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The SHORT WAVE Magazine

VOL. XVIII FEBRUARY, 1961 NUMBER 12

SHORT WAVE MAGAZINE

Vol. XVIII FEBRUARY, 1961 No. 208

CONTENTS

Managing Editor: AUSTIN FORSYTH, O.B.E. (G6FO)

Advertisement Manager: M. GREENWOOD

Published on the first Friday of each month at 55 Victoria Street, London, S.W.1. *Telephone: Abbey 5341/2*

Annual Subscription: Home and Overseas 33s. ($5·00 U.S.) post paid

AUTHORS' MSS

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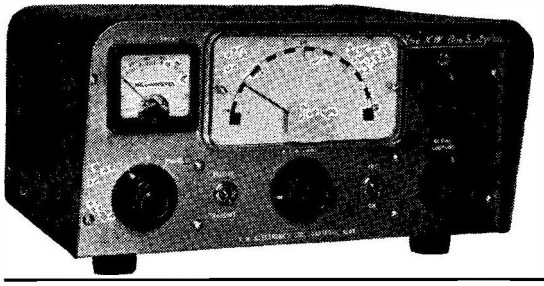

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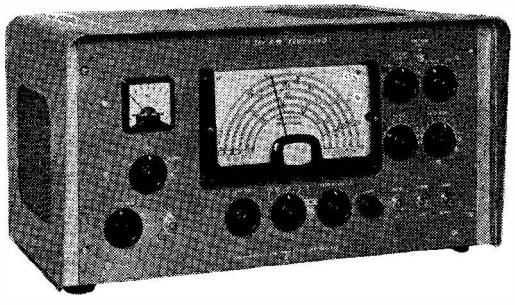

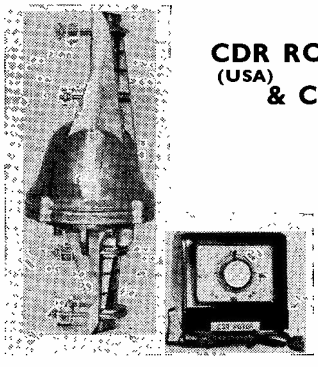

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FOR THE RADIO AMATEUR AND AMATEUR RADIO

The SHORT WAVE Magazine

EDITORIAL

Pressure

One certain result of the emergence of the "new, independent nations" — the membership of the United Nations has nearly doubled in the last ten years, and they are now having difficulty in accommodating all the delegations in the Headquarters building — will be an increased demand for ether space — for one of the first actions of a "new nation" (however insignificant and ill-found it may be) is to bolster its prestige by establishing a "Voice" on the air, with the complementary requirement of frequencies for the other services it wishes to operate. At the next international Radio Conference there will be about 20 more nations represented than were at Geneva in 1959.

The overall demand for frequency space extends from the LF and medium-wave ranges right into the VHF regions — and, indeed, with the new developments in ultra short-wave communication, the pressure on ether space above 100 mc is just as great as in the areas below it.

In the long term, these tendencies presage danger for the AT frequency allocations which — with all the other agreements reached at Geneva in 1959 — become effective on May 1st, and are to continue in force for some years. However, though AT stations have this legal sanction, they have not got full and effective protection — there is almost nothing to prevent the "Voice of Saudi-Banana" planting itself in our part of the 40-metre band; there is already one notorious example of this sort of piracy, justified by the authority concerned on the grounds of expediency and its refusal to accept the Geneva decisions.

Against all this, amateurs have the advantage of a great and growing weight of numbers — which in the long run cannot be ignored — as well as increasing awareness in responsible quarters of the value and importance of radio amateur activity. This is in one way shown by the number of professional delegates, at almost any radio conference, who are found to hold (of course, in a private capacity) AT station licences.

While our frequencies are on the face of it always vulnerable, we can be sure that our numbers, and the high level of activity on all bands throughout the world, are strong deterrents when it comes to a question of illegal operation on an amateur band by some irresponsible "emergent nation." An organised effort, on the air and, particularly, through the mail, could make things extremely uncomfortable for any unauthorised broadcast station. And it may have to come to this if there is no relief in our area of the 7 mc band after May 1st.

Austin Forbes G6FO.

WORLD-WIDE COMMUNICATION

An SSB Transceiver for Twenty

GENERAL DESIGN, CIRCUITRY, CONSTRUCTIONAL DETAILS

PART I

J. D. HEYS (G3BDQ)

The more sophisticated commercial approach to Sideband operation is a combined Transmitter/Receiver, or Transceiver, designed to cover all amateur bands 10-80 metres, with certain sections of the circuit operating on both "transmit" and "receive," an exceptionally stable VFO for accurate SSB working, and the power supply built in. These features can be combined in a single cabinet, so making an extremely compact and portable one-knob single-switch controlled transmit-receive unit, with the "transmit" side always on the "receive" frequency, because the VFO is common to both. Our contributor has adapted these general principles to a single-band (20-metre) SSB Transceiver, with the advantages, on this one band, of the modern commercial trend in amateur Sideband equipment. As this Transceiver can be home-constructed, it is dealt with in some detail. The discussion will be of great interest to many readers.—Editor.

DURING the winter of 1959-60 the writer was tempted to try his hand at Single Sideband, which to a dyed-in-the-wool CW and VHF man seemed then to be rather a bold and rash undertaking. However, after a few months on 80 and 20 metres using his version of the G2NH Exciter[1] (which, incidentally, forms the basis of the excellent "K.W. Viceroy" transmitter), the superiority of SSB over AM—and at times even of CW—left him in no doubt that previously an awful lot had been missed. A mere 50 watts input to a 6146 linear hooked on to the faithful end-fed "wet string" aerial gave solid contacts with all sorts of exotic DX.

Of course there was a big snag—there always is! The station was cluttered with power packs, VFO, exciter, PA, ATU, relays, and inevitably the receiver, a vintage HRO with BC453 out-rigger. Change-over, netting, and tuning-up became a work of art and a source of wonderment to the XYL and visiting amateurs. Something neater and more compact was needed, so then began the long search through all the technical literature that could be obtained on the subject.

Reading of the Collins KWM Transceivers and also an excellent *QST* article on a Mobile SSB Transceiver for 15m.[2] finally decided the course of future construction. It had to be a transceiver! W1DX in a report on the KWM-1[3] said: "Once you get used to it (two or three QSO's), you are likely to think anything else is old-fashioned." This referred to the ease of operation when using a VFO common to receiver and transmitter. Accurate netting, so important on SSB, is simplicity with a transceiver. Tune to a station — push a switch — then call, right on frequency.

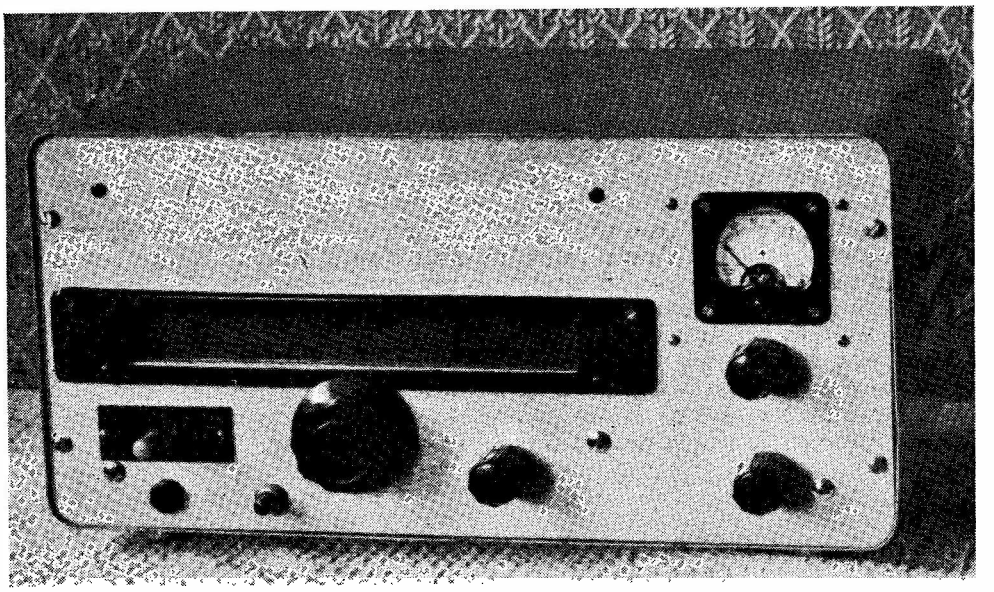
As the design took shape on paper a major decision was taken. The transceiver was to be for just one band, 20m. being the obvious choice as it carries most of the DX traffic and is likely to be disturbed least by the rapidly approaching sun-spot minimum. By building for one band there is great simplification, there being no need for coil switching and the associated lining-up problems. Provision was made for CW operation, and by using a high-frequency filter, reception and transmission could be achieved with a single-conversion design.

It is suggested that newcomers to the art of SSB first gain some experience with a simple half-lattice design for the LF bands (like the G2NH Exciter) before embarking upon a more complex transceiver such as this. However, there are many sections of the circuit, *e.g.* the VFO, the filter, the balanced modulator or the crystal calibrator, which can easily be "Chinese copied" and incorporated into the reader's own home-brew equipment.

The Transceiver described here involves 14 valves and 7 germanium diodes. It tunes from 13995 kc to 14355 kc and can transmit and receive CW and upper sideband SSB over this frequency range. The PA valve, a Mullard QQVO6-40, can be run at inputs up to 120 watts, but 65 to 70 watts is a more realistic figure with only 500 volts HT. No provision has been made for loudspeaker operation, so VOX and anti-trip circuits were not needed; the Transmit/Receive functions are rapidly achieved with a manually-operated keyswitch.

The Receiver Circuit

V1 is the receiver RF amplifier (refer Figs. 1 and 2) and is an ECC85 double-triode working in the series cascode manner. The ECC85 is a low-noise, high-gain valve designed to work satisfactorily at VHF and so gives good performance at 14 mc. A small variable con-



General view of the 20-metre SSB Transceiver, which is housed in a wrap-round style cabinet. The controls, from left to right, are : Send-receive keyswitch and phone jack, calibrator push-button, main tuning, RF gain and PA tuning controls, the upper of these two being the PA tank condenser C73 and the lower the grid condenser C72 (see Fig. 2). The dial mechanism is the Eddystone type 898, with a home-made escutcheon.

denser, C1 (Fig. 2) is provided to peak up the RF stage when tuning across the whole band. The tuning is quite flat and adjustment of C1 is not needed over a range of 100 kc or so ; this control is located at the rear of the transceiver, and in practice it is rarely touched. A potentiometer R2 controls RF gain, R4 ensuring that V1 is never without bias regardless of the gain control setting. A negative AGC voltage (audio derived) is applied to the grid of V1 by strong signals. The time constant of the AGC circuit is of a type suitable for SSB working. The tuned circuit at V1A anode is pre-set to mid-band.

V2 is the receiver mixer and is arranged in the conventional manner, apart from its anode circuit which has an RF choke as load. A tuned circuit at the IF (8·4 mc) and also a 1000-ohm resistor were tried in this position, but the receiver performance was unchanged ; this is because of the low input impedance of the filter which follows.

Two half-lattice sections back-to-back using four inexpensive surplus-type crystals make up the filter. The filter circuit is given in Fig. 3, together with the crystal frequencies. (The toroid coupling coil LT, will be fully described in the section on filter construction.) The use of a filter of this type with a steep cut-off characteristic (*see* Fig. 5) in the receiver obviates the need for high-Q IF transformers. V3 is a 6AK5 pentode and is the first IF amplifier. A 6AK5 can be a " fiery " valve owing to its high mutual conductance, but as used in the transceiver with a 560-ohm resistor (R14) between control grid and earth no instability is experienced. The second IF stage V4 is a 6BA6. The coils L3 and L4 are unscreened, but by careful positioning at right angles to each other there should be no feedback problems. However, if this is not the case, neutralisation can easily be effected by making a small condenser, NC1, from a pair of suitably-insulated wires twisted together and adjusted for correct capacity. Originally a second 6AK5 was used as V4 and the high gain made neutralisation necessary, and no re-arranging of the IF coils would overcome this ; IF gain level is fixed because both stages are also used when transmitting.

In the " Receive " position the IF output goes *via* the IF relay to the grid of V8A ; V8 and V8A make up a cathode-coupled mixer or product detector. V10 provides BFO voltage to the detector as well as supplying the carrier to the balanced modulator when transmitting. The audio output from this type of product detector is small and both sections of a 12AX7 (V7 and V7A) in cascade amplify the signals to a comfortable level.

Further simplification is achieved by omitting the usual AF gain control. In practice the

writer never uses a loudspeaker, and as a result the AF gain is always left right up and signal levels are adjusted with the RF gain control. This is the correct procedure when receiving SSB. Much has been said and written upon the merits and disadvantages of audio-derived AGC systems, but they certainly work very effectively on SSB. D3 (a high back resistance type germanium diode) is back-biassed through R37 and R38 to prevent AGC action taking place on normal background noise and weak signals. Audio voltages appear across the small LF choke Ch.1 and any of greater amplitude than the back bias are rectified by D3 and appear as negative voltages at V1 grid. C42 and R36 set the time constant to ensure the fast attack and slow decay action needed for SSB reception.

The Transmitter Circuit

The carrier generator V10 (Figs. 1 and 2) is a 6BA6 with an 8400 kc crystal between its screen and control grids, in a Pierce oscillator circuit. V10 anode is tuned to the same frequency by L7 and C64. A "swamping" resistor of 3900 ohms (R62) was found to simplify the initial setting up and also reduced the output to the correct level. L7A is a link coil which couples to the balanced modulator at the correct low impedance. To prevent stray carrier voltages finding their way around the balanced modulator and the filter, L7 and L7A must be enclosed in a suitable screening can. The twin leads from L7A must also be screened along their length. A 3/30 $\mu\mu$F Philips trimmer (C62) can be used to set the oscillator frequency to its correct position on the response curve of the filter (*see* Fig. 5).

The output from a crystal microphone is amplified by V9A and V9, two sections of a 12AX7 high-gain double triode, and is coupled at medium impedance *via* T1 to the balanced modulator. Any small output transformer with a secondary impedance in the 300 to 500 ohms range is suitable for T1; output transformers from the SCR-522 equipment or the "Command" receivers are suitable. R53 is the amplifier gain control which can be pre-set and forgotten about once the correct audio level has been found. When SW1 is in the CW position, the microphone input is removed and V9A functions as a phase-shift audio oscillator with a frequency of about 1000 c/s. As the output from this kind of oscillator is almost pure sine-wave, the single tone produced enables the transmission of a CW signal. Keying takes place in the cathode lead to V9A, the jack self-shorting when the key plug is removed.

The balanced modulator is of the ring type similar to that used in the Collins KWM-1 and KWS-1 equipments, with four semi-conductor diodes, D1, D1A, D2 and D2A; these consist of two matched pairs of Mullard OA79's. R24 is the balance potentiometer used in conjunction with C25 and C28 to reduce the carrier

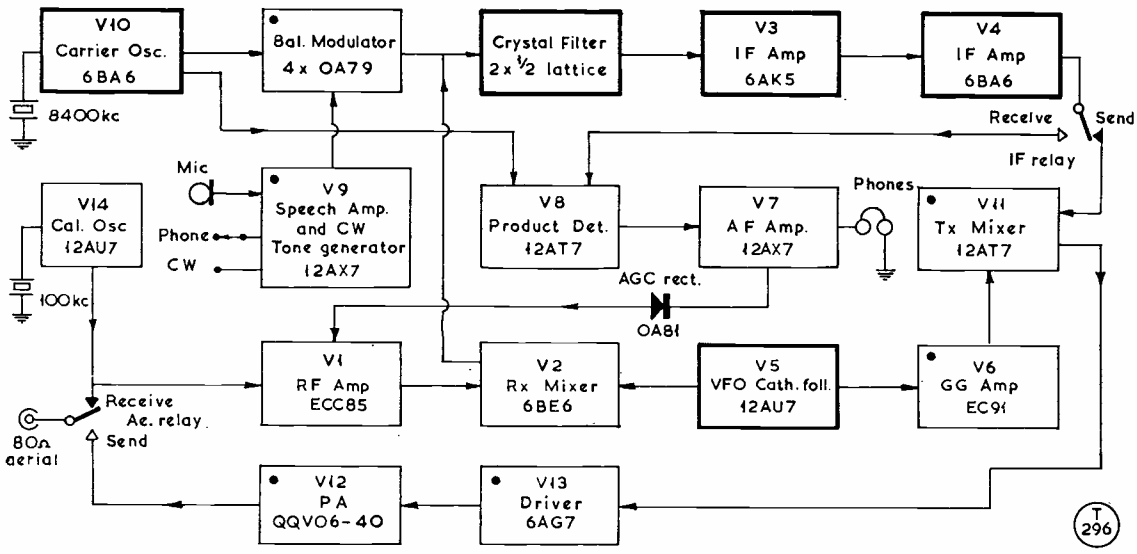
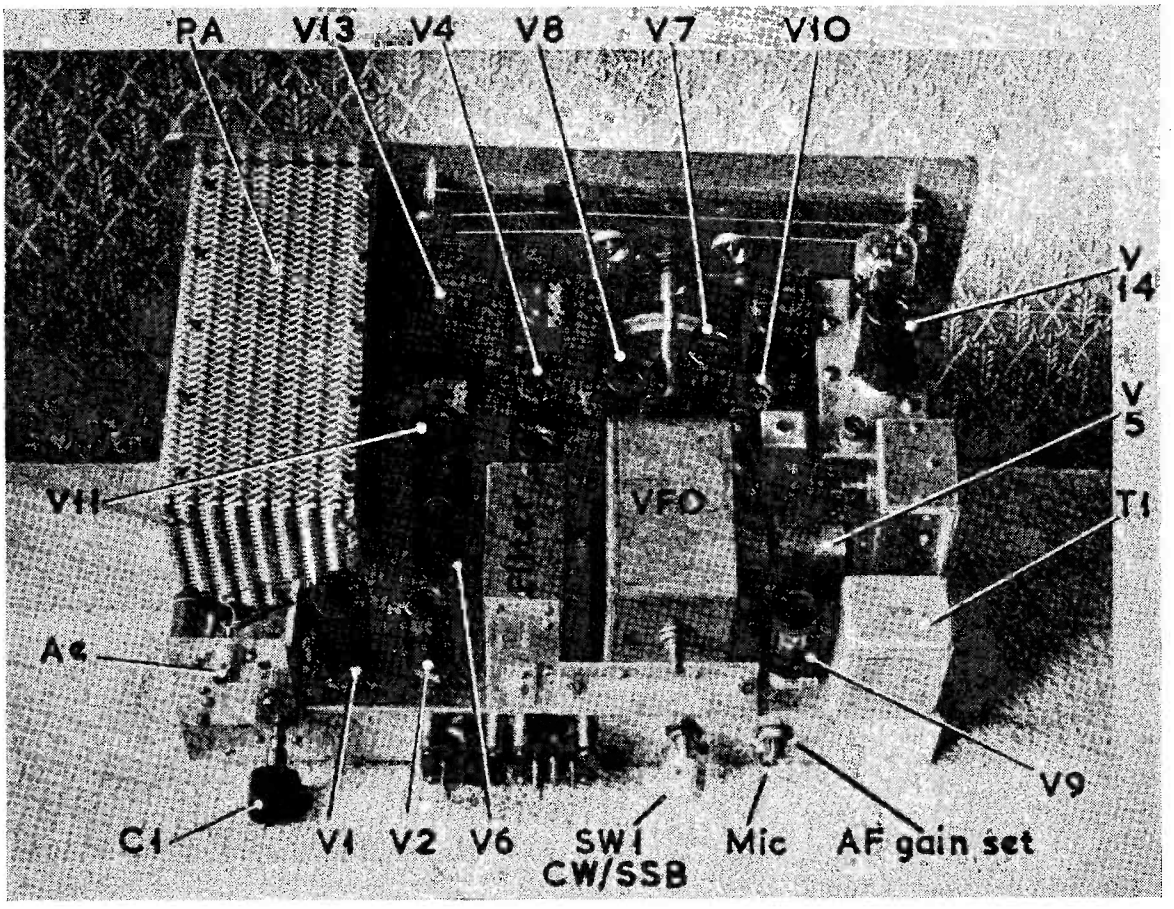


Fig. 1. Block diagram of the 20-metre Transceiver designed by G3BDQ, and fully described in the article. The units in heavy line are common to both "transmit" and "receive" positions, and those with a dot in the top left-hand corner operate when transmitting. V1, V2, V7, V8 and V14 are only in use when receiving. The send-receive switch, SW3 in Fig. 6, is not shown on this diagram.



Rear view of the 20-metre SSB Transceiver out of its cabinet, with main items identified. The aerial relay is between the PA box and C1, and to the left of the VFO box are the IF stages and IF relay. The balanced modulator box and the crystal calibrator unit are behind the transformer T1 ; the 100 kc (calibrator) crystal is hidden by V14.

output to a very low level.

From the balanced modulator the double sideband suppressed carrier signal at 8400 kc passes through the filter and the resultant upper sideband signal is amplified by the two IF stages before appearing at the grid of V11A. V11A and V11 are arranged as a cathode coupled mixer. The USB at 8400 kc is mixed with the VFO frequency and a 14 mc upper sideband is developed at V11A anode. There is no change of sideband because the mixing process is one of addition. L8 is slug tuned to 14 mc, the only capacity across it being interelectrode capacities and strays. This makes the coil effective across the whole band without re-adjustment of the slug.

A 6AG7 operating in Class-A (V13) behaves as a high-gain driver to the PA and requires no neutralisation if its input and output circuits are properly shielded. The 47-ohm anode stopper R75 is also important in this direction.

The PA valve V12 is a Mullard QQVO6-40 VHF twin tetrode with both sections in parallel. It is a small, extremely efficient valve very suitable for SSB applications. In Class-AB1 it has an efficiency of 67·5% with a total distortion product of only 2·4%. (Prospective users of this valve are advised to obtain the most informative *Data and Application Notes* from Mullard.) In Class-AB1 only 40 volts RF is required between control grid and cathode when both sections of the valve are in parallel. This is easily obtainable from the 6AG7 driver stage, and R71 is a 22000-ohm resistor shunted across L10 and C72 to damp the circuit and help linearity. The correct value of R71 can be found by experiment, depending upon the available drive. The common screen grid of V12 is tied to the 250-volt HT line on " transmit " and does not need stabilising as the load-

Table of Values

Fig. 2. Circuit of the SSB Transceiver

C1 = 20 $\mu\mu$F variable
C2, C8, C12, C24 = 120 $\mu\mu$F silver mica
C3, C7, C10, C18, C21, C40, C44, C65, C66, C76, C82, C83, C84, C90 = .01 μF disc ceramic
C4, C6, C9, C11, C15, C23, C26, C27, C39, C45, C48, C49, C54, C56, C61, C70, C80, C87, C91, C92 = .001 μF disc ceramic
C5, C17, C22, C25, C28, C62 = 3/30 $\mu\mu$F Philips trimmers
C13, C14, C19, C20, C43, C69, C88 = 005 μF disc ceramic
C16, C29, C30, C37, C50, C51, C85 = 200 $\mu\mu$F silver mica
C31, C72 = 50 $\mu\mu$F variable
C32 = 10 $\mu\mu$F variable
C33 = approx. 200 $\mu\mu$F silver mica (*see text*)
C34, C63 = 15 $\mu\mu$F silver mica
C35, C38 = .003 μF mica
C36 = 10 $\mu\mu$F silver mica
C41, C93 = 50 $\mu\mu$F silver mica
C42 = 0.5 μF paper
C46, C52, C55 = 8 μF 450v. wkng. elect.
C47 = 0.1 μF paper
C53 = 500 $\mu\mu$F mica
C57, C58, C59 = 470 $\mu\mu$F tubular ceramic
C60 = 10 μF 25v. wkng. elect.
C64 = 65 $\mu\mu$F silver mica
C67 = 40 $\mu\mu$F silver mica
C68 = .05 μF paper
C71 = 300 $\mu\mu$F mica
C73 = 150 $\mu\mu$F var. txm. type
C74, C79 = .001 μF mica, 2500 volts wkng.
C75 = 450 $\mu\mu$F mica compression
C77, C81 = .006 μF mica
C78 = 50 $\mu\mu$F mica, 2500 volts working
C86 = 5 $\mu\mu$F tubular ceramic
C89 = 10 $\mu\mu$F tubular ceramic
NC1, NC2 = Neutralising condensers (*see text*)
R1, R43 = 220,000 ohms
R2 = 10,000 ohms w/ wound pot.
R3 = 85,000 ohms
R4, R31 = 100 ohms
R5, R13, R70, R72, R75 = 47 ohms
R6, R15, R17, R19, R20, R27, R30 = 220 ohms
R7, R50 = 68,000 ohms
R8, R47, R82 = 47,000 ohms
R9, R34, R74 = 150 ohms
R10, R48 = 820 ohms
R11, R42, R46, R57, R58, R59, R67, R79 = 100,000 ohms
R12 = 27,000 ohms
R14 = 560 ohms
R16, R29, R71, R73, R76 = 22,000 ohms
R18, R61 = 330,000 ohms
R21 = 15,000 ohms
R22 = 4,700 ohms 2-watt
R23, R25, R66 = 470 ohms
R24 = 100ohms w/wound pot.
R26 = 1,300 ohms
R28 = 330 ohms
R32, R37, R52, R56 = 10,000 ohms
R33, R84 = 180,000 ohms
R35 = 5,000 ohms, 1-watt
R36, R45, R60 = 1 megohm
R38 = 270,000 ohms
R39, R64 = 18,000 ohms
R40, R77, R83, R55 = 470,000 ohms
R41, R44, R51, R54 = 2,200 ohms, 1-watt
R49 = 25,000 ohms
R53 = 500,000 ohms, carbon track pot.
R62 = 3,900 ohms
R63, R78, R81 = 1,000 ohms
R65 = 6,000 ohms
R68 = 1,600 ohms
R69 = 12,000 ohms
R80, R85 = 12,000 ohms, 1-watt
RFC1, RFC8, RFC10, RFC11 = 100 μH single pi-section (*ex*-R1355 receiver)
RFC2, RFC3, RFC4, RFC5, RFC6, RFC9 = 2.5 mH, 100mA
RFC7 = 2.5 mH, 300mA
Aerial Relay = 27 volt surplus (coils in parallel for 12 volt working)
IF Relay = 12 volt 180 ohms enclosed. (G.E.C. type M1485)
M1 = 150 mA moving coil
SW1 = Single pole, 2-way
SW2 = On/Off, push-button
CH1 = 20 mA, 4 Hy. or similar
T1 = SCR-522 receiver output transformer or similar. (15,000 ohms to 300 ohm load)
PC1, PC2 = Anti-parasitic chokes: 9 turns 20g. enam. on 1-watt 47 ohm resistors
D1, D1A, D2, D2A = Two matched pairs Mullard OA79 germanium diodes
D3 = Germanium diode, high back-resistance type, Mullard OA81
D4, D5 = Germanium diodes, Mullard OA70
V1 = ECC85 Mullard
V2 = 6BE6 Brimar
V3 = 6AK5
V4, V10 = 6BA6 Brimar
V5, V14 = 12AU7 Brimar
V6 = EC91 Mullard
V7, V9 = 12AX7 Brimar
V8, V11 = 12AT7 Brimar
V13 = 6AG7
V12 = QQV06-40 Mullard

COIL VALUES FOR THE SSB TRANSCEIVER

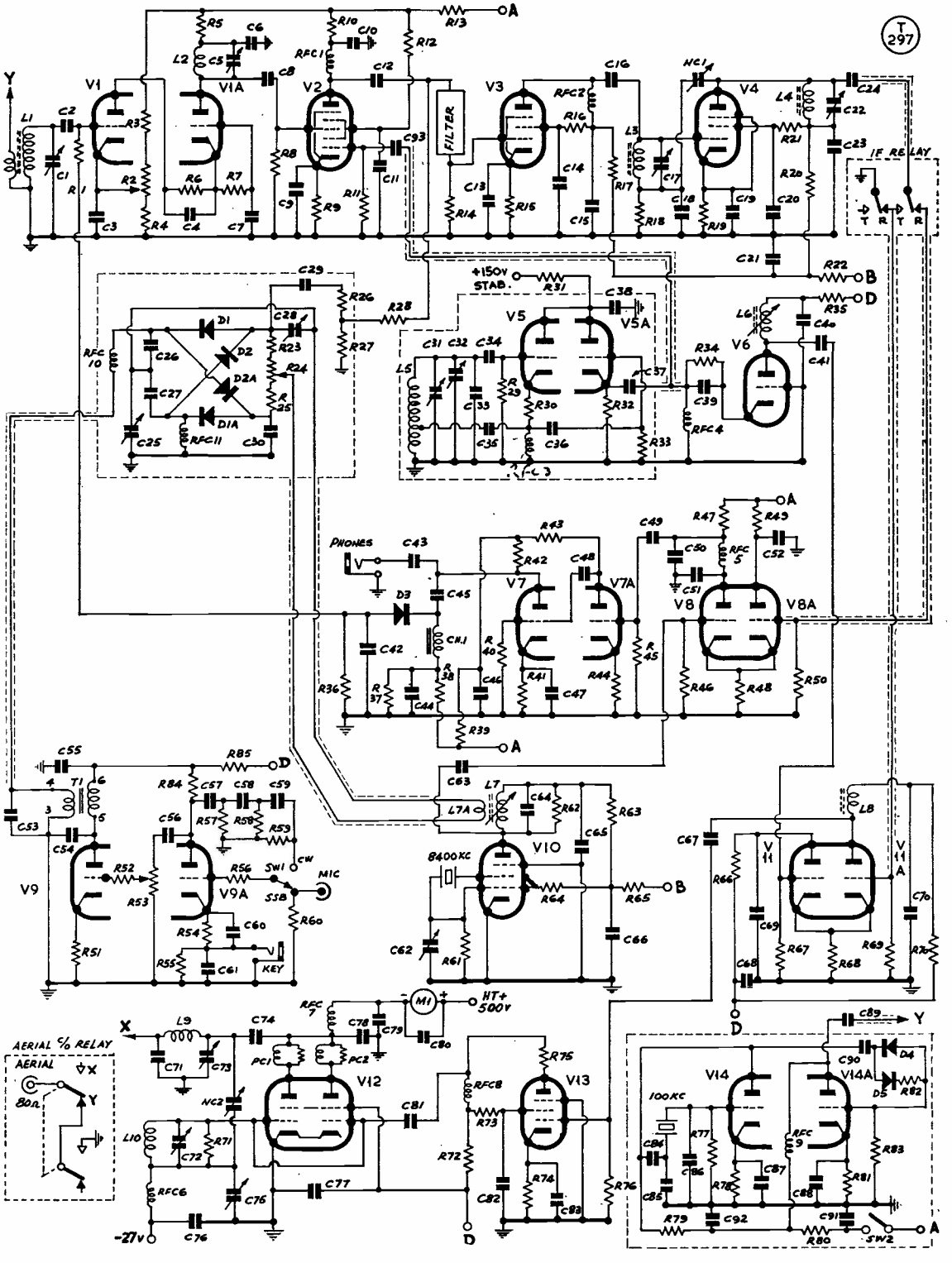
L1 = $\frac{5}{8}$-ins. 26g. enam. close wound on 13/32-ins. diam. former, slug-tuned, to tune 14 mc.
L1A = 2 turns 24g. PVC covered, at earthy end of L1.
L2 = $\frac{5}{8}$-ins. 26g. enam. close wound on 0 4-ins diam. former, to tune 14 mc.
L3, L4 = 26g. enam. scramble wound on $\frac{1}{4}$-ins. diam. slug-tuned former to tune to 8.4 mc in parallel with 20 $\mu\mu$F.
L5 = 15 turns 20g. over $1\frac{1}{2}$-ins. on 1-in. diam. ceramic ribbed former; tap 4 turns from earthy end.
L6 = 26g. enam. close wound for $\frac{7}{8}$-ins. on 13/32-ins. slug-tuned former, to tune to about 6 mc with V9 anode/ground capacity in parallel.
L7 30g. enam. scramble wound on 0.3-ins. Aladdin slug-tuned former, to tune 8.4 mc with 65 $\mu\mu$F in parallel (in screening can).
L7A = 8 turns of 30g. enam. at earthy end of L7.
L8 = 26g. enam. close wound on 0.3-ins. Aladdin slug-tuned former, to tune 14 mc with circuit capacities in parallel. (V11A anode/ground, plus V13 grid/ground capacities), in screening can.
L9 = 1.47 μH approximately; 11 turns of 16g. enam., self-supporting, $1\frac{1}{4}$-ins. long, 1-in. diameter.
L10 = 12 turns 22g. enam. over $\frac{3}{4}$-ins. on $\frac{3}{4}$-ins. diameter ceramic former.

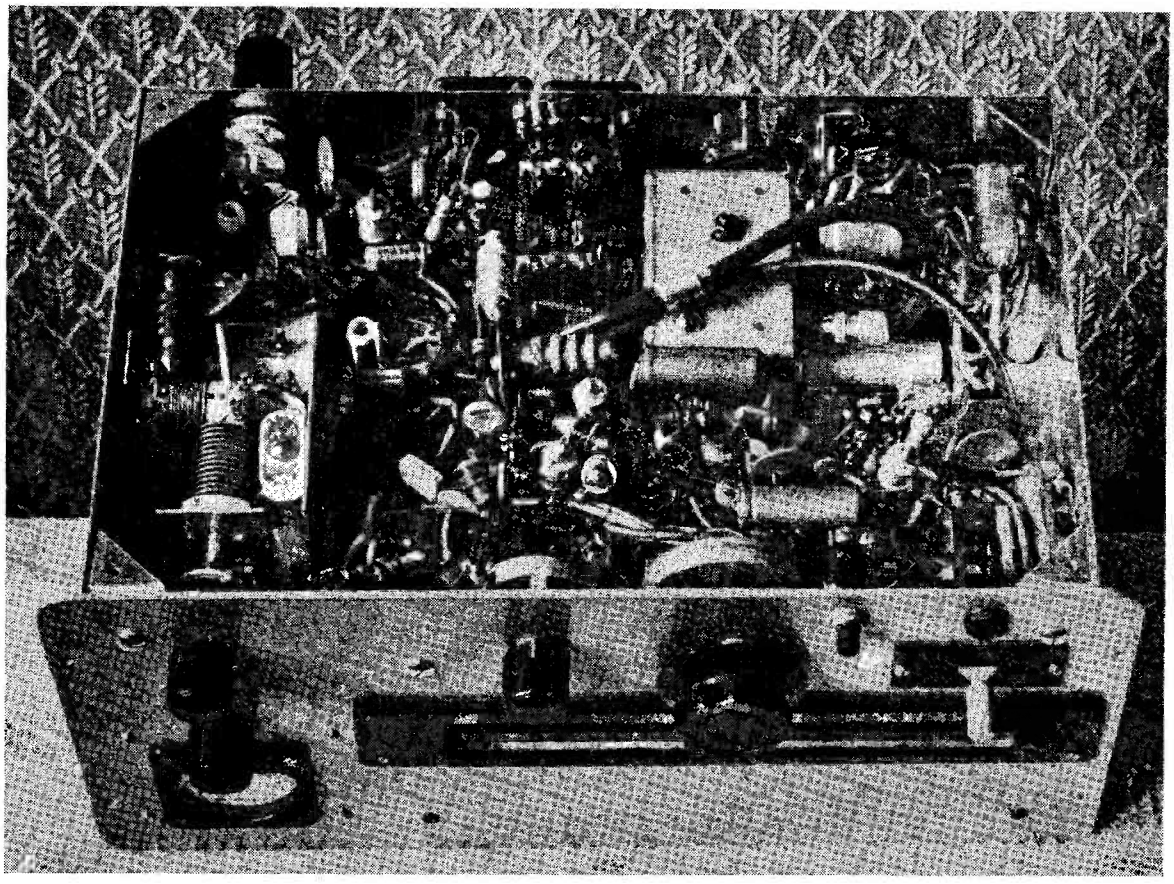
ing on the power pack is sufficient to hold the voltage reasonably constant through undriven to driven conditions.

An orthodox pi-tank circuit is employed with a ·003 μF mica condenser C71 on the output side to match the PA to an 80-ohm load. Part of the tank capacity on the anode side is made up by C78, a 50 $\mu\mu$F high-voltage mica condenser; this is a useful anti-harmonic device and also makes it possible to use a physically smaller tuning condenser, C73.

When used as a conventional push-pull amplifier the QQVO6-40 does not need external neutralisation, but when its elements are paralleled it is of course necessary. The capacitive bridge method is employed using C75 (a 450 $\mu\mu$F mica compression condenser) and NC2. To calculate the capacity of NC2 the following formula is used *(see p.630):*

Fig. 2. At right is the circuit of the 20-metre SSB Transceiver complete. For the HT and other switching, see Fig. 6. The balanced modulator, VFO, filter unit and crystal calibrator were built and tested as separate items before incorporation in the main assembly. All crystals are surplus types, at a few shillings each. Although the receiver section is only single-conversion, the high IF of 8.4 mc eliminates second-channel and the two half-lattice sections in the crystal filter give ideal selectivity for SSB reception. (*Note: In this circuit, the winding in the cathode of V5 should be marked RFC3.*)


T 297
V1
V1A
V2
V3
V4
V5
V5A
V6
V7
V7A
V8
V8A
V9
V9A
V10
V11
V11A
V12
V13
V14
V14A
FILTER
IF RELAY
+150V STAB.
PHONES
8400KC
100KC
MIC
KEY
SW1
AERIAL % RELAY
AERIAL
80 n.
HT+ 500v
-27v



Underside view of the SSB Transceiver designed and built by G3BDQ.

$$NC2 = \frac{C75 \times Cga}{Cgk}$$

All values of C are in $\mu\mu$F.

In the case of the QQVO6-40, NC2 should be about 4 $\mu\mu$F. Any small air-spaced condenser of around this value will suffice, the final adjustment being made with C75.

The anti-parasitic chokes PC1 and PC2 are needed in the anode leads, for without them alarming things are likely to happen!

The VFO and G.G. Amplifier

The heart of the transceiver is the VFO, V5

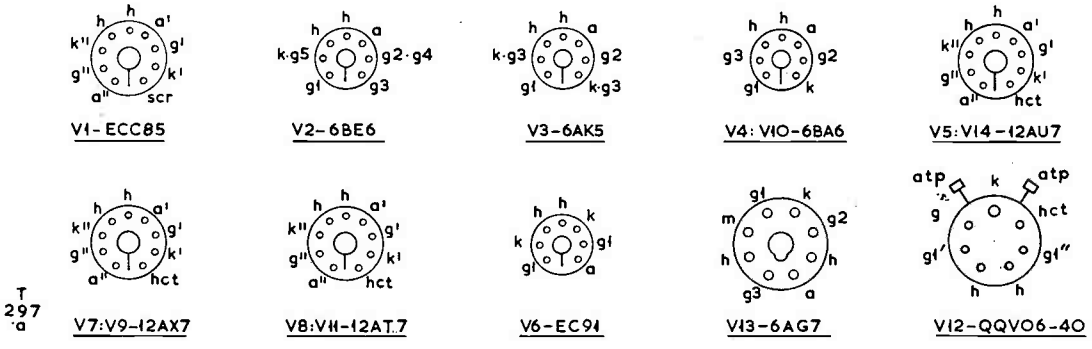


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Fig. 2A. Base connections for all the valves used in the G3BDQ 20-metre SSB Transceiver. *(Note: In the V12 diagram, the grid connection at upper left should be marked G2, for screen).*

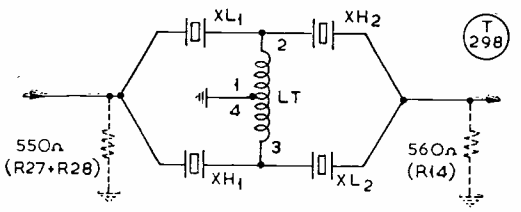


Fig. 3. The crystal filter for the Transceiver; it comprises two half-lattice sections back-to-back, tightly coupled by the winding LT, a home-made toroidal bifilar coil. The crystals are two identical pairs, XH1/XH2 being etched 1.5 kc higher than XL1/XL2, which have a nominal frequency of 8,400 kc. The filter input and output leads are shunted by 550-ohm resistors, essential to achieve correct filter characteristics.

in Figs. 1 and 2. It must be realised that no " second best " is likely to be good enough for any VFO used in SSB equipment; short-term stability of the order of 50 cycles must be the aim with a rapid settling-down time when switching on from cold.

After considerable deliberation a version of the earthed-anode Hartley oscillator was chosen, and the results exceeded all expectations. V5 is the oscillator and V5A is a cathode follower isolating stage, both being parts of the same 12AU7 valve. Output from V5A is very low but sufficient to operate V2, the receiver mixer, quite adequately. The transmitter mixer requires a greater voltage so V6, an EC91 grounded-grid amplifier, was added. The low impedance output from the cathode follower matches in beautifully to the cathode of V6. L6 is a slug-tuned coil adjusted to the centre VFO frequency (5775 kc) and is broad-banded enough not to need alteration when tuning.

The VFO is constructed around an Eddystone die-cast box, the usual precautions being taken to prevent mechanical movement of components by tying everything down very securely. A good quality coil form (ceramic ribbed) and tuning condenser having both front and back bearings are essential; high-grade silver-mica condensers should be used for C34 and C33; the latter is made up from a 150 $\mu\mu$F condenser with two smaller capacities in parallel to make up the required total; the exact value must be found by experiment. A virtue of the VFO design is that its output is almost pure sine wave and free from strong harmonics.

It should be possible to dunt the VFO box with a heavy screwdriver and *not hear any change of beat note on a monitor receiver.* After 5-10 minutes' running the drift is negligible, and one can short circuit the output lead without pulling the oscillator frequency by more than a few cycles.

Making the Crystal Filter

This part of the transceiver was actually built and tested before any other constructional work began. If the filter would not work it was pointless to go ahead with anything else. Some little experience with filters had been gained from building the G2NH Exciter using FT241 LF crystals at 430 kc, but from all accounts a filter designed around HF crystals was rather more difficult. However, this proved not to be the case, for all the work had been done already by W3LTN. In his *QST* article " Surplus-Crystal High-Frequency Filters,"[4] W3LTN produced a sure-fire design with four crystals. Luckily, a large number of surplus 8400 kc crystals appeared on the market at 2s. 6d. each, and eight of them were purchased.

A BC-221 Frequency Meter was borrowed and a test oscillator (Pierce type) was knocked up. Two of the crystals were spot-on the same frequency and they were marked XL1 and XL2; these became the LF crystals for the filter.

Some hydrofluoric acid was obtained and added to an equal volume of water, then one of the remaining crystals was etched up 1·5 kc higher than the LF pair. (Details of the acid-etching technique will be found in the July 1954 issue of SHORT WAVE MAGAZINE and elsewhere.)[5] Then another crystal was etched to exactly the same frequency, a process involving considerable care and patience. The two etched crystals were marked XH1 and XH2 respectively, and attention next turned to the coil LT (*see* Figs. 3 and 4).

For the correct operation of this type of filter, the coupling coil LT must be bifilar wound, and if maximum coupling is to be achieved, the windings must be on a ferrite toroidal core. Some cores were obtained from a surplus store but their characteristics remained a mystery. They were 2 ins. in diameter with a cross section of $\frac{1}{2}$ in. and probably came from telephone equipment. Suitable 1-in. diameter cores can be obtained in Stanferite S.F.6 material from S.T.C. Ltd.,

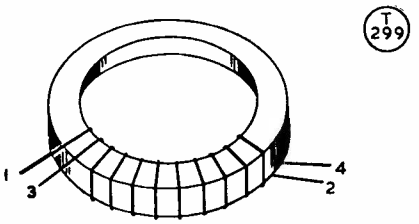


Fig. 4. Winding the toroid coil LT; the leads marked 1, 4 are connected to earth.

Magnetic Materials Dept. at 1s. 6d. net each (although the delivery time is from 8 to 10 weeks).

The exact inductance of LT is not critical, about 100 μH total being suggested by W3LTN. Not having an inductance bridge, the writer looked up his coil tables and discovered that 50 μH tuned by 120 $\mu\mu$F should resonate around 2 mc. A silver-mica condenser across half the winding on LT, a one turn link, and a grid-dip meter were all that was needed to wind the coil to approximate inductance. The winding details are given in Fig. 4. Wire gauge is not important, but owing to the large size of former used the writer put on about 20 bifilar (40 total) turns of 18g. enamelled copper. The coil was mounted in a rectangular screening can and connected up to the crystals.

The filter as described should give excellent results (*see* Fig. 5) but with the help of a BC-221, a couple of 560-ohm resistors, a small coupling condenser, and a communications receiver with an S-meter, the actual filter response curve can be plotted in under an hour.

From the remaining 8400 kc crystals one was selected for use in the carrier oscillator circuit.

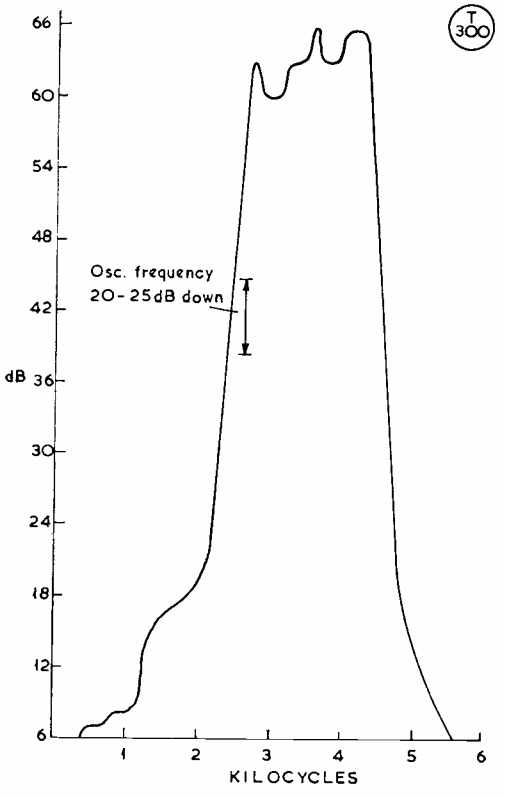


Fig. 5. The filter response curve, obtained by using a BC-221 as an RF generator and a carefully adjusted S-meter on the station Rx at G3BDQ. The filter band-width is adequate for amateur phone working and it has a good cut-off characteristic. For USB generation, the carrier oscillator should be positioned as shown, about 20 dB down the LF slope. Exact carrier placing is achieved by pulling the oscillator frequency slightly with a small air-trimmer C62 — see Fig. 2.

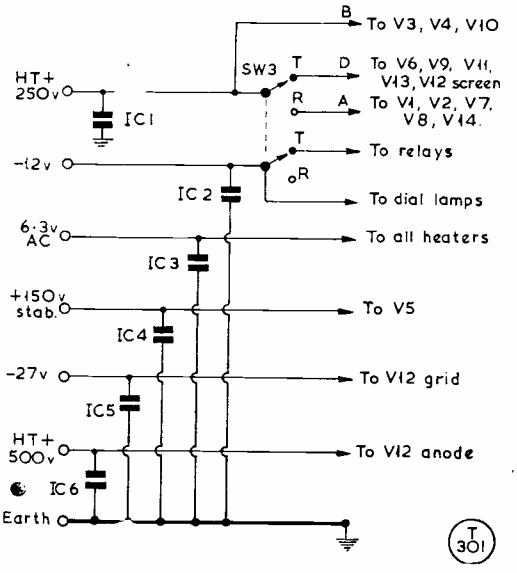


Fig. 6. A GPO type key-switch is used for SW3, the transmit-receive selector switch on the front panel — see photograph. SW3 switches HT to the appropriate sections of the equipment and also operates the IF and aerial relays. IC1-IC5 are .01 μF disc ceramics at the input sockets; IC6 is a .0018 μF disc ceramic rated at 1,200v. The negative 27v. bias for the PA is obtained from three 9v. dry batteries.

The Calibrator Circuit

The transceiver is provided with a 100 kc crystal calibrator, V14, which gives strong marker points across the 14 mc band. It is important that the output from any calibrator be easily recognised among the signals present on the band, this being a failing with most 100 kc circuits when used above about 10 mc.

Two years ago the writer developed a circuit suitable for use with an HF bands communications receiver and was pleasantly surprised to find that useful markers could be obtained up to 150 mc, whilst on 14 mc they were S9.

V14 and V14A are two halves of a 12AU7 twin-triode, V14 operating as a Pierce oscillator at 100 kc, with its anode coupled through D4 and D5 to the grid of V14A, the harmonic amplifier. The two semi-conductor diodes D4 and D5 are the harmonic generators and are connected in opposition with a 47000-ohm

resistor (R82) between D5 and V14A grid. In this way they behave as a non-linear resistor and generate strong harmonics from the 100 kc input; SW2 is a push-button switch in the HT line to the oscillator, and is mounted on the front panel of the transceiver.

With the crystal used (a gold-plated surplus-type vacuum mounted with octal base connections) a 5 $\mu\mu$F condenser (C86) was required to "pull" the frequency to 100 kc exactly. With different crystals this value may be substituted for some other figure to suit the particular crystal.

(To be continued)

REFERENCES

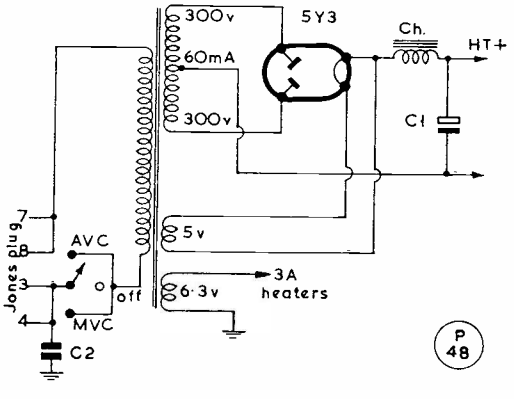
(1) "SSB Topics," *Short Wave Magazine*, December, 1957; February, 1958.
(2) Vester, "Mobile S.S.B. Transceiver," *QST*, June, 1959.
(3) "The Collins KWM-1 Transceiver," *QST*, April, 1958.
(4) Vester, "Surplus-Crystal High-Frequency Filters," *QST*, January, 1959.
(5) Newland, "A Safe Method for Etching Crystals," *QST*, January, 1958.

Power Supply for the BC-348

OPERATION FROM AC MAINS

FOR the reader who wishes to convert the originally 28-volt DC operated BC-348 to AC working a variety of modifications are possible. A source of high tension of between 230 and 250 volt DC capable of supplying some 65 mA, and a low tension supply of 6·3 volts AC at about 3·6 amps will get the receiver going with a minimum of effort—of course, after heater modification, as in the original they are wired in series-parallel for 24-28v. DC. In any case, the dynamotor must be removed and this constitutes the first step. The dynamotor and its associated filters should be stripped from the platform and the mounting dimples carefully flattened out. The five spade terminals which connect to the sub-base of the dynamotor platform should not be disarranged since they are the HT and LT feeder circuits, and if the power supply is built on the dynamotor platform they will provide a satisfactory method of power distribution.

A typical power supply suitable for erection on the dynamotor platform is shown in the diagram. The heater wiring will also have to be re-arranged, by paralleling and removal of the original ballast resistors on the heater circuit. Removal of the 28-volt DC circuit wiring from the Jones plug on the receiver rear apron can be most effectively carried out as follows: Cut the earth connection free from pin No. 7 on the plug and remove the dial light supply wire from terminal (1) on the front section of the AVC-MVC switch on the front panel (orange or yellow tracer in most receivers). Then the pins No. 7 and No. 3 may be used to feed AC into the receiver with a front panel-operated switch controlling the mains input, as shown in the diagram. It is recommended that the heater balancing resistance be removed from the circuit altogether or wired across, using the ends of the resistance as soldering points. In order to wire the heaters in parallel with a minimum of disturbance the circuit should be carefully traced before this part of the work is started. An important point to watch is that HT negative should be returned to the tag board on the dynamotor platform and *not* to earth, otherwise the biasing network will be shorted out. Pins 2 and 6 on the Jones plug at the rear control the screen supply voltage. A stand-by switch should be fitted on the front panel in place of one of the phone jacks and wired across these pins. Connection to the mains will now enable the receiver to be tested for satisfactory operation on AC mains. It should be mentioned that the dial light wire is reconnected to the AC filament supply on the ungrounded side and the lamps rewired in parallel with the other end, being grounded directly instead of through the balancing resistor and dimmer rheostat. These wiring details will be clear on examination of the receiver out of its cabinet.



Circuit of a suitable AC power supply unit for the BC-348; it can be fitted on the dynamotor mounting, after removal of the machine. Values are: C1, 16 μF, 350v. working; C2, .01 μF; Ch. 12-Hy, 100 mA; and T a 300v. transformer with suitable LT windings.

All-Band Aerial Tuning Unit

TO MATCH ANY AERIAL ON ANY BAND

W. H. RILEY (GM3GOC)

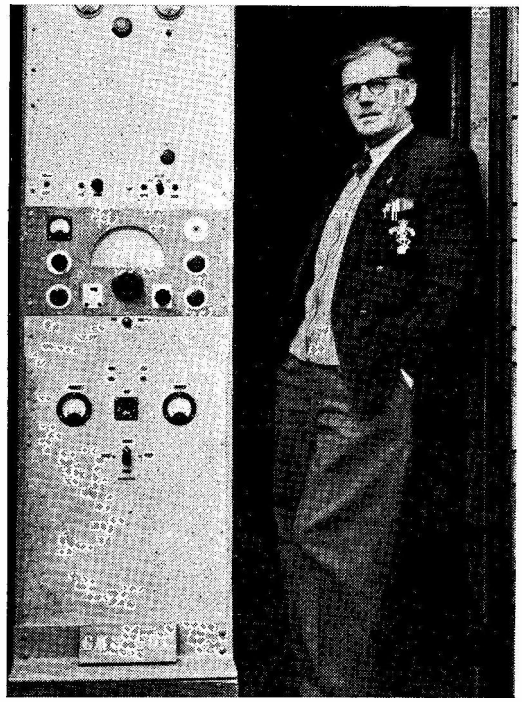
THE tuning unit shown in Fig. 1 has been in use for the past five years, and has given all-round coverage on all bands from 80 to 10 metres. It was made out of condensers, coil former and switches removed from various tuning units, TU type.

To obtain the correct matching, every turn was tapped on L1, and numerous connections were made from the taps by "croc" clips until the settings as shown in Fig. 1 were found to give the best results for each band.

In use, set either or both C1 and C2 to minimum, tune PA for minimum dip, then adjust either or both condensers for maximum PA current with full RF output. S1 and S2 select the desired band, whilst S3 selects C1 or C2 in series, in parallel or singly. By making C1 and C2 of different values, the lower capacity can be used for the higher frequencies.

The diagrams A-D in Fig. 2 show the resultant coupling in positions 1, 2, 3 and 4 of switches S3A-S3C. For long-wire use, either earth one side of the coil or leave it open circuit.

Every transmitter tried out including mobile, field



GM3GOC, Whithorn, Wigtownshire, author of the accompanying article — and also of that on the receiving SSB Adaptor in our November issue — has the tuner described here mounted in the upper chassis of the rack, which comprises a complete Tx/Rx assembly for SSB operation on 80 metres. The SSB Adaptor is fitted just above the receiver, occupying the central panel.

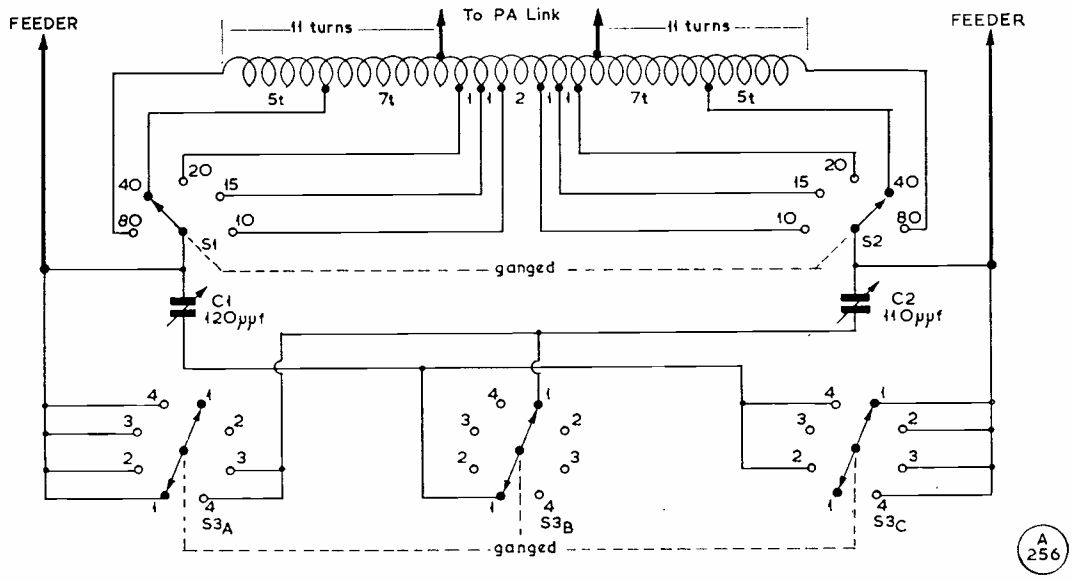


Fig. 1. Circuit of the ATU designed by GM3GOC, allowing a wide variety of aerial systems to be matched in on any band. In the case of resonant aerial types, the system must, of course, be set up for the band to be used, i.e., this tuner will not match a 10-metre dipole to 40 metres, but it will enable a long-wire of indeterminate length to be fed on any band, or (say) a 136 ft. dipole to be accurately coupled in — see Fig. 2. L1 is 30 turns of 16g. enamelled, wound 8 t.p.i. on a 2½ in. diameter ceramic former; S1, S2 are single-pole 5-way ceramic switches, ganged; S3A, S3B, S3C, also ganged, are 6-pole, 4-way, and should be ceramic types. The taps must be picked up as shown in the circuit for correct operation of the Tuner.

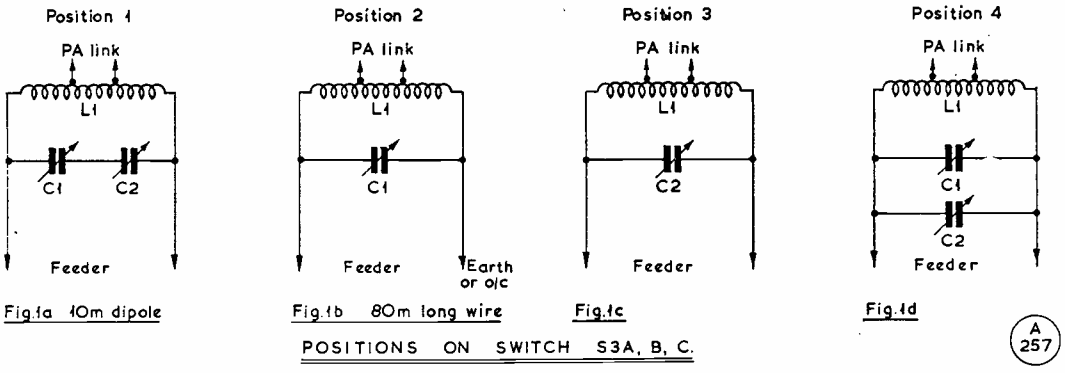


Fig. 2. The circuitry produced by the switching shown in Fig. 1. When using a long-wire (Fig. 1B above) one side of the coil can either be earthed or left free — this will depend on the band on which the system is being resonated; in general, for the LF bands, L1 should be earthed down. In every case, the main tuning adjustment is to set the PA to minimum plate current, and then to find the settings of C1, C2 at which maximum PA input is obtained at resonance with full RF output. The system is obviously susceptible to maladjustment, so some practice is required with it from band to band, and a field-strength meter would also be helpful.

day, TCS types, 53, and GM3GOC's own SSB transmitter have all loaded up easily, using either a 136ft. dipole with 66ft. of 600-ohm open wire feeder, or a long wire of indeterminate length. This ATU can be built up as a separate unit, or rack-mounted in the transmitter assembly, as in the writer's case.

APPROACHING MOBILE SEASON

Rally Dates Already Arranged

While we have some dates (quoted below) for Mobile Rallies fixed for the coming season, we would remind all Rally organisers to get their dates decided as soon as possible so that they can be given out early in order to avoid possible clashes.

For the Peterborough group the Rally season has already started—as noted in the December issue of SHORT WAVE MAGAZINE, they organised a mid-winter event for January 6 last; this attracted an attendance of 60, some from as far away as Yorkshire, one of the attractions being a lecture - demonstration of Hallicrafters equipment, given by Mr. R. Herries of James Scott & Co., Ltd., who came down from Glasgow; the Club members had erected a Mosley Tri-bander as well as dipoles on the Technical College roof in readiness for the demonstration, which was most successful. The talk-in was handled by G3KPO on Top Band and G3ARS on two metres.

WAC/M Award

The Amateur Radio Mobile Society now offers, world-wide, a WAC/Mobile award, for two-way contact with each of the six Continents while actually operating mobile. The award, a handsome certificate, is free to eligible A.R.M.S. members but costs 4s. (or 8 IRC's) to non-members. Cards are required to support the claim, also a declaration that the applicant was operating under true /M conditions when QSO was effected. Those interested should write: N. A. S. Fitch, G3FPK, hon. secretary, A.R.M.S., 79 Murchison Road, Leyton, London, E.10.

Following are Rally dates already fixed: *April 30,* North Midlands, Trentham Gardens; *May 14,* A.E.R.E., Harwell; *June 18,* Amateur Radio Mobile Society, Barford St. John U.S. Air Base, Oxon.; *June 25,* West of England, Longleat, Wilts; and *July 8-9,* South Birmingham.

Rally organisers should let us have arrangement details not less than three weeks before our publication date (the first Friday in the month) making sure that date is sufficiently in advance of their own date to make publicity worth while, *e.g.* it would be no use sending us details on April 6 for a rally to take place on May 7, as this would be only a couple of days after publication; for effective publicity for a rally on May 7, say, we would want the details by March 17 for publication in the *April* issue, with a *reminder* in May.

During last season, some Rallies could not be properly covered because the details simply did not reach us in time for publication to be of any use to the organisers. The essential information required is date, time, place (with any necessary map references), cost of admission, callsigns and frequencies of talk-in stations, what catering facilities are available on site, principal organised events, and name/QTH of some responsible person to whom enquiries can be addressed, by prospective visitors.

Surplus Converter for Two Metres

GETTING GOING WITH THE R.114 (TR.1986 RECEIVER)

C. C. ALGAR (G6AU)

THE Receiver Unit Type R.114, which is part of TR.1986 and still available readily and reasonably priced on the surplus market, offers an easy means of getting on the 2-metre band when used as a fix-tuned converter feeding into a normal receiver capable of being tuned over a range of about 7 to 10 mc. The R.114 was designed to cover 124 to 156 mc; it is a 5-valve crystal controlled type converter originally feeding into a 9·72 mc IF strip. The valves used are EF91 RF amplifier, EF91 mixer, EL91 oscillator tripler, EL91 tripler and EF91 doubler. The circuit is shown in the diagram.

The amount of work required to get the unit into operation is quite small and consists of the fitting of a mounting for the crystal, a coax socket for the aerial input, a suitable IF transformer and co-axial IF output cable; an 8-way miniature type Jones plug is required to bring the power supplies into the fitted Jones-type socket.

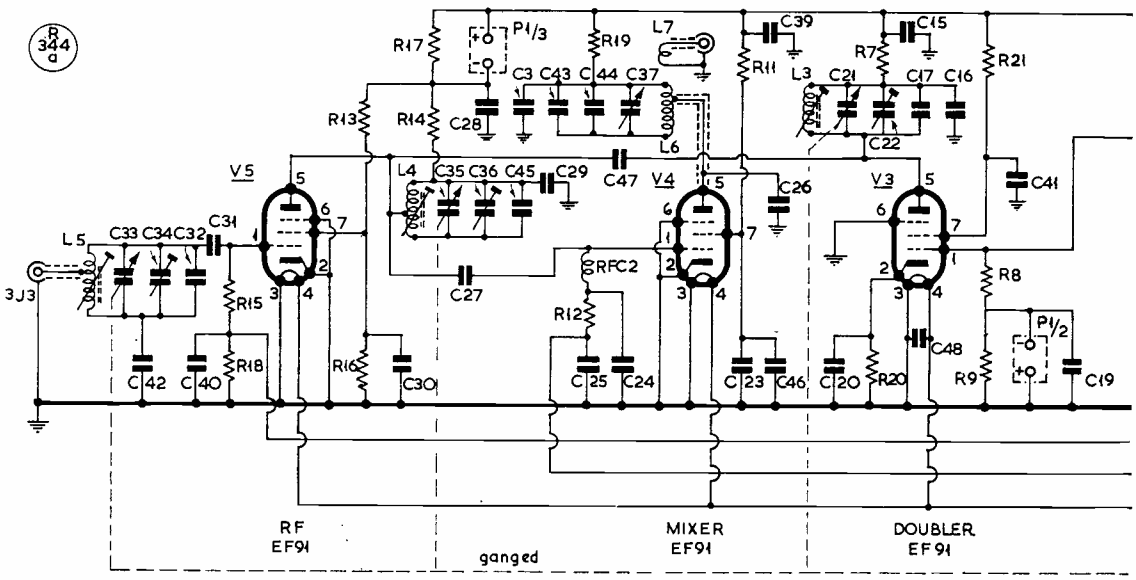
If an FT.243 surplus crystal (and socket) is used, it will be found possible to mount the socket by bending the soldering tags downwards and inwards so that the two pins of Plug 3P2 (*see* diagram) can pass through the soldering tags of the socket and be soldered to them.

The connector 3J3 should be removed from the co-axial aerial input lead as it is non-standard and the lead connected instead to a normal coax socket, which can conveniently be fitted in the centre hole in the rear right-hand chassis upright member.

A small IF transformer can be mounted on a bracket fixed under the rear upper right-hand tag strip retaining screw. This will enable the existing co-axial IF output cable to be used after the connector 3J3 has been removed. The HT connection can be obtained *via* a 10,000-ohm decoupling resistor from the 4th tag from the rear on the upper left-hand tag strip, with a small ·01 μF decoupling condenser mounted directly at the output transformer.

Output Connection

In the writer's case an IF transformer 1TR1 was available from the original IF strip and this was modified as follows: Divide the two separately screened sections by carefully sawing through the common baseplate with a hacksaw blade and remove the plastic strap. The original primary coil was used and the marking 1C1 on the can adjacent to the trimming condenser will enable this to be identified; a small 10 $\mu\mu$F condenser was put in parallel with the 8·2 $\mu\mu$F already fitted in the can. The single link turn was cut away at the soldering tags as close to



the baseplate as possible, as these tags are not used in the modification. There are two holes in the baseplate into which can be fitted wire-type soldering tags similar to those to which the existing primary winding connections are made. A 9-turn link coil L7 of about 28g. enamelled wire was wound as close to the bottom end of the existing coil as possible and the ends connected to the new soldering tags. This is the link coupling taken away to the main receiver through co-axial cable. The primary winding consists of 26 turns of 28g. enamelled, spaced over $\frac{3}{4}$ ins. on a 7/16 in. diameter former and tapped 17 turns from the earthy (HT+) end.

An alternative, but probably less efficient, way of coupling the converter into the main receiver would be to disconnect the earthy end of C26 from chassis and connect this instead to the aerial terminal of the main receiver *via* a short length of co-axial cable. An RF choke could then be substituted for the suggested IF transformer primary winding, between the anode of V4 and the 10,000-ohm decoupling resistor R19.

Power Supply, R.114

Power requirements are supplied *via* the miniature Jones type plug and are as follows:—

Pin 1, Common earth, Heater, HT−, GB+; Pin 2, Heater 6·3 volts, 1·2A; Pin 3, Mixer GB, −3 volts; Pin 4, blank; Pin 5, RF GB, −1·5 volts; Pin 6, blank; Pin 7, Connect to Pin 8; Pin 8, HT+ 250 volts approx. 30 mA.

The bias voltages can be conveniently

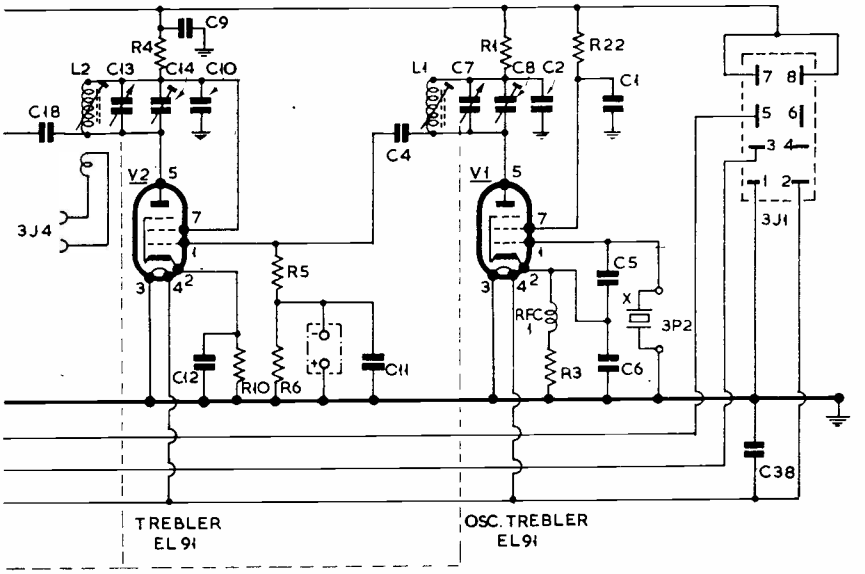
Circuit complete of the R.114 surplus item, which is the receiver section of the TR.1986. As explained in the article, it can be modified for two metres reasonably easily and is a very suitable unit for making a start on the two-metre band. Except for circuit elements shown as C3, C37, C43, C44, R19, L6 and L7, the original component marking is used throughout (as given in the TR.1986 manual). *(Note: The item across R6 in V2 grid should be marked P1/1 and is a meter check point, similar to P1/2 and P1/3).*

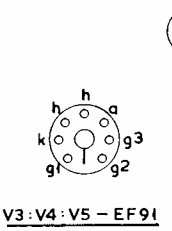
Table of Values

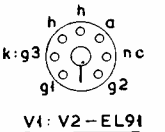
Circuit of the Surplus Converter for Two Metres

C1, C2, C9, C10, C11, C12, C19, C20,		C47	= 5.6 μμF
C38, C48	= .0015 μF	R1	= 12,000 ohms
C3, C6	= .01 μF	R2, R16	= 68,000 ohms
C4	= 100 μμF	R3	= 2,200 ohms
C5	= 12 μμF	R4	= 6,800 ohms
C6	= 47 μμF	R5, R11, R13, R21	= 47,000 ohms
C7, C13, C21, C33,		R6, R7, R9	= 1,000 ohms
C35	= 5-gang tuning condenser, as fitted	R8	= 33,000 ohms
C8	= Osc/Tripler trimmer	R10	= 3,300 ohms
C14	= Tripler trimmer	R12, R18	= 100,000 ohms
C15, C16, C23, C24, C25, C28, C29, C30, C39, C40,		R14, R19	= 10,000 ohms
C41	= 220 μμF	R15	= 1 megohm
C17, C32,		R17	= 8.2 ohms
C45	= 1.5 μμF	R20	= 150 ohms
C18, C44	= 8.2 μμF	R22	= 220,000 ohms
C22	= Double trimmer	V1, V2	= EL91
C26	= 65 μμF	V3, V4, V5	= EF91
C27	= 39 μμF	X	= Crystal, 7575 kc
C31, C43	= 10 μμF	RFC1	= RF Choke
C34	= RF Amp. trimmer	RFC2	= VHF Choke
C36	= Mixer trimmer	L1	= Osc/Tripler anode coil
C37	= 3-19 μμF, IF trimmer	L2	= Tripler anode coil
C42	= 33 μμF	L3	= Doubler anode coil
		L4	= RF Amp. anode coil
		L5	= RF Amp. Grid coil
		L6	= Mixer anode coil (*see text*)
		L7	= IF output link coil (*see text*)

Note: With the exception of C3, C37, C43, C44, R19, L6 and L7, the original component reference numbers have been used. Where the components in the actual Unit are marked, the reference numbers will be prefixed with figure 3, *e.g.*, C22 will be marked 3C22. C2, C45 may be omitted in some Units and C32, C42 may be of values different from those shown above.







obtained from a small torch battery and this will have a long life, as the drain is very low.

Choice of Crystal

A surplus FT.243 type crystal of 7575 kc was used in the unit as this gives an IF range of 7650 kc to 9650 kc, which avoids the 7 mc and most of the 9 mc broadcast bands, thus reducing possible break-through troubles. At the same time, it ensures that the crystal oscillator frequency is outside the IF range; this is necessary as the crystal oscillates on fundamental and not on overtone. No trouble with spurious responses or "birdies" has been experienced. The possibility of break-through would no doubt be further reduced by fitting the unit into a metal case or box.

Setting Up

If no test equipment is available, the following procedure should enable the converter to be set up sufficiently well to enable a local two-metre signal to be found: Having connected the aerial, power supplies and IF output to main receiver, tune the latter to 8650 kc, or to the mid-point of the selected IF range, and adjust the trimmer on the converter IF transformer for maximum noise. Set the five-gang condenser to about one-third mesh and the five trimmers to half-mesh. Tune main receiver to 7575 kc (or to appropriate crystal frequency if different from this) when oscillator should be heard. If main receiver will tune to 22,725 kcs or third harmonic of crystal used check on this frequency and adjust five-gang condenser for maximum signal. Retune receiver to 8650 kc (or appropriate IF mid-point) and adjust all trimmers in turn for maximum noise starting from the front end, which is the crystal oscillator/trebler stage. The increase in "sharsh" may not be great but car ignition noise should be heard and can be used to peak up on. By tuning the main receiver over selected IF range (7650-9650 kc in the writer's case), it should now be possible at least to find any local station which may be working and further "peaking" can be carried out on this signal and subsequently on any weaker signals which may be heard. As activity is still not too great on this band, do not despair if no signal is heard straight away.

If test gear is available, then the first trimmer should be adjusted for maximum current in a low-range milliammeter connected between Pins P.1/1 on the meter-plug at rear of the unit, and the second trimmer set for maximum current when the meter is transferred to Pins P.1/2. The RF and mixer trimmers (4th and 5th) can be trimmed for maximum output on the main receiver on a signal at 145 mc fed into the aerial socket; the IF transformer trimmer can also be peaked on the same signal. The main receiver should, of course, be tuned to the signal at 8650 kc or other selected IF mid-point.

This R.114 unit has given satisfactory results when fed into an old type PCR.1 receiver and better results still with a BC-342. The converter is very stable in operation and signal-to-noise ratio seems quite good. It has provided an easy means of opening up on another band.

In its original Service application, an output at around 72 mc was taken to the transmitter section from the second tripler stage *via* the 2-pin ceramic socket 3J4 on the left-hand side of the unit. This connection should be ignored.

RADIO AMATEURS' EXAMINATION —MAY 1961

Those who intend taking the next Radio Amateurs' Examination, in May, are reminded that their applications to sit should be in by the end of this month. Late entries involve a late-entry fee being required. Applications can be made through your Course instructor, *or* the local Technical College or Evening Institute, *or* the Education Authority for the district (city, county or county borough) *or* to the City and Guilds of London Institute, 76 Portland Place, London, W.1. The examination itself, known as "Subject No. 55—Radio Amateurs' Examination" (which should be quoted in all correspondence) is usually arranged at the educational centre nearest the candidate's home.

ECHO—AMATEUR RADIO EXHIBITION, 1960

The attendance at the "Radio Hobbies" Exhibition for the four days November 23-26 last came to 8,600 people through the doors, a slight increase on the 1959 Show. The winner of the Hallicrafters SX-111 receiver, presented by James Scott & Co., Ltd., Hallicrafters main distributors for the U.K., was SWL Palmer, of London, S.E.6. It has been suggested that for future years, a wider range of smaller prizes should be given, on the same lucky-ticket draw system; this would make the prize-draw on the last night a good deal more exciting!

In reporting, in our December issue, G3LOK as the winner of the home-constructed equipment competition, for his heterodyne frequency meter, we might have mentioned at the same time that this was described and illustrated on p.288 of the August 1960 issue of SHORT WAVE MAGAZINE.

The annual Amateur Radio Exhibition is organised and managed by P. A. Thorogood, G4KD, who also accepts full financial responsibility—and a very good job he makes of the whole undertaking. If the Exhibition is "sponsored" by anybody, it is by those who pay for their stand space—as SHORT WAVE MAGAZINE has done every year since the Show started, now being the only paying exhibitor not to have missed a single one.

LET PHONETICS PHLOURISH

AN ANSWER TO "PHUTILE PHONETICS"*

L.H.T. is not the first to make an Impassioned Plea or even an Angry Tirade on the subject of

(*a*) Place name phonetics
(*b*) Q-Code in telephony and
(*c*) "I spell. . . ."

No doubt he will not be the last. One does hear the occasional classic case of laughable lunacy on the air, but the situation is not so black, nor the prospects so gloomy, as we are asked to believe.

Place Name Phonetics

The Oxford Dictionary defines phonetic spelling as a "*system that is consistent and unambiguous and economical in representing sounds.*"

It seems that for Amateur Radio purposes place names fulfil all three requirements. At any rate, they can hardly be considered to be "shocking." With any phonetic system one will inevitably encounter word combinations which are apparently absurd when taken at their face value rather than as aids to intelligibility. It is doubtful if any but a few of the more naive SWL's and BCL's experience the difficulties which L.H.T. has described. Other systems will involve their own ambiguities, and presumably the unhappy listeners would be equally bewildered by the voluptuous vision of "Sugar Mary," the regal connotation of "King Mike VI," or the promiscuous overtones of "Easy Love." If they are confused by "Canada Ontario," how much wiser will they be with "Charlie Oboe ?"

Q-Code in Telephony

The use of Q-Code abbreviations in telephony, with or without the tiresome phonetics, may or may not be helpful in overcoming language difficulties; one feels that in some cases it is. But in any case what's *wrong* with it ? It may well be that L.H.T. dislikes it, and he is quite entitled so to do. However, the writer cannot see that he has any cause to wince and go slightly green (however restful a shade it may be) just because a large number of people do not share his views. (Apart from anything else, it isn't *healthy !*)

Every technical hobby or profession produces its own brand of specialised phrases and expressions. In their proper context, such phrases have a place in Amateur Radio parlance. L.H.T. is either cynical or very uncharitable when he charges us with "rolling off Q-signals to sound clever." Perhaps a few operators may have such an unworthy and pretentious motive, but he presumes a little when he takes it upon himself to cite the AT world at large in his personal indictment.

"I spell . . ."

The example which L.H.T. quoted to illustrate this final outrage at first sight appeared to be as improbable and exaggerated as some of the others. However, it might well serve as a good case for the opposite argument. The writer for one would be a little circumspect about spelling Nebuchadnezzar from memory, and he hazards a guess that L.H.T. himself had to look it up ! Looking through the log book at this station are found such names as Juurikorpi, Vrchlabi, Petrozavodsk and even the Scottish town of Milngavie (unsportingly pronounced *Mul-guy* by the locals). Even at readability 5, strength 9 (and without sudden fading or interference, which L.H.T. appears to ignore completely) one feels that there *is* a good case for the spelling out of names and places.

It is inevitable that in any hobby, and perhaps particularly in a hobby such as Amateur Radio, there will be a wide diversity of opinion as to what is "right" or "wrong;" "good" or "bad." However, it is perhaps rather presumptuous for any one of us generally to catechise a large number of others purely because their opinions as to expedient operating methods do not coincide with his own. One notes in his article, by the way, that L.H.T. apparently does not condemn the use of the Royal "We"—a sinister offence which might cause many another amateur to rattle his sabre.

Having read his most amusing conclusion, and in particular the hilarious New Phonetic Alphabet, one certainly cannot charge L.H.T. with being devoid of a sense of humour. Perhaps if he were to retain this admirable quality, even in the face of the intolerable provocations which he has to endure on the air, he might enjoy the hobby more and even overcome his distressing tendency to generate steam and to change colour like an excitable chameleon.

G3MCY

* See SHORT WAVE MAGAZINE, December 1960, p.545.

PROGRESS IN AMATEUR TV TRANSMISSION

The British Amateur Television Club reports that G2WJ/T (Dunmow, Essex) is now transmitting 625-line pictures, on the 70-centimetre band. These have been successfully received by G3OAT/T (nr. Huntingdon), a distance of nearly 50 miles. Later, a combined effort by G3KKD/T (Ely), G3NOX/T, G2WJ/T and G3GDR (Abbots Langley) enabled pictures originated by G3KKD/T to be received by G3GDR from G2WJ/T—the Club claims these as remarkable achievements, and rightly. Apart from the TV circuitry and equipment involved, they are using one of our highest-frequency communication bands, 430 mc, with its attendant propagation difficulties. The hon. secretary of the B.A.T.C. is D. S. Reid, M.A., 21 Silverdale, Sydenham, London, S.E.26.

THE FARADAY LECTURES, 1961

For this programme, the two concluding lectures—to be given by L. J. Davies, C.B.E., M.A., B.Sc., A.M.I.E.E. (of A.E.I., Rugby), on "Transistors and All That"—will be at the *Usher Hall, Edinburgh*, on March 21 (tickets from D. R. Rollo, Bruce, Peebles & Co., Ltd., 26 Blythswood Square, Glasgow, C2) and at the *City Hall, Newcastle*, on March 23 (apply H. Bruce, C. A. Parsons & Co., Ltd., Heaton Works, Newcastle-on-Tyne, 6). Admission to the lecture is by free ticket, obtainable from the addresses noted.

DX COMMENTARY

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

ONE of our correspondents has hit the nail squarely on the head when he writes "DX is becoming more difficult, and therefore more worthwhile and, to some, more enjoyable." He is certainly right — it can be quite hard work at times and, of course, it will get harder for some time to come, due to cyclic influences.

At this time eleven years ago we didn't quite know what we were in for. The sunspot peak (1947-48) had been passed and conditions were on the way down the slope—but this was the first time it had happened with gear of *post*-war standards, and we were all waiting to see how it coped.

Compared with pre-war sunspot minima, when DX work virtually packed up for two or three years, the doldrums of 1950-1954 were no particular ordeal; and nowadays, with even better receivers and aerial systems (particularly beams) in general use, we have still less to fear. The increase in SSB operation will undoubtedly help the phone DX'ers, too.

No, all we have to face is that the days of "dead-easy DX" will leave us for a while—and did anybody really enjoy them more than the normal routine of working for it? Apart from which, there will be good DX openings at times, with the minimum of short skip.

As compensation, the LF bands should be very interesting—in fact, they already are. If only we had that 7000-7300 kc band that once used to be there on the dial, without any broadcasting stations nearer than 6200 kc, and with no such modern conveniences as jammers!

DX Around the World

DL9KR flies the Munich-Dakar route frequently, and recently operated from Senegal as FF8CW; he has a KWM-1 and will try to work from Mauretania (FF7) and Ivory Coast (FF4) — in fact, he may have done so already.

There are now two KWM-1's in the Seychelles, which used to be the rarest of rare spots; VQ9TED and 9JER are both active, mostly from 1400 onwards on 14 mc . . . The promised JA DX-pedition to Marcus Island has been called off again—indefinitely, this time . . . LAØB has been heard around, and says he is on Bouvet Island, but there seem to be some slight doubts about this one.

AC4AX (VU2AX) is now stationed in Sikkim, but not active (as yet) . . . VK2FR (Lord Howe) said to be on 14060 kc Mondays, 1430-1600 GMT.

ZD2KHK started up from British Cameroons on January 1—14 mc, VFO . . . Other Nigerian stations started using their new prefix (5N2) the same day . . . A real suspect is ZB5AR, "Crag Island." Where is it and who is he?

K4LJV is actually in ZD8-land but can't get permission to operate (perhaps he is better known as ex-W6MHB, T I 9 M H B and VP7BT). He says there are no British amateurs on the island, which puts a damper on the "ZD8SC" reported from time to time.

The Trans-World Safari, signing ZS6TWS, is under way, bound

G3BMY

CALLS HEARD, WORKED and QSL'd

first for Cairo and then New York ; they are operating from all places in which they can get authority—14030 CW and 14300 kc SSB.

ST2AR plans to be on 3520 kc during the ARRL Contest—but that's not much help to *us* ; perhaps he'll get to like the frequency and stay around for a bit . . . About the time of writing this, VU2NRM *should* be on from the Laccadive Islands (unfortunately operating the typewriter more than the key makes it hard to gather first-hand gen.).

ZD6GA was due to show up on January 4—he is G3KKN . . . ZS6NM was planning a trip through ZS8 and ZS9 territory during January . . . CR10AA is still on Timor but not interested. However, VK8RW is said to have applied officially for a CR10 licence, so a DX-pedition in the Spring is possible. A nice one for the WPX-hunters recently was LA7RF/MM/CR10 !

K6CQV/KS6 is now the only station in that country, KS6AK having left . . . KW6CL is another one shutting down fairly soon . . . KW6DF and '6DG both QSL through bureaux, but will do so direct if postage is forwarded.

VP1AQ is a pirate ; VP1HA is genuine, and so is VP1JH, although he is " several thousands" behind with QSL's . . . CT2AH is on SSB, usually 14277 kc.

Comoro Islands will in future be using the new prefix FH8. The former FB8GP is a silent key, but FB8CE promises operation with the new prefix . . .

Rumour has it that VE7ZM and MP4BBW will launch a combined assault on the British Phœnix Islands (VR1) about the middle of March. Watch this space next month.

Dangerous DX !

Danny Weil, aboard *Yasme III,* underwent another ordeal by tempest in the course of his Clipperton Island operation. On the way there, two fuel drums broke adrift and ripped off the safety rail ; then the sails blew out and for a while they could not use the engine. They arrived off the island in bad weather and had to land the gear on a lee shore, with only one place near the island where it was shallow enough to drop anchor. Squalls were prevalent all the time, and the two anxieties were how to get the gear safely ashore in the dinghy, and what was happening to *Yasme* meanwhile. At one stage, Danny had to leave the gear on the beach and cruise around for a couple of days. When he returned, the weather was so bad that he simply fetched the gear off again. (He made over 700 QSO's during the limited time of operation there.)

Anchor trouble, winch trouble and a lot of lost tackle notwithstanding, they returned safely to Acapulco, Mexico. Then, sailing from there to San Diego, a leak in the stern presented another emergency situation, and a Mexican Navy patrol boat finally rescued them and towed them back to Manzanillo after a major radio operation on the distress frequency, in which W6's, K6CQU/MM and XE1AE and 1CV all took part. Danny himself stated, after rescuing the gear from the beach at Clipperton, that he doubted whether it would ever work again. We hope that the 700 stations who will eventually put their score up by one, and stick an FO8AN card on the wall, have some realisation of the risks involved to make it possible!

The Ex-G Net

W3HQO (Philadelphia) reports that the " ex-G Net " over there is going strong. All ex-G stations, as well as presently-licensed amateurs who were born in the British Isles, are eligible and are invited either to write to W3HQO or to check in on the net on Sundays, 2100 GMT, 21445 kc. Mode of operation not important. At present the roll-call includes W1QNC, WA2EVH, W3HQO, K5QWZ, K6CKM, K6PAK, W6UBU, WA6GLF, WA6HOH, KØYYW, WØOYP, VO1EX, VE3BPV, VE3BWY, VE3AYE, VE3CDM, VE3ENH, VE3CWB/6 and VE3DZQ/6. Other net frequencies are 28645, 14345, 7120/25 and 3785/95 kc.

They now issue a Certificate, available to all U.K. amateurs who confirm QSO's with six members of the net, in four W/K areas ; or four U.S.A. and two VE members ; contacts after October 1, 1960, count ; G's can send QSL's to G8KS *(QTHR)* for confirmation, with three IRC's and s.a.e. for return of cards (G8KS is the first holder of the Ex-G Net Certificate). A list of particulars must also be sent—call, date, time and so on.

Non-Cubical Quads

When this idea of dividing the world up into 10° by 10° sections was first brought to notice, our correspondent said that there would be 1296 of them, and a rapid piece of mental arithmetic (36 x 36) suggested that he was right. Of course, this was a major boob, since there are 360 degrees of longitude but only 180 of latitude. So the number of " Quads," or whatever they are to be called, is only 648 (18 x 36). Only one reader, and he a VS1, has pointed out this glaring error.

This correspondent is VS1KS (Changi), who comes out in favour of the scheme and suggests that, as there would be practically no likelihood of anyone ever achieving " WAQ," we should issue certificates for " W5OOQ " and " W6OOQ." A prize of a gold-plated 8-el. beam is suggested for a complete WAQ, which would involve financing several DX-peditions to the most unlikely places. (The Polar areas would be a little tricky.)

If sufficient readers show an interest in this scheme—referring not only to the hard core of DX chasers, but all kinds of medium-to-rare enthusiasts, at home and abroad—we should be pleased to sponsor the idea and to start

organising a Ladder and a Certificate. Opinions, please—we leave it to you. And, coincidentally with this, we still want to know what to call the things, as "Quads" is most misleading and inaccurate. One thing is certain—a special map would have to be drawn up with each "Quad" numbered. And another probability is that the sale of *(a)* Call-books, and *(b)* Gazeteers would increase considerably! There would even be cases where two amateurs in the same *town* could be in different Quads . . . Talk it up, think it over, and let us know your views, please.

Late Flash: Since writing the foregoing, we have heard from G3NMX (North Harrow), who also spotted that there were 648 sections. He suggests that the main disadvantage of the idea would be that the status of any station heard or worked would not be obvious from the call-sign, and that these columns might become full of "worked Quads 8, 59, 238, 496" and so on, making the whole thing completely impersonal. This should be considered along with the advantages of the scheme before you make up your mind.

G3NWT (Sandiacre) raises a similar objection both to this scheme and to WPX. He admits that the whole DXCC system is irrational, but it does "provide a constant supply of what the 'D' in DX stands for." Against WPX, he says: "How can I work up the same excitement at the sound of an OZ10 as I can for a VR3?"—and against the Quad idea he says it will become a game without competition. Who's going to fight you for possession of a small piece of the Pacific when there are 100 others to go for? "Exit the pile-ups. Exit the real competition. Exit the fun."

G3OGO (Croydon) writes: "It's OK for people like me to count prefixes from the beginning of a log, but think of the thousands worked by an active G2 or G6!" But he does suggest that the ARRL will eventually wake up to the idea that their method of country selection is unpopular in certain quarters.

Sheepskin

From *Gee-Eye*, the Northern Ireland boys' publication, we gather that the WAGI Certificate is available for proof of contact with ten GI's, two from Co. Antrim, two from Co. Armagh, two from Co. Derry, two from Co. Down and two from Co. Tyrone and Co. Fermanagh combined. Stations outside Europe need only five—one from each area. Any band, any mode, contacts since January 1959. Send 5s. or 10 IRC's with the cards to GI3KVQ, School Residence, Duncannon, Co. Tyrone.

News from Overseas

MP4BBW (Awali), active as ever on SSB, thinks 1960 must have been quite a good year. At any rate, it put up his DXCC score from 184 to 225; SSB countries from 141 to 195; and SSB WPX from 230 to 345. This took him 7000 QSO's, many thousand cigarettes and quite a few bottles of Scotch—he has no complaints.

ZC4AK (Akrotiri) says there is no news as yet of a new prefix for Cyprus (apart from the British Sovereign area, from which no change from ZC4 is expected). He has been hearing many G's on 80-metre phone, both SSB and AM, from 2330 GMT onwards, but hasn't worked any of them, although CW contacts have been numerous. Forty has also been very lively, with many G's worked on phone at S9 or better, both ways. Further news appears under the headings of DX Worked and Top Band.

Hong Kong A.R.T.S. discovered recently that they were formed in 1930 and wonder how many other Clubs are more than 30 years old. They duly celebrated the fact at their annual dinner recently. In a summing-up of DX by VS6EJ, we note the heading *"May-Sept., 1960. 20 metres - punk."* VS6EO and 6EP are two newly-licensed stations, with a third awaiting his call. (Further DX summing-up by VS6EJ: *"May-Sept. 1960. 15 metres - super punk. 10 metres - super duper punk."*) Old Timer VS6AE has been converted to SSB and others are following . . . his 70-watt AM rig is offered for sale. CR9AH is also very active on SSB, and CR9AI is on 21 and 28 mc with his XYL operating. CR9AN is another YL op.

G3HRY (R.A.F. Locking) has just returned from South Australia, where he was VS5BS and very active on all bands; he worked

TOP BAND COUNTIES LADDER

(Starting Jan. 1, 1952)

Station	Confirmed	Worked
G2NJ	98	98
G3JEQ	97	97
G6VC	96	96
G3APA	85	90
G3NFV	75	78
G2DF	73	75
G3NNO	70	82
GM2HIK	68	74
G3NVO	67	79
G3OCA	65	69
G3NBT (Phone)	61	65
G3OAG	56	62
G3NMZ (Phone)	55	58
G3NJQ	55	56
G3NNF	54	59
G3OGY	53	63
G3NPB (Phone)	52	58
G3NNF (Phone)	47	49
G3NAA (Phone)	45	57
G3LZF	42	61
G3NXQ	42	52
G3IDG	41	45
G3NNO (Phone)	36	54
G3OHX	33	56
G3NOW (Phone)	30	40
G3OIK (Phone)	27	41

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

L F BANDS TABLE

	7 mc	*3.5 mc*	*1.8 mc*
G3IGW	95	51	19
G2BLA	68	39	9
GW3CBY	41	23	13
G2FQW	33	4	1
G3NPB	21	8	9
G3IDG	20	15	9
G3NNO	10	21	10

This Table derives from Countries Worked — order based on band in first column, changed monthly.

When the Hong-Kong, VS6, boys got together on October 25, they had a Mongolian hot-pot dinner party at a Chinese restaurant in Kowloon — they cooked their own food over a charcoal brazier, and ate with chopsticks. In the photograph are, standing, left to right: VS6DS (pres., H.K.A.R.T.S.), VS6EL, xyl VS6EL, xyl VS6DS, DL1OV (xyl VS6EC), VS1KF (visiting), VS6EK, VS6AE, VS6EC, and VS6EM. Seated, left to right, are: xyl VS6EK, W2DPP and xyl (visiting), DU1OR, VS6DK, DU1OR jnr., and VS6DJ. The hon. secretary of H.K.A.R.T.S. is VS6EK. The VS6's are in the enviable position of being DX to almost the whole world.

lots of G's but many more DL's! Anyone awaiting cards from VK5BS or VS6DE should contact him while he is in the U.K.

VU2XG (Bombay) thinks conditions are getting worse, not better, and finds it difficult to improve on his WPX score. He is now screen-modulating his final and finds that he can raise a few new ones on phone and then ask them for a CW QSO!

ON4IB (Bruges) tells us that he is in the most active section of Belgium, and that new ON4 call-signs are being added regularly. For the sheepskin hunter there are two awards available — WXBAS (Worked Ten Bruges Amateur Stations) and the corresponding HXBAS for listeners.

ZC4CT (BFPO 53) runs a DX-40U into dipoles for 7 and 14 mc, plus a 28 mc ground-plane; he and ZC4AK are planning a DX-pedition to Jordan (JY)—more news later.

5A2CV (El Adem) took part in the recent TV programme which involved GB2SM, and was very frustrated when the skip changed, just a few minutes before the "call-in." They had been 5-and-9 *plus* for quite a while, but disappointment came at the last minute; he is very active on One-Sixty with a new rig (*see* also Top Band DX).

Old Friend Departs

Many DX'ers will be very sad to hear of the death of "Ev"—KP4KD, surely one of the best-known DX operators in the world for many years. In the old K4KD days he was the only station that most of us had ever heard from Puerto Rico. Active on all bands (even One-Sixty while it was allowed) Ev had countless friends among the CW fraternity, and we shall all miss his familiar signal and beautiful operating.

Other silent keys we have heard of this month include Bert Brown, W4FU (formerly W9FS), a great contest man; also W2WMV, who used to sign /C9 from Manchuria and /C1 from China, fourteen years ago; JZØPB and EA9DC, of "Ifni" fame, are also reported as deceased.

Miscellany

The big magnetic storm that threw everything off balance last November is said to have been the worst recorded for ten years. The World Warning Service of the U.S. National Bureau of Standards states that an intensity of "A268" was reached. (A5 represents very good conditions, A5-20 fairly good, A25 upwards "disturbed," and A50 *plus* represent major magnetic storms.)

G6ZY (London, S.W.15) wrote in just too late for the last issue that he would be operating SSB from ZB2I at the end of January; however, he goes out to Gib. every three months, and he hopes to take the KWM-2 with him again on future trips.

G5BZ (Woldingham) was delighted to work VK3ARX, who used to be VK3RX and was last worked by 'BZ in 1928!

G3HZW writes from Aden to say that he hopes to be on with a VS9 call soon, and is looking for a nice location; all bands, Eighty to Ten, will be worked. G3LOL (Newquay) also says good-bye to his U.K. friends, and will show up as an MP4 from Bahrain, on Fifteen and Twenty, CW and AM, as soon as the licence is fixed.

G3OFI (Bryan Bisley of MP4BDA, *etc.*) proposes to try Eighty as soon as he gets settled in the Middle East again — and with such a number of countries to operate from, he should be much sought after; incidentally, he says that the Oman authorities know nothing about this "9C2" prefix that has been bandied about, and repeats that the only *licensed* operation from Oman

has been with MP4M calls. The various VS9O calls have been used with R.A.F. permission, but no licences were issued by the Political Resident, who is the legal authority. Bryan himself holds MP4MAB, and the calls MP4MAA to 4MAG have all been issued at various times, though some of them have not yet been used.

Channel Two

Still Bryan Bisley speaking . . . referring to the note on the Americans' "Channel Two" scheme, as described by G3WW last month, on p.586, he wonders whether things don't actually go a little further. He has a suspicion that certain DX contacts have been made from W stations through a two-metre phone patch! In particular, he suspects that while he was in Yemen he was worked *via* two metres—and possibly a mobile at that. As he says, "possibilities in this direction are limitless, so we must rely on individual honesty and remember that it's only a hobby after all."

Top Band DX

The DX Tests on One-Sixty have not yet burst out into anything very startling, but on Christmas morning at 0525 GMT K2BWR worked G6HB and G3PU, and W9PNE raised G3PU —who always does well in these Tests, and was also heard by other W8's and W9's, but not worked. W2UWD worked him, and W8ANO worked G6HB. Congrats. to all concerned in these contacts, which appear to be the first crossings of the season.

OD5LX is said to be on, Saturday mornings at 0300; KH6DVD works East Coast W's at 0800 Sundays; and VP9EP is expected to be on. A tremendous number of W's are active every Sunday morning, according to W1BB's bulletins, but over here, as yet, we can't even hear them, let alone work them.

SWL Peter Day scoops the pool with a *confirmed* report from W2RMM, whose phone was heard at S5-8, peaking 9, just before 0500 on Christmas Day. On CW, same morning, he heard the two W8's ('ANO and 'GDQ) and many others, all R5 and some peaking S6-7. Nice going!! January 1 and 8 were not so good, but he was logging them all the same, with W3FBV 569, 0750, Jan. 1.

5A2CV asks us to say that he will be coming on the band, trying to reach the U.K. again, and will be found on 1837 kc every Saturday night from 2000 GMT until the early hours of the morning.

A late airmail from 5A2CV reports that they started up on 160 metres on January 14, working OD5CX, ZC4AK and ZC4KV, with G2PU and G3BMY heard, each at 589! As the OD/ZC contacts were the first for 5A2CV (operated by G3LCV) and a net developed, the G's had gone by the time the net broke up. 5A2CV, at R.A.F. El-Adem, BFPO-56, would welcome Top Band schedules with U.K. stations.

ZC4AK continues his operations on Saturday evenings from 2100, with G3BMY acting as traffic cop, but '4AK says that the static level is invariably high and he has a lot of difficulty with the G's. He has worked 45 stations in six countries (or rather *had*, on December 11), running 150 watts to a long wire.

WPX MARATHON, 1960

Final Placings

CW Only		Phone Only	
G6VC	370	MP4BBW (*SSB*)	343
G8DI	354	G3GHE	339
G3JVL	316	G3LAS	261
VU2XG	300	G3DO (*SSB*)	259
G3LAS	257	GB2SM	252
G4JA	218	G3LHJ	211
G8VG	208	G3NFV	188
G3JUL	200	G3MCN	167
G3WP	195	G3BHJ	152
G3LHJ	188	GM3NQB	107
G3LZF	187	G8VG	103
G3DQO	157	GM2DBX	92
G3JVU	151	G3OGO	87
G3NWF	151	G2FQW (7 mc)	84
G3DNR	128	G6VC	83
G2BP	125	G3DNR	55
G2BLA	125	G4JA	49
G3GMK	116	G3NWF	47
G3MGL	108	G3MGL	17
G3JFF	103		

P & Z TABLE

	PREFIXES WORKED	ZONES WORKED
	CW Only	
G2DC	421	40
GI3NPP	382	40
G3WP	362	36
G3ABG	336	40
GW3CBY	240	23
G3IDG	226	28
G3LZF	187	29
ZC4CT	168	27
	Phone Only	
G3DO	620	39
GB2SM	370	37
G3LKJ	347	38
G3MCN	324	38
G3NWT	297	38
G3ABG	261	32
G2FQW (7 mc)	99	6
G3WP	80	25

G3NVO (Middlesbrough) has collected his WABC and now scores 63/77; he thinks the band was better last August than it is now . . . G3OIK (Exeter) recently started up on 160 metres and was amazed at the level of activity; he has been working phone only, is now a confirmed Top-Bander, and plans a better aerial than his present 132-footer (there are some pine-trees 600 feet away!) His comment on CW *versus* Phone: "Had not been on CW for a month when a contest started. I plugged in my rusty key and within half an hour the antenna fell down! Let's have a phone contest for a change" . . . He logged his first W (CW, of course) on January 1.

G3NMZ (Luton) pushed his score up with GM3FSV (Orkney) and GM3OBC (Fife), and also raised EI3AE—he now rates 58 worked on phone. G3OAX (Alnwick) joins the ladder with 56 worked, and says he got a 589 from DJ2KS on Christmas Day, 2020 GMT.

G3NNO (Leeds) was pleased to work GM5YK (Aberdeen) on phone; and he writes that he, G3OGZ and G3OHH are planning a two-week trip to EI and GJ in

late July and early August, passing through GM as well.

Late Flash: ZC4AK had a fine morning of it on January 15. They worked W1BB/1, W1ME and W1PPN—these being the first 160-metre contacts between Asia and U.S.A. except for W1BB's isolated one some years back. In eight hours, Saturday night to Sunday morning, ZC4AK worked four continents and eight countries (DL, G, HB, OD, OK, W, ZC4 and 5A2)—pretty phenomenal for Top Band, we should say ! Conditions were excellent on the Sunday morning, and it may well be that other DX contacts were made. We hope to hear of them in time for our next.

Our Heading Photograph *(p.640)*

G3BMY (I. T. Cashmore, 105 Long Lane, Blackheath, Birmingham) is an outstandingly successful 160-metre operator—his station, entered for the Stourbridge Club, has been in the top flight in the *Magazine* Club Contest, MCC, for the last five years (four wins and one 2nd place) and lately he has been busy with ZC4AK. An interesting feature of his equipment is that the transmitter VFO and Rx main tuning are controlled by the one knob, so that the Tx is always spot-on the receiving frequency. With full BK facilities as well, this makes for exceptionally fast and easy operating.

DX on Eighty

Nice to be able to say some good things about *Eighty* once more, although it's beginning to carry such a load that things are almost as tricky as on *Forty*. A couple of keen SWL's take the prizes this month, the first being Bob Griffiths (Ventnor), who has logged the following: KP4AXU, W4VCA / KH6, TG5HC, YN1TAT, VE1ABZ, W6's and 7's, ZL1ACG, plus more than sixty W's from all districts, heard January 9-11 ; all these were on SSB except the KP4.

Peter Day (Sheffield) also got busy on 80 metres and logged ZL1AIX (working W1BU and G2HX on SSB), ZL3JT, ZL4IE and FA2FR (all CW, the latter on 3498 kc!).

G4JA (Baschurch) worked KV4CI (CW, 0100), VE's, W's and UA9CM; G3DO (Sutton Coldfield) merely remarks " Plenty of DX on Eighty SSB, evenings and early mornings." G3NOF reports VO1EX, ZC4AK and 4X4DK, all SSB.

Ah, well—that's yet another band we shall have to keep an eye on. And it's going to get better, not worse.

The set-up at ZC4AK, the Club station at R.A.F. Akrotiri, and famous for their success in working GDX on Top Band. The transmitter is a Heathkit DX-100U and the receiver an AR88. The operator on 160 metres is usually Stephen Gibbs, G3MBS, who carried the torch for Top Band when posted to Cyprus ; in the photograph we see Roger Williams, of Mumbles, Swansea, at the operating position. All bands 10-160 metres are worked from ZC4AK. Their latest Top Band DX results are discussed in the adjoining column.

DX on Forty

There is no doubt that *Forty* is open as a real DX band for quite long periods, if only the activity were there. The W6's have been coming over the long path once more—they always do in December and January—and have been worked from Europe quite frequently. GI3NPP (Dungannon) has raised them, around 1500 GMT, with W6ULS putting in the best signals.

Our old friend " Fletcher's Ice Island " has shown up again, with KF3AR worked by G2JB (Grimsby) at 0100. It is " Met. Station No. 13," near Baffin Island, with mail every three months. Others for G2JB included W's, both at 2000 and 0730; ZL (0730), VK5 (2000), PY (2100), JA (2200), 4X4 and HZ1AB (2315).

G3IGW (Halifax) had KL7RQ come back to a CQ at 1830, and also worked MP4QAR and UH8BI; he heard XZ2TH and TG1A, all CW.

G5BZ found the band good and worked KV4CI, KP4ARR, CN2BK, VO1DX, VE7ZM, JA3AIS, 4X4JO and all W districts except 6 and 7.

VU2XG booked in a goodly bunch of G's as well as FB8XX, VS9 and ZS's. GI3NPP raised KV4CI, KR6VG, UAØYE, VQ4HT, VS9AAC and W6's—all CW. G2DC got a new one—SVØWZ (Crete)—this band only just having been released there ; others were HZ1AB, LA1NG/P, VS9OA and ZD2JKO.

SWL Day was there again, some notable CW loggings being VK3AZZ (1545!), VU2XG (1750), W9KLD/KL7 (0825), VE8ER (0615), MP4BBE and '4TAK and TF5TP. And his colleague Bob Griffiths lists KP4AXT, KH6EEA, KH6PD/KW6, VP2AE, 2GV and 2GAQ, VP4AP and 4MN, CN9CR and TF5TP. All AM phone except for the KP4's and KH6's, who were SSB.

The HF Bands

It's really come to something when we list Eighty and Forty separately and then lump the HF bands together—but it's happened

SSB DX WORKED

14 mc Band

G3DO: CR9AH, EL1G, EP2AY, MP4TAI, VKØKJ, ZB2A, ZD2PJB, ZL4MD.

MP4BBW: TI2HP, FL8ZA, VK8OW/M, KX6BU, HS2A, HC1FG, W8OLJ/PK, YNØNZ, KM6BI, CT3AV, ZS6ATU/8, VQ9JER, HR1KS, ZS7P, 9N1SM, KW6CV.

EI5AI: MP4BBW, UP2CG, SP5PO, HZ1AB, UA9CM, OD5CL, EP1AD, ZC4AK.

G3NWT: PI1OS/MM, HB1PC, EP2AG, 3V8CA, KG6AJB, ZC4AK, TF2WFF.

G3NOF: CN2WH, KG1FR, LZ1WD, ZS5QV, 4X4AU.

21 mc Band

G3NOF: EA8BF, 8CT, FF8CW, HR2HA, HZ1AB, W2ZXM/MM.

AM PHONE DX WORKED

14 mc Band

G3NAC: IT1DAM, SV1AQ, FF8BP.

ZC4AK: MP4TAC, OR4TX, 6O1AA, FL9, ET2US, VS9OC, VS9MB, MP4TAI.

21 mc Band

G3NFV: EA6AR, TF2WFJ, VP2LY, 3MC, 9AK.

GI3NPP: FF4AH, FQ8HY, OY2AB.

ZC4AK: KH6DJV, VS9MB, 9G1YL, 9Q5BK, 9U5DM, ZD6FC, VQ8AM, MP4TAJ.

G3NAC: MP4BBA, 4BDC, EA8BB, VP6WR, VK6YL, IT1PAK, 5N2BRG.

G3NWT: CR7DN, CT3AN, FR7ZD, VK6YL, VP6WR, VQ8BM, 5N2BRG, 9U5VS.

G3NOF: EP2AT, FF4AH, FF8BL, PZ1BW, ZL3UY, 9G1CC.

28 mc Band

G3NOF: KG4AT, KP4AEB, ZE6JL, ZS1BV, 6IW, 5N2ATU, 2DPD.

ZC4AK: G3IPV/MM (Red Sea), GO2GM.

GI3NPP: HKØAI, VP5BB, YS2IM.

G3NFV: CR7EI, HP1AC, KG4AT, ZS7L, 6O2GM.

G3LKJ: VP3MC, PJ2AL, CO7SO, HR2MT, HK3LX, VP6PV, VU2BK, HI8DGC, TG9BK, EP2AT, OD5CN, G3IPV/MM, JA3ACT/MM.

CW DX WORKED

14 mc Band

G2DC: FL9, FF8AB, HH1MN, HK4TM, PZ1AP, TI2MA, VU2JA, XZ2TH, XE1VP, ZS6IF/9.

GI3NPP: EQ5X, FF8CW, HC5CN, HL9KT, ZD2KHK/NC, ZD9AM, SM5BUG/9Q5.

ZC4AK: EQ5X, SM5KV/9Q5, VQ1A, VQ9A, 6O1AA, FL9, MP4QAR, ZS6IF/9, ZS7M, FQ8HP, VS9OA, KH6JG, LX3AH, 7G1A, 6O1MT, FL8ZA, VQ8BC.

G3GMK: VS1KQ, VS9AAC, ZS5QU, 6O1AA, KH6ACU, 6IJ, W6's.

G3WP: MP4TAI, LA1NG/P, OY1R, W4ARH/KL7, KL7PI, 7KG, KP4AZ.

G5BZ: VEØMC, HK1HV, KL7's, OR4TX, PY7SA, VQ5IG, VQ3HD, PZ1BR, ZE8JJ, ZP5LS, LU's, CE1AD, VK9GP (Norfolk Is.).

ZC4CT: EP2AF, EQ5X, KL7KG, VS9AAC, 5A3TN, 5A3CAE.

21 mc Band

ZC4AK: TI2CAH, OA3D, VQ1A, EP2AT, FB8XX.

GI3NPP: EP2AF, VQ8BM, 5N2GUP.

G2DC: HKØHCA, FO8AN, FF8CW, PY7LJ, CE1AD, EL4A, FR7ZD, KZ5TD, JT1AR, VS6EC, VS9MB, VQ8AM, 6O1AA, 6O2GM, 7G1A.

ZC4CT: MP4BCV, VQ2WM, VU2RN, ZE2KG, 3JO, VK, ZL, ZS.

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before. And most of the HF-band DX appears concisely in the form of the lists, so that there's not much to comment on. Certainly the activity on *Fifteen* and *Ten* has been very low, whatever the conditions may have been like.

Most noticeable, by those with rotary beams, has been the fact that the long path is often open when the short path is quite hopeless. This has applied to all bands from Forty downwards, although *Ten* has generally given normal short-path contacts—but the few who have turned their beams have found strange things happening.

Two expected DX-peditions failed to appear — the Malpelo affair, HKØTU, is put off until March, and the Laccadive Islands effort of VU2NRM postponed possibly until next October. So, with a complete lack of pile-up traffic for once, the behaviour of the HF bands has been normal.

G3LKJ (Torquay) gave *Ten* a serious working-over and was surprised to get VU2BK at 0815 GMT (with his beam on the long-path to ZL !). He was also the first G to work G3IPV/MM (H.M.S. *Hermes*), in the Indian Ocean.

Personal Column

Last month a request was made for details of rigs, aerials and general news of shack and activities. The response has been so good that some of the descriptions will have to be held in reserve ! However, please continue to send them in, and we will release a few each month, to give the necessary flavour to each offering, so to speak. Here is this month's selection:

G3IGW (Mike Whittaker of Halifax) runs a home-brew Tx starting with a Top-Band VFO and finishing with a TT-21; plate-and-screen modulation, or screen keying of the VFO, are used with equal enthusiasm; his aerial is a 260-ft. East-West wire, and the receiver an Eddystone S.750. Interests: LF-band CW DX, especially *Forty* . . . also to get 200 countries by any means and then relax!

G3GMK (K. W. May, of Southampton) runs a CO-PA rig with 35 watts, and the receiver is a CR-100 ; aerials are two 33-ft. dipoles firing in different directions (both sloping), and his Tx was built 11 years ago, but he intends to collect a DXCC before scrapping it. A possible move to a better QTH is an encouragement for the future.

G3NAC (Bourton-on-the-Water, Glos.) runs a Heathkit DX-40U with a high-level modulator unit; receiver is a Geloso G-209R; and aerials are a Mosley 21 mc Power-master and a 130-ft. Zepp, both fed into a Z-match, with LPF and SWR indicator. Chief operating times are 1200-1400 and 1700-1800 (week-ends 0900-1200), and he also operates from the R.A.F. Club station G3NGZ. Main interest is 21-mc skeds with R.A.F. stations overseas, collecting information for the RAFARS at Locking for their news bulletins, and so on.

Quick Quotes

" My greatest thrill was getting a message to ZL2XA, whom I first worked on August 30, 1925 " . . . (Very Old-Timer *G2DX*, now active again) ; " Nice to get a new country (UA2) without doing any chasing . . . *(G3NAC)* ; " The noise on this band is at present 5 and 8 " (an HA station) ; " I got a Z-match from a friend, unfortunately with the friend still attached " (G3OGO) ; " Now will the station that gave me the longest call please call again ? " (a DX station) . . . all from *G3NWT;* " How I wish stations, G as well as EU, would dig up their own DX instead of waiting for the other fellow to winkle it out and then plastering the frequency with calls " . . . *(G4JA);* " A sleepy earwig crawled into my key gap, electrocuted himself and messed up my H's for the rest of the

session " . . . *(G3OGO).*

Ladders

Congratulations to G6VC and MP4BBW, the winners of the 1960 WPX Marathon, in the CW and Phone sections respectively—and G8DI drops a card to congratulate G6VC on his success in their little encounter ! Thanks to all those who patiently continued to send in their scores and make the ladders worth while. Now, please, may we have more entries for the " P & Z Table " ? And note the fantastic score of 620 prefixes on Phone, by G3DO. The organised " WPX " (certificate and all) has a more recent starting date—please note that for the purposes of this table you can dig right back to 1946. And the LF Bands Table has started off quite nicely ; more entries for that will doubtless follow.

And so to sign off once more, with our usual thanks and acknowledgments to the WGDXC *Bulletin,* W4KVX's *DX,* The *Western Radio Amateur,* the Northern California *DX-er* and the Top-Band bulletins from W1BB. Thanks, as ever, to all our correspondents, who never fail to make life both interesting and hectic for us once a month. Keep it up, please — and don't forget some personal details and descriptions of the gear.

Next month's deadline will be **first post on Friday, February 10** —and for those who correspond by airmail, the closing date for April will be *March 17.* Let us have everything in good time, and address it all to " Dx Commentary," *Short Wave Magazine,* 55 Victoria Street, London, S.W.1. Good Hunting, 73 and—BCNU.

W. R. METCALFE, G3DQ

We very much regret to have to record the death, suddenly, on Christmas Day, of William Radcliffe Metcalfe, G3DQ, president for 1960 of the Radio Society of Great Britain. Licensed about 1936, he was a keen and active operator. In business, he had a variety of interests, from marine salvage—he was connected with the *Flying Enterprise* rescue attempt in January 1952—and survey work to a travel agency. He was a large and kindly man, entirely sincere, and in his later years was much afflicted by illness, which he bore with patience and fortitude. He leaves a widow and two sons, who will have the sympathy of a great number of friends unknown to them.

INDEX TO VOLUME XVIII

All copies of the next (March) issue of SHORT WAVE MAGAZINE will contain, as a free loose supplement, a complete Index to Volume 18, which is completed by the present issue.

SOME CITY AND GUILDS STATISTICS

As is, of course, well known, the City and Guilds of London Institute, 76 Portland Place, London, W.1, is the examining authority for a wide range of technological subjects, in which a C. & G. diploma or pass certificate is a qualification recognised throughout the U.K. and the Commonwealth—and, indeed, in many other parts of the world as well. For the year 1960, the total number of candidates examined by the City and Guilds was over a quarter of a million, representing an enormous amount of work by a very large number of people. The Courses are constantly being revised, and one of the new subjects added recently was Technical Authorship ; for the 1960 examination in this subject, held in eighteen centres, 113 candidates presented themselves, of whom only 30 were passed, becoming eligible to take Subject No. 217 at advanced level. The results of our own " Subject No. 55—Radio Amateurs' Examination " were reported in full in the November issue of SHORT WAVE MAGAZINE.

DUTCH BROADCAST SHIP

Certain " keen commercial interests " have found that providing they operate from a ship moored outside anybody's territorial waters, they can do almost as they like on the air. This alarming fact has inspired the inauguration of a new commercial broadcasting station installed in the m.v. *Veronica,* moored five miles off the Dutch coast. Under nobody's jurisdiction, she is transmitting on 192m. (1562·5 kc), on the LF side of Luxembourg II (208m., 1439 kc), using plenty of power and radiating programme material intended for U.K. consumption. Regular broadcasting was to have started on February 1st, and the idea is, of course, to work up to commercial advertising programmes on the lines of Luxembourg.

A view of the 1960 Radio Hobbies Exhibition, looking towards the R.A.F. Amateur Radio Society's stand. Part of the K.W. Electronics display is on the immediate left. There were nearly 30 commercial exhibitors and 8,600 visitors.

SIDEBAND FROM THE START

Part II

DESIGN AND METHOD

By "VOX"

The first article in this series appeared in the December 1960 issue of SHORT WAVE MAGAZINE. *The next will be in April. The intention of this series is that it should present the technique of Sideband transmission shorn of the complications.*
—Editor.

THE first article in this series was intended to make it clear to beginners that SSB is not a phase, a fad or a method of communication likely to be restricted to the favoured few. Rather is it a mode which has many major advantages, and one which is growing very rapidly in popularity.

Correspondence arising from that first article shows that the beginners appreciated what was being said, and the spirit in which it was presented. One or two experts, however, wrote to say that it was calculated to frighten the beginners off SSB for life, and one of them even went so far as to say that he was "horrified at the hysterical claims put forward." After re-reading carefully, we can't find any very clear signs of hysteria, and fortunately the category of readers for whom Part I was written don't appear to agree with this minority panel of experts.

We tried to present the case for SSB in a manner which would convince the newcomer that he had better investigate this business for himself; and it was not suggested that anyone should be content to believe everything he is told without doing some fact-finding on his own.

A series intended for the beginner very often has to be over-simplified, and this, naturally, makes it an easy target for the more knowledgeable. This pitfall will be avoided in future by leaving open as many "escape roads" as possible.

Well-informed argument is always more instructive than a collection of bald statements, however much they are backed up by authority and experience, and we hope that many points will arouse subsequent discussion. But the "experts" (whether actual or otherwise) are asked to remember that this series is for the *starter* in SSB, and that much of the discussion must be in the nature of a comprehensive "re-cap" rather than an attempt to present anything technically new.

Table of Values

Fig. 1. Push-Pull Balanced Modulator

C1, C2	= 100 $\mu\mu$F	R1, R2	= 15,000 ohms
C3, C4	= .01 μF	R3	= 1000-ohm potentiometer
C5	= 150 $\mu\mu$F, variable, split-stator	RFC	= RF chokes
L1	= Anode coil tuned to carrier frequency	T1	= Audio transformer

Technique

The methods of transmitting and receiving SSB are varied enough to give plenty of scope for individual ideas and, in particular, individual ways of putting well-established circuitry into practical use. This again may be over-simplification, but we will take that risk and say that the task, at the transmitting end, is simply the removal of the carrier-wave and one sideband; and, at the receiving end, to achieve intelligibility from the remaining sideband by producing, and beating with it, a carrier-wave of the correct frequency and amplitude.

First, to be logical, we will deal with transmitters; and first of all with the removal of the carrier. (This, to the purists, is a little misleading, since we don't really *remove* it—we merely refrain from amplifying and radiating it.) The task is to transmit a signal, the RF power of which is directly proportional to the audio input—when no audio input, there must be no RF output. And the heart of the whole business lies in the use of the *balanced modulator*.

Balanced Modulators

Nearly every article ever written on sideband fundamentals has contained the statement that to heterodyne, to modulate, to mix and to convert all mean the same thing. Whichever term you use, a mixer, a converter or a modulator all have one function—to combine two frequencies and to produce two new ones representing the sum and difference of the original two. But the normal mixer or converter will also contain, in its output, the two original frequencies as well (to say nothing of their harmonics and all sorts of combinations of the sums and differences of those harmonics and the new frequencies).

If you *modulate* a 1000 kc signal with a 1 kc tone, the resultant output will consist of the 1000 kc signal plus two new ones, at 999 kc and 1001 kc—a

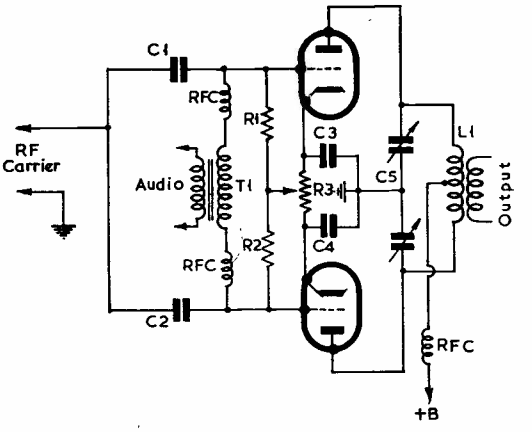


Fig. 1. A push-pull balanced modulator circuit. RF is introduced to both grids in parallel, audio in push-pull. The push-pull output circuit suppresses the carrier, leaving the two groups of sideband frequencies. C5 is tuned to the RF input, and R3 adjusted to give minimum carrier at the output terminals.

Table of Values

Fig. 2. Push-Push Balanced Modulator

C1	= 150 $\mu\mu$F, variable, split-stator	R1	= 1000-ohm potentiometer
C2, C3	= .01 μF	T1	= Audio transformer
C4	= 150 $\mu\mu$F variable	RFC	= RF choke
C5	= .001 μF		

normal AM transmission. Apply frequencies of 1000 kc and 1 kc to a *mixer* and you will produce the same result. You have done exactly the same thing, but called it by a different name.

But if you use a *balanced* mixer or modulator, the output will contain only the sum and difference signals —999 kc and 1001 kc—which you can regard as two sidebands. You now have a DSB transmission on your hands. Take, for example, an amplitude-modulated 10-watt transmitter on Top Band; substitute a balanced modulator for the PA; and you will be transmitting double sideband with suppressed (or reduced) carrier—which quite a number of experimenters, to the bewilderment of their locals, are now doing.

Balanced modulators come in many forms, and the basic circuit is elegant and beautifully simple. Fig. 1 shows a push-pull type which, at a glance, might be taken for an ordinary push-pull PA. But the RF is introduced to the two grids in parallel, and the audio in push-pull. The anodes are in push-pull and tuned to the carrier frequency.

Since the RF is applied to both valves in phase, the effect in the push-pull tank circuit will be that of cancellation. (One well-known writer once put it that "each valve acts as a neutralising circuit for the other.")

When the audio is applied, the anodes of the two valves behave in true push-pull fashion; but since the tank circuit is naturally not tuned to the audio frequencies, these audio-frequency variations in anode current merely drain off through the power supply.

Thus when either the RF alone, or the audio alone, is applied to the stage, there is no output. When *both* are applied, however, the beats between audio and RF inputs will be passed on; the stage will be "switching the carrier on and off" at a rate dependent upon the AF input.

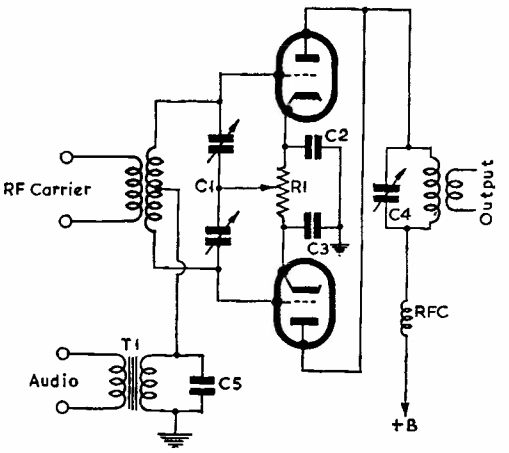


Fig. 2. Push-push balanced modulator, in which grid and anode circuits are both resonated at the carrier frequency. The RF excitation is applied to the grids in push-pull, and the audio in parallel, but the RF is suppressed in the parallel output tank. R1 is set for minimum carrier, and the two groups of sidebands again appear at the output terminals — see note in text regarding even harmonics.

To prevent any of the original RF from appearing at the output terminals, the stage must be carefully balanced, and this is achieved in the circuit of Fig. 1 by the cathode potentiometer, R3.

Unbalance the stage deliberately, and it will act almost as a PA. Fed with frequencies of 1000 kc and 1 kc, its output circuit will contain 999 kc, 1000 kc and 1001 kc—a carrier and two sidebands. Balance it carefully, however, and the carrier will be greatly reduced (what remains will be removed in a later stage) and you are on the way to DSB, and eventually SSB transmission.

Fig. 2 shows another way of doing the same thing, this time by using a push-push circuit. The audio is now fed to both grids in parallel, the RF in push-pull. But the anode circuits are in parallel. This is the same circuit that is used for very efficient frequency-doublers, but the anode circuit is, of course, now tuned to the *same* frequency as the grid circuit, not twice the frequency.

By the very nature of this circuit, however, the even harmonics will tend to appear in the output tank unless it has a very high Q, and for this reason the push-pull circuit of Fig. 1 is more often used.

Balanced modulator design is a big subject to cover, and several pages could be filled with alternative circuits using multi-grid valves, transistors and many types of diodes. The underlying principle of practically all of them is that *no RF can pass from the source to the output circuit until the audio is applied.* This, then, unbalances the circuit and allows RF at the beat frequencies to appear in the output.

One of the advantages of SSB, as stated in the first article (December 1960), is now coming to the surface . . . very little audio power is required. With balanced modulators using diodes, the ideal condition for lack of distortion occurs when the RF carrier voltage is considerably greater than the peak audio voltage. "Low-level modulation" is a misleading term, but, in the usual form of SSB transmitter, only a fraction of a volt of audio is needed to operate the balanced modulator. A ten-to-one ratio between RF and AF voltages seems to be the average accepted figure.

This brief description of the balanced modulator has been necessary, at this stage in the series, because it is so fundamental to SSB technique. It would not be a good plan, however, to go on and describe other units in the transmitter without first considering the equipment as a whole, so that the *function* of each unit may be appreciated. Having first done this, we can continue with discussions of circuitry and general planning.

It is not proposed at this stage to start a discussion on the relative advantages of the two main methods of designing sideband transmitters—the Filter method and the Phasing method. For various reasons (mainly convenience) we will take a typical filter rig first, and identify its various parts.

The Filter Rig

Fig. 3 shows a basic block diagram of a complete transmitter using the filter method, and it is based on the well-known "K.W. Viceroy," but with some of the circuitry purposely omitted for simplicity's sake. The intention is to show the basic line-up of a filter-type transmitter of sound design and proven performance.

The chain starts, naturally, with a carrier oscillator —in this instance at 435 kc. This is normal practice, frequencies between 420 and 470 kc being convenient because standard IF transformers can be used for various purposes around this range.

A double triode is used, one half as a crystal oscillator and the other as phase-splitter, giving low-impedance drive to the balanced modulator. The audio amplifier is another double triode, the output from which, together with the carrier from the phase-splitter, is also fed to the balanced modulator. The latter consists of a matched pair of crystal diodes, with provision for final balancing out of the carrier.

The output from the balanced modulator (two sidebands, reduced carrier) is fed to the filter unit, which has two crystals in a half-lattice filter, together with a third as a series rejector at carrier frequency. (Full descriptions of filters will be given later in the series, so let this brief description suffice for the

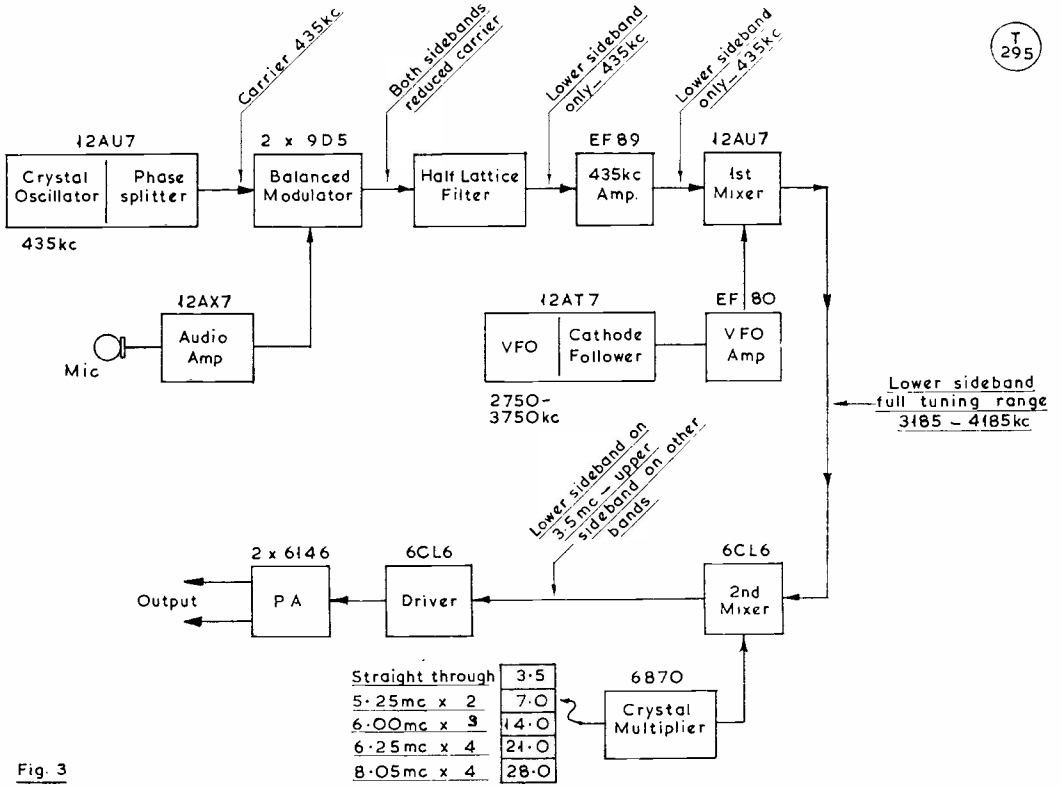


Fig. 3. Simplified block diagram of a filter-type SSB transmitter, based on the K.W. Viceroy. Other circuitry is included in the finished transmitter, but this diagram shows the essentials, together with the type of signal appearing at the output of each stage. See text for full discussion, and Fig. 4 for a comparative American design.

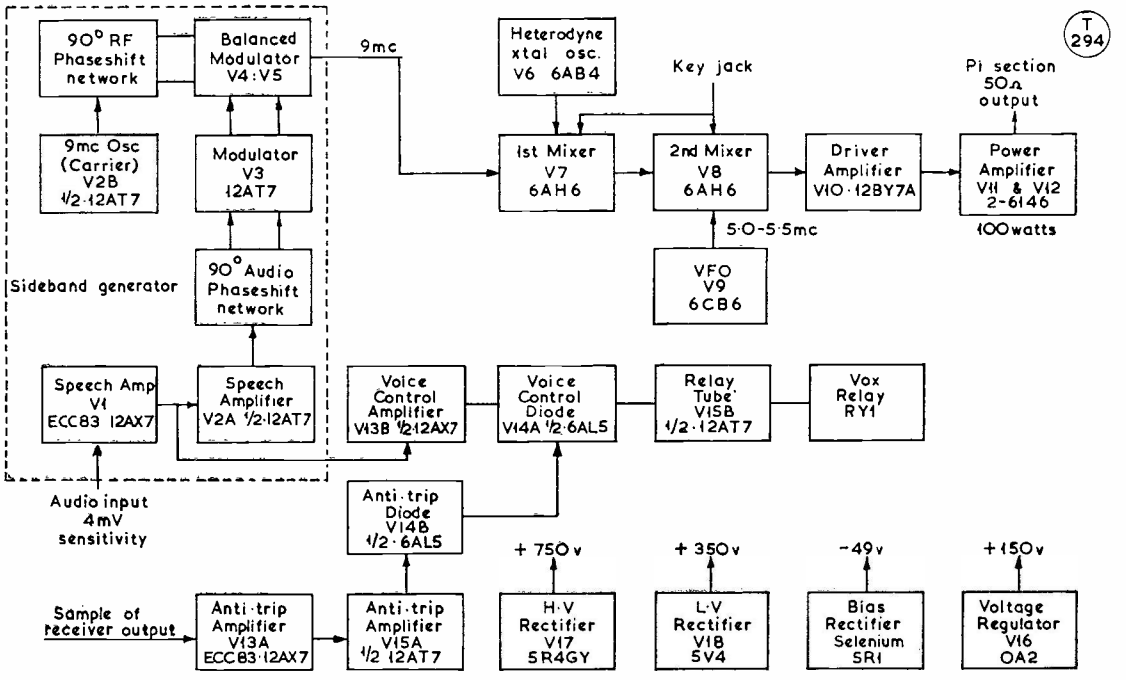


Fig. 4. General arrangement of the Hallicrafters HT-37 all-band SSB transmitter, and including all relevant circuitry. It will be noticed that in this design, carrier generation is at 9 mc with the VFO swinging across 5.0 to 5.5 mc. As in the K.W. Viceroy, the PA takes a pair of 6146's, and in both the output circuit is designed for a low-impedance load.

present.)

Crystal frequencies are chosen so that the filter rejects the unwanted sideband (in the case of the "Viceroy" the upper sideband is suppressed, and the filter provides a passband which is flat within 4 dB between 250 and 2800 c.p.s.).

The output now consists of lower sideband only, and obviously all amplification hereafter must be linear; no frequency multiplication is possible, and frequency changing must be carried out by mixing.

Accordingly, the lower sideband is now amplified (by an EF89 at 435 kc) and is then applied to a 12AU7 mixer, into which the VFO is also fed. The VFO has a frequency range of approximately 2750-3750 kc; a 12AT7 serves as oscillator and cathode follower, and an EF80 as VFO amplifier.

If the VFO is now set to a frequency of 3365 kc, its beat with the lower sideband at 435 kc will produce a 3800 kc output. This could be fed straight into a linear amplifier, and the complete outfit would then be all that is necessary for SSB transmission on 3800 kc.

To cover the other bands, further mixing is necessary; and this is achieved by using four crystals and a crystal multiplier stage. The frequencies and ratios are shown in Fig. 3, and the output from the 6870 kc crystal multiplier, together with the 80-metre lower sideband, is fed into another mixer—in this instance a 6CL6.

The crystal frequencies can be chosen so as to give either lower or upper sideband at the new frequencies. "Difference" mixing converts lower sideband to upper; "sum" mixing makes no change. We will not bother to explain this, as simple arithmetic supplies the answer. In passing, it may be mentioned that the crystal frequencies chosen in the "K.W. Viceroy" give *upper* sideband operation on all bands other than 3·5 mc, although the normal usage on 7 mc is lower sideband.

A signal having been produced on each of the bands required, all that remains is to amplify it, and, of course, the necessity for linear conditions still applies. In the case under review, a further 6CL6 is used as a driver, with a pair of 6146's as a final (linear) amplifier, and this completes the set-up except for various refinements required for "Vox" operation, automatic level control and so on, which need not concern the reader at this stage. The main thing is to obtain a complete mental picture of a basic transmitter, in order that the various parts can be discussed and understood.

A block diagram of a complete SSB transmitter may be a fearsome thing to the novice, but none of its component units embodies anything in the way of circuitry that is difficult to understand, and, by taking it stage by stage, we hope to be able to make the function of each unit (and its circuit details) perfectly clear.

Where the filter system is under discussion, it is only necessary to comprehend the operation of *(a)* A carrier generator (normal CO); *(b)* A balanced

modulator (already mentioned); *(c)* A half-lattice filter; and *(d)* Ordinary, conventional VFO, mixer and Class-B linear amplifier stages.

Each of these we hope to deal with in turn, with the space available to go into more detail than is possible in this rapid "run-through" of the whole thing.

External refinements such as T-R switches, anti-trip circuits (for preventing noises from the loud-speaker from operating the "Vox") and the necessary measures for receiver muting while transmitting, will also have to form a queue. Meanwhile, it is hoped that enough has been said to convince readers that no black-magic is involved.

ELECTRICAL ENGINEERS' EXHIBITION

This always-interesting Exhibition, covering the electrical engineering industry and many aspects of communication engineering, will be held at Earl's Court, London, during March 21-25. One of the features of this year's show is to be a communications exhibit by the G.P.O., covering both radio and land-line working; some new equipment to be displayed will include a 960 mc receiver for satellite-echo operation. The British Railways communications department will also be represented.

ARMY AMATEUR ORGANISATION

We are asked to announce that the Army Wireless Reserve Amateur Radio Society, already a well-established body, is seeking to interest other Royal Signals and R.E.M.E. radio amateur clubs in the idea of affiliation. The object is to explore the possibility of forming, for the Army, a national amateur society on the lines of the R.N. and R.A.F. societies. The intention is to hold a meeting, later in the year, to form a society, and to seek War Office recognition and backing. All Army radio amateur organisations are asked to write immediately to: Major D. W. J. Haylock, R. Sigs. (G3ADZ), hon. secretary, A.W.R.A.R.S., 3 Norris Gardens, Grange Estate, Havant, Hants.

CARDS IN THE BOX

Our QSL Bureau holds cards for the following, who do not appear in any published list: G2ANG, G3FCQ, G3GV, G3JAW, G3LDO, G3NJ, G3NRP, G3ONX, G3OWT, G8ZZ, GI3OIM, and GW2XS. The cards may be obtained on application to BCM/QSL, London, W.C.1, enclosing a large s.a.e., with name and callsign.

PROFESSOR SIR BERNARD LOVELL, Kt., O.B.E., F.R.S.

As many readers will have seen in the New Year List, Her Majesty conferred the honour of knighthood on Professor Lovell of Jodrell Bank, whose official designation is "Professor of Radio Astronomy, University of Manchester and Director, Jodrell Bank Experimental Station." A scientist of great distinction, Bernard Lovell has devoted himself, since the war, to unravelling the mysteries of the Universe. The great radio telescope at Jodrell Bank, now famous throughout the world, was entirely his own conception and it was his enthusiasm and perseverance that got the project beyond the stage of being just an idea. With his gift of lucid expression he is "easy to listen to," and he has often appeared in BBC programmes. His *tour de force* in this connection was his Reith Lecture of 1958, a series of six dissertations entitled "The Individual and the Universe." His scientific achievements have been recognised by his election to a Fellowship of the Royal Society, that most coveted of distinctions, and now he is honoured for the prestige he has gained for Britain.

RESISTOR VALUES QUICKLY

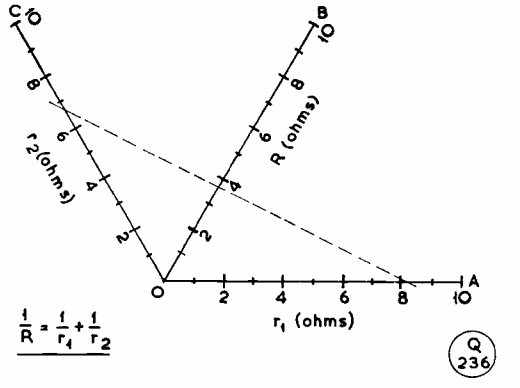
CALCULATING BY STRAIGHT-EDGE

M. D. Bass (G3OJE)

It is often necessary to make up a specified resistance from "preferred values" in parallel. The procedure suggested here eliminates the hit-or-miss method and enables values to be obtained without the use of reciprocals.

The three axes OA, OB and OC are drawn at exactly 60° to each other and are marked off in units of 0 to 10. Points on OA and OC are used for the component resistors, and the result of connecting them in parallel is found from the intersection of OB with a straight edge laid across the two outer axes. Thus, in the example shown, 37K could be made up from 68K and 82K in parallel.

The two outer axes might more conveniently be marked in the "preferred values," namely 1·0, 1·5, 2·2, 3·3, 4·7, 6·8, 8·2, 10·0—in ones, tens, thousands or tens of thousands of ohms, as required. And for those who may be interested, the chart so prepared and shown here can also be applied to optics problems using the relation $\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$.



An abac for resistor calculations, where resistances are to be put in parallel to produce a required value. This diagram is drawn in such a way that it can be used as given here, with reasonable accuracy for practical purposes.

DOPPLER EFFECT, OR WHAT?

STRANGE RESULTS ON 15 METRES

DURING the afternoon of Sunday, January 8, some really extraordinary conditions developed on the 21 mc amateur band, giving rise to an effect unique in the writer's long experience.

After making several normal QSO's with American stations, under rather poor conditions, a K9 station was raised at about 1600 GMT and it was noticed that the frequency of the distant station was varying smoothly but somewhat erratically by amounts up to 200 or 300 cycles. This was naturally put down to a fault in the VFO used by the K9 but, on making this comment, the American reported that no variation was occurring in the transmitted frequency.

This contact was completed and another immediately made with a W9 in Chicago. Again the peculiar variation in frequency was noticed and, on paying closer attention, it was also evident that waves of noise were "passing across" (for want of a better expression) the selected frequency. The noise-level was varying rapidly and rhythmically and the change of tone of the incoming frequency corresponded in time with the bursts of noise.

Further, the noise had a sort of "signal characteristic," akin to high-speed telegraphy but nothing like so clear cut, and obviously of man-made origin, as distinct from the usual steady atmospheric or tropospheric noise. The opinion was formed that it probably had something to do with a scatter-wave transmitter, operating on high power and probably much higher in frequency.

By 1630 GMT the effect was getting less pronounced and soon afterwards normal conditions resumed, with a steady noise-level.

Did anyone else notice this spell of unusual propagation conditions? And what can be the explanation?

The frequency of a signal, quite steady at its source some 3,000 miles away, was definitely varying at the receiving point (using a highly stable receiver) and presumably this can only be due to a Doppler effect. Again, it all had something to do with energy radiated from Earth to one of the reflecting layers—or was reflection taking place from a satellite. And why did the noise appear to have a "travelling" frequency?

Looking back on the experience, the writer wishes he had left the transmitter to idle whilst more attention was paid to the range (in frequency) of the effect, and to making some tape recordings of it. But maybe the experience of others active on the 21 mc band at the time will throw some light on the occurrence.

J.N.W.

CONVENTION ON TELEVISION AND FILM TECHNIQUES

We are asked to announce that The Television Society, jointly with the British Kinematograph Society, will be holding a convention at the Institution of Electrical Engineers, Savoy Place, London, W.C.2, during April 20-21. The opening address will be delivered by Sir Harold Bishop, C.B.E., M.I.E.E., Director of Engineering, B.B.C., and a number of important papers will be read, dealing with many aspects of colour television and TV recording techniques. Each of the eight lectures will be followed by a discussion period. The convention is open to all who care to register (fee £3 3s.) and full details, with registration forms and other particulars regarding over-night accommodation and entertainment bookings, can be obtained on application to: The Convention Secretary, The Television Society, 166 Shaftesbury Avenue, London, W.C.2.

WORLD RADIO HANDBOOK, 1961

The latest (15th) edition of that remarkable publication *World Radio/TV Handbook* is now available; it is remarkable because it gives full coverage of the broadcasting stations and systems of the whole world, and as such is an indispensable guide to all who are in any way interested in broadcast or TV programme reception, either as listeners, amateurs or professionals. The most detailed information is given as to transmission times, frequencies, power used and programme content of every known broadcaster, with station addresses. Also included are maps, a standard frequency list, world time chart, allocation of frequency bands, a table of callsign groups by countries, and a listing, from 150 kc to 26000 kc, of all broadcast stations by frequency, with metre-wavelength, power, callsign and location; this list runs to more than 18 pages, of the total of 218 pages making up the book, which is a little smaller than SHORT WAVE MAGAZINE in page area. *World Radio/TV Handbook* is obtainable from us, from stock, at 17s. 9d. post free. Orders, with remittance, to: Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1. Orders from overseas, for delivery by surface mail, can be accepted at the same price.

THE EDITOR WOULD LIKE TO SEE—

Articles on transistorised amateur-band equipment of all types; miniaturised transmitting and receiving apparatus (valve or transistor); complete VHF installations, including 4-metre gear; practical applications of new valves and components. All work accepted for publication is paid for at good rates.

G.P.O. MORSE TEST—AMATEUR LICENCE

The Post Office Morse Test for an amateur transmitting licence calls for the ability to send and receive 36 words in plain language (averaging five letters per word) in two periods of three minutes each, *i.e.* a speed of 12 w.p.m. Additionally, ten five-figure groups must be sent and received in two periods of 1½ minutes each. A certain small margin of error is allowed. The Test itself is arranged on application to: Radio Services Dept., W/T Section, G.P.O. Headquarters, St. Martin's-le-Grand, London, E.C.1, the fee being ten shillings, and the Test is held at some suitable Post Office centre within convenient reach of the candidate's home address.

VHF BANDS

A. J. DEVON

EDX Results with the Quadrantids Shower—

New VHFCC Awards—

Notes, News and Gossip—

THOUGH it has been a relatively quiet month, meteor shower EDX results are again reported. As regards tropospheric conditions, the barograph trace shows a very erratic pattern all through the period—however, the little man in the picture succeeded in driving the needle well up during the week-end January 13-15, when your A.J.D.'s own glass was nearly as high as it ever has been. The weather conditions then prevailing suggested that GDX ought to have been fairly good in the southern part of the country.

The Quadrantids

This meteor shower was due over January 1-4, and G3CCH of Scunthorpe and G3HBW were duly on EDX schedules; they were both successful. G3CCH worked OH1NL on the 3rd, the QSO taking from 1700 until 2130 GMT, when the final "R" was received; a long burst at 2007 gave all the essential information. G3CCH had also arranged a schedule with OE3SE, but this was only partially successful, with but a callsign heard at this end, at 0628 on January 3. The contact with OH1NL puts G3CCH up to 19C in the Countries table, and we congratulate him on his success.

For Arnold, G3HBW, the test produced, at long last, a QSO with HB9RG, the time taken to effect the contact being 2359-0320 on the 3rd; the burst-rate was the highest ever recorded at G3HBW, coming in every few seconds; Arnold remarks that the distance London-Zurich, about 500 miles, is really too short for a successful m/s contact, but he and HB9RG overcame this by using high keying speeds. The QSO makes it the 20th country for G3HBW, and puts him right back into the hot seat in that table—well done!

Another Quadrantids result reported is the OH-OK "First," when OH1NL worked OK2VCG on January 3, this taking from 0200 until 0505, the distance being about 860 miles. Going further back, it now transpires that GM2FHH/OK2VCG succeeded on December 13, during the Geminids appearance; this contact took about two hours.

It will be evident that these interesting EDX results are achieved only by accurate frequency setting, careful beam heading, plenty of power radiated, a great deal of patience—and, according to Arnold, a lot of luck. There are not many stations properly equipped to meet all these requirements, so that meteor-shower contacts still remain the exception rather than the rule so far as AT stations are concerned.

Getting on Frequency

The comment on this in our last has provoked a certain reaction—mainly of agreement. What we took to be the 10% who can get "to the nearest kc" has turned out to be a reasonable estimate. The first requirement is a crystal-controlled converter with the injection frequency measurable to a high degree of accuracy—it is not enough merely to multiply up from the xtal fundamental, as marked on the holder! Secondly, the receiver used as the tunable IF/AF amplifier must itself have a very stable oscillator, with a good open tuning scale—such as the Eddystone S.750. With such a set-up, and the converter CO adjusted to knock out at, say, 120 mc exactly, tuning across 24-26 mc on the S.750 will enable frequencies to be read off to a kilocycle, near enough, on the minor scale if a few calibration points are taken through the range; the accuracy would be even better, and the calibration more reliable, with an S.888 tuned across 28-30 mc and the converter injection at 116 mc exactly.

With other sorts of receiver used as IF/AF amplifier, or some other mixer frequency, just as reliable a calibration can be applied provided the crystal injection can be accurately determined and the main receiver has a reasonably stable oscillator and an open tuning scale; it is then a matter of working out how the main-receiver dial readings correspond to frequency and, by taking a few calibration points over the main-receiver tuning range, either drawing a graph or sticking a "144-146 mc" scale on the receiver tuning control itself.

There are obvious advantages in

TWO METRES

COUNTIES WORKED SINCE SEPTEMBER 1, 1960

Starting Figure, 14

From Home QTH Only

Worked	Station
50	G3HBW
43	G6XA
42	G3JWQ
41	G2CIW
40	G6GN
35	G3KPT
28	G3MPS, GW3MFY
27	GW3ATM
26	G3KQF
25	G3HS, G3NAE, G3OBD
23	G2CVV
22	G5QA
21	G3HWR
20	G3GSO, G3OBB
15	G3NNK

This Annual Counties Worked Table opened on September 1st, 1960, and will close on August 31st, 1961. All operators who work 14 or more Counties on Two Metres are eligible for entry in the Table. QSL cards or other proofs are not required when making claims. The first claim should be a list of counties with the stations worked for them. Thereafter, counties may be claimed as they accrue.

using 120 mc, or some similar whole number in this region, as the converter injection frequency, as it enables almost any usual amateur - band receiver to be accurately calibrated for 144-146 mc.

Scottish VHF Meeting

The annual dinner meeting of the Scottish VHF group will take place on March 11, at the Carlton Hotel, Edinburgh. Visitors from south of the border are invited, a good lecture has been arranged and there will be the usual prize draw; tickets are 21s., inclusive dinner, and can be obtained either from W. C. Bradford, GM3DIQ, 6 Langside Park, Kilbarchan, Renfrew, or from L. F. Benzies, GM3DDE, 78 Hillview Road, Edinburgh 12. Overnight accommodation can no doubt be arranged, and Edinburgh can be reached either by sleeper-express or by air.

VHFCC Elections

VHF Century Club Certificate No. 281 is awarded to Bodo Henningsen, DJ5LZ, of Munich, who has six countries worked on two metres, and two countries on 70 centimetres, probably his most interesting card being that from OE5HEP for a 430 mc QSO; DJ5LZ shows no U.K. stations worked, all his contacts having been with EU's, and mainly on two metres.

Certificate No. 282 goes to M. Linfoot, G3GCX, of Acomb, York, who includes cards from eight countries (all 144 mc) and is one of those who can show a QSL from G8AO/MM; he has also worked two OZ's and several stations in the Low Countries.

In his claim entitling him to VHFCC Certificate No. 283, Josef Hoever, DJ3ZU, of Kempen, is almost unique in showing only one U.K. station, G3LTF, worked for his batch of 100; all the others are EU's, and mainly DJ/DL's.

Four Metres

We are glad to hear from G3LZN (Rowington, Warks.) that he is another who is active on four metres—*see* p.598, January—with a cascode converter into an Eddystone S.750, a QQVO3-20A in the PA running 12w., and a Labgear bisquare aerial; he is on every Sunday morning, has a regular schedule with G3EHY (Banwell) with 59 phone both ways, and recently has also worked G3AYJ, G3KPT, G3LZH and G3MNQ. Remarking that most Midlands operators on 4 metres seem to be untroubled by TVI (thought by some to be a serious difficulty on this band), G3LZN says that activity on 70 mc is increasing in the Midlands area.

G3GCX reports that, with himself, there are three stations in York who are using four metres regularly, the other two being G3DSA and G3FFV. They would welcome contacts from other directions, and no doubt schedules could be arranged—Sunday morning seems to be the best sort of time.

Station Gossip

G6XA (Leamington Spa), having torn your poor old A.J.D. off a strip for having put him in the w r o n g bracket in Countries Worked (too high), says that for him it has been a quiet month because he has been busy on the bench; however, G3JTK was worked for a new one, and *Ar* conditions were noted on January 8 and 9. G3OBD (Poole) found a few openings, with some new stations worked outside the local area, and reports that G3NOH is now on from one of the highest parts of Bournemouth, and should get out well.

G2CIW (Birmingham) noticed the brief *Ar* opening on January 9, with GM2FHH heard as a weak signal, and also found tropospheric conditions good during January 15-16, with strong signals on two metres, and G2XV and G6GN worked on 70 centimetres.

G3CZZ (Camborne, Cornwall) must be desirable GDX for most two-metre operators; conscious of this, he is now operating mobile-fixed almost every Sunday morning from a good site near Redruth, about 750 a.s.l.; he is there from 10.45 to 12.45 clock time, on 144·08 mc, and has already had a number of interesting contacts, including G5TZ in the I.o.W. G3CZZ remarks that "it is obvious that few stations trouble to look in this direction and that a number of them that can be heard have poor receivers

TWO METRES

COUNTRIES WORKED

Starting Figure, 8

20	G3HBW (DL, EI, F, G, GC, GD, GI, GM, GW, HB, LA, LX, OE, OH, OK, ON, OZ, PA, SM, SP)
19	G3CCH (DL, EI, F, G, GC, GD, GI, GM, GW, HB, LA, LX, OE, OH, ON, OZ, PA, SM, SP)
18	G5YV, G6NB (DL, EI, F, G, GC, GD, GI, GM, GW, HB, LA, LX, OK, ON, OZ, PA, SM, SP)
17	ON4BZ
16	G3GHO, G3KEQ, G5MA, G6XM, PAØFB
15	G2XV, G3FZL, G4MW, GM3EGW
14	G2FJR, G2HDZ, G3AYC, G3FAN, G3HAZ, G3IOO, G3JWQ, G3WS, *G5BD*, G6LI, G8OU, OK2VCG
13	G3BLP, G3DMU, G3DVK, *G3GPT*, G3KPT, G5DS, G6XX
12	EI2W, F8MX, G2HIF, G3EHY, G3GFD, G3GHI, G3LTF, G3WW, G5CP, G5ML, G6RH, G8VZ
11	G2AJ, G2CIW, G2CZS, G3ABA, G3CO, G3JZN, *G3KUH*, G3LHA, G4RO, G4SA, G5UD, G6XA, OK1VR
10	G2AHP, G2FQP, G2HOP, G3BDQ, G3BK, G3BNC, G3DLU, G3GSE, G3GSO, G3JAM, G3KQF, G3MED, G5MR, G8IC, GW5MQ
9	G2DVD, G2FCL, G3DKF, G3FIJ, G3FUR, G3IUD, G4LX, G8DR, G8GP, GC3EBK, GM3DIQ, GW3ATM
8	G2DDD, G2XC, G3AEP, G3AGS, G3BOC, G3EKX, G3GBO, G3HCU, G3HWJ, G3KHA, G3MPS, G3VM, G5BM, G5BY, G8SB, GC2FZC

—they put in excellent signals from the London area, but are heard to be in difficulties when trying to receive more distant stations." He runs a CC converter into a BC-455 tuning 6·5-8·5 mc, the beam is a 5-ele wide-spaced Yagi, and the transmitter runs about 8w. in a QQVO2-6 as PA, modulated by a 12BH7 in Class-B. G3CZZ says that for a small transmitter, *e.g.*, when working mobile, the QQVO2-6 seems to be a much better PA valve than the more usual QQVO3-10; at any rate, he can get more RF output for less DC input, and the '2-6 is over-driven with 1 mA into the grid! For those wanting to arrange schedules or tests, G3CZZ can be reached on *Camborne 3066* during leisure hours.

G3ICO (Yeovil), in sending in his "statistical evidence," reports himself as still fairly active on week-day evenings and Sunday mornings, but has not worked anything of note recently. G3NAE (Bournemouth) finds that there is enough local activity to keep the band going and produce QSO's, though general conditions have been poor during the period; he plans some /P work from the Dorset high spots. G3LTN (Weyhill, Hants.) got a few GDX contacts during the January tropo. openings, including a QSO with G5YV, lost due to a blown fuse at the Leeds end—*really*, Harold! However, they picked it up again the next evening, when G5YV explained about the fuse.

G3FRV (Crawley) says, "ask the boys to shine the beam down south" because he is now on 144·80 mc with a 4/4 slot-fed, a cascode converter and a QQVO3-10 in the PA; contacts are being made up to 50 miles, and stations outside this radius are now being sought.

A very new station on the two-metre air is G3OPR (Cranleigh, Sy.), who also has a QQVO3-10 in the PA with about 15w. input, a modified tunable G2IQ-type converter and a slot-fed 4/4 "rotatable by a system of strings from the kitchen." G3OPR has got to 10C worked since commencing operations on December 10, 1960, when the ticket came through; prior to that he had wisely provided himself with what he calls "gadgets to make it easier"—an FS meter, a noise generator, an SWR bridge, and a reflectometer. This makes him better equipped than most newcomers, we would think.

PAØFB, The Hague, is a very well-known VHF man, and is also SSB and RTTY-minded.

Converter Comment

Referring to the Converter design in the January issue of SHORT WAVE MAGAZINE—"Improved Two-Metre Converter," p.578—G6JP (Pinner) suggests that a more realistic approach to the choice of first-stage valve is noise *factor* rather than noise *resistance*; on this basis, he says that the G.E.C. A.2521 or A.2599 (both valves already well known for their excellent VHF characteristics) would be a better choice than the 417A, which actually has a worse noise factor than either, by about 1 dB.

SEVENTY CENTIMETRES

ALL-TIME COUNTIES WORKED

Starting Figure, 4

Worked	Station
33	G2XV
28	G3HBW
27	G3JWQ, G3KEQ, G5YV
26	G6NF, GW2ADZ
23	G3BKQ, G6NB
21	G3IOO
20	G3HAZ
19	G2CIW
17	G3KPT
16	G2DDD, G3LHA, G3MED
15	G4RO
14	G2HDZ, G3FAN
13	G3MPS
12	*G5BD*
11	G3AYC, G3LTF
10	G2OI, G3IRW, G6XA
9	G5DS
7	G2HDY, G3JHM
6	G3JMA, G3KHA, G3WW
5	G3FUL, G3IRA, G3IUD G5ML
4	G3JGY

On working four Counties or more on the 70-Centimetre band, a list showing stations and counties should be sent in for this Table, and thereafter new counties worked notified as they accrue

G6JP goes on to say "At the present time, the best valve combination available anywhere using glass base pin valves remains the A.2599 for a neutralised g.c. stage, and the A.2521 for the following g.g. stage; the NF of this combination at 145 mc will be of the order of 3·8-3·9 dB, compared with 4·8-5·0 dB using the 417A."

In Conclusion

The dead-line for our next is **February 15** — addressed A. J. Devon, "VHF Bands" *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. Looking forward to being with you again on March 3, *73 de A.J.D.*

GW3ITD/MM—DX CRUISE

WITH THE FRIGATE H.M.S. *PUMA* IN THE SOUTH ATLANTIC JANUARY-DECEMBER, 1960

M. R. Davies (GW3ITD)
(R.E.A., Royal Navy)

THE pursuit of a Maritime Mobile (/MM) licence for operating on the amateur bands from the frigate H.M.S. *Puma* started in November 1959, and it was with no great hopes that the various departments of the Navy were approached for the necessary consents. It had been tried often enough before, friends said, without success. But with perseverance, luck and a great deal of co-operation, the licence was eventually obtained, authorising use of GW3ITD on ten metres with the suffix /MM when at sea, and /MA ("maritime anchored") when in Portland or Plymouth.

A Heathkit DX-100U Kit was thereupon purchased and built up during Christmas leave, 1959—with the final stages completed only the day before leave expired, a few QSO's were made on 28 mc from the home QTH to test the potency of the transmitter; a report from a VK of "S9 + 30 dB," using only a dipole, came as a very satisfying reward for a hectic week of constructional endeavour, lasting into the small hours to get the job completed.

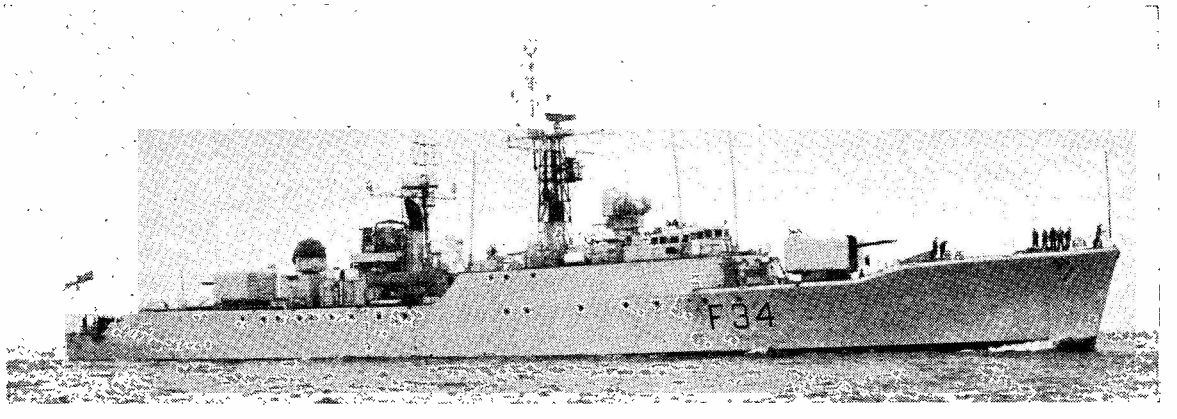
With a Service receiver, the station was installed in a corner of a radar office in the ship, the aerial being a whip cut for 28·4 mc, fitted on a fan trunking. (It was "part of the contract" that this had to be taken down when entering or leaving harbour, in order to preserve the ship's silhouette.) The only drawback about the shack was its lack of air conditioning or any sort of forced ventilation, which made things a bit sticky when in the tropics; the highest temperature recorded was a steady 120° F., which was a trifle *too* warm for comfortable working on the 10-metre band! The shack was adorned with a *DX Zone Map* and a few QSL cards, and in the end very many enjoyable hours were spent in it during 1960.

The first GW3ITD/MA contact was with G3HNA, Plymouth, followed by W2RWN, who gave a RS-59 report, and during the next few days a number of stations were worked with reports varying between S7 and S9. It was during these first tests that interference difficulties arose—on the IF strip of one of the ship's navigational receivers; the only solution was for GW3ITD/MM to close down when *Puma* was near land, or using radar for navigation in poor visibility. As the cruise was into warmer climes where little radar assistance was required, there were long days of interference-free operating. Another unusual type of local QRM was when at the dockside—this was due to rectification of GW3ITD/MM's RF by dirty contacts in temporary shore telephone circuits brought into the ship for local communication when in harbour, and was always cured by fitting ·01 μF condensers between the lines and earth.

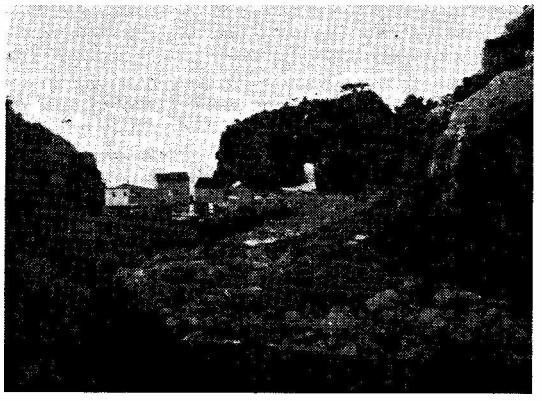
Start of the Trip

After trials off Portland, *Puma* set course for Gibraltar, the first port of call, on January 25, 1960. By now, GW3ITD/MM was having about 20 contacts a day, mainly on 28 mc phone, and the big difficulty became how to convince many of the stations worked that the call was genuine! One East-Coast W openly accused GW3ITD/MM of piracy. On arrival at Gib., a personal contact was made with ZB2N, who had been worked *en route*, and a letter was sent off to SHORT WAVE MAGAZINE—mentioned on p.31 of the March 1960 issue—to assure all concerned of GW3ITD/MM's *bona fides*.

Ten days were spent at the Rock, and then *Puma* set off for the West Coast of Africa, calling first at Las Palmas. In this area, the 10-metre skip for U.K.



The frigate H.M.S. "Puma" was flagship of the C-in-C South Atlantic and South America during the period January-December 1960, when GW3ITD made the trip described in the article. He was able to operate as GW3ITD/MM for the greater part of the cruise, covering more than 43,000 miles. Operation was mainly on 10-metre phone, some 1,200 amateur stations being worked in the eleven months' voyage. Like most ships of the Royal Navy nowadays, "Puma" carries a vast amount of radar, communications and electronic equipment — three big whip aerials, a radar scanner, and various UHF/VHF antennae are visible on her mast structures; somewhere in this complex, GW3ITD/MM put up his 28 mc vertical aerial; it had to be taken down when entering or leaving harbour in order to preserve the ship's silhouette.



A view to seaward from Gough Island, with the settlement in the foreground. ZD9AM runs the weather station at this remote spot.

and U.S.A. working was ideal. The log is a good indication of this, with whole pages of stations worked, giving "5 and 9" and "5 and 9 *plus*" reports; at first, one was rather doubtful about such generosity, but after consideration and a little calculation, it seemed that most of them could be genuine. The DX-100U was certainly doing its stuff, helped along by a vertical aerial cut for length and the perfect earth of the ship's hull.

From Las Palmas the next call was Dakar, where a very surprised FF8AP was raised on local groundwave; QSL's were duly exchanged, within 20 minutes of the contact. At this stage in the cruise, G's were being worked every day at very good strength, but there was a noticeable difference between the average U.K. station running 150 watts and stations from North America using similar input; the latter appeared to be more fully modulated and to have greater talk-power; this effect persisted when off the East African coast and in South American waters.

By now a daily schedule was being worked with OQ5FH (Katanga, Congo); her cheerful voice was often heard in a number of different languages, and before she had to evacuate to Belgium at the height of the crisis in the Congo, she had a few Welsh words added to her vocabulary. On passage to Freetown, a fine QSO was made with FD8AMS, whilst on his expedition into Togoland; he was later worked as ZD2AMS from his home QTH in Nigeria. On *Puma's* arrival at Freetown, ZD1EO and ZD1RO were met in person.

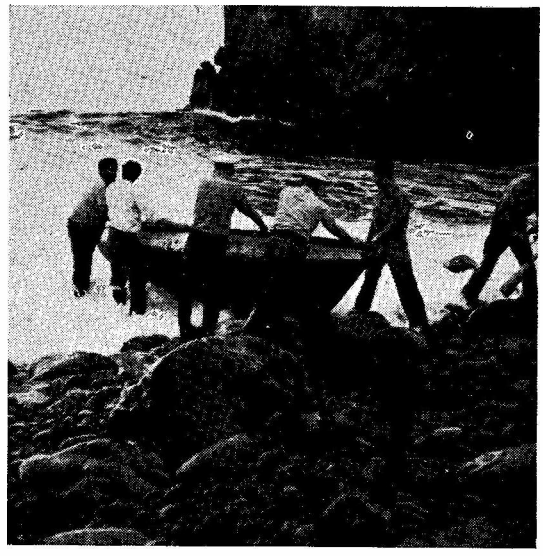
At Monrovia, Liberia, GW3ITD/MM was presented with a pair of 6146's, by EL2Z, one of the American "locals," as possible spares for the transmitter; as it happened, one of these 6146's was required only a few days after leaving Monrovia, when the PA went up in smoke. Without EL2Z's generous gift, GW3ITD/MM would have been QRT until arrival in Cape Town. Calling in next at Takoradi, Ghana, the local contact was 9G1CT (whose photograph duly appeared in "DX Commentary" in the *Magazine*), and many an interesting QSO was made using the Heathkit DX-40U at his station.

Conditions remained good for the run down to the Cape; a large number of North American stations appeared in the log, including numerous 10-metre mobiles, their vertically polarised signals obviously suiting the GW3ITD/MM aerial system which, of course, was likewise vertical. At Simonstown Naval Port, 26 miles from Cape Town, a number of ZS1's visited the ship, and seemed surprised by the simple aerial arrangement — a 10-metre ground plane is not very conspicuous and does not take up a lot of space!

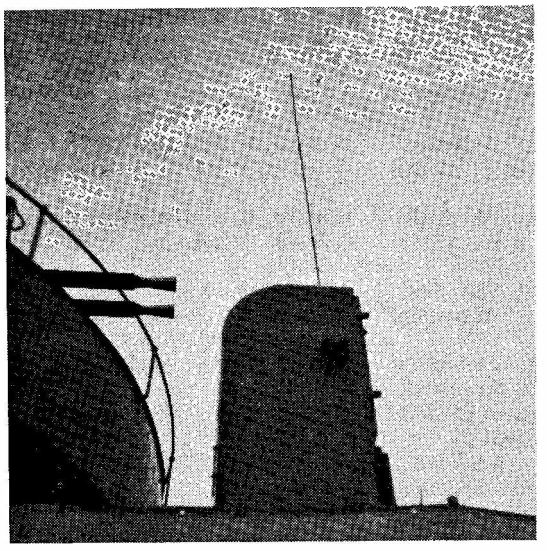
The Remote Islands

After a few very enjoyable weeks in Simonstown, course was set for Tristan da Cunha and Gough Island, the loneliest inhabited settlements in the world, for which *Puma* was carrying supplies and mail. Application had been made for a ZD9 call, but unfortunately too late; the licence was there on return to Simonstown, under call-sign ZD9ITD; but there was never the opportunity to use it.

The only active ZD9, at present, is ZD9AM, who is the radio operator with the weather station on Gough Island. A personal QSO was effected with him, but in circumstances a little different from the usual—to reach the Island, one has to get through the heavy surf in a small boat, which is a hazardous undertaking. After landing stores, *Puma* returned to Tristan da Cunha, to ride out a spell of stormy weather, before landing more stores.



The landing party from "Puma" were ducked in the surf when coming ashore at Gough Is. to visit ZD9AM.



The 10-metre aerial for GW3ITD/MM was mounted on a fan trunking, and had to be removed when the ship was entering or leaving harbour. With this harmless-looking remnant of BC-610 whip more than 1,000 stations were worked during the 11 months' cruise of some 43,000 miles.

From these distant South Atlantic islands, a number of U.K. stations were worked on 28 mc, including GW5TJ, who became a regular contact. Returning to Simonstown (where the ZD9ITD licence was found), the cruise continued up the east coast of Africa to Port Louis, Mauritius, where VQ8AW was met on arrival; only a few weeks earlier, his station had been badly damaged by a typhoon that had struck the Island; a large number of what, for Peter, were rare QSL cards were destroyed.

On the trip back to Simonstown, a call was made at Durban. For such a large place, the amateur activity was disappointing; only one local station was worked during the ten days' stay.

The Westerly Leg

The next long run, to South America, was now looming. For the writer, this was the most enjoyable part of the whole cruise. On arrival at Buenos Aires, a great number of LU's were met and all went out of their way to be hospitable; a particularly interesting evening was spent at the very well organised Amateur Radio Club in B.A., for which a substantial grant is made by the Argentine government. This grant is strictly for the benefit of Amateur Radio activity and the furthering of the amateur interest. The enlightened attitude of the Argentine government could well serve as a model for certain other authorities! All too soon the visit to South America came to an end, and *Puma* started for home, calling at Ascension Is. and Simonstown again.

By November 29, 1960, she was headed north, but conditions on 28 mc had deteriorated considerably; between Simonstown and St. Helena barely a half-dozen stations could be raised. The only amateur on St. Helena, ZD7AS, was QRT when called from seaward, so in this instance the usual "local ground-wave QSO" did not materialise—however, the contact was later made and the much-sought-after QSL card duly received. Soon *Puma* was back into Gibraltar again, where this time ZB2J was met, his QTH being near the Dockyard; a very interesting visit to "Radio Gibraltar" was arranged, where ZB2J is engineer-in-charge.

The short run home to Plymouth was made in good weather, arriving on December 19, 1960, in nice time for Christmas leave once more, and just eleven months after the start of the cruise. This had taken GW3ITD/MM about 43,000 miles, on a trip even a millionaire might envy—with 1200 different amateur stations worked on 10 metres, DXCC all but achieved, and many happy personal friendships made. For GW3ITD, at least, the saying "Join the Navy and see the world" has real meaning!

GETTING THE MAGAZINE

You should be able to get SHORT WAVE MAGAZINE, anywhere in the U.K., by order through a local newsagent. If there is any doubt, difficulty or delay about this, we can accept subscription orders at 33s. for a year of twelve issues, ensuring delivery by post on the day of publication, the first Friday in the month. Orders, with remittance, to: Circulation Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FAMILY ON THE AIR

GI3ATH (R.A.F. Bishops Court, Co. Down) found on working DL1YQ that his wife is DJ6YQ, his daughter DJ4YM and his son DJ4YQ! Three-call families are not unknown in the U.K.—see the photograph herewith—but, like GI3ATH, we wonder if there is one holding four calls between close relations?

We congratulate this family! Left to right: Stella Fish, G3IYL; Edward Fish, G2HCZ; and Miss Joan Fish, GM3NYG daughter of G2HCZ and G3IYL. Good luck to them for many happy years in Amateur Radio.

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 U.K. section 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.

GW3FEZ, Amateur Radio Society, Physics Department, Glamorgan Technical College, Treforest, Pontypridd, Glam. *(Re-issue.)*

G3GJQ, R. Handley *(ex-AP2R)*, 8 Foley Road, St. Johns, Worcs. *(Re-issue.)*

G3OCL, M. Gay, 19 Uley Road, Dursley, Glos. *(Tel.: Dursley 2765.)*

G3OEI, F. W. Fairclough, 28 Rimmer Green, Carr-Cross, Southport, Lancs.

GM3OIO, J. Howie, 11 Chapelton Avenue, Bearsden, Glasgow.

G3OJD, L. Burch, Alexandria House, Temple Street, Sidmouth, Devon. *(Tel.: Sidmouth 1468.)*

G3OKE, P. W. Copeman, 58 Alexandra Road, Wimbledon, London, S.W.19.

G3OKV, F. A. Parsonage *(ex-DL2ZB)*, 14 Filmer Close, Rowner, Gosport, Hants.

GW3OLX, J. C. G. Parker, 10 Park Wern Road, Sketty, Swansea, Glam.

G3ONB, K. Hall-Brooks, 5 Forest Road, Annesley Woodhouse, Kirkby-in-Ashfield, Notts.

GM3ONM, J. McCall, 16 East Park Drive, Kilmaurs, Ayrshire.

G3OOP, B. G. Havenhand, 675 Barnsley Road, Sheffield 5, Yorkshire. *(Tel. Sheffield 386504.)*

G3OPP, A. E. Lee, 7 Standard Road, Downe, Orpington, Kent.

G3OQA, G. W. Young, 35 Westmead, Windsor, Berks. *(Tel.: Windsor 2195.)*

G3OQC, J. W. Woods, 40 Woodcock Avenue, Naphill, High Wycombe, Bucks.

G3OQH, K. L. Garraway, Lynden Cottage, Southview Road, Marlow, Bucks. *(Tel.: Marlow 975.)*

G3OQJ, S. Haddon, 63 Knights Lane, Kingsthorpe, Northampton, Northants.

G3OQK, A. Fairgrieve, 38 Chatsworth Road, Ellesmere Park, Eccles, Lancs.

G3OQL, F. J. Holdaway, Skerryvore, King's Road, Clevedon, Somerset.

G3OQP, R. N. Poston, St. Andrew's Vicarage, Electric Avenue, Westcliff, Essex.

G3ORD, D. Munton, 27 Carlton Avenue, Hull Road, York, Yorkshire.

G3ORG, I. K. Taylor, Westfield Nurseries, Henlow, Beds. *(Tel.: Clifton 366.)*

G3ORI, J. R. Vickers, The Flat, Charlecote Park, Warwick, Warks.

G3ORK, R. A. Talbot, 15 Chesterfield Road, Ainsdale, Southport, Lancs. *(Tel.: Southport 79131.)*

G3ORU, Mrs. M. Moore, 30 Abbey Crescent, Beauchief, Sheffield 7. *(Tel.: Sheffield 363155.)*

G3OSB, A. D. Taylor, 34 St. Peter's Avenue, Lincoln, Lincs.

G3OSH, A. W. Haines, The Laurels, Roping Path, Yeovil, Somerset.

G3OSK, B. R. Parsons, 77 Southampton Road, Paulsgrove, Cosham, Portsmouth, Hants.

G3OSZ, C. E. Mumford, 36 Canterbury Road, Wallasey, Cheshire.

CHANGE OF ADDRESS

G2CUZ, N. Horrocks, 34 Sandbrook Road, Ainsdale, Southport, Lancs.

G2FQT, P. Wolfendale, 67 Arnewood Road, Southbourne, Bournemouth, Hants.

G3BES, C. Nash, 46 Rutland Road, Hove 3, Sussex.

G3BHT, B. G. Meaden, 56 Sheen Park, Richmond, Surrey.

G3BIC, E. J. Lawrence, 53 Grosvenor Close, Sutton Coldfield, Warks.

G3EIW, R. Halls, 46 High Street, Wells, Somerset.

G3ESW, B. Insull, 24 Hartland Avenue, Weeping Cross, Stafford, Staffs. *(Tel.: Milford 665.)*

G3FQC, W. G. Edwards-Hanham, 11 Lower Howsell Road, Malvern Link, Worcs.

G3HJF, L. J. Smith, Hillcroft, Toyse Lane, Burwell, Cambs.

GI3HSG, F. Peirson, 16 Neptune Crescent, R.A.F. Station, Ballykelly, Limavady, Co. Derry.

G3ILS, L. Smith, 12 Stretton Grove, Ward End, Birmingham, 8.

G3IQM, R. I. Sills, 4 Humberston Road, Wollaton, Nottingham, Notts.

G3KDB, P. A. Miles, 28 Scotch Orchard, Brownsfield Park Estate, Lichfield, Staffs.

G3KVV, BM/G3KVV, London, W.C.1.

GW3KZX, L. J. Loveland *(ex-G3KZX)*, 73 Ogwen Drive, Lakeside, Cyncoed, Cardiff, Glam.

G3LOW, J. Barrett, Lower Gentilshurst Farm, Fernhurst, Haslemere, Surrey. *(Tel.: Fernhurst 214.)*

GW3MOV, C. L. Smith, 24 St. Gowans Avenue, Heath, Cardiff, Glam.

G3MSF, C. B. J. Hughes, 321 Park Road, Kingston-upon-Thames, Surrey.

GM3NHQ, T. Harrison, c/o Fawsett, 14 Queen Street, Bannockburn, Stirlingshire.

G3NMQ, P. J. Crosbie *(GW3NMQ-ZC4BC)*, 40 Newcome Road, Shenley, Herts. *(Tel.: Radlet 6241.)*

G3NOD, R. J. Burton, 16 Lowcross Avenue, Hutton Lowcross, Guisborough, Yorkshire.

G3NTS, Ariel Radio Group, B.B.C. Club, Room S-301, B.B.C. Television Studios, Lime Grove, London, W.12.

G3NXP, D. V. Flannery, 32 Mob Lane, High Heath, Pelsall, Walsall, Staffs.

GI3OAU, D. B. McCutcheon, R.U.C. Station, Dromara, Co. Down.

G3OFS, C. J. Swain, All Saints' Lodge, Wellington Lines, Farnborough Road, Aldershot, Hants.

G3OIJ, D. R. Blewett, R.A.F. Station, Uxbridge, Middlesex.

G3RB, K. N. Smith, 12 Atkinson Terrace, Benwell, Newcastle-on-Tyne, 4, Northumberland.

G6GF, F. H. Tyler, Tudor Farm, Cherry Garden Lane, Littlewick, Berks.

THE MONTH WITH THE CLUBS

By "*Club Secretary*"

(Deadline for March Issue : February 10)

(Address all reports for this feature to "Club Secretary")

ACTIVITY reports are very numerous this month, a fair number of secretaries and scribes not having noted that last month's space was being devoted to the MCC Results, and having sent in reports intended for publication in January. Most of these, unless completely out of date, have been incorporated in the notes which follow.

We have received a very interesting proposition concerning a suggested scoring system for future *Magazine Club Contests*, based on the dividing up of the U.K. into regions, each designated with a letter. Exchanges would take the form of "579 F 20" or "579 D 34" and so on, the regional letter taking the place of the present "C" for Club.

Inter-regional points would be allotted on a sliding scale; for instance, Scottish stations working the Southern region would obviously collect more points than would any of the adjacent regions. The main task is to arrive at an equitable scale of points, and we are at present carrying out researches on the logs for the last Contest, to see if it is possible to produce a really good and fair handicapping system. The only thing we can see against the proposed idea is that points for each contact would have to be worked out from a simple chart and entered on the log accordingly, instead of remaining at three per contact.

Further details in due course; meanwhile, ideas welcome . . .

Aldershot meet every Friday—7.30 p.m. at Signals Wing, No. 4 Training Regt., Gibraltar Barracks, and they are running classes for the May R.A.E.; one member passed in the October examination. **Bradford** gather on February 14 for a talk on Transistors, Pirates and D-F (a mixed bag!) by G3IBN; the 28th is booked for an Informal Meeting.

Cornish met on December 5 and welcomed a contingent of R.A.F. visitors; with 28 members present, G2DDR gave a talk on the Radio Hobbies Exhibition, and G3LPB lectured on wide-band couplers. On January 4 many subjects were under discussion and G3CZZ showed a two-metre transceiver.

Crystal Palace are holding Morse Classes and so on, on February 7, and their AGM on Saturday, February 18; in future they will meet on the first Tuesday and third Saturday of the month, in the Windermere House Annexe, Westow Street, at 8 p.m.

Derby had a Constructors' night on January 25 and their AGM on February 1; their Wednesday meetings continue at Room 4, 119 Green Lane, at 7.30 p.m., unless otherwise stated. **Enfield** meet on February 23 for a talk by Mr. R. S. Wells about Acos products, and on March 23 for a lecture on HF Transistor Applications.

Grimsby ran a very successful stand at the local Model Engineers' exhibition, and found nine prospective members; G3ELZ and G2AJB lent equipment, which was kept busy by a rota of transmitting members.

Hastings will have a talk by G3BDQ on High Frequency Crystal Filters on February 14, and a Tape Lecture on February 28. The **I.H.H.C.** are having difficulty over the printing of their *Ham Hop News* in the U.S.A., but report that the Club's new folded-type QSL is very effective in enrolling new members; they held their AGM on January 14.

Kingston report that their future programme will include talks on Transmitters, Receivers, Airborne Radio and Power Distribution—quite a range of subjects! Meetings are on alternate Thursdays at the YMCA, Eden Street, Kingston, the next being on February 9. Morse classes, however, are held weekly. February 9—National Grid System; February 23—Aerials, by G3BHT.

Leeds have an Open Night on February 8 and a talk on Amateur TV by Mr. D. Watson on the 15th; on Sunday 19th (10 a.m.) they visit the Odeon Theatre, "back stage," and on the 21st they have a Mullard Film Show at the Hotel Metropole; March 1 is booked for a talk by G3BDR on Subscriber Trunk Dialling.

Midland had a VHF Lecture/Demonstration on

January 24 and a talk on Amateur TV on February 2. All meetings are at the Birmingham and Midland Institute, Paradise Street, Birmingham. February 21 is booked for a talk on D-F, and March 2 for a demonstration of SSB gear.

Newbury have set aside February 24 as Ragchew Night; March 24 is the date for their AGM. **North Kent** meet on February 9 and 23.

Reading have recently had lectures by G2JU (taped) on Two Metres, and by G3ASU and G2BRQ on Low Power Equipment for Two Metres. **Reigate** will be holding their Annual Dinner on February 11 at Laker's Hotel, when the chief guest will be G5LK—a former secretary now moved from the district; There will be a normal Club meeting on February 18.

The **Royal Naval** Amateur Radio Society, now with a membership of 90, is open to all serving or past members of all the Naval Services, U.K. or Commonwealth, with associateship for civilians who are or have been connected with these Services. Further information from the hon. sec. (*see* panel). The Hq. station is G3BZU, regularly on the air on Forty and the DX bands.

South Birmingham will be hearing a lecture on D-F on February 16; on March 16 they visit the local Police Headquarters. Normal meetings are at the Friends Meeting House, Moseley Road, Birmingham 12, where visitors are welcome; their Mobile Rally on July 8-9 is being organised on a national scale and they hope it will prove to be a major date in the 1961 calendar. Their regular journal *QSP* is a well produced monthly stencil, with a cover.

Spen Valley will be visiting Fane Acoustics Ltd. on February 15; the subject for March 1 is Audio in Practice—a lecture by Philips Electrical, Leeds; meet at the Labour Rooms, Cleckheaton, at 7.30 p.m.

Stevenage, new to these columns, meet on Tuesdays, but also run an R.A.E. course on Thursdays and Morse classes on Fridays. **Sutton & Cheam** meet on the third Tuesday at The Harrow, High Street, Cheam; at their January meeting they had a talk by G3DCZ on El-Bugs.

Sutton Coldfield will be hearing about Methods of Receiving CW (keys, oscillators, BFO's and so on) on February 9; on the 23rd the subject will be Crystal Grinding. **Wolverhampton** have a Ragchew on February 6 (8 p.m.) and on the 20th they run their second two-metre Constructional Class (Mr. R. J. Thomas). The Clubroom is at Nechells Cottage, Stockwell End, Tettenhall.

Acton, Brentford & Chiswick will be hearing about The HF Application of Transistors on February 21, the lecturer being Mr. Harvey, of A.E.I. Ltd. Applications Laboratory. **Bridlington** meet every Monday evening at the B.R. Sports Room, Station Buildings, and also hold an R.A.E. class on Wednesday evenings. February 6 is booked for two Mullard films, the 13th for a talk by G5VO, the 20th for "Any Questions?" and the 27th for a tape lecture by Bob Ford (*ex*-AC3SS) on his stay in Tibet.

Cheltenham report a good attendance for the exhibition of Heathkit (Daystrom) kits and gear, which followed the "hangover" from their AGM; they have now acquired the call-sign G5BK, formerly

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, London, W.3.
ALDERSHOT: A. M. Laidler, G3OJY, Pondside, Sandy Lane, Churt, Farnham.
BARNET: E. W. Brett, G3LUY, 28 Edward House, Edward Grove, New Barnet.
BRADFORD: M. Powell, G3NNO, 28 Gledhow Avenue, Roundhay, Leeds 8.
BRIDLINGTON: H. H. Mills, G3AJB, c/o 28 East Road, Bridlington.
BRITISH TIMKEN: D. G. Chatfield, G3JXU, 55 Bush Hill, Weston Favell, Northampton.
BURY: I. G. Winter, G3KJN, 269 Lever Street, Radcliffe, Lancs.
CAMBRIDGE: A. H. G. Waton, Arkengarthdale, New Road, Barton, Cambridge.
CHELTENHAM: J. H. Moxey, G3MOE, 11 Westbury Road, Leckhampton, Cheltenham.
CIVIL SERVICE: G. Lloyd-Dalton, 2 Honister Heights, Purley.
CLIFTON: C. H. Bullivant, G3DIC, 25 St. Fillans Road, London, S.E.6.
CORNISH: W. J. Gilbert, 7 Poltair Road, Penryn.
CRAWLEY: R. G. B. Vaughan, G3FRV, 9 Hawkins Road, Tilgate, Crawley.
CRYSTAL PALACE: G. M. C. Stone, G3FZL, 10 Liphook Crescent, London, S.E.23.
DERBY: F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby.
ENFIELD: V. Croucher, G3AFY, 15 Nelson Road, London, N.15.
GRIMSBY: P. Mason, 213 Clee Road, Cleethorpes.
GUILDFORD: Mrs. E. Bennet, Gravetts Lane, Worplesdon, Surrey.
HALIFAX: A. Robinson, G3MLW, 7 Upper Brockholes, Ogden, Halifax.
HASTINGS: W. E. Thompson, G3MQT, 8 Coventry Road, St. Leonards-on-Sea.
I.H.H.C.: M. Allenden, G3LTZ, 16 Grovefields Avenue, Frimley, Aldershot.
IRISH R.T.S.: T. O'Connor, EI9U, 280 Collins Avenue, Whitehall, Dublin.
KINGSTON: R. S. Babbs, B.Sc., G3GVU, 28 Grove Lane, Kingston.
LEEDS: D. Dinsdale, 69 Spen Lane, Leeds 16.
LOTHIANS: L. Lumsden, 33 Hillview Drive, Edinburgh 12.
MIDLAND: C. J. Haycock, G3JDJ, 360 Portland Road, Birmingham 17.
MITCHAM: M. Pharaoh, G3LCH, 1 Madeira Road, Mitcham.
NEWBURY: J. A. Gale, G3LLK, Wild Hedges, Crookham Common, Newbury.
NORTH KENT: D. W. Wooderson, G3HKX, 75 Mount Road, Bexleyheath.
PADDINGTON: N. Lambert, G3LVK, 22 Sunderland Terrace, London, W.2.
PLYMOUTH: R. Hooper, 2 Chestnut Road, Peverell, Plymouth.
PURLEY: E. R. Honeywood, G3GKF, 105 Whytecliffe Road, Purley.
R.A.I.B.C.: W. E. Harris, G3DPH, 4 Glanville Place, Kesgrave, Ipswich.
READING: R. G. Nash, G3EJA, 9 Holybrook Road, Reading.
REIGATE: F. D. Thom, G3NKT, 12 Willow Road, Redhill.
ROTHERHAM: S. J. Scarbrough, 25 Crawshaw Avenue, Sheffield 8.
R.N.A.R.S.: M. J. Matthews, G3JFF, RNARS, H.M.S. *Mercury*, Leydene, Petersfield, Hants.
SLADE: C. N. Smart, 100 Woolmore Road, Birmingham 23.
SOUTHGATE, FINCHLEY & DISTRICT: R. Pedder, G3NEE, 6 Greenall Close, Cheshunt, Herts.
SPEN VALLEY: N. Pride, 100 Raikes Lane, Birstall, Leeds.
STEVENAGE: A. E. Latham, G3JLA, 114a High Street, Stevenage.
SUTTON & CHEAM: F. J. Harris, G2BOF, 143 Collingwood Road, Sutton.
SUTTON COLDFIELD: L. E. R. Hall, G3IGI, 24 Calthorpe Road, Walsall.
THAMES VALLEY: K. Rogers, G3AIU, 21 Links Road, Epsom.
TORBAY: Mrs. G. Western, G3NQD, 118 Salisbury Road, Barton, Torquay.
WANSTEAD & WOODFORD: J. R. Seaman, 67 Beattyville Gardens, Ilford.
WOLVERHAMPTON: J. Rickwood, 738 Stafford Road, Fordhouses, Wolverhampton.
WOLVERTON: D. A. Shepherd, G3LCS, 35 The Crescent, Haversham, Wolverton.

held by a founder member of the society who died some ten years ago, and who did much to help local amateurs during his lifetime. The call G3GPW is now relinquished.

Crawley held their first AGM in December and put G3NVB in as chairman, with G3FRV secretary; at their February meeting, on the 23rd, G5CS of the Science Museum will be lecturing on The History of Radio.

Guildford meet on the fourth Friday of the month, with a further meeting in between, which is announced in their new publication *Monthly Natter*. From this we learn that they managed to book G6CJ on Aerials for their meeting on January 27 and were naturally expecting a big attendance.

I.R.T.S. held their AGM at the Clarence Hotel, Dublin, on January 28 and were expecting a big turn-out from all corners of Eire. **Plymouth** have a Junk Sale on February 14.

Wanstead & Woodford are active on Tuesday and Wednesday nights with their junior and senior groups respectively; on Wednesdays there is some Top Band activity; the shack is being re-equipped for constructional work, and extensive technical literature is available. Further details from the hon. sec. (*see* panel).

Purley plan a general discussion and display of transmitters (exhibits welcome) on February 3, and on the 17th they will be discussing arrangements for their proposed three-day DX-pedition to Wales, as a Club event—it should be fun! Meetings are at the Railwaymen's Hall, Whytecliffe Road.

Southgate held their AGM and elected a new secretary and joint editor; and at their regular meeting on January 12 G3GBN gave a film show.

Clifton staged their Constructional Contest on December 16; it was won by G3FNZ with an SWR indicator. On the 23rd Bryan Bisley (MP4QAO, *etc.*!) gave a talk on DX Operating, and on the 30th G3IWL lectured, with illustrations, on GPO equipment; February 10 is scheduled for a Junk Sale, and on the 24th G3BCM will talk on International Radio Regulations.

Halifax boast three new call-signs in the "G3O . ." series—good show! On March 7 they will be discussing Field Day arrangements, and March 21 is Ragchew night.

Lothians report several interesting lectures, covering Transistors, the Hallicrafters SX-101A and Cabinet Construction; on February 9 there will be a talk and film on Radio Control of Models, by GM3BBW. The subject for the 23rd is not yet fixed. Meetings at the YMCA, St. Andrew Street, 7.30 p.m.

Slade have a special meeting on February 10, to consider alterations to their rules, and to discuss D-F Contests and equipment for the coming season—Slade are very keen on direction finding activities. On the 24th they have a Junk Sale.

Mitcham had a talk on Lifeboat Radio Equipment on January 13; February 10 is booked for an NFD discussion and the 24th for the AGM; the Club Net operates on 1980 kc, Tuesdays between 2000 and 2200, clock time.

Paddington is a newly-formed Club which will be meeting on Wednesdays, 7.30 p.m., at Beauchamp Lodge Settlement, 2 Warwick Crescent, Harrow Road, London, W.2. Visitors and prospective members will be specially welcome, and they hope to be on the air, signing G3PAD, very shortly.

Aberdeen will be tidying up their workshop on February 3, listening to some Hints and Kinks on the 10th, and chasing Junk Sale bargains on the 17th; they meet at 7.45 on Fridays in their Clubroom at 6 Blenheim Lane, and invite any local readers of the *Magazine* to go along and join them.

Barnet will be at the Red Lion Hotel on February 28 for a Junk Sale; note change of secretary (*see* panel). **Bury** will be hearing about SSB from G2ALN on February 14; on March 14 the lecturer will be G2HW—subject not yet announced; note change of secretary here, also.

British Timken are now running an R.A.E. course and Morse class; they have six licensed members out of a total of 21; their first Annual Dinner, at the Lough Hotel, Northampton, was a great success. **Civil Service** Radio Society put GB2SM on Two Metres for the first time during a recent talk by G5UM on that subject. On February 7 a team of experts will be talking on Radio Control of Models, with demonstrations.

Cambridge meet next on February 24 to hear G3WW's talk on his second visit to the U.S.A.; the AGM will be held in March. **Rotherham** now get together on the first three Wednesdays of the month at The Crofts, where they have their own station (G3OAM) using a Heathkit DX-40U. At the January meeting the G3KUH Memorial Plaque was presented to G3NXZ for the best piece of home-built equipment. Lectures, Morse classes and an R.A.E. course are all planned—details from the new secretary (*see* panel).

Torbay were sadly hit by the death of their secretary, George Western (G3LFL) on Boxing Day; his widow, who is also a licensed amateur (G3NQD) is continuing the work until the AGM; next regular meeting is on February 11, with the Annual Dinner and Dance booked for March 4 at the Abbey Lawn Hotel, Torquay.

Thames Valley held their AGM and re-elected all their officers; they have started a Junior Section for R.A.E. and Morse tuition, which will be held at 7.30 p.m. sharp on meeting nights (first Wednesday). The Club Net is now in action on the Top Band on Tuesday evenings.

Eccles are trying to re-form themselves into an organised Club, and a meeting has been called for February 21, 8 p.m. at the Cross Keys Hotel, Church Road, Eccles; anyone interested is cordially invited to be there.

In North Bucks., **Wolverton** meet every first Friday at the Science & Arts Institute, Church Street, Wolverton, under the chairmanship of G3IYX; next meetings are February 3 (AGM and lecture) and March 3 (meeting of two-metre mobiles, and discussions, with G3NOC as talk-in station); on April 7 there will be a lecture on mobile operating. Some helpful suggestions anent MCC have come from the Wolverton group.

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; R.A.F. Manston, Kent; R.A.F. Aldergrove, N. Ireland; and a few 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. Annual leave, 3 weeks and 3 days, increasing to 4 weeks 2 days after 10 years' service; 5 weeks after 20 years' service, and 6 weeks after 30 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 Commanding Officer No. 30 Maintenance Unit, Royal Air Force, Sealand, Cheshire (for Sealand vacancies); Commanding Officer R.A.F. Manston, Kent (for Manston vacancies); Commanding Officer, R.A.F. Aldergrove, Nr. Crumlin, N. Ireland (for Aldergrove vacancies); or to Air Ministry, C.E.3g, Princes House, Kingsway, London, W.C.2, for vacancies in other areas, or apply any Employment Exchange, quoting City O/N 3057.

TRADE

NEW from " Telecomm " for the 1961 Mobileer: 2-metre 30-watt Tx, extensively transistorised, 27 gns.; 2-metre all-transistor double-super Rx, £50. Terms. Shortly available: All-transistor 2-metre converter.—R.E.E. Telecommunications, Ltd., Telecomm Works, Crewkerne, Somerset.

WANTED FOR CASH: Good clean communication receivers and SSB equipment. Please state price. — Short Wave (Hull) Radio, 30/32 Princes Avenue, Hull. *(Tel. 18953.)*

BC221 Tested, guaranteed, complete, £19 10s. Untested, not guaranteed, £12. — Altham Radio Co., Ltd., Jersey House, Jersey Street, Manchester, 4.

SMALL ADVERTISEMENTS, TRADE—*continued*

QUALITY GEAR in mint condition: Hallicrafters HT32A; Johnson "Courier"; Hammarlund HQ170E; K.W. Valiant Tx; K.W. Receiver 76; and other first-class gear. Best offers accepted.—Box No. 2401, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

TRI-BAND QUAD AERIALS. Optimum spacing for EACH Band, £17 each. 80 dB 70-80 ohm TVI LOW PASS FILTERS, handle 1 kw correctly terminated, £6 each. SWR METERS, Co-ax unit, 30s., Indicator £6 15s. PLUG-IN AIR WOUND 250-WATT INDUCTORS with swinging links, complete set 10-80m., with base, £12 19s., or sold separately. MULTI-TAPPED INDUCTANCE, ideal for aerial tuning units, 42s. each. THE EXCLUSIVE LAB-GEAR WIDE-BAND MULTIPLIER UNIT, 7 gns. each. 5-BAND COIL TURRETS, 50-watt rating, single-ended, 55s.; Push-pull 60s.; Pi 50s. PARALLEL FEED RF CHOKES for 10-160m. Amateur Bands, 250 mA, ceramic former, 10s. 6d. each. S.a.e. for leaflets. Terms, c.w.o.; carriage paid over £5. All items *ex*-stock.—LABGEAR LIMITED, WILLOW PLACE, CAMBRIDGE. *(Tel.: Cambridge 88022 — 4 lines.)*

QSL's and Logs by Minerva. The best there are.—Samples from Minerva Press, 2 New Road, Brentwood, Essex.

QSL CARDS AND LOG BOOKS, G.P.O. APPROVED. CHEAPEST, BEST. PROMPT DELIVERY. SAMPLES. — ATKINSON BROS., PRINTERS, LOOE, CORNWALL.

OSCILLOSCOPE, Type 13A, urgently required. Highest price paid.—P.C.A. Radio, Beavor Lane, Hammersmith, W.6.

READERS' ADVERTISEMENTS

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.

AVO 7 for sale, complete; recently re-calibrated to manufacturers' specification, £8 or offers?—Tubb, 9 Prince's Street, Rugby.

FOR SALE: HRO-MX, good condition, working; 9 coil units 50 kc-30 mc, home-built power pack, manual, £12. Buyer collects. WANTED: Instruction Manual AR88LF. — G3NPF, 2 Edith Road, Southend, Essex.

MINIMITTER 150-watt Tx, but PSU owner-built; bargain, £27 10s., collect or carriage extra. Panda LP Filter, hardly used, £4. Taylor 45B Valve Tester and manual, soiled case, FB order, £7 10s.—Ralfs, 67 Meadow Lane, Liverpool, 12.

SALE: Receivers—Hallicrafters S20, £8; R103, £4; AR77ER, £15; 4ft. 6in. rack with back panels, 15s.; DC Avometer, £1; BC-221 Wavemeter, with charts, £12; m/c microphone, 15s. — *Phone Wax. 5142.*

WANTED: BC-453 Q-Fiver, in good condition and suitable for HRO.—Full particulars to: Henderson, 84 Old Inverkip Road, Greenock, Renfrew, Scotland.

FOR SALE: No. 19 Set, 50s.; unused since bought. Buyer collects.—Minshull, 18 Park Avenue, Great Crosby, Liverpool 23, Lancs.

SMALL ADVERTISEMENTS, READERS—*continued*

EDDYSTONE 840A, very little used and in new condition, £35. Buyer collects. — Ingham, 57 Southway Beechwood, Horsforth, Leeds.

MINIMITTER 4ZU Beam and Telescopic Mast, 6 months old, £20 o.n.o.? Beam only, £10.—G5JU, 333 Rednal Road, Birmingham, 31.

WANTED: Western Electric Amplifier Converter AM-913/TRC, good price paid. Also Collins 51-J-4, or R390/URR Receiver.—Dixon, 17 Wright Street, Horwich, Lancs.

G3III SALE: SX16, crystal model, with manual, in working order, good condition; share carriage. Offers?—Write: Lovelock, Sgts'. Mess, R.A.F. Lyneham, Chippenham, Wilts.

WANTED: Minimitter amateur band converter, communication receiver. SALE, at prices to suit amateurs: Transformers, Meters, Valves QQVO6/40, £1 new; others from 1s.. Send for complete lists.—Kirby, 12 Station Road, Teynham, Nr. Sittingbourne, Kent.

MULLARD PROJECTION optical units, complete with tube and scan coils. £5 10s. 25 kV EHT supply units also available. EF80, ECL80, 5s.; 35T, 10s.; motor deck from Baird Tape deck, 30s.; VT62's, 12s. 6d.; Wilcox-Gay VFO, modified as per *Short Wave Magazine*, £4 10s. All above used but in new condition. Wearite 4A Tape Deck, brand-new, complete with tape, mains transformer, OPT—or would exchange for Commercial Mobile rig. Post extra.—P. M. Trowbridge, G3BLN, 123 Bournemouth Road, Parkstone, Dorset.

FOR SALE: HRO Senior, mint condition, full coverage (9 coils), £20; p.p. extra, if required. WANTED: Tape Recorder.—G8817, 196, Lower Higham Road, Gravesend, Kent.

GELOSO G209R Rx, £60; recently re-aligned by suppliers; bargain. Minimitter Beam Rotator, complete, £10.—G3NAC, Old Rectory, Bourton-on-the-Water, Glos.

SALE: Minimitter Telescopic Mast, new and never erected, with turning gear and indicator. Also Panda G4ZU Auto-Match unit; GM3BQA Double Quad (10 and 15 metres) and Labgear Quad. All new and never used. What offers? Buyer collects.—Box No. 2393, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: HRO Receiver with xtal filter and S-meter, complete with coils, about £16.—G3OCI, D. Hayter, 42 Huntsmead *(Billericay 1852)*, Essex.

CR100 Console with manual, RF Units, home-built 'scope, PSU's, O.P.S.. Audio amp.; L/MW Set, test meter, *Practical Wireless*, valves, bits. Offers callers.—Farrington, 16 Lindridge Road, Shirley, Warks.

OFFERS WANTED: 2-metre Transmitter, Receiver, Converter, Amplifier, Power Supplies and Speaker, complete in 5 ft. rack; 150-watt all-band Transmitter, consisting of three power supplies, modulator, amplifier, and 813 final stage, in 6 ft. rack; 120-watt Transmitter, same as above, but RK-20 in final; another in 5 ft. rack, but parts missing; all fully metered. Panda "Cub," Eddystone S.640 Receiver; 50-watt amplifier, turntable, and speaker in 4 ft. baffle cabinet; mobile receiver; whip aerials; work-bench, 6 ft. x 4 ft., tools, vice, etc. Spare valves, resistances, condensers, transformers.—Write for appointment to inspect, test, and take away.—Sims, 160 Bridge Road, Maidenhead, Berks.

SMALL ADVERTISEMENTS, READERS—*continued*

SALE: Mini-Power, £14; Mini-PA, £6; Mini-citer with S/M dial, £8 o.n.o.?—G6TC, 136 Black Halve Lane, Wednesfield, Wolverhampton. *(Tel. 32002.)*

WANTED: Cossor 343 Oscillator, E.M.I. frequency modulator, No. 1 RF Unit, Brown's "A" Type phones. Handbooks: 36 Transmitter, 1-30A Sig.-Gen., 1-95A, FSM *Short Wave Magazine*, 1945 Jan.-Dec. inclusive, 1946 Feb., 1947 April. *RSGB Bulletins*, 1946 Jan.-Dec. inclusive, 1947 Jan.-Dec. inclusive, 1948 Jan.-June, Dec. 1949 April, 1950 May, 1953 June, July; 1954 April, 1957 June.—Allen, 118 Atlantic Road, Kingstanding, Birmingham, 22.C.

TWO TG7 TRANSMITTERS, valved; one large modulator amplifier, 2/PX25; one VHF transmitter, fixed crystal frequency, Rx/Tx; two 14-volt Nife heavy-duty batteries. Buyer collects; no reasonable offer refused.—Marcuse, G2NM, Tidewaters, Old Bosham, Nr. Chichester, Sussex.

LG. 300, as new, £40. HRO-5TAI, all-metal valves and noise limiter, complete matched speaker, power pack, coils, £25. Vortexion Super fifty-watt amplifier, as new, £25.—E. W. Stewart, Mid Calder, Midlothian, Scotland.

MUST SELL (all offers answered): 813 (new); PU.234A re-built; Hallicrafter S27, handbook (buyer collects); Resistance Unit, Type 231, contains eleven 80-ohm carbon resistors; pair Eddystone sloping feet; Eddystone diecast box-type 650; Eddystone full-vision dial, Type 598; Eddystone signal strength meter; all Eddystone parts as new, ATU *(Short Wave Magazine*, February 1959); all components mounted on chassis and standard panel, complete, but wiring incomplete. Home-built Imlok cabinet, framework and base only; 70 ins. panel space, 17 ins. deep, standard holes (buyer collects).—Turner, 51 East Street, Horncastle, Lincs.

THREE XTAL-CONTROLLED 2-metre Cascode converters, IF's 24-26/25-27 inc, good NF, 2 at £5, 1 at £7. Also 8-valve 2-metre self-contained superhet, EC91 RF, internal speaker and p/p, BFO, etc., £8. All carriage paid.—Kirk, 74 Clough Road, Rotherham, Yorks.

EXCHANGE: 80 Radio-Tape Machines, etc.; value when new £14. WANTED: S/W Receiver covering at least 3·5 to 15 mc. Send for details and offers.—G6933, 13 York Road, Upper Ventnor, I.o.W.

SALE: R107 and R.1392, both mint condition; R.1392 includes power pack and speaker; £10 the two, or R.107 £6 and R.1392 £5. Seen Sats. only. —*Phone Maida Vale 7419 first.*

10/15 MINIBEAM, with 40ft. coax, new last Sept., excellent condition, £12. — Box No. 2394 (London), Short Wave Magazine, Ltd., 55 Victoria Street. London, S.W.1.

K. W. GELOSO or Minimitter Converter wanted, or similar, with bandspread amateur bands, working.—A2305, Myers, 132 St. Andrew's Road, Felixstowe. Suffolk.

EDDYSTONE S.640 with matching S-meter, FB cond., no mods., manual, £20. — G. Carr, 63 Wagon Lane, Birmingham, 26.

FOR SALE: RF24's, 15s. each, p/p 3s. 6d. WANTED: *Short Wave Magazine*, March 1959. —A. H. Jubb, 18 Morton Terrace, Gainsborough, Lincs.

SMALL ADVERTISEMENTS, READERS—*continued*

WILL EXCHANGE TCS Tx/Rx with coil box, plugs, for either : R107, BC-348, AR88 ; will also exchange Walter 303 Tape Recorder for CR-100 or similar.—Hardcastle, East Keswick, Leeds.

AR88LF receiver, nice condition, £31 or swop for Panda Cub.—G3MEM, Jevington, Hilltop Road, Earley, Reading, Berks.

SALE : Hallicrafters "Sky Challenger," 550 kc-38 mc, £12 10s. ARR-5, AM/FM, 27-144 mc. SCR-522, AC p/pack, £5. R.1132 and p/pack, £3 10s. R107 front end, 30s. Osc. Type 37, 30s. QQVO7-40, 10s. Plus carriage. Wanted : CV172 and Cossor D/B 'Scope Kit.—43 Brompton Road, Northallerton, Yorks.

HRO Six coils, 100 kc to 30 mc, crystal calibration circuit, noise-limiter, S-meter, etc., speaker, phones, all mains power-pack, £22 complete o.n.o.? Plus carriage.—Earnshaw, 37 Serpentine Street, Market Rasen, Lincs. (*Tel. 2307.*)

WANTED : Bandspread coils for HRO Senior. Loan, hire or purchase of Service Manual for HRO-MX, *Short Wave Magazine*, January, 1955.—Offers to Box No. 2395, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

ALL OFFERS : Gonset Super-6 Ham Mobile Converter. Minimitter Mobile aerials, base, whips, coils 1·8, 3·5 mc. HRO, coils, power supply needs attention. HRO HF5 Rx. DX-40U. Lustraphone transistorised 10-watt amplifier. BC-45 3B. Ferrograph recorder 2A. Heathkit electronic voice control VX-1 kitform. Heathkit Grid dip meter GD-1B assembled. Transistors new matched pairs, V30/20P. Valves new QQVO3-20A, SV-4X150A, QVO6-20, QVO3-10, QVO3-12.—Box No. 2396, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED : Any miniature Spy Tx/Rx, such as B2-minor, AR11, MR3, AI, etc., and handbooks, publications, etc., relating to the above. All letters answered.—Gee, 11 Whitehorse Lane, Stepney, London, E.1.

WANTED : R.1155, L or N, unmodified and in good condition, or BC-348; state price.—Paling, 13 Miller Road, Banbury, Oxon.

SALE : Tiger 200/HF Tx, Z-match coupler, trolley, 6 months old, QY3/65 linear PA for SSB, £140. AR88LF, S-meter, £35. UM3 new, £4. ZC1 Mk.II, unmod., £6. Taylor Test Meter 85A, £5. Triplett Sig. Gen., £6. New Boxed QVO6-40's, 30s. Plessey dual concentric 12-in. PM speaker with tweeter, £3; carriage extra.—G3MCN, 448 East Prescot Road, Liverpool, 14.

100-WATT 80-10 metre Tx, Geloso VFO, pair 807's, modulator pair 807's zero bias, relay controlled, PSU, 3BPI mod. monitor, screened cabinet, £30.—G3NJF, 16 Clyde Street, Grimsby, Lincs.

WANTED : Commercial Tx, Minimitter, PR120 or similar. price and condition to—G3JWC, 21 Rangemore Street, Burton-on-Trent.

SALE : 35-watt phone Tx, Geloso VFO, 6146 PA, TVI-proofed, in professional cabinet, built-in lowpass filter and heater transformers, PA fully metered, separate HT power pack and modulator (2 × 6L6), with own power supply, £25. S.640 Receiver, 6BA6 RF stage, stabilised HT, matching speaker and S-meter, £20.—James, 302 Carter Knowle Road, Sheffield, 11. (*Phone 50712.*)

HRO SENIOR, mint condition, 9 coils, b/spread 80-20-10, with p/pack, spare valves, £22.—Hodgson, Raithby Road, Hundleby, Spilsby, Lincs.

SMALL ADVERTISEMENTS, READERS—*continued*

SCR-522 Tx/Rx 55s.; TCS aerial loading box 12s. 6d.; Type 14 Vibrator, 7s. 6d.; 955 v/holders, 1s. 6d.; 6N7G, ML6, 6JSG, 6B8, NR88, 4s. 6d. each, plus postage/carriage; other items see December *Short Wave Magazine*. Wanted : LG.50, DX-40U, or similar.—G8UO, 12 Cartmel Road, Keighley, Yorks.

AMATEUR with flat wishes to share same with another, must be licensed. S.W. London.—Box No. 2397, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

G3HSC Morse Course for sale, record and instruction book, takes candidate to standard required for G.P.O. test, £1 15s. post free.—Box No. 2402, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED : All-band converter, Minimitter, Labgear or Geloso; also CR-100, not necessarily working. Full details, to be delivered East Midlands.—Box No. 2398, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED : Table Top 150w. Tx, DX-100U etc., must be in mint condition, state price, etc.—Bird, 53 Coton Road, Nuneaton, Warks.

G3IJB age 49, chartered accountant, requires accommodation for himself within 20 miles of London, where 2-metre tranmission could continue. Paying guest, rooms or flat ? Preferably with garage. Suggestions, please.—Barker, St. Margarets, Maldon Road, Burnham-on-Crouch, Essex.

SALE : S.750 Receiver £40. S-meter, £5.—Waller, 18 Leaside, Delves Lane, Consett, Co. Durham.

SELL: DX-40U with manual, ££2 ; Heath VFO VF-1, with manual, £7; crystal mike, 25s.; all perfect, together £28. Battery Eliminator 90v. 1·5v, 25s. Offers considered. Sell/swop good stamps for Rx, details.—Akehurst, P.E.E., Pendine, Carms.

FOR SALE : R.1155, o/p stage, PSU, £5. 19 Set, two RF stages, o/p stage, mains, PSU, £3. PA 7 mc, 807, two meters, 15s. Tube unit, VCR97, EHT Pack, 6V6, EY51, 15s. All equipment in good condition. Please include carriage.—Box No. 2399, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

AR88LF £32, o.n.o.? AR77E £22, o.n.o.? Both FB. Wanted: AR88D, SX28 or W.H.U.?—G3NKL, 64 Lexton Drive, Churchtown, Southport, Lancs.

R.107, good working order, £7 10s. 7005 kc xtal 10s. New 3BP1, base, screen, 17s. Mains transformer 500/0/500v., 240 mA, 6·3v. 8A, 5v. 2A, etc., 25s. TU5 case, 8s.—Box No. 2400, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE : Geloso G209 Rx, little used, £70. K.W. Viceroy SSB Tx, with control box, little used, £95. Minimitter Mobile Tx, new, £12. Minimitter Mobile 160m. and 80m. whips, with one base unit, £5. Minimitter MR38 Comm.Rx, 8-band, little used, £30. All the above is being sold as owner has decided to stay on VHF and has little time to do all the work that is anticipated, especially in the experimental line.—A. M. Laidler, Pondside, Sandy Lane, Churt, Nr. Farnham, Surrey.

QRT Sale: Viceroy SSB Tx, complete with aerial change-over relay and PSU, in first-class condition, £115 carriage paid, o.n.o.? No dealers.—Box No. 2405, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS, READERS—*continued*

MINIMITTER, Multi-Q, Bridges, Taylor/Mullard; Sig. Gens. Taylor/Homelab; Tape Deck; Weston Analyser; sell, exchange.—J. Brown, Marlborough Farm, Falmouth, Cornwall.

SALE: Marconi CR150, double superhet, 2-60 mc, good condition, complete with power pack and speaker, manual, £35; prefer buyer collects.—Joslin, 13 Talbot Road, Skegness, Lincs. *(Tel. 1589).*

P116 (691 Receiver) 21-valve double S/H, first IF 25 mc, second 3·25 mc, oscillators crystal controlled, RF, audio, AGC, AM and FM detectors, N/L, latest unit construction and miniature valves, 10-switched channels in range 277 to 283 mc, complete with 11 crystals and crystal oven, supply 230/115v., 50/60 cycles, photostat circuits and test voltages. Exchange first rate communication or amateur band receiver, or sell.—Box No. 2404, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

GOING QRT: For sale, new Minimitter MR44 receiver, mint, few hours' use, nearest £45.—G3LCI, 9 Eastcroft Road, Wallasey, Cheshire.

WANTED: Commercially built Receiver and Transmitter. Will exchange 1950 Ford "Prefect" with cash adjustment. All letters replied to, Cambridge area.—Box No. 2406, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: KW Valiant 10-160m. model, Eddystone 888A, National 1-10, BC-453, HRO S-T, 1960 *ARRL Handbook*, Taylor 45C Valve Tester.—Box No. 2407, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

AMATEUR with XYL (from GC) and four months' old 2nd op., urgently seek unfurnished or furnished flat/rooms with some security. in South Birmingham area, or border. Good tenants. OM engaged in TV service.—Further details, please write Box No. 2408, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE OR EXCHANGE: Minimitter Converter (1·6 mc IF), £10. Tape Recorder, Walter 303, £15. 3-Band Quad (S/feed), £10. Wanted: Good Tx.—Details to Crosbie, 40 Newcome Road, Shenley, Herts *(RA.26241).*

SALE: Complete fixed/mobile rig by Minimitter, Tx Phone/CW, control box, MC8 Converter fitted BFO, £35, or will sell separately.—G3LBO, 11 Strickland Close, Shadwell, Leeds, 17 *(Phone 656247).*

EDDYSTONE 750, matching speaker and S-meter, excellent condition, £35. Geloso 4/102 complete, and with valves, £6 10s., carriage extra.—G3BNW, 13 Heywood Road, Alderley Edge, Cheshire.

PANDA PR-120V. Transmitter, 150w. CW, 120w. Phone; excellent working order, £58 or near offer; can deliver reasonable distance; going SSB.—K. Wright, 27 Haverstock Court, St. Pauls Cray, Kent *(FOO: 4266).*

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Printed by The Courier Printing Co. Ltd., Tunbridge Wells, for the Proprietors and Publishers, The Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1. The *Short Wave Magazine* is obtainable abroad through the following : Continental Publishers & Distributors, Ltd., William Dawson & Son, Ltd. ; AUSTRALIA AND NEW ZEALAND—Gordon & Gotch, Ltd. ; AMERICA—International News Company, 131 Varick Street, NEW YORK. Registered for transmission to Canada by Magazine Post. *February 1961.*