been at all active—and possibly is not even interested at present—but VK3ARX promises to stir things up. No details of modes, bands, or times, unfortunately.

Christmas Island—another rare one . . . VR3V, VR3W and VR3X all belong there, and hope to form a club station. Meanwhile, VR3V is operating on 28, 21 and 14 mc with 30 watts, a dipole and an AR88.

The Creepies

Probably some at least of our regular readers will remember the distressing state of affairs on the old five-metre band in the early 1930's. The transmitters were usually single-valve Hartley oscillators and the receivers were of the one-valve squelch variety ("super-regenerative detectors" to the pundits). The transmitters were so unstable that anyone with a stable and selective receiver could not have received them; the receivers were so unstable that anyone with a stable transmitter would probably have passed unnoticed. Short-range working on phone was dead easy; but until we all grew up and developed stable transmitters and effective receivers, real DX on the 5-metre band was impossible unless stations went on high ground "to create a line-of-sight path."

Well, these creepy-crawly things infesting the 28 mc band are the same old pests come to life again, but from another part of the world! The stations concerned (you-know-where!) have obviously been operating squirt-and-squelch gear as novices on 70 mc, and have now been moved to 28 mc; so they have just wound new coils for their transmitters . . . with the ghastly results now obvious all over our ten-metre band.

The only way to treat this manifestation is to refrain from working them. In any case, it must be pretty difficult, since only about one in twenty is even intelligible on a normal modern receiver. If only everyone would refrain, they would surely have to improve their technique in order to make

FIVE BAND DX TABLE
(POST WAR)

Station	Points	3.5 mc	7 mc	14 mc	21 mc	28 mc	Countries
G3FXB	803	75	131	222	213	162	261
G2DC	789	84	114	236	196	159	264
G5BZ	783	64	119	267	205	128	276
G3FPQ	760	71	102	218	211	158	242
G3DO	686	24	47	248	188	179	275
GW3AHN	661	16	55	203	240	147	262
GI3IVJ	608	39	62	168	178	161	226
G3ABG	584	55	88	186	132	123	212
W6AM	566	40	68	296	96	67	296
G2YS	521	72	92	164	118	75	181
G3LET	468	32	92	183	118	43	201
G3IGW	447	44	73	112	119	99	163
UR2BU	446	18	42	143	136	107	180
GM2DBX (Phone)	427	34	31	160	102	100	176
W6AM (Phone)	424	23	62	279	49	31	279
G3JZK	408	17	60	94	137	100	187
G3FPK	404	36	82	126	99	61	159
UR2BU (Phone)	341	5	16	102	116	102	154
MP4BBW (Phone)	330	1	5	126	120	78	163
G8DI	312	32	60	91	72	57	127
G2BLA	304	33	57	71	74	69	120
G3DNR	286	10	23	90	80	83	128
G3MCN (Phone)	285	4	8	62	139	72	173
G3BHJ	272	8	27	37	128	71	156
G3LHJ	267	11	30	97	102	27	138
VO2NA	261	19	35	107	64	36	117
G3WP	256	17	34	80	24	101	138
G2DHV	256	22	27	128	59	20	143
W3HQO	227	3	8	76	110	30	155
G3NOF (Phone)	211	1	12	25	93	80	129
G3JFF	210	12	52	107	35	4	113
G3MMP	193	5	26	45	57	66	93
VQ4GQ	173	1	10	72	59	31	106
G3MJL	173	8	40	33	29	63	92
G3NAC	165	6	20	47	67	25	87
G3DNF	156	7	31	45	41	32	68
G3IDG	144	15	15	41	36	37	65

(Failure to report for three months entails removal from this Table. New claims can be made at any time)

any contacts at all. Unfortunately, they seem quite happy working each other, like they did on 70 mc. Some even boast that they are using FM! If Mr. Khrushchev could only realise it, one of the best things he could do for international relations would be to get these noises suppressed!

Ten Metres

The previous paragraphs covered one of the more distressing aspects of this band. However, there are still plenty of civilised signals to work, and the 'chasers have not overlooked many of them. G2DC (Ringwood) comments on a wonderful opening on October 21, when all continents were worked between 1200 and 1600. New ones on the band for him were BV1USB, ZS7M, 7G1A, EA9AP and VS9OM; also worked, OA4FM, VU2JA and 2MD, CR7EO, UA9 and Ø, VK, ZL and such.

GW3AHN (Cardiff) never fails to put in a good list, and this one (all 'phone) includes CT2's, CX's, HH2Z, HI8CJY, HK7LX, HZ, KZ5, MP4QAO, PJ2's, TI's, VP3MC, VP6's, VP9 and YV4CI.

G3ABG (Cannock), also on phone, collected 9K2AP, ZE's, ZD6FG, YV4CI, OQ5IG, ZS3S, HH2Z, VQ2's, VQ8AV, ZD2AMS and stations in RA3, RC2, RB5 and RD6. G3WP (Chelmsford) used this band only and added UO5SA for a new one; he also raised RA9CAR—"one of the few RA's with a readable call-sign"—and queries the prefixes actually claimable for WPX. This is covered in a short paragraph further on.

G3MBL (North Finchley) swapped phone with VE7PV, VQ4DT, XE2BM, PY, LU and W's; he runs 30 watts to a dipole and a 2-el. beam. G3MMP (Pinner) raised RN1AAB, VP6GT, YV4CI and IP1ZGY. G6VC (Northfleet) worked HI8CJY, OA4GD and PJ3AB; he missed the QTH of the latter—can anyone help?

GI3IVJ (Belfast) sends a very welcome report from Northern Ireland—from which part of the world we hear a great deal less than we would like—and says that on phone he worked CO, CR7, FB8CM, FE8AH, KZ5, JA's, MP4QAO, PJ3AB, TI, UL7FA, VQ2, 3, 4, 5, and 8, VS9OM, XW8AL, YA1AO, YN1BS, YS1IM, ZD3E, ZD6FC, ZS3B and 3LL, OQØPD, OR4RW, 9G1DG—and a whole string of "R" stations. CW fetched in JA's, FB8CJ, VQ4HT and 7G1A. This, we should say, puts GI right on the DX map!

G3NOF (Yeovil) also sends a terrific list of phones, which includes BV1USC, CO, CT2, CX, EA8, FF8, HI, HK, HZ, JA's, KR6DR, KZ5's, OA4IA and 4IT, OQ5's, VE2AIG/SU, VE8SY, VP5AB (Caicos), VQ2, 3 and 4, VS9AH, VU2NR, XE3CB, YS1IM, ZD3E, ZP5CG and ZS8I, as well as numerous R's, K's and W's.

G3MCN (Liverpool), again on phone, raised BV1USC, MP4QAO, UL7FA, JA, VU2NR, KZ5, KG6AIA, HZ1AB and RH8.

G3JZK (Cambridge) put in a score of about 100,000 for the "CQ" Phone Contest, during which he raised BV1USC, KG6AIA, FE8AH, XE1CP and EA8 on this band. G3DO (Sutton Coldfield) worked a number of those R stations, and mentions that RA9VHH is in Zone 18.

Fifteen Metres

After these formidable ten-metre lists, it is not surprising to find some even better and longer ones for Fifteen. Considerable "filtering" is necessary on grounds of space, but we have tried to keep all the really nice DX in the picture. (It's rather difficult to answer the question "What *is* DX?" for this band at present.)

GW3AHN worked CW with FP8BN, JZØHA, KP4USA, VK9RO, VP8EG, WL7DCC (Alaskan novice, and good for WPX!) and SP1JN/MM/ZA. Phone brought him CE, CO, CX, HC1IE, HH2MV, HK's, KL7, KR6HS and 6RB, PJ2AF, PZ1AA, TI, VP6, VP8EG, YN1WW, YV4CI and 5AGJ.

G2DC finds the short-skip on the wane but the commercials pretty trying (they reduce the CW band to about half its width these days). He also remarks that early-morning activity is somewhat less, and the band is apt to be dull until quite late in the morning. Two new ones were ZS8Q and VE2AIG/SU; others included CE2AT, CR7IZ (Ibo Island), HK3TH, KW6CGA, UI8AG, VS9OM, VQ8AD, XE1PJ and ZS3AH.

G3DNR (Broadstairs) added UD6AM, VS1GZ and VS9AE and also worked UA9, UF6, VK, ZL and W's. G3ABG mentions

Short Wave Magazine

DX CERTIFICATES

The following have been issued since the publication of our last list, in the September 1959 issue:

PRA

No. 3 K2OEA (N.J.)

WFE

No. 43 OH2NB (Helsinki)

FBA

No. 156 W6NJU (Los Angeles)
157 OH2NB (Helsinki)
158 G3KIM (Lincoln)
159 G3IMV (Bletchley)
160 SP7HX (Lodz)
161 DL7CS (Berlin)
162 DL6FT (Erlangen)
163 UA3AN (Moscow)
164 GI3JIM (Belfast)

WNACA

No. 222 GW3AQV (Pembroke)
223 G3DQC (High Wycombe)
224 F3DM (Toulouse)
225 G2YS (Filey)
226 GB2SM (London, S.W.7)
227 G3HHT (Henlow)
228 SM2BCS (Lulea)
229 G3WL (Plymouth)

WABC

No. 192 G3MWG (London, N.W.7)
193 G3FS (Sidcup) (*Phone, No.* 6)
194 G3WL (Plymouth)
195 GI3LFH (Belfast)
196 G3LLW (Lymington) (*Phone, No.* 7)
197 G6QN (London, S.W.19)

WBC

No. 141 K2PFC (N.Y.)
142 CT2AI (Ponta Delgada)
143 F8SH (Paris)
144 W8WT (Mich.)
145 W2GVZ (N.J.)
146 W1VG (Hartford, Co n.)
147 F9MS (Suresnes)
148 F3DM (Toulouse)
149 W2BUY (N.Y.)
150 W2BXA (N.J.)
151 DJ1UE (Oberhausen)

Details of MAGAZINE DX AWARDS and CERTIFICATES, and the claims required for them, appeared in full on p. 134 of the May, 1959 issue.

Overseas claimants may send either (*a*) A check list, without cards, duly certified by the Hq. of their National Radio Society, or (*b*) An uncertified check list, from which any or all cards may be called in by us. U.K. claimants must send the relevant cards for each award.

All claimants must include sufficient return postage for the cards and Certificate — five IRC's in the case of overseas claims.

CO2OZ, VP6FR, MP4QAO and YO3VI, all phone. G3LHJ (Newton Abbot) worked phone with HH2CB, VP4MM, VP6ZX and VU2CQ; CW with CR7IZ, VU2MD, VK and ZL.

G2VV (Sunbury), with CW and a 68-ft. *indoor* aerial, raised VP9DL, VQ3CF, YV5ACP, 9K2AN, OQ5IG, JA1IF, VK's, PY, W6 and innumerable U's. G3MMP's bag included VP6FR, IP1ZGY, KR6RB and some new Europeans.

GI3IVJ worked JA8OF and 9FV, OA4KF, UO5, VK9XK and VQ4HT, all on CW; the phone list was much longer and included CP3CC, CR5SP, CX, FB8CM and 8XX, FQ8AF, HC, HH, HI8JSM, MP4QAO, PJ2CE, PZ1AA, TI, VP3MC, 5BL and 8CX, VS9OM, VU2EJ, ZD1EO, 9M2DQ and 2EZ.

G3NOF worked entirely on phone and collected CE, CN8, EA6 and 9, EL4A, FB8CO and 8XX, FE8AR, FQ8AF, HH's, HV1CN (SSB), KR6HT, KZ5, OHØ, VK, VP6FR, VS1GZ and some ZC4's.

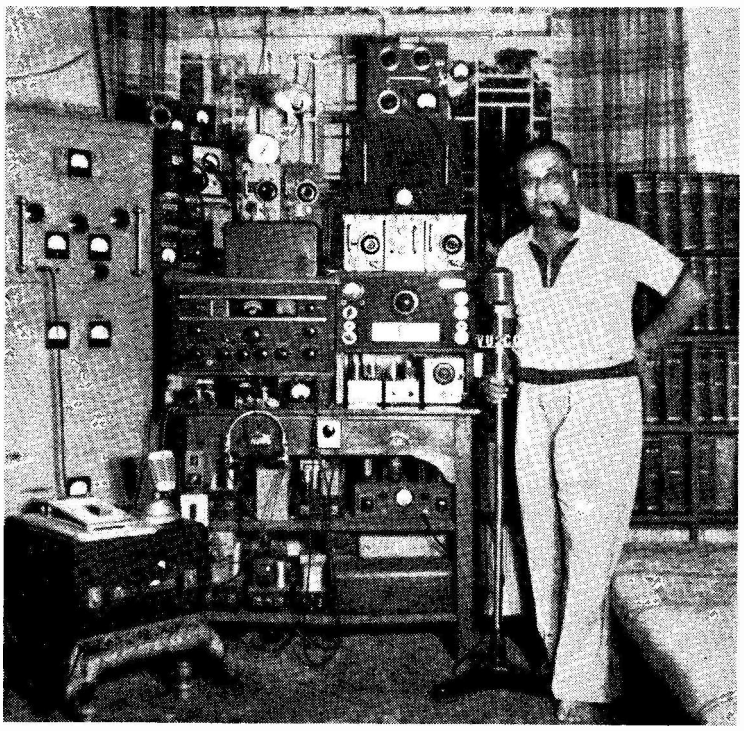
Twenty Metres

Many of our 'chasers say that the short-skip is less troublesome, but they seem to be the ones who cannot get on the band during daylight. G2DC says it's as bad as ever during daylight hours, but he managed to bag VR3V (Christmas Island) and UM8KAA for two new ones, never even having heard either country before.

G3DNR worked UF6KPA for a new country and W3SFR (Indiana) for a new state; G2VV confirms that the going has been tough during the day, but he did work VU2CM, PY, UA9 and the usual W's with his indoor aerial.

G5BZ collected FR7ZD for a new one; also FB8XX, HC4IE, VS9OC, PJ2CP, KH6's, MP4TAF, VE7 and 8, PY 7 and 8 and many others. G3GMK (Southampton) only uses two 33-ft. dipoles, both sloping, plus 35 watts and a few crystals, but managed to raise W6, VE4 and 8, MP4TAF, 5A2's, VO, VQ4, SV, UA9 and dozens of W's. He heard BV1USB telling someone that HL9KR is on 14 mc CW.

G2CZU (Bath) called a station signing "KY4AA," who didn't come back; he says there was a whole welter of stations after this one, but we have no gen. on him as yet.



VU2CQ is at Bombay, India, has a fine range of gear, and is active on all bands 3.5-420 mc inclusive, taking in also the 6-metre band. SSB is worked on 14-21-28 mc, with a Hammarlund SP400SX receiver; other receivers are an AR88, HRO and S22R, with a selection of modified Command sets and RF26 31 units for the 50 and 144 mc bands, and a modified R89-AR85A (U.S. surplus) receiver for 430 mc. Power used is 100 watts on all bands except VHF, where it is 25w. As can be imagined, VU2CQ also has a comprehensive selection of test gear and measuring apparatus. He was the first in India to receive BBC television signals.

G3LET (Westcliff) stuck to CW and raised EL4A, FG7XC, K5UTW/KG6, MP4TAF, VS4FC, VR2DA and ZK1AK—all after 1800 GMT. G3MMP's list includes 3A2BF, OHØNC, ZB1, PY, VK, OY2Z and some Europeans. G6VC caught up with Jan Mayen at last and raised LA1NG/P.

GI3IVJ, on CW, worked CP3CN, FF8AD, FG7XC, LA1NG/P, LA2TD/P, OA3D, VQ1SSB, 4HT and 5EK, and ZP5HK. On phone he raised EA6, TI, UN1, VE6QG/SU (his last day there), VP2AR, 3IG and 4TS, VQ4DT, YV and VK's on the long path. G3NOF (phone) worked UR2BU, 4X4CX and 4JT (the latter both on SSB).

GW3AHN raised ZS2MI for a brand-new one on phone, also LA3SG/P. CW brought in CR4AX, LA3SG/P, VQ1SSB and VQ1WVR. G8DI (Liverpool) got HC1JU on 14010 kc CW.

Forty Metres

One can hardly call this band a DX-chasers' paradise as yet—but there are more reports than usual, and there have been many converts to the rather esoteric joys of winkling out the rare ones from the particular brand of hash that is encountered on Forty.

G3NOF worked phone with OH and UB5; GI3IVJ used CW and raised CX2TF, OX3RH, 3A2BT, IS1MM, UA9CB, 4X4FV and numerous W's and PY's; G2DC also worked many W's and VE's, also PY, CX, VO, ZD2 and VK.

G3LPS (Blackburn) still sticks to 40 metres and says he thoroughly enjoys it, although

others might consider it a punishment; the secret is that he never *expects* to work DX, so that when it turns up it's always a pleasant surprise! New ones worked since the last report were VK3YD, UP2NL and 5A2CV; others were UL7FA, UA9 and Ø, OHØ, 3A2BB, ZB1, PY's and W's.

G3LET comments on VK3YD's "fabulous" signal, both mornings and evenings, and wonders what it will sound like when 7 mc conditions are really at their peak. He wants to see more African and Asian activity—when their signals *are* there, they are excellent. Best worked were ETE3CE, a funny one purporting to come from Addis Ababa, UI8KAA, UM8KAB, UN1AB, VK3YD, ZB1NR, PY's and W's.

SWL Peter Day thinks Forty has been the star band of the month, and his excellent lists include MP4QAO, VK3YD, VE4EH, ZA1KC, SVØWI, UM8, UI8, UH8, FA8EC, LU6DBQ and "hundreds of PY's and W's" on CW; HZ1AB, ZC4JB, 4X4GB, UA9CM, CO2AMS and 2QQ, YV1 and 5 on phone. He adds that VS9OM is known to be working G's on the band, as are VS1FZ (2330) and VQ4GQ (1815).

TOP BAND COUNTIES LADDER

(Starting Jan. 1, 1952)

Station	Confirmed	Worked
G2NJ	98	98
G3JEQ	96	97
G6VC	96	96
G3JHH	94	94
G3FNV	93	95
G2AYG	88	88
G3KEP	86	86
G3KOR	84	90
G2CZU	81	83
GM3AVA (Phone)	72	74
G3APA	70	83
G3LHJ	68	74
G2CZU (Phone)	67	68
G3MCY	65	67
G6QN	64	76
G3KEP (Phone)	62	64
G3FS (Phone)	61	61
G3NFV	55	63
G3LNR	50	56
G3MXJ	41	51
G3JFF	35	38
G3NKH (Phone)	20	32
G3JRH/A (*TTx*)	20	24

(Failure to report for three months entails removal from this Table. New claims can be made at any time.)

Eighty Metres

Poor old Eighty is still the odd man out as far as DX is concerned, although we have heard the ZL's many mornings at about 229-339. G2DC finds W's and VE's strong and plentiful between 0500 and 0700, and also worked a VO.

GI3IVJ worked 3A2BT on this band, but doesn't mention any other contacts. Others talk of QSO's with some of the more distant European countries, but don't claim that they are DX, or even unusual.

Top Band DX

Flash! The first crossing of this season was made on October 16, 0600 GMT, by W3RGQ and G3PU, after a series of skeds. W3RGQ is making a terrific effort this year, having written to more than 50 DX stations for skeds; he will be listening between 1827 and 1837 kc every Friday from 0430-0530, and every Saturday 0530-0630. Look for *him* between 1802 and 1822 kc.

W3ASK is a member of the U.S. I.T.U. Conference Delegation at Geneva, and will be listening to Top Band activities from his apartment, when time permits . . . KH6IJ is another who will be listening but not transmitting; he is studying at Harvard for a year.

W1BB received a Russian SWL card from Leningrad, reporting his signals 'way back in January—a 349 report, too. Yet another notch on what must be the notchiest stick in the Top Band business!

To be active this season: W1WY, W9PNE with a better and higher aerial, VE2AYE and VE3BWY and W11GU, returning to the band after 25 years. VE3BWY has suggested to W1BB that a W/VE Contest would stir up some activity on the band.

Please re-read last month's notes concerning the Sunday morning tests throughout the winter. In particular, observe the five-minute transmitting and receiving periods, and *DO NOT* call the W/VE stations on their own frequency. You will spoil your own chances and expose yourself to everyone listening as a lid.

Other Top-Band News

G3CNM (Cheadle Hulme) worked HB9IN and was also very pleased to hear EI8J put in an appearance. GB3RI was worked in daylight, as was G3FAU/P (Rutland). G3CNM has now worked 28 counties (best DX 208 miles) during *daylight* hours, but he is being very honest and discontinuing the search now, since, as he says, sky-wave conditions become apparent at all sorts of times, and he wants his tally to consist of purely ground-wave QSO's. Finally, he mentions that G3DFA reports an LX station active on the band.

G2DHV pulled off a nice one when he raised 5A2CW on October 21 at 2300. The 5A station is G3JFC, using 50 watts; 5A2CV (G3BBF) is also licensed for Top Band, using 100 watts CW and a long wire. They will both be taking part in the Trans-Atlantic tests.

G6QN (London, S.W.19) has collected his WABC at last—a tribute to his 33-ft. wire; he hopes it will encourage others, who have no space, to have a go.

G2CZU was away for a while, and was amazed to read of the

WPX LADDER

Station	Worked	Confirmed
G3DO	460	402
G3ABG	305	243
G3MCN	302	250
G3LHJ	299	200
G8DI	275	247
G2BLA	275	188
G3ABG (Phone)	250	169
G3MMP	200	121
G3JFF	106	15

(NOTE: *For next year, WPX Marathon starts from January 1st, 1960.*)

Expeditions that he had missed! He is after his WAGM—needs a GM4 and GM5 still. After that, the "Tops" Club Century and the London Town award . . .

G3JRH (Newmarket) sends details of some very interesting work with a Transistor Tx, signing G3JRH/A from Bury St. Edmunds; he has covered 24 counties, and his best DX to date is OK1VG/P, who gave him 569. Best phone contact was with G3NBR (Dartmouth) at over 200 miles, again with a 5 & 6 report. This, remember, with 350 *milliwatts!*

G2VV worked OK1WR and had a look round early one morning, when DL1FF was calling "CQ USA — no G's" and several G's were calling him "before his key-knob was cold." Luckily, there were no phone stations up at the LF end of the band during the DX period.

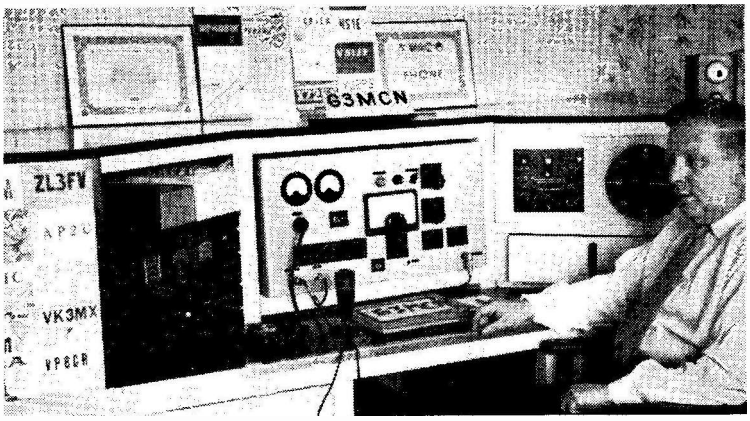
G3APA worked GM3BQA (East Lothian), G3MHB/P (Westmorland) and GM3COV (Caithness), among others. Best daylight QSO was with GM6RI (1650) during peculiar conditions which soon changed. G3APA still wants Shropshire for All English Counties, and Anglesey for All Welsh.

G3LHJ raised five new ones—GC3HFE (Guernsey), G4RJ/P (Scillies), GW3ALE (Monmouth), GM2HIK (Angus) and GM3CEA (Wigtown). DL and OK were also worked.

G2DC has had skeds with 5A2CV—as yet without results. The DL's have been heard calling and working YU's and ZB1's, but G2DC couldn't hear the other end.

Late Flash: In a further letter, G3CNM says that although the Russians are said to have lost the Top Band, UO5AA was heard working OK stations. G3MBS, it seems, has worked HA5KFR (599 most of the time), who was called by many other stations. The DL's are on until next March, but are only allowed 1825-1835 kc. Known to be active are DL1FF, 1YA, 3OO, 9KP and DJ2HC. ZB1FA put in an appearance, but G3CNM missed him. G5PP/M worked DL3OO while using 7 watts and an 8-ft. whip.

And after the second leg of the MCC party on November 15. HB9T emerged and worked G3KMO.



The operator of G3MCN, Liverpool 14, is also hon. secretary of the Liverpool and District A.R.S. After serving several years' apprenticeship as an SWL (which, he says, "helped a lot"), G3MCN was licensed in 1957; the main interest is 15-metre phone, and the station is described as all-commercial. G3MCN admits to being a DX enthusiast and sheepskin chaser, of which he has claimed 10 so far; the station record stands at 170 countries worked in 37 Zones, with 48 States.

Miscellany

G3LET writes that he now owns a teleprinter, and is feverishly equipping himself with converters, FSK keyers and so on with a view to becoming a fully-fledged RTTY exponent. He was a bit shaken to find that his typing speed wasn't quite up to the job, so that will have to be brushed-up, too!

It was recently mentioned here that VS5GS had been reported as using 200 milliwatts. G5MD (Bromyard) reports that when he worked him, 20 watts was the power. VS5GS is apparently Gordon Scott, one-time MD7DC, and is making inquiries about higher-powered equipment. Quite a lot of people reported working him last month, and there are a few more this month, but so far as we know he is still using 20 watts.

VK5WS (Adelaide) is ex-G3WS, and should by now be operational on 21 and 14 CW with a Vanguard and an HRO; a Quad covers both bands. He says that most of the activity in VK5 is local natter on 7 mc, with a very small amount of 144 mc work thrown in. He hopes to work many of his old G friends, and the QTH is Fred Jenkins, 24 Le Hunte Street, Wayville, Adelaide.

W2CTN *(QTHR)* notifies us that he is now QSL manager for all the following: ZD2DCP, OX3RH, VQ3CF, VK2FR, JZØHA, VK9BW, VR2DA and 2DK, VK9NT, FK8AT, KW6CU, 9G1BQ, FK8AW and 8AI, FM7WP, ZS7M, CR4AV, VQ4AQ, TI2WD, VK9GK, TG9AL, ZC4CS, HR2FG, OQ5BC and 5IG, VQ2EW, VQ3HH, ZB2I, VP6PJ, VK2AYY/LH, JZØDA, KW6CP, CR4AH and 4AX. Quite a list! And if you QSL direct, he wastes no time in passing the cards, either.

G3HTA (Exeter) writes that he had a good time during the "CQ" Phone Contest, quadrupling his score of last year; 54 countries were worked on 21 mc, and 36C on Ten.

SSB/AM

GW3AHN agrees with G3NOF that the SSB boys are only too willing to work the AM stations. He raises them so frequently (and beneficially to his DX record) that he has modified his receiver to include voltage stabilisation of the oscillator and BFO. Before long, he hopes to build an SSB rig for himself.

The CW fraternity should not overlook the fact that many of the DX SSB stations are fairly recent converts from CW, and they do not object to SSB/CW contacts. At least, they have BFO's running, which make

them far easier to raise on CW than many of the dyed-in-the-wool AM stations.

DX Flashes

ZD2AMS is said to be planning to go to Togoland for two weeks in January . . . VQ1SSB and 1WVR operated from Zanzibar for just two days, using SSB only. QSL *via* the VQ3 or VQ4 bureaux.

VR3V is packed up by now and may even be back in G-land, but he says further activity can be expected . . . VS9OM will remain in Masirah until about the end of December; he is testing on 21 mc with a new rhombic, and is also very active on 7 mc.

Six Metres

Hardly anyone seems to take any interest in the 50 mc band these days, but SWL Peter Day always supplies some interesting snippets. Among this month's are the following: Known to be on 6-metre phone, and looking for DX, are KG1FN (Fletcher's Ice Island), VP5FB, XE1PFE and KH6UR. VQ5FS has been heard on 28 mc, calling for cross-band contacts on 50 mc. The ZE's continue to work ZC4 *via* trans-equatorial scatter.

The WPX Ladder

Apparently, many people were not quite clear what "WPX" was all about — it was obviously our own fault for not giving more details. Taking January 1st, 1957, as the commencing date, *every* different prefix counts, including the numeral; thus G2, G3, G4 and so on each score one point, as do GI2, 3, 4, GM2, 3, 4 and the whole lot. LA3SG/P is different from an ordinary LA3; W2ZXM/MM is different from an ordinary W2; but, on the other hand, suffixes like W9XYZ/VO2 count as a VO2. WA, WV, KN, K and W are all different, together with all the numbers that follow. RA1, RB5 and that series count in addition to UA1, UB5 and so on.

For the purposes of the act, the prefix consists of the nationality prefix *plus* the figure; if there is a suffix, that is also considered as if it were a prefix—except in the case of our own /P, /M and /A, which are operational suffixes with no indication of a QTH away from one's own country.

The WPX Marathon, 1960

Bear the above rules in mind, but now start with a clean sheet from January 1st next, and you can enter the lists for the WPX Marathon Contest we are running throughout 1960. We will not be taking confirmations into consideration—they confuse the issue when so many countries will be those from which one might not bother to ask for QSL's. Simply list every different prefix contacted, from January 1st onwards, and send your figure in each month.

Your first entry can be sent on the deadline date in January, and will appear (although only representing half a month's work) in the February issue. No prize for the winner except an appearance in the honours list!

The USA Call-Signs

While on the subject of prefixes, we may as well elucidate the rather complex situation concerning USA calls at present. It seems that many 'chasers do not yet understand quite what is happening.

When the straightforward W calls were exhausted, the prefix K was adopted. In some districts, such as the 2nd, where the list of K's ran right through to K2ZZZ, they started all over again with WA. All right so far?

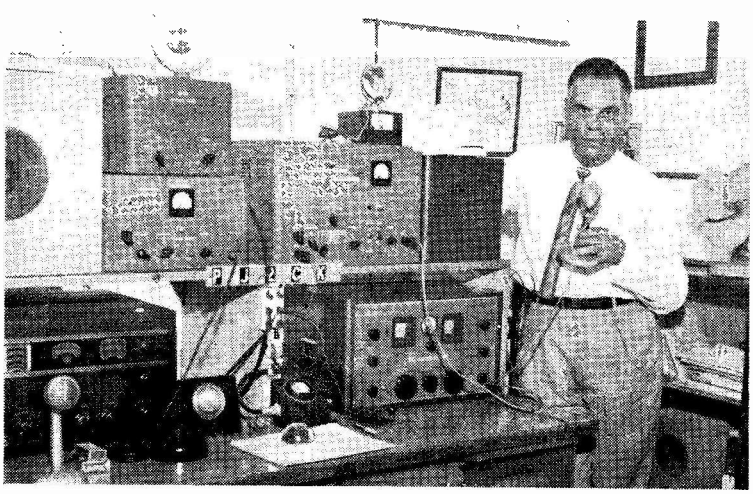
Novices were allotted calls with the prefix KN in some districts, but WV in others. On the other hand, novices in KB6 became WB6; in KG6, WG6; in KH6, WH6, and so on. Around the other U.S.A. territories you will find WP4's, WW6's, WL7's and such. Substitute K for W and you know what the real prefix is.

For the record, the W districts now run the following calls: W1, K1, KN1; W2, K2, WA2, WV2; W3, K3, KN3; W4, K4, KN4; W5, K5, KN5; W6, K6, WA6, WV6; W7, K7, KN7; W8, K8, KN8; W9, K9, KN9; WØ, KØ, KNØ. There are 32 different prefixes for your WPX right away! In each case, the last-quoted prefix is the novice label. (And, to make things more interesting, some of the districts start their KN calls half-way through the alphabet instead of at the beginning.)

All right, it's complicated . . . but you try explaining to a W station why *we* can have a G2, a G3, 4, 5, 6 and 8 all living in Southampton and you'll realise that our own system isn't crystal-clear to everybody in the world! (Why no G1, 7 and 9?)

Send in your Scores!

The CW half of the *CQ World-*



PJ2CK, Curacao, Dutch West Indies, is an ex-sea going operator and keen on Top Band work — but, owing to local regulations, he is unable to transmit on 160 metres. However, he will be listening through the current Top Band test scbedule (see p. 363, November "DX Commentary") and will report on any U.K. signals heard.

Photograph W1BB.

UR2BU is a very active station at Tartu, Estonia, one of the old Baltic States. He is a keen collector of QSL cards and DX certificates, being the holder of several of ours, and has a high standing in the DX tables.

wide Contest will be all over by the time you read these words, but naturally at our time of writing it is still in the future. It will probably be the liveliest DX scramble in history, if conditions stay as they are, and no doubt the most fantastic scores will be notched up.

Please tell us about your own scores in your next letter. The U.K. has been very poorly represented in this Contest during the past few years; we hope that this will have been put right, and we might as well publish some of the approximate scores as soon as they are known. Some phone scores have already come in, but they will be held till we get a few more and can present a fuller picture.

It might even be possible to persuade the Editor to present the highest U.K. scorer with a year's free subscription to the *Magazine* —you never know!

Hot Flash — New Countries!

ARRL have now accredited two new countries for their official list: Cargados Carajos Islands, VQ8—B; and Willis Island, lying outside the Great Barrier Reef. VK4IA is situated on Willis Is. and is reported to be active on 14 mc CW in the mornings.

And now, once more, it is our pleasant duty to wish all readers a Merry Christmas and the Happiest of New Years. Especially we must include all those whose co-operation makes the monthly preparation of this Commentary more of a pleasure than a duty—may their DX never grow less and may their finals never blow up.

Don't forget the deadline—**first post on Friday, December 11.** Address everything to "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. Be seeing you next month, and, meanwhile, 73. Good Hunting, and - - MX!

POST OFFICE RADIO SERVICES

GOLDEN JUBILEE OF THE COAST STATION ORGANISATION

AS most readers will know, the ship-shore radio services between the U.K. and ships at sea, in all parts of the world, are provided by the Post Office. These services have reached an advanced stage of development and a very high standard of operating efficiency, so that the G.P.O. radio system, as now in being, is unrivalled by any other administration in the world.

This year sees the golden jubilee of that part of the ship-shore service most familiar to radio amateurs —the Coastal Radio organisation in the 2 mc frequency area, with the transmitters round our coasts on frequencies between 1·8 and 2·0 mc, working cross-frequency to ships on various channels in the range 2·0-2·5 mc. In fact, most G.P.O. Coast Stations cover a wider frequency area, for both transmission and reception. Some photographs and notes on one of the newest of these stations, Ilfracombe Radio, appeared on p.101 of the April 1959 issue of SHORT WAVE MAGAZINE.

The Coastal Radio Service was actually started at the turn of the century, the original stations being Niton, North Foreland and Seaforth, operated by the Marconi Company for Lloyds. The first of the G.P.O.'s own stations (since dismantled) was that established at Bolt Head, S. Devon, in 1908; during the next year the whole system was taken over as a G.P.O. responsibility. Incidentally, this came about by reason of decisions reached at the very first International Radio Conference, in 1906.

With the authority for providing and operating the service, the G.P.O. also became responsible for marine radio installations and operator licences. All ships' radio officers must hold the P.M.G. certificate, and the equipment installation for every British ship over 500 tons register has to be approved by the G.P.O.

The level of traffic nowadays is enormous. With some 6,000 ships on the U.K. register using the service, plus another 3,000 or so foreign vessels, more than one million messages are handled in a year, with something like 100,000 radio-telephone and phone-patch calls. The radio-telephony service was started in 1934 (and thus celebrates its silver jubilee this year), the system now in use permitting two-way or duplex working, as in an ordinary landline telephone conversation. The radio transmit-receive paths are fed to the two-wire telephone landline through a control unit which adjusts levels and separates the signal both ways—there is more circuit trickery involved in this than meets the eye.

Long-Distance Working

The Coastal Radio Service—for ships in the near neighbourhood of the U.K.—say, up to 450 miles out —is one thing, but the world-wide service for deep-sea ships, which may be anywhere in the world, is quite another.

This is provided by the magnificent Burnham-Portishead HF band system, known as Portishead

Radio. Magnificent is the word. The Portishead station, on a commanding site overlooking the Bristol Channel, has a total of 16 CW transmitters, running 7-12 kW, on 22 selectable frequencies, all controlled by landline from the receiving point at Burnham (nr. Highbridge, Som.), 30 miles away. The frequencies are in the 4, 6, 8, 12, 17 and 22 mc ship bands, under call-signs such as GKD, GKU3, GKJ or GKT7, the station main call-sign being GKU.

At Burnham, the receiving and control point, the main feature of the installation is the aerial system, which consists of 10 double rhombics and more than 20 other aerials for general coverage at various frequencies, all extending over an area of 40 acres. The aerial-receiver layout is such that any of 16 operators can select any one of the ten rhombics which, being bi-directional and laid out at 18° separations, give coverage in any required direction over the whole 360°. The lobe width of these rhombics is about 20° in either direction, so that, in effect, "rhombic gain" is provided in all directions. Since long feeder runs are involved, they are fed to the receivers through wide-band amplifiers. A separate switching system brings in the non-directional general coverage aerial for listening and searching over a particular band, since it cannot always be known where a ship is when establishing preliminary contact.

The receiver used throughout at Burnham is the Marconi CR150. An operating position, one of the sixteen, consists of the CR150 receiver, a CW key, and a panel for selecting a transmitter at Portishead, with its control line; there is also an indicator board to show which transmitters (channels) are already in use. All operation from Portishead Radio is on CW, and the service given is world-wide.

What is known as the "Long-Range Radio-telephone Service," also operated by the Post Office (through the International Telephone Exchange) is an entirely separate HF system—somewhat similar to the Portishead Radio set-up — with transmitters at Rugby and Criggion (Montgomeryshire) and receiving points at Baldock, Herts., and Bearley (nr. Stratford-on-Avon). In addition to this long-distance system, the radio-telephone facilities have recently been extended by the use of VHF/FM for local working from certain of the established Coast Stations — including Niton, GNI, and North Foreland, GNF, which, as we have seen, were the very first links in the ship-shore service established nearly 60 years ago.

This brief summary only begins to outline what is involved in the present-day G.P.O. service to ships, built up over the last 50 years by a devoted band of enthusiastic radio engineers, operators and far-seeing administrators, always ready to improve and expand facilities, and anxious to take advantage of the latest technical developments. And, be it noted, all this is being done by the Post Office as part of its public service. It is achievement of which we, with our specialised interest and activity in radio communication, can be very proud.

The G.P.O. is not now resting on its success over the last 50 years. At present under investigation is the use of automatic telegraphy and the extension of the Telex service to the big passenger ships. Perhaps even more significant is the fact that Land's End Radio, GLD, has just taken delivery of the latest Redifon G.423/R.403 equipment, for SSB transmission and reception on up to eight spot frequencies in the ship MF (2·0 mc) band; the G.P.O. contract also provides for this equipment to be fitted at Anglesey, Niton and North Foreland.

Celebration

The jubilee year was fittingly celebrated at a reception given by the new Postmaster-General, the Rt. Hon. R. Bevins, M.P., at the Baltic Exchange, London, on November 4; he was supported by Sir Gordon Radley, Director-General, G.P.O. In the course of the proceedings, a radio-telephone contact was worked with the Canadian Pacific liner, *Empress of England*, in the St. Lawrence Seaway.

Two presentations of unusual interest were made by the Minister—the first to Mr. R. Ferguson, now general manager of the Marconi International Marine Communication Co., Ltd., who gained his P.M.G. operator's certificate in 1911; his ship was torpedoed in 1914 (at the mouth of the St. Lawrence) and, with

Close-up of an operating position at Burnham, the receiving and control centre for Portishead Radio. The receiver is a Marconi CR-150, to which a wide variety of receiving aerials can be connected by switch selection. The control panel enables the required transmitter frequency (at Portishead, 30 miles away) to be picked out, and there is also an indicator system to inform the operator which transmit-channels are already in use. Note how the receiver is recessed for comfortable manipulation.

Photograph by courtesy Postmaster-General.

General view of the HF receiving room at Burnham, from which the Portishead Radio transmitters are remotely-controlled for DX traffic with ships in all parts of the world. Each position is a separate channel, there being 22 selectable transmitting frequencies available, in the ship bands 4, 6, 8, 12, 17 and 22 mc. The operator at each position also has a number of receiving aerials at choice, selectable by switching, ranging from omni-directional systems for particular bands, to rhombics for reception in any special direction. The aerial farm at Burnham covers 40 acres.

Photograph by courtesy Postmaster-General.

all his belongings, the certificate was lost. The presentation took the form of a suitably inscribed and mounted replacement.

The other presentation was that of his P.M.G. certificate to the most recently qualified radio officer —this turned out to be Philip Baker, aged 18, of Hayes, Middlesex. Not only was this the very first time for a P.M.G. certificate to be presented to the holder by the Postmaster-General in person, but it also transpired that the recipient is a very recently licensed radio amateur, G3NPQ. It was unanimously agreed that the only proper objective for G3NPQ could be that, in the fullness of time, he should succeed to the chair of the Postmaster-General, there to preside over the Radio Service, some of the achievements of which have been outlined in these notes.

A.J.F.

NORWOOD TECHNICAL COLLEGE— CENTENARY EXHIBITION

The callsign GB3NTC has been allotted for a station to be on the air during December 14-18, from the Norwood Technical College, Knights Hill, London, S.E.27, the centenary of which is being celebrated this year. It is hoped to work all bands 3·5 to 28 mc, CW and phone, with some 14 mc SSB if practicable. The station will be run on "contest lines," to give as much coverage as possible, as the GB3 call will be of interest to those after the WPX rating.

CLUB ACTIVITY INCREASING

During the last year or so, there has been a notable increase in general Club activity—as regards both the formation of new Club groups and the re-activation of others which, for one reason or another, may have been moribund. Practically all Amateur Radio clubs and societies are glad to welcome new members, either transmitter or SWL. If there is a club in your neighbourhood, why not join it? Check through the list of addresses, given in the panel in the "Month with the Clubs" feature, in this and the last two or three issues of the *Magazine*.

AMATEUR RADIO EXHIBITION

LONDON, NOVEMBER 25-28, 1959

THE Radio Hobbies Exhibition, sponsored by the Radio Society of Great Britain and organised and managed by P. A. Thorogood, G4KD, was opened on November 25 at the Royal Horticultural (Old) Hall, S.W.1, by Rear-Admiral K. R. Buckley, who is Chief Electrical Officer, Royal Navy. In the course of his remarks, Admiral Buckley laid emphasis on the valuable work being done by radio amateurs as amateurs, though it is recognised that nowadays many professional engineers hold amateur licences. In tracing the general development of Amateur Radio over the years, he mentioned the pioneer work of Hogg, 2SH, "that Mill Hill schoolboy who first showed that long-distance communication was possible on the short waves." As proof of the Service interest in Amateur Radio, Admiral Buckley drew attention to the Service representation at the Exhibition, with the Royal Navy, Army and Royal Air Force stands.

There were two interesting presentations—the first was the Exhibition prize for what was considered to be the best piece of commercial equipment for the radio amateur; this went to David Godwin, of Minimitter, Ltd., for their MR-44 Communications Receiver. The prize for home-built apparatus went to W. J. Colclough, G3XC, of Slough, for a receiver using transistors throughout.

Among the supporting party on the platform at the opening ceremony were Major-General E. S. Cole (G2EC), A./Cdre. H. Blair, Lt./Col. W. Milner, Dr. R. L. Smith-Rose. Mr. John Gilbert, and Dr. F. E. Jones. The speakers were introduced by the Exhibition manager, and Dr. Smith-Rose proposed a vote of thanks to Admiral Buckley. The official party toured the Exhibition and those of them without much experience of the *practique* of Amateur Radio were astonished not only at the range and quality of the equipment, but by the fact that what is often supposed to be no more than a hobby-interest could support such a large commercial display.

This year, there were more than 30 exhibitors, who reported good business and a keen interest in their products. Probably, many people come to the Exhibition merely to see and be seen, but this year there appeared to be more serious buyers—those who made a point of coming to examine particular items of equipment before deciding to buy—than ever before. The "Saturday crush" was again phenomenal, though it was evident that, to avoid it, many people had arranged to come in on a week-day morning—all right for those who can fix it, as somebody said!

GENERAL REVIEW

A first impression of the Hall when the Exhibition was ready to open was one of rotary beams and gleaming gear. The following report attempts to pick out the items that interested your correspondent, but in fact it would not be possible to mention all there was to see.

At the **K.W. Electronics** stand, where everything is "designed by professionals for amateurs," we found their new Single-Sideband Transmitter, for which the crystal filter is based on the G2NH design first published in SHORT WAVE MAGAZINE. The pass-band is quoted as flat within 4 dB over 250-2800 c.p.s., the unwanted sideband rejection being better than 40 dB. The SSB drive output is on 80m., with a band-switched crystal multiplier for covering all other bands to 10m., the PA being a pair of 6146's running 185 watts p.e.p. The power supply is a separate unit and the price complete (Tx with PSU) is £118. On the receiving side, *K.W. Electronics* were showing the K.W. 76 Mobile Receiver, an extremely compact and well engineered job, suitable for use either under the dash, or from the home station with an A.C. mains supply. Frequency coverage is in seven switched bands, and the circuit is double conversion (4·6 mc/465 kc) with BFO and noise limiter. Smaller items of considerable interest were the KW Match, an SWR measuring device for coax feed lines, and a fully transistorised power supply unit which gives 300v. at 140 mA for an input of 12v., 4 amps. The size of this PSU is only 4 ins. by 4 ins. by $1\frac{3}{4}$ ins., yet it gives more than 40w. HT with an efficiency of about 87%.

With American radio importation now freed, there was naturally much interest in the **Collins** display, which included the 32S-1 and 75S-1 amateur-band SSB equipment, with the KWM-2 mobile (or fixed station) SSB transceiver. The compact dimensions and beautiful finish of this gear were very much admired—and even if the price is high, *Collins* rightly feel that there is a good market for them in this country. In the KWM-2 Transceiver, the rated PA output is a nominal 100w. into a 50-ohm load, the frequency range being for the five amateur bands 3·5-28 mc. The 32S-1, as an SSB transmitter, runs 175w. p.e.p. and can be used as a driver for the 30S-1 Linear Amplifier to get the 1 kW RF output p.e.p. which is permissible in the States and some other countries. The more usual set-up would be the 75S-1 and 32S-1 operated as an SSB transceiver for home station working.

At the stand of **Minimitter,** we found the six-amateur-band MR-44 Receiver, which is an 11-valve double-conversation design with "8-in. slide-rule" tuning over all bands, and suitable for CW, AM phone and SSB reception by switch selection; a half-lattice crystal filter gives 3 kc bandwidth and the 2nd osc. stage is crystal controlled; a Q-Multiplier is incorporated, with a calibrated S-meter and special AVC system to prevent over-loading on strong SSB signals. At its list price of £55, the MR-44 is sure to stimulate a wide demand. Also on the *Minimitter* stand, your correspondent ran over the re-designed Mercury Tx which, using the new G.E.C. TT21's in the PA, now gives an input rating up to 200w. CW and AM/FM phone; by the use of negative-cycle loading, the AM speech power is considerably increased. For those many readers who have recently been asking us about where to get a Multi-Q unit as a receiver refinement,

Minimitter's have a neat one-box, one-connection design, which is priced at £5, and has the necessary controls for achieving crystal-filter selectivity, together with the advantage of "exalted carrier" reception.

At the stand of **James Scott,** now U.K. concessionaires for the famous American range of Hallicrafters equipment, we saw the HT-32 AM/CW/SSB Transmitter, which is only 20 ins. wide by 10½ ins. high by 17 ins. deep, but runs 140w. p.e.p. for the five bands 10-80 metres, with a voice-control system built in; this Tx conforms to all (U.K.) G.P.O. requirements. The PA runs a pair of 6146's, and one of the panel controls gives upper or lower sideband selection. The Hallicrafters receivers on show included the S-38E, S-107, SX-101A, SX-100 and SX-62A. The SX-100 is a 538 kc - 34 mc design in four switched bands, with calibrated bandspread over the five bands 10-80 metres, and features include a 100 kc crystal oscillator for accurate band-edge setting, a T-notch filter, and SSB reception by switch selection. The SX-101A is a more sophisticated design which includes a converter for reception on the 2-metre and 6-metre amateur bands; the tuning range is full-scale over 10-80 metres, with a marker crystal oscillator and five selectivity steps from 500 cycles to 5 kc.

Two new items of particular interest appeared on the **Labgear** stand—the QRP version of the well-known LG.300, now available as a 50-watter, and the *Labgear* Top Bander, a CW/Phone 160-metre transmitter, self-contained, in a very attractive cabinet. *Labgear's* were also showing their new SWR indicator unit, a multi-band Cubical Quad assembly, and the full range of coil assemblies for home-constructed apparatus.

The highlight of the **Taylor** stand was the new Model 127A Multimeter, which is a pocket-sized instrument with a sensitivity of 20,000 o.p.v. With more than 20 voltage/current/resistance ranges, it will read up to 20 megohms and (with a probe) to 25,000 volts; the nett price is only £10. A high-grade instrument in a different category was their Model 100A, which has a sensitivity of 100,000 o.p.v.

For several years now, **Home Radio** (Mitcham) have been at the Amateur Radio Exhibition. As factors, they handle a wide range of proprietary apparatus and equipment, including the entire Eddystone catalogue; of great interest on this stand was, of course, the Eddystone "888A" Receiver; this is designed specifically for the amateur bands and has full bandspread with a built-in crystal calibrator for checking the dial reading over the whole tuning range. *Home Radio* also do kit sets for simple receivers, of particular interest to the beginner; these kits are modestly priced and include a one-valve short wave receiver.

As many readers already know, **Daystrom** are coming to the fore with their Heathkit equipment, all supplied only on a direct-from-factory-to-user basis. These kits, which cover a wide range of apparatus, including transmitters and test and measuring gear, come absolutely complete down to the last length of wire required; all parts supplied are of the best make, many items being specially designed for the Heathkit assembly with which they are to be used. As already mentioned in SHORT WAVE MAGAZINE, the descriptive manuals accompanying the kits are outstanding—not only well written, they cover every possible detail, and are durably bound for hard work on the bench. Apart from the DX-40U, a transmitter kit in which many visitors were greatly interested was the DX-100U, which is a full-powered all-band VFO controlled CW/Phone transmitter.

Again on the kit theme, but in a different context, we were interested to see the Lektrokit chassis construction system shown by **A.P.T. Electronic Industries;** this is designed to eliminate the plumbing, in that by the use of a number of pre-fabricated chassis items, a circuit can be built up with only essential wiring to be carried out. Needless to say, the Lektrokit system is in daily use in those research laboratories in which any electronic development is being done.

It is hardly necessary, after all these years, to draw attention to the range of instruments and test gear produced by **Avo, Ltd.**—but in their Multiminor, a compact and sensitive lightweight instrument, and the Avo Model 8 they have two test meters coveted by every radio man who wants to be able to make accurate voltage, current and resistance measurements. The Avo Model 8 is a beautifully-styled multi-range instrument which is not only highly sensitive but is also robust enough for bench work.

As last year, **Richard Maurice** showed their range of "make-it-up-yourself" aerial assemblies; the parts supplied are sufficiently comprehensive for the construction of more than 100 different aerial models in the VHF/UHF range, Bands I-III, and the amateur VHF bands. The assembly can be done with simple tools, and all material supplied is exactly as for large-scale quantity production.

The foregoing is a brief summary of what your correspondent was able to see and discuss on the afternoon of the opening day—it does not purport to be a full stand-by-stand review, which was not possible in the time available. After all, the Exhibition will hardly be cold before you are reading this!

SUPPORTING DISPLAYS

The Exhibition station GB3RS was a focus of interest and, on the other side of hall, the B.A.T.C. group—indefatigable in the cause of Amateur TV—had a slow-scan demonstration, the effect of which is to reduce the required bandwidth for a TV signal to a few kc; some of the pictures shown had been taped (yes, *taped*) by WA2BCW and airmailed over for the Exhibition. The Amateur Radio Mobile Society and the RTTY Group were also represented, the latter receiving many enquiries as to the availability of surplus teleprinters.

As for ourselves, we had an extremely busy time, were glad to welcome many old friends to the stand, and we can say that business done was fully up to last year's, with the new *DX Zone Map* a very popular buy.

Adding a BFO

RESOLVING CW SIGNALS ON A BC RECEIVER

F. G. RAYER

Some domestic BC receivers are capable of quite a good performance on the short wave bands, but even those designs catering for the keen listener and having such refinements as an RF stage and a little extra band spread are practically never fitted with a beat frequency oscillator (BFO), for taking CW signals. This article shows that it is an easy matter to add a BFO, which can be built into the receiver itself and take its power from it.—Editor.

AS is generally known, a beat frequency oscillator enables a CW (Morse) signal to appear as an audible tone in the receiver. A BFO stage is therefore provided in communications type sets, but is seldom, if ever, found in the average general purpose all-wave superhet, *e.g.*, the domestic BC receiver. It is, however, relatively easy to add the required BFO stage, and CW signals can then be heard.

A suitable circuit is shown in the diagram (Fig. 1) and will operate with almost any type of valve. For a 6·3v. heater supply the 6BA6 is suggested because it is a miniature type and allows a small unit to be constructed ; HT and heater current is drawn from the main receiver's own power pack, and the slight extra load will usually be unimportant. A switch is included in the HT line, so that the BFO stage can be cut out when listening to normal modulated signals. (With battery equipment, the switch can be placed in series with the valve filament.)

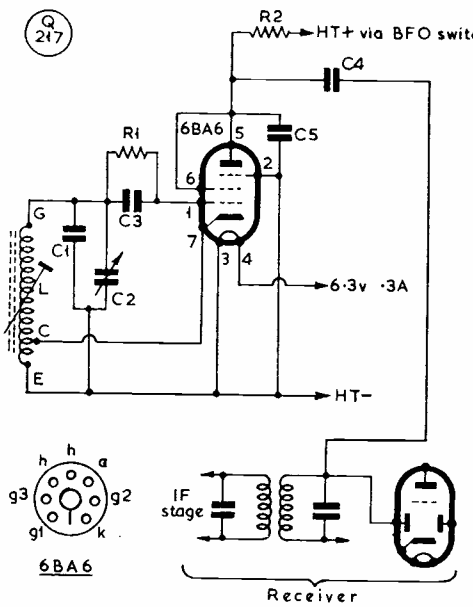


Fig. 1. Circuit of the BFO unit, considered as an addition to an ordinary general-coverage BC receiver. Values are : C1, 200 $\mu\mu$F ; C2, 25 $\mu\mu$F ; C3, C5, 100 $\mu\mu$F ; C4, 2 $\mu\mu$F, or "very small capacity" ; R1, R2, 47,000 ohms ; L, see text.

In operation, the BFO is tuned to nearly the same frequency as that used in the intermediate frequency stage or stages, the difference in frequency between BFO and IF providing the audio tone which is heard. For example, with 465 kc IF stages in the receiver, the BFO can be tuned to 466 kc or 464 kc, to produce a 1 kc (or 1,000 c.p.s.) audio tone. Some variable tuning in the BFO enables the beat to be adjusted, and permits operation above or below the IF as necessary for maximum readability over or through interference on or near the same channel.

Good screening is important, or harmonics of the BFO output will be picked up by the aerial and frequency changer circuits. If these are suspected, switching off or re-tuning the BFO will show if it is responsible. In the ordinary way, these harmonics should not be troublesome, even if noticeable.

Construction

With a valve of the type mentioned, the unit can be made to fit inside a 2in. × 2in. screening can 4in. high, taken from an old IF transformer

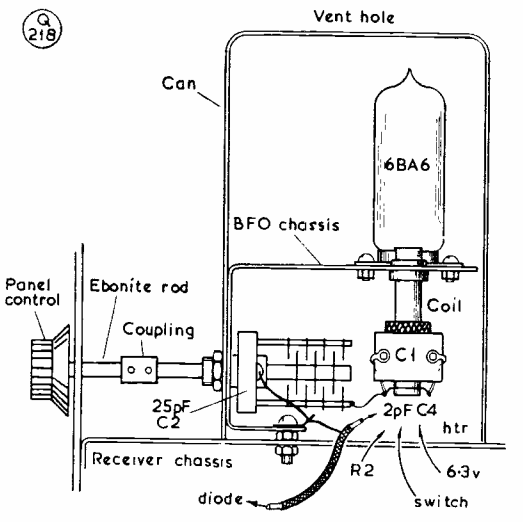
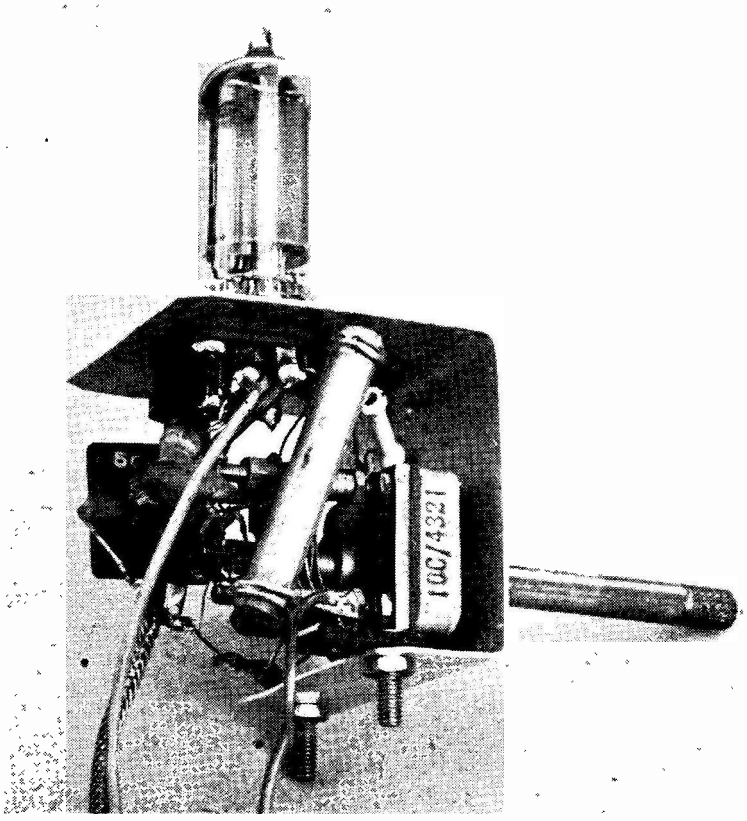


Fig. 2. Pictorial layout and general wiring plan for the BFO unit. It can be mounted conveniently somewhere within the receiver, from which it can take the HT/LT required for operation. The variable capacity need not be a panel control, but it is as well to make it so if that is possible.

or similar component. The BFO is built complete as a separate unit on a small chassis. The 25 $\mu\mu$F condenser C2 bush nut holds this inside the can, as shown in Fig. 2. The BFO chassis is bolted to the receiver chassis, the whole being secured by extra nuts. Leads pass down through a hole under the can. The variable condenser C2 can be fitted with a suitable coupling and extension spindle so that a control knob can be provided on the receiver front panel.

The coil actually used in the model was a 465 kc rejection filter, but a winding from an old IF transformer would be equally satisfactory. The simplest way to provide a cathode tap is to wind extra turns of thin insulated wire (say 34g. SWG) over the original winding. Eight turns will be sufficient, and they must be wound in the same direction as the original winding, so that the cathode tap "C" is virtually eight turns from the earthed end E of one continuous winding. The fixed condenser in parallel with the coil (C1 in the diagram) must be of such a capacity as will allow the BFO to tune over the IF channel of the receiver. This will automatically be so if an IF transformer winding is used, with its original condenser, or an IF filter, with the specified condenser.



A beat-frequency oscillator unit (BFO) can be made up to work with almost any domestic broadcast receiver, some of which are capable of a good short-wave performance. As in this case, such a unit can be powered from the main receiver. The control rod is for the small variable condenser to swing the beat frequency across the main receiver IF.

The anode resistor R2 needs to be of $1\frac{1}{2}$-watt rating. The lead from the 2 $\mu\mu$F condenser C4 is screened for the reason already explained —prevention of harmonic interference. This condenser can be made by twisting insulated wires together. A little experiment with the best value is worth while. A very strong BFO signal is not required, as it will cause noise to over-ride very weak signals. The BFO signal is injected into the diode side of the second detector, or its grid if the valve is not a diode type.

Operating the Unit

A check can be made for oscillation by inserting a meter in the HT line and noting if the current increases when C2 is shorted. If not, the cathode turns may be wound in the wrong sense.

Powerful Morse signals are often manifest by "clicking" in the receiver when such a signal is tuned in. With the BFO switched on, the coil core is adjusted until these "thumps" or clicks are resolved into audible signals. The unit can then be permanently mounted as in Fig. 2. Final adjustment of the core, through a hole in the can, is made until the unit operates on 465 kc with the 25 $\mu\mu$F condenser C2 at half mesh. The audible note, for upper or lower frequency relative to the IF, can then be selected by manipulation of the BFO control knob.

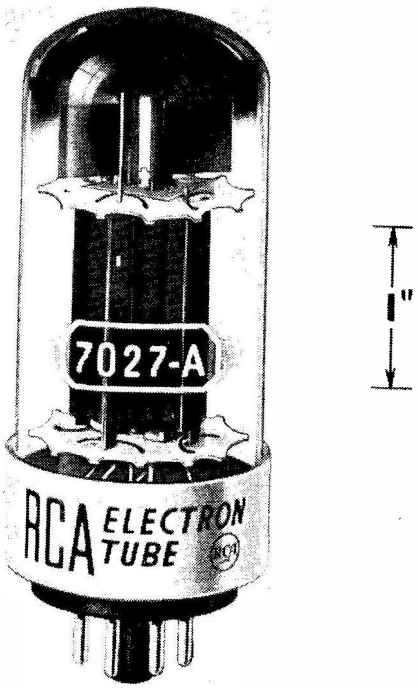
If the receiver should have some different intermediate frequency it is, of course, necessary to use a BFO coil to suit. For maximum possible efficiency, slight re-alignment of the final IF transformer may be needed. This will not be necessary if it is found that sufficient BFO

injection is obtained by "stray coupling," *i.e.* no physical connection through C4 may be needed. This will be a matter of experiment.

The BFO switch can be mounted at any convenient point, and it is best to employ a rotary, or double-pole double-throw, switch. The extra contacts can then be used to short the receiver AVC line to chassis, when bringing in the BFO. This prevents chirping due to the AVC trying to follow strong CW signals. At the same time it may be desired to fit a manual gain control, which can be matched up with the extra BFO knob. A cathode bias potentiometer in the RF or an IF stage will do for this purpose, the value being 2,000 ohms in the cathode lead.

RADIO CLUB OF UGANDA

Further to the note on p.269 of the September issue of SHORT WAVE MAGAZINE, "East African QSL Bureaux," we are notified of the formation of the Radio Club of Uganda, with VQ5AV as president, and a present total of 14 members. The address for all correspondence is: R.C.U., P.O. Box 3433, Kampala, Uganda, British East Africa.



This is just about the actual size of the new RCA 7027-A, a beam power audio type. Two in Class-AB1 can deliver a maximum of 76 watts of audio with only 540 volts on the plate. The safe plate dissipation is 35 watts.

INTERNATIONAL TECHNICAL STANDARDS

It is perhaps not generally known that, these days, a considerable effort is being made to co-ordinate standards, nationally and internationally, in the radionics field. There is an International Electro-Technical Commission, a unit of the International Organisation for Standardisation, which has numerous committees and sub-committees dealing with the highly-technical problems involved in standardisation. One of the difficulties is to get suitably-qualified people who can spare the time to travel about Europe for meetings and deal with the considerable amount of paper-work radiated from Geneva, which is the Hq. of the parent organisation.

BBC's REMOTE CONTROL TV CAMERA

The BBC Television Service has taken over for experimental trial a remotely-controlled television camera developed by the Engineering Division. The camera is located in the All Souls television interview studio, near Broadcasting House, but all its functions —pan, tilt, focus, zoom and iris—can be controlled from the News studio at Alexandra Palace, about six miles away.

The camera proper is of the vidicon type and can be switched on from Alexandra Palace; it is then ready to operate within one minute. The camera tripod carries a special head in which the panning and tilting movements are operated by servo motors. Additional servo motors, mounted on a plate fitted to the camera body, are arranged to drive the focus, iris and zoom controls. The operation of the motors and their associated servo amplifiers is controlled, over cable circuits, from a special console at Alexandra Palace, or alternatively by the interviewer in the studio who is provided with push-buttons for the purpose.

Apart from the console, all the control equipment is at All Souls and is combined in a metal cabinet some 22ins. square and about 5ft. high. In addition to the power supply equipment, this cabinet houses the transistorized servo amplifiers, control relays and four additional sets of potentiometers for operating under local control.

SPECIAL NOTICE
PRICE INCREASE

Due to the continuing rise in production costs —which are outside our direct control—it has been found necessary to make a small increase in the cover price of SHORT WAVE MAGAZINE. With effect from the January 1960 issue, due out on January 1st, it will cost 2s. 9d. on bookstalls.

This increase will not, however, affect direct subscribers, for whom the annual subscription will continue at 33s. post free for a year of 12 issues ($5.00 U.S., and equivalent currencies), as at present.

We would like to assure readers that this increase is dictated solely by the outcome of the mid-summer printing dispute; this resulted in a rise in our cost of production, which we have already had to carry for some months.

THE OTHER MAN'S STATION

G 3 L B

THIS month it is the station of G3LB, A. R. Yates, Gower Hey, Whitcliffe Lane, Ripon, Yorkshire, who writes:

"Having spent four years climbing two flights of stairs up to the shack built in the roof-space and finding that this tended to curtail operating time, it was decided to find a more suitable location for the gear." The house was surveyed, and it was soon realised that there was room for a bay window to be built on the side of the house between two chimney breasts; this could be just big enough to hold the gear and operator, and access would be through a sliding door replacing a window.

With the new room completed, the operator is within call and view of the family, making a much more satisfactory arrangement, and it is so easy to go on the air when there are a few minutes to spare at meal times or in the evenings.

After years "in the business" and having spent thousands of man-hours building many items of gear, from the old V-1 battery-operated receivers (in which even the variable tuning condensers were home-made) to modern double super-hets, the pleasures of construction are still appreciated—but, with most of the headaches removed, all the equipment now used at G3LB has been built from kits.

The receiver is the new Heathkit "Mohawk" and, on the transmitting side, the main unit is a Johnson "Valiant," also built from a kit; it is operated almost entirely in the SSB mode, with a modified BC-458 VFO and a Central Electronics 20A exciter.

Three aerials are available: A centre-fed 135 ft. single wire for the LF bands; "Hy-gain" 3-band ground-plane for 14, 21 and 28 mc; and a Minibeam.

A Heathkit standing-wave-ratio meter is always in the feeder line, and the aerials are tuned by a Z-match; this is to be replaced by a standard type of band-switched link-coupled aerial tuner, which has been found to be superior to the Z-match for TVI rejection, and will incorporate a built-in "Mickey Match" and dummy load. The beam is rotated by the usual prop-pitch motor, and with the selsyn remote indicator is a photograph of a wall map, coloured to indicate the various parts of the world.

No record is kept of DX worked, as Amateur Radio is looked upon as a way of creating friendships with other amateurs; one contact lasting thirty minutes, when every topic *except* radio is discussed, is much preferred to rubber stamp QSO's.

For those who, like G3LB, may be interested in photography, the pictures were taken by a Vito 11B using FP3 film and one PF15 flash-bulb, the delay mechanism being used for the self-taken photograph.

It is much regretted that due to unforeseen circumstances, A. J. Devon's feature "VHF Bands" has had to be held out for this month. The closing date for the January issue is December 14.

STARTING A CLUB

AND SUPPORTING IT

By G3JHY

THE writer and several cronies were having an interesting talk one evening on things in general and radio in particular when one of them said, "You know, we ought to have a Radio Club."

There was unanimous approval of this idea and while the XYL was being badgered into organising the tea-pot, crony number one, one Ron, exhibited his usual shy character by electing himself Chairman of the Committee.

Perhaps it should be explained at this point that it wasn't so much a *new* club, as the resurrection of an old one that was in danger of going the way of so many others. The original club Hq. was in a large house near to bus and train services, and in its early days had served its members well. But with the passing of the years the optimism, drive and what-have-you gradually got rather like the well-known "old soldier." Although never quite fading away, it got down to about S2, and so we thought that we should get together and see what could be done about it.

We needed a place where meetings could be held in comparative comfort, also where all our gear could be left in safety. Upon inquiries being made, we were told that there was "some sort of shed" that we could use, but it needed a bit of doing up.

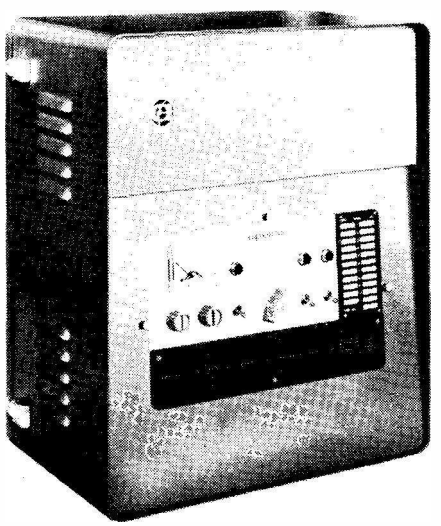
Our informant was quite right, it *was* "some sort" of a shed; it had one solitary bulb (no shade) and a floor that threatened to collapse at any moment. The latter problem was tackled by a colleague who certainly knew his job even if he didn't get paid for it, and the lighting system was improved with no trouble at all.

After several week-ends spent in setting up transmitters and so on, we felt that at last we were getting somewhere. We were, but what use was a club without 100% support from its members? It was the old, old story that so many of us have heard before, the attitude being "Thanks for the new set-up, but don't ask *me* to lift a finger towards keeping it going!" Why should this be so? A good question needing an equally good answer.

Naturally, we can't all be chairmen or secretaries, but if the Club is conducted efficiently by elected members, the remainder should surely be prepared to do their part, too, and not sit back to "leave it to Joe."

Weekly meetings can be made quite attractive by giving a little thought well in advance as to the general likes and dislikes of the members, and by preparing definite programmes that endeavour to cater for all comers. If the standard is good, one soon finds new members coming along, and the result is an enjoyable evening without any qualms. The occasional spells of summer weather and holidays do, of course, affect attendances to some degree, but any club worthy of the name can always get by even during this period.

So if you are a member of a radio club, regardless of its size or age, remember that its up to *you* to help keep it strong and healthy, for in that way you are maintaining its "radio-active" properties and such a club will never suffer from "fall out"—if you will excuse the metaphor.



An American 150-watt radio-telephony installation designed for yachts and small craft. The Apelco AE-160M is crystal controlled on 11 channels, including the HF ranges needed for long-distance working. Control is "press-to-talk" and "release-to-listen," no tuning being required when frequencies are pre-set; the correct aerial arrangement is also selected automatically for the channel in use. Agents are Ad. Auriema, Inc., of New York.

THE I.R.T.S. "NEWS SHEET"

The Irish Radio Transmitters Society—hon. sec., T. M. O'Connor, EI9U, 280 Collins Avenue, Whitehall, Dublin, Eire—produce a regular *News Sheet* of some 6-8 pages each month, which is edited by B. Fogerty, EI6X. The features include general news and activity reports of EI interest, with occasional sallies (in the nicest possible way, of course!) into GI territory. As the I.R.T.S. *News Sheet* is the kind of publication that EI's exiled overseas would like to see, it is mentioned here so that they can get in touch with EI9U, while as hon. editor EI6X would also be glad to hear from them.

MARCONI LONG-RANGE RADAR

The Marconi 50 kW Type S264 radar, operating on 50cm crystal controlled—the only commercial CC radar equipment in the world—is having a great success as an airport terminal-area and airways-control installation. Its principal function is to regulate the approach, for which ranges up to 100 miles and more are necessary. Having picked up the aircraft, it is passed over to the local-approach system for the final landing control. From the point of view of airport authorities investing in the S264, one of its important advantages is that it can easily be converted from 50 kW to 500 kW input.

First Week on the Air

WITH TWO WATTS ON EIGHTY

D. WILLS (G3NMX)

This article will be of interest to many an active amateur, irrespective of status, proficiency, experience or position on the DX ladders. Whether your first contact was three weeks or thirty years ago, it is something not easily forgotten.—Editor.

MUCH has been written in the past by Old Timers for the novice; in contrast the following is an account of the first week on the air written by a novice, hoping that it will bring back nostalgic memories of the early days to some Old Timers, at least. Naturally, everyone wants to tell the world about his first few contacts, but with commercial receivers and transmitters running the full permitted power that is no longer news in the accepted sense. However, the writer followed in the footsteps of the 1925 amateur and started with—an 0-V-1 receiver and a QRP transmitter.

Being still at school, pocket-money could never be made to stretch far enough even to acquire a modest R1155, so some eighteen months ago the writer built an 0-V-1, using 954 acorn valves, as these were obtainable for a few coppers. The circuit of this was conventional, coverage being 10-160 metres, but it did at least run to the refinement of bandspread tuning. This simple arrangement enabled 150 countries to be logged in the year and a half as an SWL.

The writer's transmitting licence arrived at the end of July (this last July) and he was naturally anxious to get on the air as soon as possible. But events had moved rather faster than anticipated, and whilst thought had been given to the future transmitter, nothing to radiate was immediately to hand, and there were only seven days to go before leaving for a lengthy stay on the Continent.

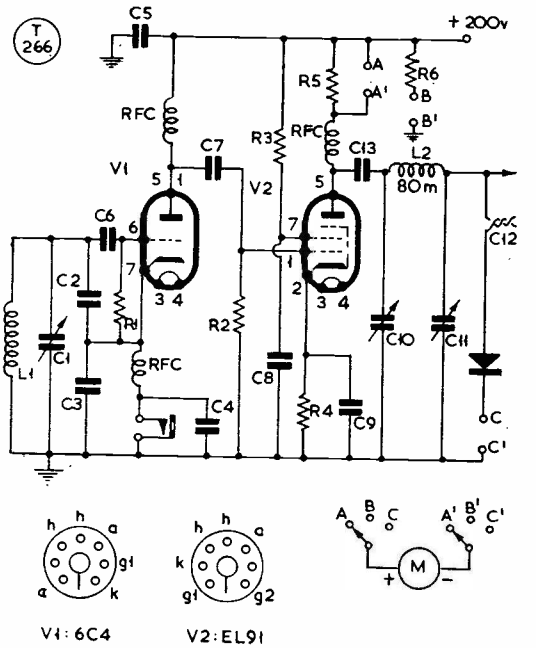
An old friend, G3KGU, came to the rescue with a loan, for that week, of a compact 80m. CW transmitter, running just the two watts input. Could this, and the 0-V-1, compete with the QRO boys and their AR88's, HRO's and 888's?

The circuit of the transmitter is shown in the diagram. It consists of a 6C4 Clapp VFO, followed by an EL91 PA. Cathode keying of the oscillator is used, and contrary to expectations there was a negligible amount of chirp on signals, and reports of T9 were invariably received. The only screening called for was between the two stages of the transmitter. The VFO valve, in a screening can, was placed on the PA side of the screen to prevent any temperature rise affecting the VFO tuned circuit. The VFO was adjusted by a slow-motion drive, and this, together with C10 and C11 of the pi-section tank circuit, comprised the only variable controls, although in practice when working over the CW portion of the band C11 did not need any adjustment when a 132ft. long-wire aerial was used. The pi-section tank output fed straight into the aerial, which was

Table of Values

Circuit of QRP 80-metre Transmitter

C1	= 75 $\mu\mu$F	R5, R6	= Meter shunts
C2, C3	= .001 μF	L1	= 80-metre coil, VFO
C4, C5	= .01 μF	L2	= 45 turns 30g. close-wound on $\frac{3}{4}$in. dia. former
C6, C7	= 50 $\mu\mu$F	RFC	= 2.5 mH RF choke
C8, C9	= 0.1 μF	V1	= 6C4
C10	= 160 $\mu\mu$F	V2	= EL91
C11	= .001 μF var.	Meter	= AA, PA current
C12	= Small capacity (twisted wires)		BB, PA voltage
R1	= 1 megohm		CC, RF indicator
R2, R3	= 10,000 ohms		
R4	= 220 ohms		



Circuit of the G3GKU 80-metre transmitter used by G3NMX, consisting of a VFO, V1, into a PA, V2 — input 2 watts, coverage 11 countries.

The QRP 2-watt transmitter with which G3NMX started up on 80 metres, with the results described in the article. A simple VFO-PA circuit, consisting of a 6C4 into an EL91 as PA, produced contacts with eleven European countries in a few days.

only 15ft. above ground. The earthing system consisted of a thin wire buried only a few inches, and was theoretically very inefficient.

The power pack, small in keeping with the rest of the equipment, after a long spell on the air got somewhat warmer than seemed desirable. It used a small half-wave rectifier, with a 1,000-ohm resistor instead of a choke for smoothing.

First Attempt—

With a manual change-over system wired up, all seemed ready for some interesting contacts —but of course that would have been much too easy! Many stations were called but nobody came back. Eventually a frantic telephone call was made to a very local station to fix a schedule. Contact was made, but a comparatively poor report was received, and following tests with him, it was evident that no RF was being radiated by the aerial, as signals were about the same with it removed altogether. Obviously, things were not all they should have been! A single-turn lamp loop was placed over the PA coil, and the fact that the lamp only just glowed even with tight coupling indicated very incorrect tuning of the pi-network. C10 and C11 were adjusted one against the other until the flash-lamp bulb lit brilliantly. The pick-up, C12, was adjusted to give half-scale deflection on the meter M. The actual settings of the tank circuit were found to be fairly critical but a few minutes spent on getting maximum loading were well repaid.

—First Contacts

G3MCY in Tangmere was called, and he came back with a 559 report. The shock was too great for the writer, for when it was his turn to transmit, the QTH, name, report, and so on were sent with the aerial still switched to "receive," and the QSO was lost! It took some minutes for the pulse rate to drop to normal, but eventually a search was begun for the next station who would dare to call CQ. It was G3NCA in Sussex, and when challenged, he replied giving 579. Concentration and determination prevented a repetition of the previous mishap, and a QSO of some twenty minutes' duration was successfully completed. With a deep breath and an overwhelming sense of satisfaction another victim was sought. This time it was a station a few miles further away, and with a report of 589 from him it was felt that the modest two watts input was not disgracing itself by any means.

Much fun was had the following day working several G's and generally getting the "feel" of the gear. That evening the first "DX" was worked—France!! F9DY was called and gave

569 from Normandy.

The third day produced contacts with two more countries; ON4 and GW, both around mid-day. At that time of course, Belgium was regarded as real "DX"; after all, it was only the third day on the air—the exotic call-signs of SWL days were temporarily forgotten.

Best Procedure

By the Friday of that week five countries were in the bag, with a PAØ netted and the number of QSO's rising rapidly. The week-end ahead, with increased activity on 80 metres, was full of promise and contacts were possible at any time of the day, but it was useless to call CQ—it was soon evident that this was very definitely the one way *not* to get a contact. Several DJ/DL stations were called, but to no avail, and as the week passed by, it looked as if Germany could not be worked. Then DJ3XK came back with an S7 report, and this was most encouraging. Thus spurred on to greater effort a GI was raised, giving a final tally of seven countries in seven days, and well over 50 contacts altogether.

The writer can now look back to that first week on the air with very much pleasure, not because of the contacts made with seven countries, but for the great experience gained, and the friendliness of all the operators worked. The possible exceptions to this were a couple of gentlemen who, having been told that their signals were somewhat chirpy, suddenly remembered that they had something in the house that called for immediate attention, and they had to QRT hurriedly. It is to be hoped that their excuses were as genuine as the reports given to them.

The writer trusts that this article will not be taken as a counter-blast to "DX Commentary," but more as an account of a very new amateur's first week on the air. Perhaps it will bring back memories to the two-letter G fraternity, and at the same time give encouragement to those who are still striving for their licence. Here is proof that simple equipment works, and the initial outlay can almost be reckoned in shillings rather than pounds.

The writer would like to express his grateful thanks to G3KGU for his continued encouragement and assistance, as without his support this article could not have been written.

Tailpiece.—In the week following the return home from holiday, the country total was raised to 11 by contacts with Scotland, Denmark, Sweden and, for the best DX to date, Finland — all on 80-metre CW, with two watts input.

SCOUT JAMBOREE-ON-THE-AIR

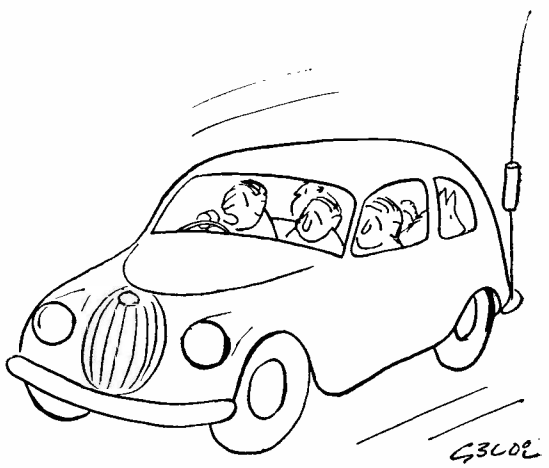
Arranged for the week-end October 24-25, this event brought on not only a number of Scout-operated amateur stations, but also many other stations at which local Scouts were offered hospitality and the opportunity to participate in demonstration amateur-band QSO's. One of the most active stations was GB3BP, at Buckmore Park, near Chatham, Kent, which is a permanent Scout Camp. Unfortunately in some respects, the Radio Jamboree coincided with the Phone Section of the *CQ* DX Contest, which made the HF bands a bit busy, to say the least! However, from reports so far received, this year's Jamboree-on-the-Air appears to have been more successful than the first one, held in May, 1958.

MAKING PRINTED CIRCUITS

It is now possible for the home-constructor to obtain, at very reasonable cost, a kit for the fabrication of printed circuits. By using the etching technique, with suitable chemicals, boards up to 6 ins. by 3½ ins. can be printed with the materials provided. With care, a "professional job" can be produced and, in the Amateur Radio field, the applications are obvious. The materials supplied are completely safe to handle, and the quantities are sufficient for the treatment of dozens of laminated sheets. The instruction book is well written, detailed, and gives some worked examples. As well as the materials, three laminated boards are included in the kit. We can recommend this process as a useful, practical addition to the radio amateur work-bench. Obtainable from Proops Bros., Ltd., 52 Tottenham Court Road, London, W.1, at 21s.

"FILTER UNIT DESIGN 12"

We are informed by G3IUX (Barrow-in-Furness) that the Filter Unit Design 12 (A.P.56152) is a 6-section low-pass filter of 95 ohms terminal impedance with a frequency cut-off of about 30 mc. It is thus an attractive proposition for amateur-band transmitters, which can nearly always accommodate a 95-ohm impedance between PA output and ATU.



". . . It's the usual line-up here—wife, dog, two kids and a loaded whip . . ."

NEW QTH's

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

G2ARN, T. L. Franklin, Vine Cottage, Betts Lane, Upper Nazeing, nr. Waltham Abbey, Essex.

G2FFK, Dr. G. M. Holme, 90 Coleshill Road, Marston Green, Birmingham.

G3BEZ, H. G. Peers, A.M.Inst.E., 3 Monks Brook Close, North Stoneham, Eastleigh, Hants.

G3NHC, C. P. Trinick, York Cottage, Bolters Lane, Banstead, Surrey.

G3NHD, J. Doherty, 39 Windermere Avenue, Wembley, Middlesex.

G3NJG, T. M. George, 69 Shirley Park Road, Addiscombe, Croydon, Surrey.

G3NKC, L. G. Tonkinson, 37 Ash Crescent, Kingshurst, Birmingham, 34.

G3NLF, C. L. Young, 11 Wild Green North, Langley, Bucks.

G3NNM, B. R. Smith, 1 Belle Vue Road, Herne Bay, Kent.

G3NOK, R. A. Knight, 12 Windsor Crescent, Northampton, Northants.

G3NOM, R. Gerrard, 2 Bleatarn Road, Offerton, Stockport, Cheshire.

GM3NOV, G. A. Roberts, 111 Great Southern Road, Aberdeen.

G3NPQ, P. Baker, 51 Seaton Road, Hayes, Middlesex.

G3NPU, P. Hill, 12 Harding Avenue, Eastbourne, Sussex.

GI3NQH, J. Beattie, 170 Lower Braniel Road, Gilnahirk, Belfast, 5.

G3NQM, C. A. Teed, 20 Brampton Gardens, Hersham, Walton-on-Thames, Surrey.

G3NQU, A. W. Dick, 19 Warners Gardens, Southend-on-Sea, Essex.

GM3NQZ, G. B. Lockhart, Schoolhouse, Echt, Aberdeenshire.

G3NRE, J. Allen, 3/17 Woodbridge Road, Moseley, Birmingham, 13.

G3NRU, D. B. Foster, Alma, Grigg Lane, Headcorn, nr. Ashford, Kent.

G3NRW, I. Wade, 20 Upper Pines, Woodmansterne, Banstead, Surrey.

G3NSB, R. Broy, 25 The Circle, Meon Park, Wickham, Hampshire.

G3NSD, B. C. Styles, 51 Aylestone Drive, Aylestone, Leicester.

GI3NSP, J. C. Lennox, Sunnymead, Deans Bridge, Armagh, Co. Armagh.

G3NSU, B. G. Ellis, 27 Oldfield Street, Wortley, Leeds, 12.

CHANGE OF ADDRESS

GW2CAS, J. Douglas, c/o Lloyds Register of Shipping, Avenida del Generalisimo Franco 2-1, Cadiz, Spain.

G2CBS, L. G. Thompson, 7 Hastings Road, Woodhouse Eaves, Loughborough, Leics.

G2NS, N. P. Spooner, 31 Cranleigh Gardens, Southbourne, Bournemouth, Hants.

G2SG, V. F. B. Dunk, Applegarth, Medstead Road, Beech, Alton, Hants.

G2XV, G. A. Jeapes, 165 Cambridge Road, Great Shelford, Cambridge.

G3BRK, Aquila Amateur Radio Club, E.I.D. Ministry of Supply, Golf Road, Bromley, Kent. *(Hon. Sec.: R. C. B. Cutts, Section L.25.)*

G3CCA, C. L. Wright, B.A., B.Sc.(Eng.), M.Sc.(Tech.), 29 Astill Drive, Thurcaston Road, Leicester, Leics. *(Tel.: Leicester 62042.)*

G3EBA, D. R. Wilde, 81 Manor Road, Bletchley, Bucks. *(Tel.: Bletchley 3756.)*

G3EJT, C. A. Hogley, 22 Hightown, Holmfirth, Huddersfield, Yorkshire.

G3FRG, R. B. Forge, 1 Beaumont Road, Worthing, Sussex.

G3HLR, A. D. Dickins, Haxey Lane Filling Station, Haxey, Doncaster, Yorkshire.

G3HLV, J. A. Martin, 48 Rathcoole Avenue, Crouch End, London, N.8.

G3IJU, E. Briggs *(ex-ZB1EB/VS1EB)*, 1 Dragon Junction, Harrogate, Yorkshire.

G3ITV, A. J. Bryant, 20 White thorn Gardens, Chelmsford, Essex.

GM3IVZ, W. Stephen, 15 Napier Road, Glenrothes, Fife.

G3JXN, Dr. J. E. Tindle, 26 Park Crescent, London, W.1. *(Tel.: Langham 9246.)*

GM3KAJ, D. K. Jagger *(ex-G3KAJ)*, Ashcroft, Castle Street, Fortrose, Ross-shire.

G3KMA, R. Balister, 9 Warwick Close, Hampton, Middlesex.

G3KWC, D. Page *(ex-VS6DF)*, 57 Queen Street, Stamford, Lincs.

GW3KYT, K. Schofield *(ex-G3KYT)*, 101 Penrhyn Avenue, Rhos-on-Sea, Denbighshire.

G3LDY, R. Taylor, 68 Farrington Road, Ettingshall Park, Wolverhampton, Staffs.

G3LNC, J. A. Batham, 10 Church Field Road, Houghton Regis, nr. Dunstable, Beds.

G3LWC, M. Butchart, Ulveston Hall, Debenham, nr. Stowmarket, Suffolk. *(Tel.: Debenham 293.)*

G3LXD, J. L. Hawkins, c/o 37 Burford Road, Catford, London, S.E.6.

G3MBF, D. Place, 11 Bowring Mead, Moretonhampstead, nr. Newton Abbot, Devon.

G3MIH, B. W. Sutton, 16 Barncombe Road, Heswall Hills, Wirral, Cheshire.

G3NDO, P. Sorab, 60 Queen Street, Sutton Coldfield, Warks.

G5NN, J. H. D. Ridley, Spencers, Charlwood, nr. Horley, Surrey. *(Tel.: Norwood Hill 139.)*

GW5TJ, E. T. James, Brooklands, Merthyr Tydfil, Glam.

CORRECTION

G3HRC, R. C. B. Cutts, 8 Beech Court, Kingsground, Eltham, London, S.E.9.

THE MONTH WITH THE CLUBS

By *"Club Secretary"*

(Deadline for February issue : January 15, 1960)

(MCC Report only next month)

THE first two days of "MCC" have just closed as these notes are written, and there is no doubt that this popular event has been supported as well as ever, or even better. Listening from one location, it seemed that some 50 Clubs were taking part, although there may well have been more.

The new rules appear to have livened things up considerably, and the operating was rather more in the "fast-and-furious" category than in previous MCC's. Signals were good in quality; some of them extremely strong; and most of them very well operated.

Club Secretaries are asked to note that, as usual, there will be **no Club Notes in January.** This space will be taken up by the full review of MCC with, of course, the detailed tables of scores and results. The deadline given at the head of this page is for the *February* issue, when these notes will be in business as usual.

It is too late to remind you about MCC Logs, which should have been in the Editor's possession by December 2—we hope they all arrived safely on or before that date.

Reports are very numerous this month, so we pass without further comment to Club activities . . .

Barnet notify a change of secretary *(see* panel for new QTH) and report that although next year's programme is not yet finalised, "everything is well under control." **Bradford** have a Social Evening on December 8 at the Mechanics' Institute Café, and, on the 20th, a Film Show.

Civil Service Radio Society meet at the Science Museum on December 1 for a Film Show covering various allied subjects, and on January 5 for a lecture-demonstration by EM1 on Tape and Disc Technique.

Crosby have a "Take Your Pick Night" on December 8, a Junk Sale on the 15th, and an Open Night on the 22nd. They now have their Top Band Tx on the air, and meet every Tuesday, 8.30 p.m., at Colonsay, Crosby Road South, Waterloo, Liverpool. **Derby** have an open meeting on December 9, and their Christmas Party on the 11th. The subject for December 16 is "Electronic Gadgets for Amusement from the Junk Box"—which sounds interesting. On the 23rd and 30th the Clubroom will be closed.

Dorking are holding their Christmas Dinner on December 8; the meeting on the 22nd, at the "Star and Garter," will be an informal evening. **Leeds** hold their Social Evening on December 16, the previous meeting taking the form of a discussion on the said Social. On January 6 they are visiting Leeds University to see the Electronic Computer.

Mitcham meet every Friday, 8 p.m., at The Cannons, Madeira Road, and the December 18 meeting will be the occasion of the Christmas Draw and Constructional Contest. **Newbury** announce that the monthly meeting on December 18 will take the form of a Technical Forum, and the judging of the Home Constructor Competition.

Norwich will be given a lecture-demonstration on SWR, by G3BHJ, on December 4; December 18 is fixed for their Home Constructors' Exhibition. Points will be awarded by ballot, consideration being given to age, experience, operation, usefulness and so on. **Slade** have a talk and demonstration on Colour Organs, by D. T. Wilson, on December 4; and on December 18 the only clue to the meeting is "Fun and Games," presented by two members.

Spen Valley will be hearing a talk called "From the Generator to Your Meter" on December 9—we assume that it deals with power transmission! January 6 will be an Open Meeting.

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For the Lincoln Hamfest on September 20, G3ESR/G3LWY gave a party at their home at Saxilby, Lincs., for those en route to the meeting. G3ESR is at extreme left in this photograph, other callsigns in the group being G2CAJ, GW2FOF, G3AQY, G3CQQ, G3DF, G3GWR, GW3GYY, G3HYU, G3KYH, G3LAZ, G3LYQ and G6QA.

Wellingborough have three films on Applications of Steel for their December 10 meeting; on the 17th they hold their Christmas Dinner at the Hind Hotel. January 7 is the date of their AGM. **Acton, Brentford & Chiswick** assemble on the third Tuesday at their Hq, 66 High Road, Chiswick, W.4. On December 15, G3IGM will be demonstrating his low-power field day transmitter; on January 19 the AGM will be held. Morse classes are being run at the home of G3KSO — anyone interested should consult the hon. sec.

NAMES AND ADDRESSES OF CLUB SECRETARIES REPORTING IN THIS ISSUE

ABERDEEN: W. K. Heggie, GM3NHW, 80 Leslie Terrace, Aberdeen.
ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, W.3.
BARNET: K. Clarke, 3 Castle Road, London, N.2.
BLACKPOOL & FYLDE: H. G. Newland, G5ND, 161 Penrose Avenue, Marton, Blackpool.
BRADFORD: D. M. Pratt, G3KEP, Glenluce, Lyndale Road, Eldwick, Bingley.
BRIGHTON: H. R. Henley, 72 Loder Road, Brighton 6.
CANNOCK CHASE: P. Davis, G3NTY, 45 Broad Street, Bridgtown, Cannock.
CIVIL SERVICE: G. Lloyd-Dalton, 2 Honister Heights, Purley, Surrey.
CORNISH: G. W. Hubber, 9 Cardrew Terrace, Redruth.
CRAWLEY: D. A. Hunt, G3LBH, 18 Maiden Lane, Langley Green, Crawley.
CROSBY: F. Rosete, 13 Menai Road, Bootle 20.
CRYSTAL PALACE: G. M. C. Stone, G3FZL, 10 Liphook Crescent, London, S.E.23.
DERBY: F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby.
DORKING: J. Greenwell, G3AEZ, Wigmore Lodge, Beare Green, Dorking.
EAST KENT: D. Williams, G3MDO, Llandogo, Bridge, near Canterbury.
GRIMSBY: O. Gilliatt, G3LOP, 24 Station Road, Healing, Lincs.
GUILDFORD: S. W. Saddington, G2FXQ, 59 Hamilton Avenue, Pyrford, Woking.
HALIFAX: A. Robinson, G3MDW, 7 Upper Brockholes, Ogden, Halifax.
HASTINGS: W. E. Thompson, G3MQT, 8 Coventry Road, St. Leonards-on-Sea.
INTERNATIONAL HAM-HOP CLUB: G. A. Partridge, G3CED, 17 Ethel Road, Broadstairs, Kent.
LEEDS: D. Dinsdale, 8 Quarry Mount Street, Leeds 6.
LEICESTER: P. G. Goadby, G3MCP, 535 Welford Road, Leicester.
LOTHIANS: L. L. Lumsden, 33 Hillview Drive, Edinburgh 12 (*Tel.: COR* 1435).
MIDLAND: C. J. Haycock, G3JDJ, 360 Portland Road, Birmingham 17.
MITCHAM: D. Johnston, G3NFA, 23 Woodland Way, Mitcham.
NEWBURY: J. A. Gale, G3LLK, Wild Hedges, Crookham Common, near Newbury.
NORTH KENT: D. W. Wooderson, G3HKX, 75 Mount Road, Bexleyheath.
NORWICH: C. R. Reynolds, Post Office, Barnham Broom, Norwich.
NOTTINGHAM (Amateur Radio Club): E. C. Weatherall, 16 Avebury Close, Clifton, Nottingham.
PURLEY: E. R. Honeywood, G3GKF, 105 Whytecliffe Road, Purley.
RAF STANBRIDGE: B. H. Williams, 64 Brooklands Drive, Leighton Buzzard, Beds.
READING: R. G. Nash, G3EJA, 9 Holybrook Road, Reading.
REIGATE: F. D. Thom, G3NKT, 12 Willow Road, Redhill.
SLADE: C. N. Smart, 110 Woolmore Road, Birmingham 23.
SOUTHEND: Mrs. P. M. C. Collop, 53 Beedell Avenue, Westcliff-on-Sea.
SOUTHGATE: A. G. Edwards, G3MBL, 244 Ballards Lane, London, N.12.
SOUTH MANCHESTER: J. A. Elliott, G3KIQ, 2 Pennine Close, Blackley, Manchester 9.
SPEN VALLEY: N. Pride, 100 Raikes Lane, Birstall, near Leeds.
SURREY (CROYDON): S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon.
TEES-SIDE: A. L. Taylor, G3JMO, 12 Endsleigh Drive, Middlesbrough.
WANSTEAD & WOODFORD: P. J. Seaman, 39 Kensington Drive, Woodford Green.
WELLINGBOROUGH: D. J. Trusler, 87 Irchester Road, Rushden, Northants.
WOLVERHAMPTON: R. P. Thomas, 91 Fraser Street, Bilston, Staffs.

Blackpool & Fylde have permanent Hq. in Squires Gate Holiday Camp, Clifton Drive, Blackpool, where they meet every Tuesday at 7.30 p.m. R.A.E. Classes are also in progress—at the St. Anne's Institute of Further Instruction.

Brighton held their AGM on October 28, and will continue to meet at their new headquarters every Wednesday at 8 p.m. (Home Guard Club, British Legion, 76 Marine Parade, Brighton). *See* panel for new secretary's QTH.

Crawley is a newly-formed Club with fourteen members and every prospect of an increase in numbers. They will be holding their first meetings on December 10 and January 7, 7.30 p.m., at the Brewery Shades Hotel, Crawley, when all prospective members and others interested will be very welcome.

Crystal Palace report such a decline in the art of home construction that they were unable to supply any exhibits for the Amateur Exhibition; they attribute this to the many excellent kits and small units on the market today and suggest that the tendency must be accepted rather than deplored. On December 12 they meet for a Junk Sale.

Reading will meet on December 19 (one week earlier than usual) to hear a talk by G3LLK on the communications receiver he has built. Recent meetings have been well attended, and they report a vastly better state of affairs, both financially and otherwise, than at the beginning of the year. Membership has trebled!

Southgate forward their excellent *Newsletter*, a feature of which is a trio of well-reproduced circuit diagrams for "Do-It-Yourself" items of interest to everyone. Recent meetings have been well attended and took the form of a VHF Talk and the judging of home-built equipment for the G6QM Trophy. Morse classes are being run, in conjunction with Grafton. December 10 is the date for the AGM, which will be followed by a Junk Sale.

South Manchester, who meet every Friday at Ladybarn House, 17 Mauldeth Road, Manchester, 20, recently held their AGM and elected G3LQQ chairman, G3DQU vice-chairman and G3KIQ secretary.

Tees-Side are holding their Annual Christmas Dinner on December 12, 7.30 p.m., at Settlement House, 132 Newport Road, Middlesbrough. An attendance of 50 is expected, and there will be the usual raffles and prizes, also a "swap table." At this latter there is no auction, and the Club makes no charge—members simply "swap" gear by private arrangement. It was tried last year and was very successful. Early application for tickets is recommended—accommodation is limited.

Cornish met at the Falmouth YMCA in November, and fixed the rules for the G2AYQ Shield and SWL Cup Contests, to be held January 1-14. Their Sunday net is now on 40 metres instead of Eighty. At the same meeting, G3LPB gave a talk on Radio and TV Servicing, and the discussion ranged over subjects from shallow-depth TV receivers and printed circuits to the future availability of the

Top Band.

Guildford are particularly anxious to find a keen SWL who will give them a talk on his experiences as a listener, especially including experiences *outside* the amateur bands. If any reader can oblige, please get in touch with their hon. sec. *(see* panel for QTH).

R.A.F. Stanbridge Club was formed last May by fourteen members of the Central Signals Area, and is now active on the air with the Club call G3HSX, on Top Band. A 90-watt four-band Tx is under way, and all activities on the air are under the guidance of G3HOI and G3NLG/A.

Midland meet twice a month at Birmingham Midland Institute, Paradise Street, Birmingham, and on December 15 they are holding a "Do and be Done By" night, which appears to be a Junk Sale! On January 7 there will be a talk on the construction of a 70-cm transmitter.

Aberdeen get together every Friday at 6 Blenheim Lane, and December 4 and 11 will be Work Nights, for completing the Clubroom re-decoration. The 18th will be their "Christmas Function," and on Christmas Day and January 1 they will be on the air from GM3BSQ—the Club Tx. **Cannock Chase** held their AGM in November and report a successful year, membership showing a steady increase. Four new call-signs have been added this year. Meetings are at the Castle Inn, Bridgtown, on the first Thursday of the month.

East Kent have been busy building a completely new Top Band rig, chiefly with the object of using it in MCC. It has duly been completed and is running well. Their Christmas Social will be held on December 5. **Halifax** are holding an Informal Meeting on December 19; on January 5 there will be a talk on TVI, by G3ADG, and on January 8 they are holding their Annual Dinner.

At a recent hobbies exhibition locally, the Cheltenham Amateur Radio Club put on a three-day stand, with two stations on the air — the other being tented to reproduce field-day conditions. The operators included G3BCC, G3CEG, G3MOE and SWL's Hart, Walden and Hadley. The group got a spot in the BBC's Midland Region programme "Signpost."

SPECIAL NOTICE — ALL HONORARY SECRETARIES

The next (January) issue of SHORT WAVE MAGAZINE **will, as in previous years, take this space for a full report on the recent Magazine Club Contest, MCC. The publication of "Month with the Clubs" will be resumed in our February issue, for which the closing date is January 15, 1960. All hon. secretaries are asked to ensure that their Club activity reports reach us by the due date—given each month at the head of the "Clubs" article—all through the year. We have recently been receiving an increasing number of late reports, which it is impossible to write in after we close for press. This leads to misunderstanding and disappointment.**

Hastings re-elected all their officers at the AGM, and have decided to meet fortnightly instead of weekly in future. A new location for the meetings is being sought. The Horst Jens (DJ3OD) Trophy was awarded to the hon. sec. (G3MQT), and the G6QB and G3MGQ Trophies to two SWL members, for their interest and steady progress.

Leicester decided, at their AGM, that they would in future meet on the first and third Mondays at the Hq, Old Hall Farm, Braunstone Lane, 7.30 p.m. At the AGM they elected G3KKV chairman, G3MCP secretary and G3DVP treasurer.

Purley recently held a very successful Junk Sale, and also saw some colour slides of European travels by VK3ACS/G3NFG. On December 18 they will be officially christening the Club Transmitter, G3JSQ/A.

Reigate continue their regular monthly meetings at The Tower, High Street, Redhill. They are normally on the third Saturday, but the December meeting will be on December 12, when there will be a talk on Transistors and Amateur Radio. On January 9 they will be visiting the BBC at Tatsfield, and on the 16th will hold their first AGM. The Annual Dinner is fixed for February 7. They now publish their own news-sheet, *Feedback*, which is useful and informative.

Southend are under way with their new season, including technical and Morse classes. They have a large number of members with licences, many of whom burn the midnight oil on Top Band and will welcome contacts with all and sundry—just break in. The December meeting is on the 11th and will take the form of a visit to a well-known Plastics plant. AGM on Jan. 22.

Surrey had a talk on the History of Computers at their November meeting; they are

now looking forward to their Annual Party on December 18. They are running another Constructional Contest, and have arranged a programme of interesting meetings as far ahead as next May. They have published a very impressive membership list, showing that they have 59 licensed amateurs and 12 SWL's.

Wanstead & Woodford meet every Wednesday at 8 p.m., recent lectures having covered aerial systems, receivers and Radio Astronomy. They put up a new aerial for MCC and were active as G3BRX. Future lectures will include a series on VFO's by G3AMF. **Wolverhampton** meet in their own Clubroom (Nechells Cottage, Stockwell Road, Tettenhall) every Monday at 8 p.m. December 7 is fixed for their Instruction Class, December 14 for a Film Show; on the 21st there is another R.A.E. Instruction Class, and on the 28th a talk by G2JZ on Communication Receivers.

The **International Ham-Hop Club,** whose business is hospitality, reports that their member 4S7SW (who is their Asian representative) left England recently for a five-week tour of European amateurs before embarking at Marseilles for Colombo; his accommodation was being provided by Club members in F, DL, OE, I and HB. Full details of membership from the hon. sec. *(see* panel for QTH).

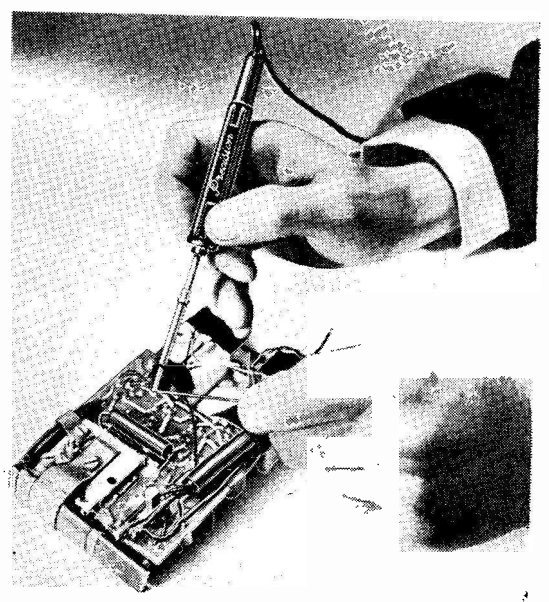
North Kent, who publish an interesting *Newsletter* which runs to four well-written foolscap sheets and has reached No. 28, have their next meeting on December 10, when the subject is "Recent Developments at K.W. Electronics"; on the 17th, they hold their annual social evening at the King's Head, Old Bexley; and on Christmas morning, those members who can make it are on Top Band at 11.0 a.m. for the annual "round-robin." The January meetings are on the 14th and 28th, all such ordinary meetings being held at the Congregational Hall, Chapel Road.

Nottingham (Amateur Radio Club—G3EKW) continue the R.A.E. classes on Thursdays, taken by G3LXL, and also meet on Tuesdays, the programme for the next few weeks being: December 8, "Loudspeaker and Amplifier Design," by Whiteley Radio, Ltd.; December 15, "Magnetic Amplifiers and Transformers," Parmeko, Ltd.; and December 22 is the Christmas Party. All meetings are at Woodthorpe House, Mansfield Road, Nottingham, and the hon. secretary reports that membership is increasing steadily.

The **Grimsby** club meetings are held at the R.A.F.A., The Abbey, with G3LXX as chairman, G2AJB vice-chairman, G3LOP hon. secretary, SWL Francis treasurer, and G3IYT committee member. The next meeting is on December 12, and on January 7 they visit the local Civil Defence Hq. R.A.E. classes are under way, taken by members G3ELZ and G3HTI at the Evening Institute.

When the Shipley (Yorks.) group ran a station for the Shipley Shopping Week, they had GB3SSW operating on 20, 40, 80 and 160 metres. A total of 304 QSO's was made with 250 different stations. GB3SSW was kept on the air until 11.30 p.m. every night for a week, the operators being G2BXS, G3BOR, G3KSS, G3LED, G3LZZ, G3MAB, G3NDG and G3NFH. In this photograph are, left to right: G3BOR, junior, G3LED and G2BXS.

The **Lothians** (Edinburgh) Radio Society meets on alternate Thursdays at the Y.M.C.A., 14 South Street, Andrew Street, Edinburgh, 2, at 7.30 p.m. SWL's are invited and local amateurs are welcomed, while visitors and newcomers to the district can get in touch by phoning the hon. secretary on *COR 1435*. Next meetings are on December 17, "Sound Studio Equipment and Techniques"; and January 14, "DX Working, Certificates and Awards," by GM2DBX.



The Antex precision miniature soldering iron is now fitted with a new type of handle which is fully heat-resistant; it is specially suitable for small, close work like the wiring out of transistor assemblies.

G4GZ's BARGAINS

VALVES : 6H6M, 12SC7M, EF50, **2/6.** VS70, **3/-.** 2X2, 6AG5, 6B8G, 6K7G, **3/6.** EL32, 6AL5, 6AM6, 6C4, 6J6, 1629, EB91, EF91, EF50 (S), EF36, Z77, PEN25, **4/-.** 3A4, 6J5GT, 6SN7GT, EAC91, EF39, **4/6.** 1T4, 6AC7M, 6AK5, 6J5M, 6SH7M, 12SJ7M, 12SK7M, 959, ARP12, DC70, DF70, DL70, EBC33, VP23, **5/-.** 6K8G, 6SL7, AL60, **6/-.** 1R5, 1S5, 3Q4, 6F32, 6SG7M, 6SK7M, 6X5G, 6BH6, 12A6M, 12AU7, 12K7GT, 12Q7GT, 80, ECC82, **6/6.** EZ40, EZ80, EZ81, **7/-.** 3V4, 5Y3GT, 6AT6, 6AU6, 6BA6, 6BE6, 6BJ6, 6J7G, 6Q7G, 6SA7M, 6SJ7M, 6SQ7M, 6V6G, 12AX7, 12C8M, 35Z4GT, 42, 801A, ECC83, EF80, GT1C, PY80, PY82, UY41, VR150/30, **7/6.** 6L6G, 7B7, 7C5, 7C6, 7Y4, OA2, PY83, **8/-.** 2A3, 3S4, 6AQ5, 6ST7, 12AT6, 12AT7, 12BE6, 12SQ7, 35Z5GT, EBC41, KT33C, PCC84, PL82, PL83, PY81, UY85, UF42, **8/6.** 3A5, 6BW6, 12AU6, EAF42, EBF80, ECC85, ECH42, EF89, EL84, PCC85, PCF80, PCF82, UAF42, UCH42, UF41, UF89, UL41, UL84, **9/-.** 5R4GY, 6Q7GT, 7S7, 35L6GT, 50L6GT, EBF89, ECC84, EF41, EF85, EL41, EM80, UBC41, UBF89, UCC85, UCH81, **9/6.** 6L6M, EABC80, EC81, **10/-.** 6K8M, 446A, 5763, ECL80, EY51, EY86, UABC80, **10/6.** 6BR7, ECF80, ECF82, ECL82, EF86, GZ32, PCL82, **11/6.** 12K8M, EC80, PL81, U25, VLS631, **12/6.** 830B, 866A, **15/-.** HK24G, **25/-.** 805, **30/-.** 3E29, **45/-.**

VHF Men, note latest GGT (12m/a p.v.) in stock. EC80, **12/6.**

VALVEHOLDERS, moulded. B7G, B8A, B9A, I.O. **9d.** each, **7/6** doz. B7G Ptfe, B9A Micalex, 1/- each. B7G, B9A screened, **1/6** each, **15/-** doz. B9A Micalex screened, **1/9** each, **18/-** doz. B9A Cer. screened, **2/6** each.

PARMEKO MAINS TRANSFORMERS. 230v. 50c/s input. sec. 620-550-375-0-375-550-620v. 200m/a on 620 and 550v. taps with 250m/a simultaneously on 375v. tap plus 2, 5v. 3a. windings. BRAND NEW BOXED, **50/-**, carr. paid. Input 200-250v. 50c/s. sec. 750-630-0-630-750v. 96m/a (OK for 140m/a). 6.3v. 2a, 4v. C.T. 3a. NEW BOXED, wt. 9lbs., **32/6** each post paid. ET4336, 190-250v., 10v. 10a. C.T., 2½v. 10a. twice C.T. All HV ins., **28/6** each, carr. paid.

GRESHAM TRANSFORMERS POTTED. 230v. input, 0-70-75-80v., 4A, **55/-.** 230v. to 6.3v. 4a., "C" core, **15/-.** Oil filled, 0, 230, 250v. input., 55v. 30m/a, 4 times. 350v. 52m/a CT twice. 5v. 3a. CT twice, **22/6.** All carr. paid.

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RESISTANCE UNIT 231, with 12 heavy duty non-inductive 80 ohm carbon resistors, ideal dummy load. **32/6,** each, carr. paid.

ACOS STICK MIKE. Latest model MIC39-1 brand new, less stand, **55/-** each. (List £5/5/-), MIC33-1 (List 50/-), **32/6.** AR88 Ceramic w/ch. switches and coil screens, **19/6** each. P/P. AR88 chokes, **9/6.** Tube trimmers, **1/6.** Post 9d. to £1. 1/6 to £2. SAE enquiries.

AMPLIFIER AM-33/ART.

As a result of a favourable purchase we are able to offer this fine piece of American equipment, supplies of which have not been seen on the surplus market for a long time.

For those not acquainted with it, it is an RF amplifier using a pair of HK257B's or 4E27's in push-pull having a frequency range of 25-100m/cs. with silver plated rotary inductors in pla e and grid circuits. The incorporated 2000v. 300m/a. power supply using 2, 836's is unfortunately for 400c/s. input but the space it occupies could very nicely be used to house an appropriate exciter or lower voltage 50c/s. pack. Apart from its use "as is" the unit could very easily be modified to cover say 2 metres, the 3 HF DX bands or by using only one of the PA tubes there would be sufficient space to build in a normal 5 band tank circuit. The HK257B or 4E27 (plate dissipation 75 watts) is probably the finest medium power beam tube available on the surplus market today, being only about half the physical size of an 813, having less than half the output and about one fifth the grid/plate capacitance. Drive requirements for maximum input of 300 watts (600 watts for a pair) being only a sniff.

We offer these units brand new in tropically packed sealed cartons and crated in a wooden crate for less than the current surplus value of the valves. ONLY **£6/10/-** each plus **20/-** carriage (UK Mainland only). We regret we cannot accept overseas orders.

These units are normally valved with HK257B's though some may have 4E27's but in view of the fact that we are supplying them in maker's unopened, sealed packing we cannot guarantee that a particular unit will have one type or the other. Size of unit 10" x 7½" x 19½". PA valves cooled by 24v. twin blower motor.

This is your opportunity to acquire a fine piece of gear at a give away price.

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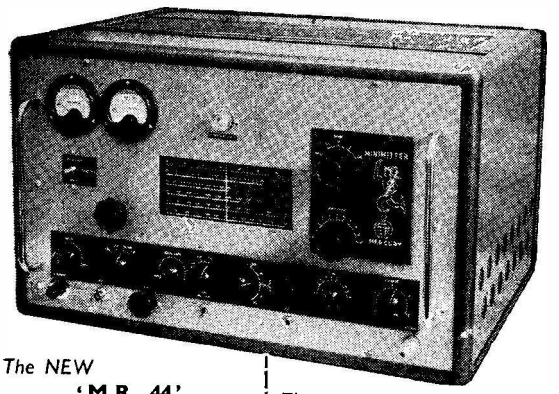
The New 'MERCURY 200' TRANSMITTER

for high powered efficiency up to 240 watts input. A "COOL" 150 watts on 'Phone

PRICE £110 *Complete*



The NEW

'M.R. 44' COMMUNICATIONS RECEIVER

with features never before offered in this country, at a price everyone can afford.

PRICE **£55** complete

The

'MINIBEAM 10/15'

is now selling fast in the Americas (both North and South), see November, 1959 "C.Q." for full details. PRICE **£16 · 0 · 0**

The MINIMITTER CONVERTERS will put that old Receiver in the "Modern Class." M.C.8. (Eight Band Converter) £20. Amateur Band Converter £17.

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The MINIMITTER Co. Ltd.

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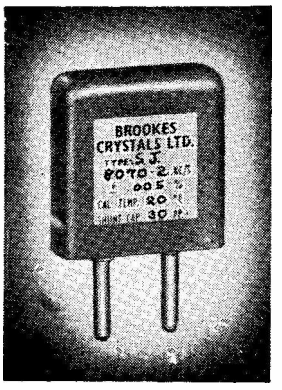

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SMALL ADVERTISEMENTS

(" SITUATIONS " AND " TRADE ")

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SITUATIONS VACANT

AIR MINISTRY have vacancies for civilian Radio Technicians at Royal Air Force Sealand, Cheshire, and at certain other R.A.F. Stations throughout the United Kingdom for the servicing, repair, modification and testing of air and ground radio and radar equipment. Commencing salary (national) (according to age) is £525-£670 p.a. Max. salary £795 p.a. Rates are subject to small deduction at certain provincial stations and to a small increase in London. Annual leave 3 weeks 3 days, increasing to 4 weeks after 3 years' service. A limited number of houses may be available for renting at Sealand. These houses are at West Kirby, some 15 miles distant.—Apply, giving details of quals. and exp. and mentioning this advertisement, direct to the Commanding Officer, No. 30 Maintenance Unit, Royal Air Force Sealand, or to Air Ministry C.E.4b, Cornwall House, Waterloo Road, London, S.E.1, for vacancies in other areas.

THE UNIVERSITY OF MANCHESTER.—There are vacancies at the Jodrell Bank Experimental Station for Instrument Makers and Electronic Technicians to work on the instrumentation of British Artificial Satellites. Salaries to be negotiated according to rates applicable in these trades.—Applications should be sent to: The Director, Jodrell Bank Experimental Station, Lower Withington, Macclesfield, Cheshire.

LEARN MORE ABOUT YOUR HOBBY.—Army Wireless Reserve, 404 Signal Squadron AER (Press Communications) has further vacancies for enthusiasts for training in Radio, Driving, Motorcycling, etc. Fifteen days' camp each year with other Hams; full pay and up to £25 Bounty. Free training at home for Operating, Morse, R.A.E. One officer vacancy also.—Write for details to: G3FDU, 28 Jack Lane, Davenham, Northwich, Cheshire.

TRADE

"TELECOMM" 2-metre Transmitters, Converters and Receivers; also the "Communicator" Mark II Mobile Transmitter/Receiver. Send s.a.e. for details, prices, H.P. terms.—R.E.E. Telecommunications, Ltd., Telecomm Works, Crewkerne, Somerset.

L.P. MORSE RECORDS: BEGINNERS AND ADVANCED COURSES. (G.P.O. PASS GUARANTEED OR REFUND.) — DETAILS: G3HSC, 45 GREEN LANE, PURLEY, SURREY.

VALVES FOR SALE (all tested on Mullard Valve Tester): 6F12, 6D2, EF80, 10FI, 6FI, PY82, 20LI, 6V6, 6P25, 6F13, 6F14, 6F15, 20DI, ECC-82, ECC-81, 5/- each, plus 1/- p. & p. on orders of less than six.—J. R. Calverley & Co., Ltd., 130 Water Street, Radcliffe, Lancs.

SMALL ADVERTISEMENTS, TRADE—*continued*

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3d. per word, min. charge 5/-, payable with order. Please write clearly, using full punctuation and recognised abbreviations. No responsibility accepted for transcription errors. Box Numbers 1/6 extra. Replies to Box Numbers should be addressed to The Short Wave Magazine, 55 Victoria Street, S.W.1.

SHORT WAVE MAGAZINE, Oct. '47-Oct. '51, £5; Dec. '51-May '54, £5 ; *QST,* Dec. '48-Dec. '51, £5 ; *CQ,* Jan.-Dec. '52, 36/-. Others, 3/-.—R. Grain, 15 Waverley Gardens, Grays, Essex.

AR88D with S-meter, full set of spare valves and manual, £45 ; buyer collects. Most *Short Wave Magazines,* 1950 to 1954, offers?—Pracey, 2 Talford Grove, Manchester, 20. *(Didsbury 3678.)*

WANTED: Ham, re-starting, requires good-type Communications Receiver, BC-348, BC-312, AR88, etc. One requiring attention acceptable if price realistic. Also other Tx components.—Full details and price required to G2CLP, 32 Putnoe Lane, Bedford.

WANTED: HRO Bandspread Coils ; also surplus crystals, channels 45, 46, 47.—Morgan, 52 Seafield Road, Southbourne, Bournemouth.

SMALL ADVERTISEMENTS, READERS—*continued*

AR88D RECEIVER. c/w, S-meter; also Elizabethan Transmitter, in matching cabinet, £40 the pair; s.a.e. for parties.—Bower, 31 The Crescent, Donnington, Wellington, Shropshire.

WANTED: HRO, CR100 or similar; also Wavemeter and 25-40w. table-top Tx. Delivery Scotland.—Sgt. McIntosh, R.A.F. Eastleigh, B.F.P.O. 10 (VQ4).

FEW 813's, Ham's surplus; fully tested and genuine, 35/- each; p/p 1/6. Other items, s.a.e. list.—Box No. 2193, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

EDDYSTONE 840a, literally as new; nearest £29. Delivered free.—*Tel.: Chiswick 0720.*

GM3BQA Tri-Band Quad; only had six weeks' use; buyer collects; £8 10s. — G3AVZ, 10 Maple Grove, Bellfields Estate, Guildford, Surrey.

EDDYSTONE 750; just over one year old, little used, perfect condition, with padded headphones, mounting blocks, speaker, mains voltmeter, new English Electric calibrated 4in. x 3in. S-meter, 300 μA FSD. All in matching black crackle cases. Complete listening station. £55.—Davies, Berwynfa, Denbigh.

NEW VALVES: EIMAC 4-400A, £10; 4X150A (2), £2 10s.; 304TL, £3 10s.; Amperex 5894 (QQVO6-40), £3 10s.; used, perfect, 304H, £1 10s.; 829, 17/6; QCC Filter xtals, 466 kc, 2 kc separation, £2, two pairs.—Marshall, 57 Godstone Road, Rotherham, Yorks.

HALLICRAFTERS RECEIVER, R44/ARR5, 27 mc to 145 mc, AM, FM, S-meter, new, £25. ARN-7 Receiver, 160m. to 3.000m., 14 valves, £4 10s.; s.a.e. list. WANTED: APR-4 Tuning Units.—Wright, 4a, Nepal Avenue, Atherton, Manchester.

RME 69, Bandspread all bands, xtal filter, good condition; £17 (o.n.o.). — 24 Norfolk Avenue, Sanderstead, Surrey. *(Tel.: Sanderstead 1126.)*

AR88D, excellent condition, £40; delivered 100 miles. — G5ML, Broomlands, Stoneleigh Road, Blackdown, Leamington Spa, Warks.

SELLING UP: Geloso Tx and matching Rx, both as new; WAC Phone any time; £80 the pair (or would separate). Leica IIIB, Summar F2, £50; Wide Angle Elmar 3·5 also available, £20. Will deliver 200 miles.—G4BL, 48 White Street, Derby. *(Phone 49758.)*

WANTED: Swinging Choke, 5/25 Hy 100 ohms, 250/50 mA; also mains transformer, 750-0-750v. 500 mA; Woden or similar make.—Box No. 2194, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

PROP-PITCH Motors, orig. U.S. version; will turn any beam; easily adapted for chain drive or to take base of pole for direct drive; only £5 each (carriage extra). Pair of new Pullin microammeters, suitable for Z-match, 75-0-75, not surplus; in boxes; price £3 the pair, post free.—Box No. 2195, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

AR88LF, excellent condition, plus set spare valves, £45 (o.n.o.). Buyer collects, Northampton.—Box No. 2196, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS, READERS—*continued*

TAPE RECORDER with microphone, two tapes, current, 39 gns.; Philips, only six hours' use, brand-new condition, £29; HRO 4-gang variable with gear box, new, 15/-; BC-221 case, 15/-. Valves, ex-new equipment, guaranteed: 6AC7, 717A, 6AK5, 6J6, 3 for 5/-; 12AU7, 6L6M (rusty), 3/6 each.—Box No. 2197, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

EDDYSTONE S640, £16; TCS6 Tx, unmodified, £7 10s.; R107, manual, RF24, £7 10s.; 450-0-450v. Transformer, 250 mA choke. Two 4 μF 1000v. condensers; moving-coil meter, SU4's, etc.; the lot, £5.—Box No. 2198. Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

PR120V, £65; AR88LF, £45 (both in perfect order); £100 the pair (o.n.o.?) WANTED: Hamobile 2m. Transmitter-Receiver, or similar.—Fenton, Niarbyl, Gay Bowers, Danbury, Chelmsford, Essex. *(Danbury 518.)*

FOR SALE: New K.W. Vanguard, 10m. to 80m., £40. QQVO6-40's, £2. — Apply GW3ITD, Rhoslwyn, Llanybyther, Carms., S. Wales.

REMAINING items of equipment for exchanges *(see* October issue). WANTED: R208, Hallicrafters HT11 Tx/Rx. Geloso VFO 104/4, or W.H.Y.? Interested? — Write G3LUV, 17 Low Escomb, Bishop Auckland, Co. Durham.

G.E.C. BRT-400 Receiver, £85 (o.n.o.); excellent condition. — Call evenings or week-ends: Buisel, 21 Marchmont Road (Bungalow), Wallington, Surrey.

SALE: QRO PSU, 230/240v. input, output 2000v. 300 mA and 1200v. 250 mA; £8, plus carriage. Consider exchange modulator giving 75w. audio.—Write G2DC, J. M. Drudge Coates, Morseden, Hightown Hill, Ringwood, Hants.

MINIMITTER Converter, as new, £10; HRO/MX, power pack, NL, all GC coils, speaker, £22 10s. Triple-Quad, unused, £10. Collins TCS Tx/Rx, 12v. power supply, remote control unit, LS, modified xtal mike, £32. Briggs & Stratton, petrol gen., 12v. 15A, in crate, £15.—G8DT, 32 Homecroft Drive, Cheltenham.

COMPLETE Relay Controlled Station, comprising Elizabethan Transmitter, Modulator, Power Unit and Hallicrafters S40A Receiver, in six-foot enclosed rack, £60 (o.n.o.); s.a.e. for photographs.—G3KBO, Crombie Villas, Halstead, Sevenoaks, Kent.

SALE: LG.300 Tx, complete with modulator and power unit, all connecting cables, spare 813, as new, £90 (o.n.o.). Can be seen by appointment. Delivery arranged. — G3KUM, 39 Warwick Road, Ipswich, Suffolk.

ZC2, Mark II, for sale, Tx/Rx 160/80/40 metres, 10w. CW/Phone, 12v. DC supply, excellent condition inside and out, c/w Mike and spares; £9 (o.n.o.); delivered South Wales area.—Parker, 10 Park Wern Road, Sketty, Swansea.

FOR SALE: Brenell MK5 Tape Recorder, 8 months old, perfect, £35; buyer collects.—Payne, 43 Hanworth Road, Earlswood, Redhill, Surrey.

AR88D, perfect condition, new valves, S-meter, handbook, spare parts, £45. WANTED: LM14, Panadaptor, 'scope. — Millar, Plot 1, High Street, Weston Favell, Northampton *(Tel. 33101.)*

SMALL ADVERTISEMENTS, READERS—*continued*

AR88D, professionally aligned, S-meter, manual, excellent condition, £45 cash (no offers). Will deliver 50 miles Sheffield.—Box No. 2199, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: Receivers, instruments, valves, 19in. rack with 60-watt amplifier, tuning unit, etc.; many other "junk box" items.—Lists from MacArdle, 77 South Drive, Brookwood, Surrey *(Brookwood 2511, Ext. 77).*

FOR SALE: Panda PR-120v. Tx, perfect, manual, LPF, £55. AR77E Rx, perfect, manual, £25. CR-100 Rx, perfect, S-meter, manual, £20. BC221-AK (modulated), brand-new, charts, manual, full kit spares, £30. Carr. extra on above.—Cutler, Barn Cottage, Walberton, Arundel. *(Phone: Eastergate 2367.)*

HRO, perfect condition, 9 coils 50 kc-30 mc, mains p/p, manual, calibration charts, earphones, £21 (o.n.o.?) R208, £5. *Short Wave Magazines*, March 1957-Nov. 1959, 30/-. ARRL *Antenna Handbook*, 8th Edition, 10/-.—Thurlow, 25 Everton Crescent, Ipswich, Suffolk.

AR88LF with S-meter, excellent condition, £45 (o.n.o.). 6ft. rack, consisting of 160-metre Tx, modulator and p/ps, also 75-watt 80-metre Tx, modulator and p/ps, offers? Valves: 813's, 30/-; 814's, 20/-; 829B's, 20/-; TZ40's, 10/-; and others; s.a.e. for full particulars.—G6AB, 44 Preston Road, Holland-on-Sea, Essex.

WANTED: Panda PR120v. or Explorer; state price, condition. FOR SALE: New 813's (3), 30/- each.—G3KZW, 41 Booth's Brow Road, North Ashton, Wigan, Lancs.

750 (no modifications), £38, carriage paid. New S-meter, £4; speaker, 8/-.—R. Grain, 15 Waverley Gardens, Grays, Essex.

TOP to Twenty 12-watt Phone/CW Tx, VFO controlled, complete, £7 10s. (o.n.o.?) Delivered reasonable distance.—Sidwell, 53 King Edward's Road, Ware, Herts.

FOR SALE: LG300 Transmitter in mint unmodified condition; also 1000-volt power unit for same; the pair, £45. 70-watt modulator also available and will sell the whole layout for £50 if buyer collects.—G3JUV, 17 Northfield Road, Gosforth, Newcastle-on-Tyne, 3.

SALE: 20w. CW/Phone, 160-80-40-metre Tx, VFO p/pack, self-contained, £14 (o.n.o.?) For 144 mc: 20w. CW/Phone Tx, 832 PA, p/p CC Cascode converter, IF 15·5-17·5 mc; 4-element Yagi Beam, lot £16 10s.—85 Grand Drive, Raynes Park, London, S.W.20. *(Liberty 4572.)*

G6BB complete, home-made double superhet; VFO, 829B, final, two supplies, wavemeter, spares; sacrifice, £30.—Details: 35 Criffel Avenue, London, S.W.2.

AR88D, £45; 1475 Rx, p/p, manual, £14.—Hales, 17 Ashbourne Road, Mitcham, Surrey. *(MIT. 5316.)*.

SMALL ADVERTISEMENTS, READERS—*continued*

RCA AR88D, mint condition, with manual and S-meter, £55. RCA RAL6 6-valve radio receiver (TRF) 2/RF + Det, BFO, etc., 0·3-23 mc in 9 wavebands, audio filter, bargain, £8. German Naval Battery Receiver, 7-valve, 5 ranges, 72-1525 kc, IF 60 kc, xtal filter, FB performance 2 RF mixer, etc., bargain, £8. Ex-WD Salford xtal multivibrator, 100 kc xtal with 10 kc and 1 kc points, 70/-. Home-built p/p final for 813's, 19in. panel 17in. deep, 7 panel meters, fil. trans., all-band grid tuner, screened wiring, plus TVI profing incorporated, slight attention (less valves), £4. Parmeko 400-watt modulation transformer P/P 805 into P/P 813, £4. RCA HT Transformer 2000-1500-0-1500-2000 volt at 400 mA, 200/240 volt input, £7. USA shrouded swinging choke, 9/60 H at 400/50 mA, 35/-. USA Potted swinging choke, 5/20H 300/20 mA, 25/-. Labgear Wideband Multiplier, 70/-. Valves: 813's, 35/-; 803's, 25/-. Baird Pro. TV Chassis, complete, good cond., ITA/BBC, £10 (o.n.o.?) Murphy 12in. console, very good Baird Proj. TV Chassis, complete, good cond., ITA/ separately), £6. RCA Modern 5ft. 6in. enclosed Tx cabinet, hinged rear door, £4. All collect or carriage extra.—L. Howes, 222 Princes Avenue, Southgate. N.13. *(BOWES PARK 2914.)*

EDDYSTONE 888A, practically new, with S-meter and speaker, £90. K.W. Vanguard 160/10-metre Tx, 4 months old, hardly used, £60.—Collect from: G3KHE, 19 Monmouth Drive, Sutton Coldfield. *(Sut. 6909.)*

SALE: R107, complete with Minimitter converter, Minimitter "Multi-Q" unit, and RF Unit 20-30 mc part of assbly., 10D19197, in first-class working order, £27. Buyer collects.—Apply after 6 p.m. (all week-ends): Tupholme, 21b Brondesbury Villas, Kilburn, London, N.W.6.

XTAL CALIBRATOR No. 5, additional output of 1 mc, new, 50/-. Line Voltage Stabilizer, contact voltmeter, motor-driven Variac, meter, 115v., unused, £4. Williamson amplifier, complete, £7. Auto-transformer, 2·5 KVA, £2. Large quantity components, new valves from 3/- each downwards; s.a.e. list.—Box No. 2201, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

CR-100's, overhauled, excellent condition, noise limiter, manual with each, £17 10s. (p. & p. £1). T-1131 VHF Tx's, 100-150 mc, 50 watts output, xtal controlled, built-in power supplies and modulators, 70-ohm coaxial output, requires only 200-250v. AC input, xtal and aerial, £22 (inc. carr. England & Wales).—G3NOO, Hamble House, Hamble, Hampshire.

WANTED FOR CASH: LG300, Minimitter or similar Tx; must be in perfect working order; state price, for immediate sale.—Box No. 2200, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

MINIMITTER Mobile Tx, £14; Control unit, £3; 12v. power supply, £9; whip bottom section, £2 — 80m. top, 30/-; 160m. top, 30/-; used only few hours. WANTED: Exchange the above or buy, Minibeam, telescopic mast, remote rotation gear.—Fletcher, 13 Park Avenue, Cheadle. Staffs.

EDDYSTONE 840A Receiver, £30 (o.n.o.?) Buyer collects. Eddystone speed key, 25/-, inc. postage. — Williams, 47 Croft Road, Yardley Birmingham.

TAPE RECORDER for sale; Walter's 303 Model, about 3 years old; working but needs attention; first offer secures.—Box No. 2179, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

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