

The

SHORT WAVE

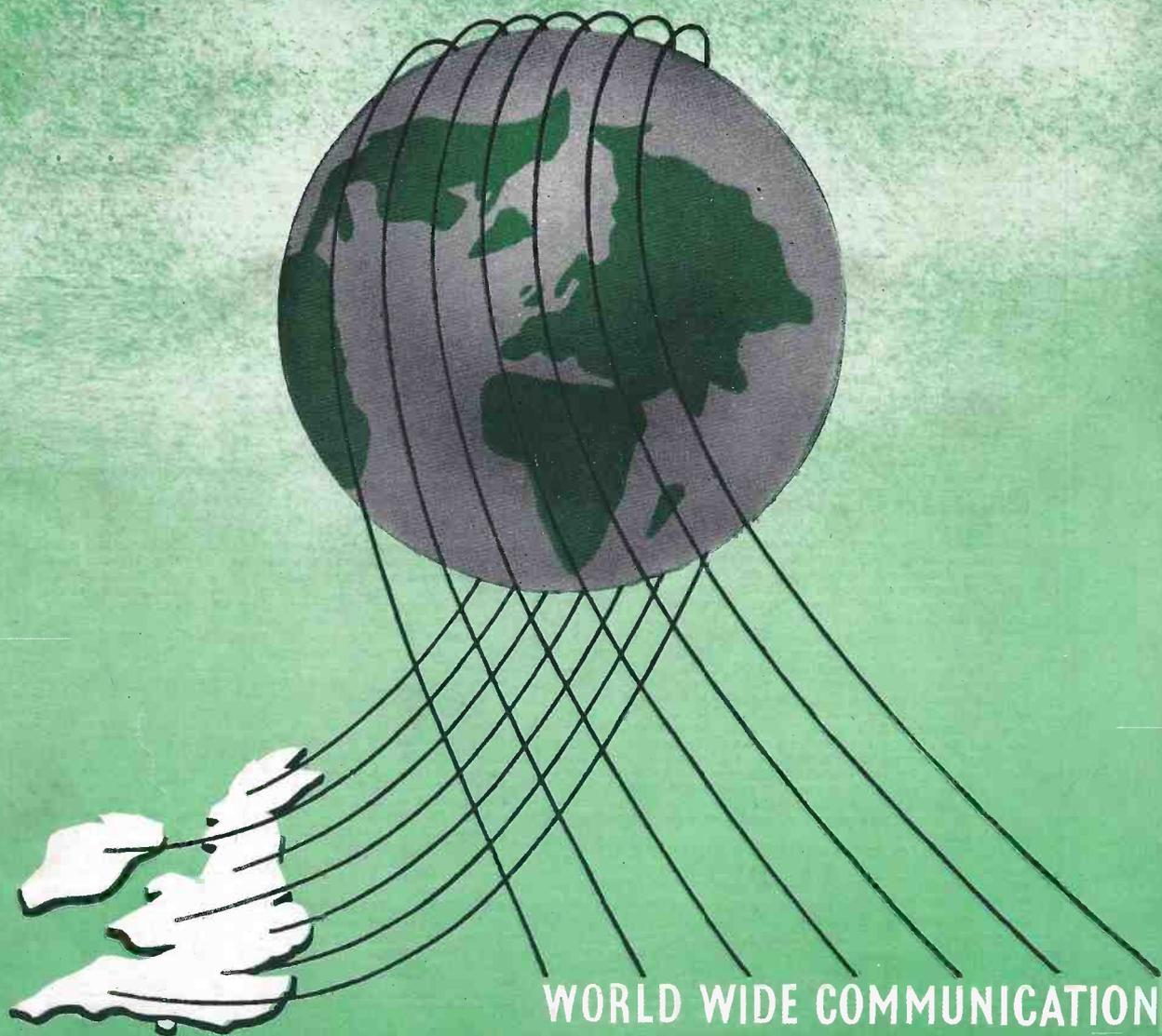
Magazine

2/-

VOL. XI

MAY, 1953

NUMBER 3



WORLD WIDE COMMUNICATION

H. WHITAKER G3SJ

10 YORKSHIRE STREET, BURNLEY Phone 4924

VALVES. 6S27, 6SS7, 6SK7, 6K7, 6AB7, 7/6. VMS4 7 pin 4/-, 6D6 8/-, 12SH7 5/-, VP4B 10/-, EF80 17/6, Z77, UF42, UAF42 17/6, 6AC7 8/-, 7Q7 6/-, 6SA7, 6L7, 8/-, ECH3 15/-, X150 10/-, UCH42 16/-, X24 7/6, 1R5, 1T4, 3S4, 3V4 8/6, 6J5 5/-, 6C8 7/6, 12C8 5/-, L63, H63 7/6, TDD13c 8/-, D63 8/-, 9004 4/-, 6H6 3/-, 6N7 8/-, 6F7 7/6, 6B8 6/6, 12J5 3/-, 12SL7, 12SR7, 12AH7 5/6, 6AL7 9/-, 6Q7gt 10/-, 7193 2/-, 866 20/-, 836 17/6, VU29 30/-, 1W4-350 8/-, 6X5, 5Z4, 25Z4, 35Z4, 80, 5Y3, 5U4 10/-, VU11 2/6, 24/- doz. RK72 3/-, CV235, CV187 8/-, VR105 10/-, 813 90/-, T200 60/-, 6AK5, 8/6, 832, 30/-.

OSCILLOSCOPES. By well-known manufacturer. In black crackle cases, 12 x 8 x 6 in., AC mains 200/250v. Tube size 3in. Hard valve time base continuously variable from 5-250,000 cps. P.P. X deflection circuit with TB waveform brought out to separate terminal for wobbulator work. Push-pull Y deflection circuit, all the usual controls, and provision for using a D.C. voltmeter to measure amplitude of A.C. waveforms. Brand new with instruction manual, £19 10s. Od. G.E.C. Miniscopes, complete with wobbulator, a few only at £14. Wobbulator is not available as a separate item. Sylvania, a laboratory job with 5in. tube. Full details on request, £60.

METERS, ETC. Met-Vik and Weston. 3in. round flush 100 mills, 200 mills, 15/-, Modulation Indicators type 2. In cast aluminium cases, 1 1/2 x 6 1/2 x 7 1/2 in. Freq. coverage 2.4mc to 6.25 mc. continuous in 2 switched bands. Modulation percentage in direct reading on 0/500 3in. microammeter calibrated 0-100%. All have individual calibration charts and complete with Tx coupling coil. To clear, 70/- each, carr. paid. Wavemeter W1252, 230v. A.C. mains. 22mc. to 30mc., Precision Muirhead dial, individual calibration charts. In copper lined cases, 12 x 9 x 8 in. Air Ministry ref. 10T/59. Made by Marconi. To clear, £4 each, carr. paid. J.V. Television pattern generators, A.C. 200/250v., covers all TV channels. 40/70 mc. 7 valves. Sound modulation. One horizontal bar, optional number of vertical bars. List £14, to clear, £9, carr. paid. Ditto Television Sig. generators, 200/250v. AC mains. All T.V. Freq. Also can be used as grid dip Oscillator. List £6 19s. 6d. To clear, £4 10s.

MARCONI. Combined T.V. and Radio. Console. 10in. screen, with separate radio chassis. 5 channel. List £84. 10 only at £60, carr. paid.

COLLARO. A.C. 37 Gram motor complete with turntable. Variable speed through 33 to 100 revs. per minute. 110/230v. A.C. mains. Exceptional offer at 50/- each. Plessey 3-speed auto record changers. Dual sapphire switched stylus. Mixes 10 and 12in. at 78, and also at 33 1/3 and 45. List £23 13s. Od. Last remaining few to clear at £10, carr. paid.

MUIRHEAD Heavy Brass Wavemeter dials, 3 1/2 in. diameter, calibrated 0/100 degrees, Fast/slow release button. 50 complete revolutions for full 100 degrees. A precision dial for V.F.O., etc. Brand new and boxed at 8/6 each. H.R.O. type T1087, with full counter mechanism 0/600, 12s gear boxes, 6/- each. National velvet vernier T.U. unit type. Complete with ceramic coupler for 1/4 in. shafts, 8/6.

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TRANSFORMERS AND CHOKES. Immediate delivery from stock at Pre-increase prices of Woden; UMI 54/-, UM2 72/6, UM3 (sold out, new stock at 110/-), UM4 215/-, Mains DTM11 39/-, DTM12 48/6, RMS11 30/-, RMS12 40/-, DTM15 75/-, DTM17 109/6, Drivers DTI (sold out new stock at 40/-), DT2 39/6, DT3 34/-, Filament DTF12 2 1/2. 10a. 38/6, DTF14 5v 4a. 31/6, DTF17 7 1/2v 5a. 37/6, DTF18 5v 3a, 6.3v 4a. 38/6, DTF20 10v 10a. 59/6, Chokes; DCS14 12hy 350 mills 102/-, DCS20 20hy 350 mills 140/-, DCS17 20hy 60 mills 28/8, DCS18 20hy 150 mills 41/6, PCS135/25hy 350/50 mills 58/6. The following are by Parmeko or Gresham Transformer Co. All are post war production not Ex-Gov., they represent the highest standard of British production, and are brand new and unused, offered at a fraction of original cost. Primaries all 200/250v 50cy. Plate 2000/0/2000 at 200 mills 9 1/2 x 9 1/2 x 8 weight 70lb. at 75/-, 2000/0/2000 at 500 mills 13 x 10 x 7 1/2 weight 100lb. at £6. 5800v at 800 mills tapped 2000/3000/3500/4000 1 1/2 x 13 x 12 weight 180lb. at £6. L.T. Chokes for the above 10hy at 800 Mills 8 1/2 x 6 x 7 weight 50lb. 70/-, 15hy at 400 mills D.C. res. 90 ohms 6 x 7 x 9 weight 40lb. 35/-, 3.5hy at 500 mills weight 45lb. 30/-, Swinging 13/23hy at 180/500 mills weight 45lb. at 40/-, Plate 19500/0/19500 at 6.1 KVa. Oil filled, built in rollers, 6in. stand-offs, weight 6 cwt. For collection only £12. Plate 5850v at 445 mills 13 x 10 1/2 x 7 1/2 tapped 4450/3560/2660v. weight 85lb. at £5. Thermador 2000/0/2000 at 800 mills £7/10/-, Swing choke suitable for the above 23/10hy at 100/800 mills weight 50lb. at 70/-, Auto, 230/115v 350 watts 35/-, 500 watts 50/-, 5KV a £6. 6 1/2 KVa at £8. L.T. Filament and L.T. heavy duty. 2 1/2v at 10 amp for 866s at 20/-, 10v c.t. at 10amp at 20/-, 22v c.t. at 30 amp 7 x 7 x 7 weight 35lb. at £2. 22v. c.t. at 15 amp 30/-, 21v at 17 amp 30/-, 11v 15 amp twice 30/-, 50v tapped at 5v at 36 amp size 10 x 10 x 10 weight 50lb. at £3. 4v at 14 1/2 amp 4 times, 13 Kv test, 10 1/2 x 11 x 8 1/2 70/-, 4v 4 1/2 a. 4v 11 1/2 a. 4v 29a. 11 x 11 x 8 1/2 weight 35lb at £3. Most of the above heavy duty LT are also available in 360/440v primaries at similar prices, as also are the high voltage plate transformers. In addition we have large stocks of High voltage plate transformers 440v3 phase working. Parmeko driver transformers, single 6L6 to 805 grids split secondary, ditto PP 6V6s to split secondary 805 grids both 12/6 each, completely screened. Parmeko Modulation 450 watts. P.P. 805s to pair of 813s with additional winding for plate and/or screen modulation at 50/-, Woden driver P.P. 6L6s to 500 ohm line at 22/6. The following are Ex-Gov. mostly by Philips, all are 230v primaries with earthed screen 275/0/275 100 mills 4v 2 1/2 a. 4v 5a 15/-, 265/0/265 120 mills 6.3v 7a. 4v 2 1/2 a. 20/-, 445/0/445 at 200 mills 25/-, 265/0/265 at 30 mills, 3,300v at 50 mills, 4v 10a. 2 1/2v 4a 4v 1a. 10 x 10 x 10 in die cast aluminium cases at 35/-, 365/0/365 120 mills, 4v 2 1/2 a. 6.3v 42a. 20/-, 1540v at 1.75 mills 4v 1a. 2.05v. 2a. 15/-, Fil. 4v 3 1/2 a. 4v 7a. 14/-, Chokes. 10hy 200 mills in pott cast case 3 1/2 x 3 1/2 x 4 1/2 DC res. 150 ohms 12/6. Chokes Speaker field replacement, 15hy 150 mills, 1500, 1800 or 2000 ohm 12/6. G.E.C. Fil. 4v at 5a. 8/-, ditto 4v 5a. twice 12/6. Thermador Driver, 500 ohm line to P.P. 805 grids with split secondary 20/-, Thermador Microphone. High or Low impedance to 50,000 Secondary, for m/c or carbon mike 15/-, Both the above completely screened and potted. Miniature Screened and potted Mike transformer. Single or double button carbon mike, to single of P.P. grids 3/-, Output Potted 6SN7 anodes to 45 ohm or high impedance phones 3/-, Stancor miniature smoothing chokes 8hy 40 mills 3/-, U.S.A. Rola, potted 8hy 100 mills 7/6, Modulation, single 1625 to parallel 1625s potted, 456 Modulator Command spares, 7/6.



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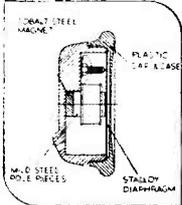
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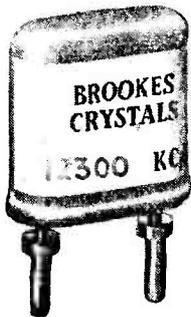
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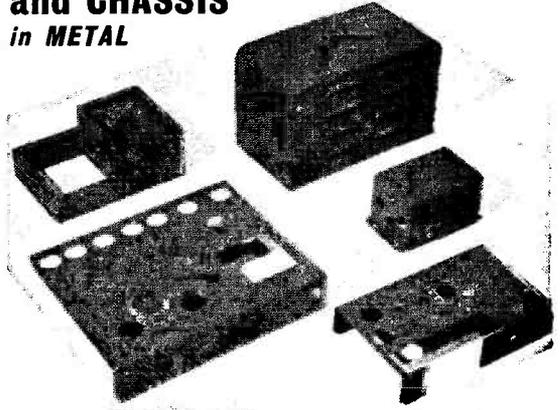
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F.S.30.	Input 200/250v. Output 300/0/300v. 80 m/a ... 23/-
F.S.3.	Input 200/250v. Output 350/0/350v. 80 m/a ... 23/-
F.S.2X.	Input 200/250v. Output 250/0/250v. 100 m/a ... 25/9
F.S.30X.	Input 200/250v. Output 300/0/300v. 100 m/a ... 25/9
F.S.3X.	Input 200/250v. Output 350/0/350v. 100 m/a ... 25/9
All above have 6.3-4-0v at 4 amps, 5-4-0v at 2 amps.	
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F12.	12.6v. tapped 6.3v. at 3 amps, 18/6.	F24.	24v. tapped 12v. at 3 amps, 26/-.	F29.	0-2-4-5-6.3v. at 4 amps, 20/9.	FU12.	0-4-6.3v. at 3 amps, 19/6.	FU24.	0-12-24v. at 1 amp, 19/6.
F5.	6.3v. at 10 amps or 5v. at 10 amps or 12.6v. at 5 amps or 10v. at 5 amps, 37/9.	F6/4.	Four windings at 6.3v. tapped 5v. at 5 amps each, giving by suitable series and parallel connections up to 6.3v. at 20 amps, 57/-.	F30.	30v. at 4 amps, 40/-.	F31.	0-4-6.3v. at 4 amps, 23/6.	F25.	25v. at 4 amps, 40/-.
F26.	Two windings, 6.3v. at 1 amp, 11/-.	F27.	Two windings, 12v. at 1.5 amp, 26/-.	F28.	Two windings, 5v. at 3 amps, 25/-.	F32.	10v. at 5 amps, 30/-.	F33.	0-10-30-60-100v. at 1 amp, 45/-.
F34.	0-4-9-15-24v. at 3 amps, 31/6.	F35.	6.3v. at 6 amps, 25/-.	F36.	0-9-30v. at 3 amps, 30/-.	F37.	0-9-15v. at 3 amps, 26/-.	F38.	0-9-15v. at 1.5 amps, 24/6.
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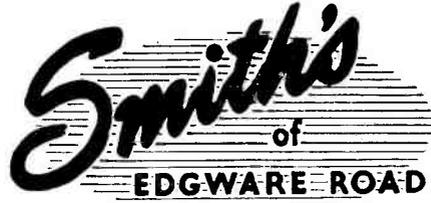
RECTIFIER UNITS TYPE 46. These units incorporating metal rectifiers were originally designed to provide H.T. and L.T. for the R.1155 and L.T. for relays and valves of the T.1154. Input 200/250v. A.C. 50cps. mains, outputs 220v. smoothed D.C. at 110mA. and 6.3v. smoothed D.C. at 13A. Totally enclosed in metal cases 17in. high x 19 x 12in. and weighs about 85 lbs. Fuse holders on outside of cases may be broken but can easily be replaced otherwise the units are in first class order. PRICE £8 7/6, carriage 12/6.

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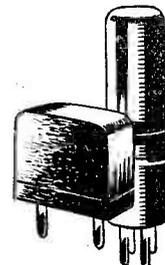
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The
SHORT-WAVE
Magazine

E D I T O R I A L

Interference

For years amateurs have had to tolerate, in one form or another, "complaints of interference" — first it was with sound broadcast receivers, and now it is on TV. It seems that anyone can put the GPO on the tail of a local amateur, and often it is found that a complaint is completely unjustified. Here it should be said that the Post Office representatives always act with justice and moderation, and there can be no criticism of officials who are merely doing their duty.

On the other hand, it would also be right to say it is high time attention was drawn to the many ways in which TV can be interfered with other than by an amateur transmission—also to the increasing interference which amateurs themselves have to tolerate, on all our bands.

The signal QRM on the HF communication channels is well-enough known, and there seems little that can be done about it. But urgent and continuous representations should be made to the authorities, so that the position is not lost simply by default.

Apart from encroaching commercials, there are a great many other unauthorised noises which amateurs have to endure — harmonics and beats from the local oscillators of TV receivers, which can ruin even BBC sound reception, and now becoming a serious problem in residential areas; the "sharsh" from next-door's vacuum cleaner, smeared round the DX and VHF bands on a Sunday morning; the polluting sounds of automatic and unsuppressed domestic machinery—refrigerators, thermostatically-controlled irons, washing machines, hair dryers and similar appliances.

The amateur has every right to kick back as hard as he can on all these interfering sources, for if the TV viewer can claim interference-free reception, then also is the licensed amateur entitled to the same degree of consideration.

*Austin Fobler
G.P.O.*

Transportable Two-Metre Station

BUILT IN FOUR UNITS—OPERATED FROM 12-VOLT DC SUPPLY—DESIGN ADAPTABLE FOR GENERAL USE

S. BABBAGE (G4CI)

This is an interesting practical article describing in detail the design and construction of a completely self-contained transportable station for λ P operation on the two-metre band from a 12-volt accumulator. It could be installed in a car or motor-cruiser fitted with "12-volt electrics" or, in the case of a 6-volt system, an additional series battery could be provided. Apart altogether from the λ PM or λ A applications of the design as discussed here, it will be noticed that the assembly consists actually of four separate units — 144 mc Converter, an IF/AF strip, the two-metre Transmitter, and its Modulator. Hence, the details given for either the Receiver or Transmitter sections can be adapted for building up gear which will perform well for ordinary fixed-station working.—Editor.

THIS equipment has been conceived and constructed to provide compact apparatus, together with ease of operation, for portable use on the 144 mc band. The overall dimensions of 21 ins. x 10 ins. x $7\frac{1}{2}$ ins., and the total weight of but 30 lbs., combine to make it easily transportable. It is formed of four basically separate units, each of which can be constructed and bench-tested before interconnection to form the final assembly. These separate units are as follows :—

- (1). Crystal Controlled Converter.
- (2). Modified BC455 providing tuned high frequency IF, second mixer and oscillator. low frequency IF, second detector and LF unit with self-contained HT generator.
- (3). Transmitter radio frequency stages.
- (4). Modulator, control relays, and transmitter main power supply.

The photographs show the completed equipment housed in the frame of an ex-U.S. army jamming transmitter, which being also unit built, lends itself admirably to the purpose. The whole assembly slides and fastens into a steel case, which is part of the original transmitter, this affording good screening and protection.

Referring to the front panel view, looking from left to right, and from the top, the panel controls are as follows: Phone jack, microphone jack, aerial input socket, meter switch, monitoring lamp and key jack. In the middle, the main receiver tuning and PA tank tuning. At the bottom, the BC-455 input trimmer, RF gain, BFO on-off switch, audio gain, and finally, the control switch.

Five relays provide the switching required during operation, and reference to the circuit of Fig. 1 will clarify the use of these relays. In this diagram, interconnections are shown by dotted lines, but for clarity the common earth between units is not given. The five-way switches are all of the wafer type, and are ganged together to form the control switch, giving the following operational sequence.

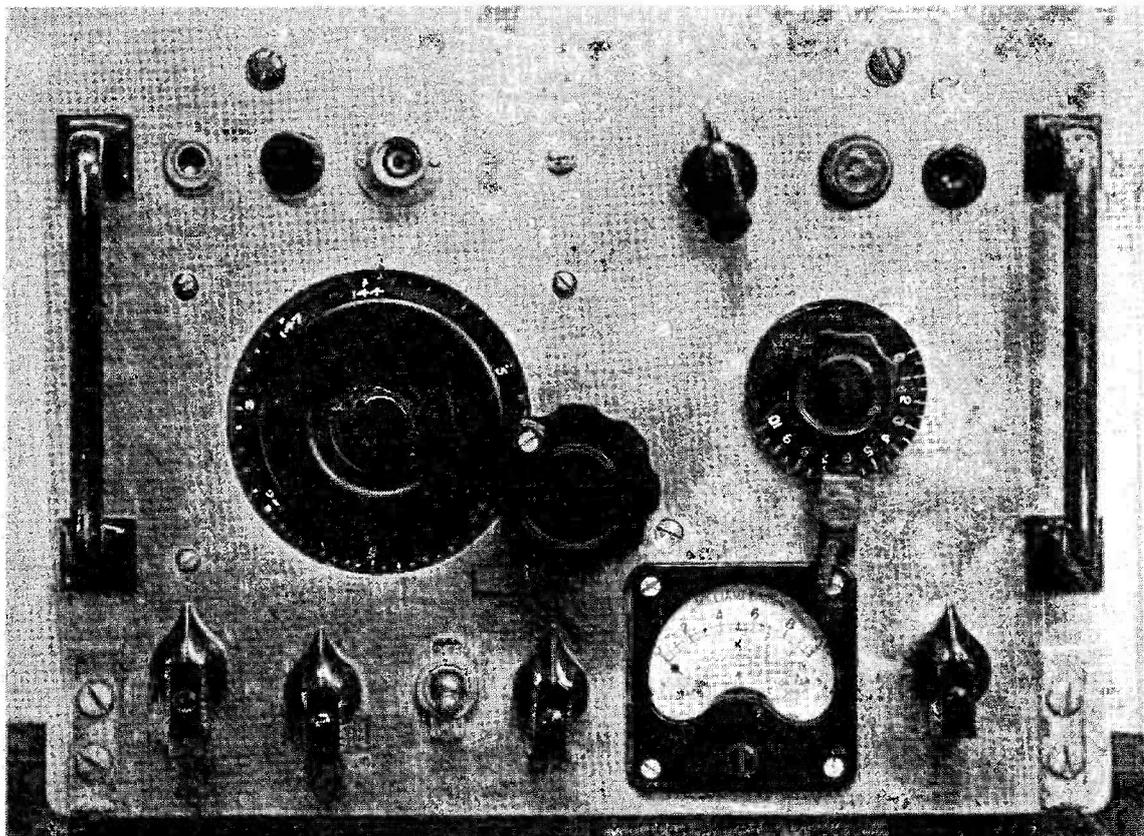
Switch Motions

Position 1, Off. Pos. 2, Receive, with transmitter heaters off. Pos. 3, Receive, with transmitter heaters on. Pos. 4, Transmit CW. Pos. 5, Transmit telephony.

Analysing these switch positions, in Position 1 all circuits are dead due to relay E being at rest and contacts E open. Position 2 operates relay E and closes contacts E, which switch on the receiver heaters and dynamotor, and makes available the 12v. supply for the remaining relays.

Position 3 still holds in E relay, and in addition relays C and D, closing contacts C, D1 and D2. Contacts C and D1 apply the heater volts to the transmitter and modulator respectively—D2 is of no consequence at this stage.

Position 4 energises A, the aerial changeover relay, also relay B, and still holds in relays C and E, but drops out relay D. The closing of contacts B2 starts the second dynamotor supplying high voltage to the transmitter final stage only, and the opening of contacts D2 removes the high voltage from the modulator. This is so that on the opening of D1 contacts the modulator valve heaters do not cool off with anode voltages applied. Contacts B1



Front panel view of the completed assembly, as constructed by G4CL. The receiver tuning is the large dial to the left with slow-motion control, PA adjustment the smaller knob on the right. The single meter is shunted and switched to read at all necessary points.

change over the smoothed output of the BC-455 dynamotor from receiver to the first two valves in the transmitter.

Position 5 is the same as 4, except that relay D is energised again, bringing the modulator into use.

In the writer's case, relay A is a war surplus component of "unknown origin," but obviously any small changeover relay suitable for RF use that will operate on 12v. DC should be satisfactory. The remaining relays, although normally intended to work from a 24v. DC supply, still perform with an adequate margin of safety on the lower voltage.

General Construction

If a chassis frame and case, similar to that used by the writer, be available, then the first step is to make a new panel. A sufficiently stout metal plate measuring $10\frac{3}{8}$ ins. x $7\frac{3}{4}$ ins. is required, and the original panel can be used as a template to reproduce the fixing holes still required. The fitting of rubber feet to the

underside of the outer case is worthwhile, and with the addition of a $\frac{1}{2}$ in. hole in the back of the case for the power cable, no further modifications are required to the original case and framework until final assembly.

For those wishing to do their own metalwork, the following details will be of help: Referring to the photographs, the side runners measure 19 ins. long and 3 ins. deep. (The holes in the side runners can be omitted if required, as they serve only to lighten the framework.) The rear runner is $9\frac{1}{8}$ ins. long and 3 ins. deep, and the frame above it $9\frac{7}{8}$ ins. x $4\frac{1}{2}$ ins. This frame is not strictly necessary, but it is an excellent safeguard against damage resulting from the equipment being turned upside down in its case without the fixing screws being in place. There are four screws retaining the unit inside the case.

Two of these are located on the top of the case at the front, and screw into hank bushes fixed into an angle piece running along the top of the panel. The remaining two pass

through the rear of the case into hank bushes carried by the rear runner. The case is just large enough to clear the rear frame, and allows the overlapping panel to be pulled tightly up against the case edge when the back fixing screws are turned home.

The Converter

This is treated in greater detail than the remainder of the equipment, due to the compact construction and its suitability for use (as a separate unit), as a home station converter. Its small size allows it to be stowed away inside the cabinet of a number of commercial receivers, e.g., the AR88. In this equipment, however, the converter is mounted on the valve box cover of the modified BC-455 for easy removal. Signals between 144 mc and 146 mc are accepted at the input end, and converted to 24-26 mc to suit the input of the modified BC-455.

Circuit.—Fig. 2 gives the circuit diagram. The aerial is coupled by L10, one turn link, to L8, which is tuned by C19. This forms the grid circuit of the RF amplifier, a 6AK5, which is in turn coupled by L8 to the mixer grid coil L7. The mixer valve, also a 6AK5, is biased by the voltage developed across R8 due to the oscillator voltage appearing across L7. In common with the mixer grid coil, the anode inductance is tuned to resonate with valve and stray capacitances, and no damping resistance is necessary. L5 couples the output of the converter to the BC-455.

Two 6F12 valves, each operating as a frequency quadrupler, multiply the output of a 7.5 mc crystal to 120 mc to provide the oscillator voltage. The first 6F12 is connected as a modified Colpitts crystal oscillator, the anode circuit being tuned to 30 mc by C5 and L1.

Greater output from this stage is obtained by strapping the anode and suppressor grid of the valve together. The second 6F12 is coupled by C6 to the anode of the crystal oscillator, and quadruples the 30 mc input to 120 mc. Bias for this valve is obtained by the rectified RF voltage appearing across R5. Injection into the mixer stage is by link coupling with L3 and L4.

Construction.—Fig. 3 shows a plan view of the bottom of the chassis, with essential dimensions marked, and the material used is 20 SWG copper. Some types of B7G valveholder do not always have the same relation between the placing of the pin sockets and fixing centres, so the fixing centres shown in the diagram may need to be modified.

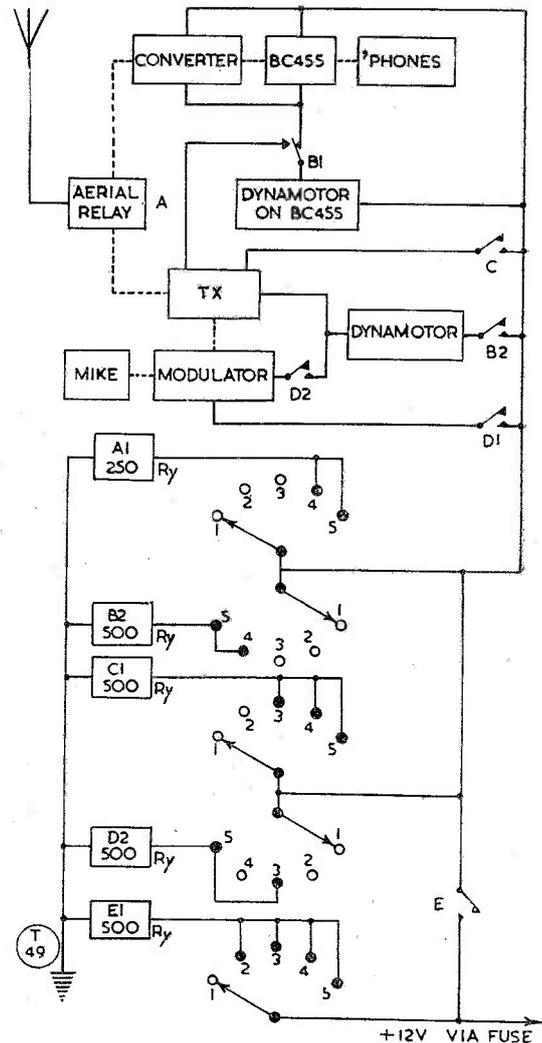
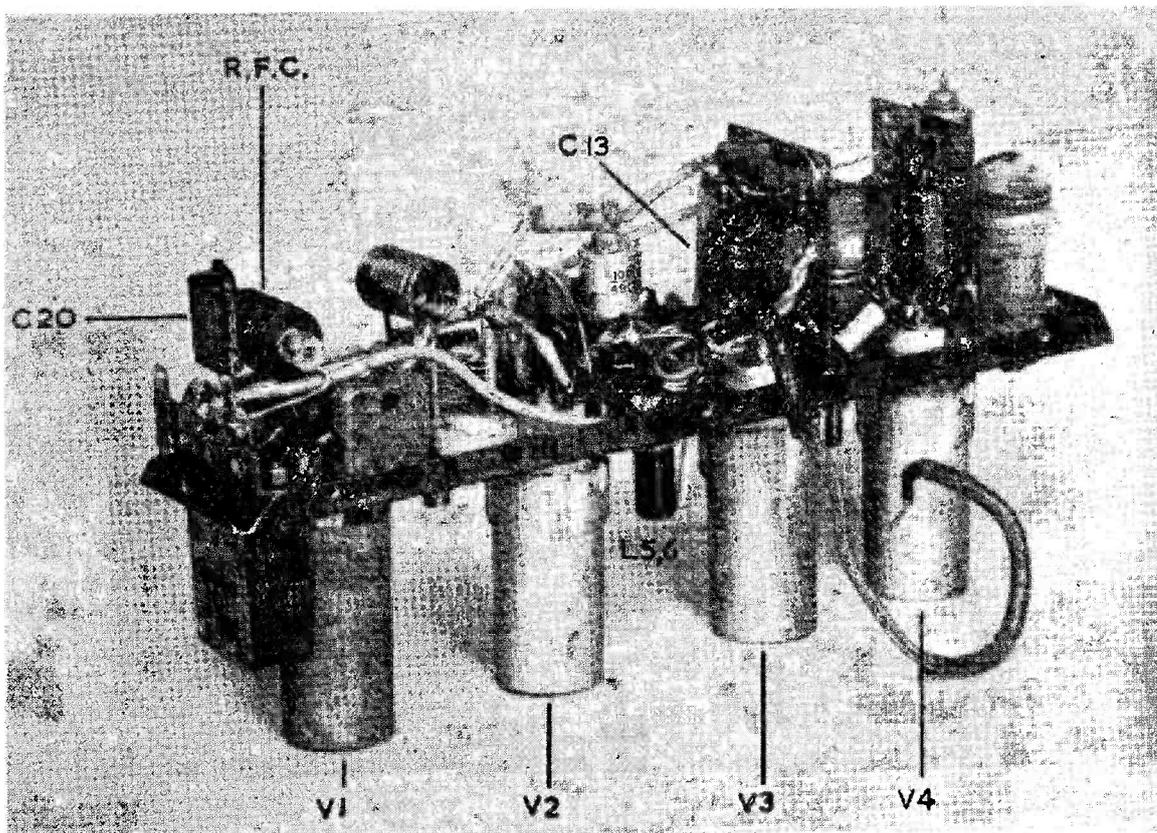


Fig. 1. Relay layout and control switching, enabling the whole equipment to be run from a 12-volt car battery.

The screens, also made of copper $1\frac{7}{8}$ ins. high and $1\frac{5}{16}$ ins. wide with a $\frac{1}{4}$ in. fixing lip at the bottom, are shown in position across the valveholders. They run between Pins 2 and 3 and the blank side of Pin 7, and are cut away at the bottom to follow closely the shape of the valveholder.

The chassis is bent inwards along the dotted lines to form a strengthening lip all the way round, and to which the cover is secured with small self-tapping screws. This cover is in the form of a box two inches deep, and has two $\frac{1}{2}$ in. holes in the bottom suitably positioned to allow a trimmer tool to pass through for adjusting C9 and C19. At the



View of the construction underside of the 144 mc converter—see Fig. 2. for circuit.

end nearest V1 there is another $\frac{1}{2}$ in. hole fitted with a grommet, through which the HT and heater supply wires pass. Lastly, on one side there are two hank bushes with a grommet hole between them. The bushes serve to secure the converter to the valve cover on the BC-455, while the grommet hole carries the lead from the converter output to the BC-455 input.

Wiring throughout is with 22 SWG wire in varnished cotton sleeving, and all the resistances and fixed condensers are supported in the wiring. C9 and C19, the Phillips type trimmers, are mounted on $\frac{1}{4}$ in. diameter keramot rod 1 in. and $\frac{1}{2}$ in. long respectively, tapped 6BA both ends and secured by a 6BA screw through the chassis, the other end supporting a tag to which the trimmers are soldered. L1 and L2 are soldered across the top of their respective tuning condensers. The RF choke is partially supported by a four-way tag strip fastened across the chassis behind V1, and this strip also terminates the HT, earth and heater supply leads.

A six-inch length of thin screened flexible wire forms the output lead from L5, and plugs into a socket inside the BC-455 (about which more will be mentioned later). The intervalve screens have the earthy ends of C11, C13, C14, C15, C16, C17, C18, and R8, R13 and L7 and L9 soldered to them. One heater pin of V4 and the cathode connections of V3 are also soldered to the screens.

No mention has been made of the aerial co-axial input socket, as the one used by the writer is non-standard, but its position can be seen in the photographs. There is ample room to fit a Belling Lee type socket.

Aligning the Converter. — Check the HT line with an ohm-meter for short circuits, and then connect up the converter to 12v. AC for the heaters, and approximately 220v. DC for HT. Take out V4 at this stage, thus removing heater volts from V3, in case the anode dissipation of V3 should be exceeded due to lack of bias. With a loop and small wattage bulb coupled to L1, rotate C5 until some output

is indicated; check that this output is on 30 mc with an absorption wavemeter. C5 should be at about half-mesh, and the power output around 0.2 watts.

Transferring the loop to L2, tune C9 for output and check frequency is 120 mc. The output here will be 0.1-0.2 watt with L3 removed. Replace L3 and V4, and retune C5 and C9 for maximum output. Connect the output from L5 to the aerial input of a receiver tunable to 25 mc, and adjust the core of L6 for maximum background noise. With aerial connected, tune in a weak signal, preferably from a small test oscillator as close as possible to 145 mc, and adjust C19 and the core of L7 for maximum signal.

Reduce the input until the signal is again weak, and vary the coupling between the link, L4 and L7 until the best signal-to-noise ratio is obtained. During this operation re-adjust L7 and C9 as required, and then when the optimum coupling has been found, cement the link in place at both ends. Finally, screw the cover into position, give a final run over the accessible trimmers, and seal the core of L6 with a spot of wax. The Denco coil form cores are locked with 4BA nuts, but the writer has not found it necessary to seal the Phillips-type trimmers in any way.

The Transmitter

Here three valves are used, all with 12v.

Table of Values

Fig. 2. Converter Unit for Composite Assembly.

- C1 = 15 μ F Ceramicon
- C2 = 100 μ F Ceramicon
- C3 = 1,000 μ F Mica.
- C4 = 1,000 μ F Mica.
- C5 = 40 μ F Polar Type air spaced trimmer.
- C6 = 100 μ F Ceramicon.
- C7, C8 = 500 μ F Mica.
- C9 = Phillips 3-30 μ F Trimmer.
- C10 = 500 μ F Mica.
- C11 = 1,000 μ F Mica.
- C12 = 100 μ F Ceramicon.
- C13, C14, C15, C16, C17, C18 = 500 μ F Mica.
- C19 = Phillips 3-30 μ F trimmer.
- R1 = 30,000 ohms, $\frac{1}{2}$ w.
- R2 = 220 ohms, $\frac{1}{2}$ w.
- R3 = 2,200 ohms, $\frac{1}{2}$ w.
- R4 = 47,000 ohms, $\frac{1}{2}$ w.
- R5 = 100,000 ohms, $\frac{1}{2}$ w.
- R6 = 33,000 ohms.
- R7 = 3,300 ohms.
- R8 = 1 megohm, $\frac{1}{2}$ w.
- R9 = 3,300 ohms.
- R10 = 33,000 ohms.
- R11 = 3,300 ohms.
- R12 = 40,000 ohms.
- R13 = 200 ohms.
- L1 = 12 turns No. 18 SWG enamelled close wound, $\frac{1}{2}$ in. diameter, self-supporting.
- L2 = 2 $\frac{1}{2}$ turns No. 18 SWG, $\frac{3}{8}$ in. diameter, spaced $\frac{3}{16}$ in., self-supporting.
- L3, L4 = Length of 7/0076 PVC covered, twisted and formed with a loop at each end.
- L5 = 2 turns 7/0076 PVC cold end of L6.
- L6 = 40 turns 24 SWG enamelled, close wound on $\frac{3}{8}$ in. form, with variable dust core.
- L7 = 2 $\frac{1}{2}$ turns 18 SWG spaced wire diameter, wound on Denco $\frac{1}{2}$ in. polystyrene former with dust core.
- L8 = 1 turn 18 SWG at cold end of L7.
- L9 = 2 $\frac{1}{2}$ turns 18 SWG, spaced wire diameter and wound on $\frac{1}{2}$ in. Denco former.
- L10 = 1 turn 7/0076 PVC covered.
- RFC = 2.5mH Choke.
- V1, V2 = 6F12 Mazda.
- V3, V4 = 6AK5.
- Xtal = 7.5 mc. in FT 243 type holder.

heaters, to provide about 6 watts output on the 18th harmonic from an 8 mc crystal. The first two valves, 12AT7 and 12AU7, now manufactured in this country, are very suitable for

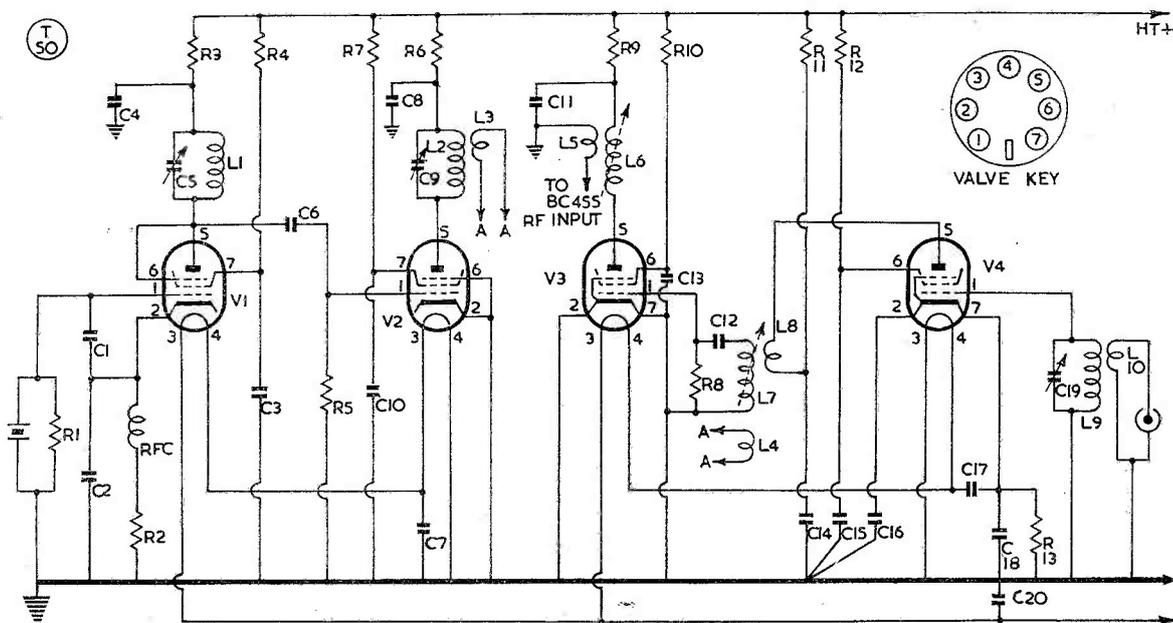


Fig. 2. Circuit diagram of two-metre converter section, operated with BC-455 as IF/AF unit.

their respective stages, but no doubt they could be substituted by two 6J6 valves with their heaters in series.

If this step is taken, the anode decoupling resistors should be increased in value and wattage to suit the lower anode voltage requirements of the 6J6. The third valve is an 832, chosen because of its 12v. heater facility, small drive requirements, and well-proven ease of operation on 145 mc.

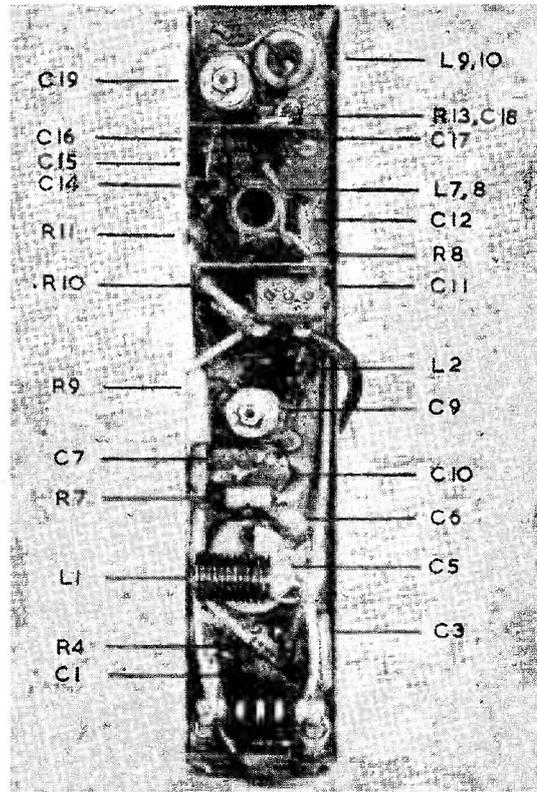
Circuit.—Fig. 4 gives the circuit of the transmitter RF chassis. An 8 mc crystal is excited on its mechanical overtone of approximately 24 mc in a Squier oscillator circuit, utilising the first half of V5. Output from the anode of this oscillator is coupled to the grid of the second half of V5 by C23, and bias is provided by the rectified voltage appearing across R16. This stage operates as a frequency tripler, the anode circuit being tuned to 72 mc by L12 and C26. C27 couples the 72 mc output to the grid of the first half of V6, bias developing across R18. Frequency doubling takes place in this stage, and the anode circuit, consisting of L13 and C28, is tuned to 144 mc. The second half of V6 is used as an amplifier and provides ample output for the excitation of the 832 PA.

Neutralising of this stage appears the conventional thing to have to do, as indicated by Cn, but in the writer's case neutralisation takes care of itself in the stray wiring capacitances, and maybe slight coupling between L13 and L15. V7 is a conventional 832 PA, the output of which is coupled through a co-axial link to the aerial changeover relay.

Construction.—The chassis is formed from 18 SWG aluminium, 11 ins. x 5½ ins. in size, which has two sides bent down to give a chassis 11 ins. x 3½ ins. x 1 in. deep. These sides are cut away for half-an-inch at each end to produce lips for supporting the chassis. At 3¾ ins. in from one end, and in the centre of the chassis, is a hole 2¼ ins. in diameter, through which V7 is mounted. V7 valveholder is spaced under the chassis on ¾ in. long distance pieces.

A ¾ in. diameter hole is made 5¾ ins. in from the same end as V7, and another 3 ins. from the other end for V5, both holes being on the chassis centre line. Referring to the photograph of the transmitter chassis the positions of the remaining components can be seen; the layout is not critical.

At the bottom left-hand corner of the chassis is C21 with L11 mounted across it; to the right, an octal valveholder which serves as crystal holder, spare crystal holder, and an



Converter unit with cover removed, to show general constructional layout with all main parts identified.

anchoring point for several leads. C26, with L12 across it, is located just above V5, then C28, supporting L13, is to be seen a little higher to the left. C26 and C28 are both mounted on ½ in. long insulated pillars similar to those supporting C9 and C19. V5 and V6 each have soldering tags under their valveholder fixing screws, to which earth returns are made.

Under the top two securing nuts of V7 valveholder are put two tag strips, the left-hand one having one insulated tag, the other two insulated tags. Between them is mounted R23, the odd tag being used as an anchoring point for the positive side of the two leads to J1. Other anchoring tags, not clearly visible in the picture, are mounted at convenient points to secure one end of C33, R20, R19, and the meter shunts.

The remaining components are supported in the wiring, with the exception of the final tank circuit. This is mounted on an L-shaped bracket above the chassis, with the condenser shaft extended through the front panel.

By-pass condensers C36, C37, C38, and R22 are closely grouped around V7 valveholder. Neutralisation of V7 is by two well-insulated 16 SWG wires passing through the chassis on each side of the valveholder nearest the anodes for about half-an-inch, crossed over under the valveholder, and soldered to the grid sockets.

Connection to the anode pins of V7 is made with two sockets removed from an old B7G type valveholder. Finally, the link from L16 to the aerial relay is formed from a length of small-diameter co-axial cable with one end bored for $\frac{1}{8}$ in. and bent round to form a loop, and then the inner conductor only is soldered to the outer braid at the beginning of the loop.

Testing the Transmitter.—With valve V6 removed, connect up to the 12v. heater test supply, and about 150v. to the HT line feeding the early stages. Couple a small wattage bulb, on a loop, to L11, and rotate C21 until a point is found where RF is indicated. Listen around 24 mc on a receiver for a signal from the oscillator, and check that this signal is characteristic of crystal control. Should the oscillator not be working, move the tapping on L11 half-a-turn towards the anode end and try again. If output is obtained at *any* setting of C21, move the tap half-a-turn towards the crystal end of L11. The correct tapping point is that which gives only one frequency of oscillation, that of the third harmonic of the crystal. Transfer the bulb and loop to L12, adjust C26 for RF output, and check that the frequency is 72 mc. Then leaving the loop coupled to L2, adjust C21 until a compromise point is found between maximum output and ready starting

of the oscillator when the anode volts are switched on and off. (How far this point is from that which gives maximum output depends on the harmonic activity of the crystal, which varies considerably between specimens, and also by the method of manufacture.)

Replace V6, and retune C26 to resonance, coupling the loop to L12 as lightly as necessary to give indication of RF. Move the bulb and loop on to L13, adjust C28 for output, and check frequency is on 144 mc. Connect an 0-1 mA milliammeter across points b1, b2 (making sure that the value of RS2 suits the meter) and tune C35 until a reading is obtained, which is the grid current of V7. Remove V5, and the meter should fall to zero; if not, it is an indication that the second half of V6 is in oscillation and requires neutralisation. This is accomplished by Cn, the capacity of which will have to be found by trial and error. With the HT increased to 220v., and C26, C28 and C35 retuned, a reading of approximately 2 mA should be obtained on the meter.

The following procedure for neutralising the double-tetrode type of valve on 145 mc is considered the best of those tried by the writer. Connect HT to V7 through a 10,000 ohm resistor, apply grid drive, and rotate C39. This may result in a considerable variation of the grid current every time the tank circuit passes through resonance.

Load the tank circuit with a loop and 2-watt bulb, and adjust the neutralising wires by bending them away or towards the valve envelope until the grid meter shows the minimum deviation when C39 is varied. Neutralisation can

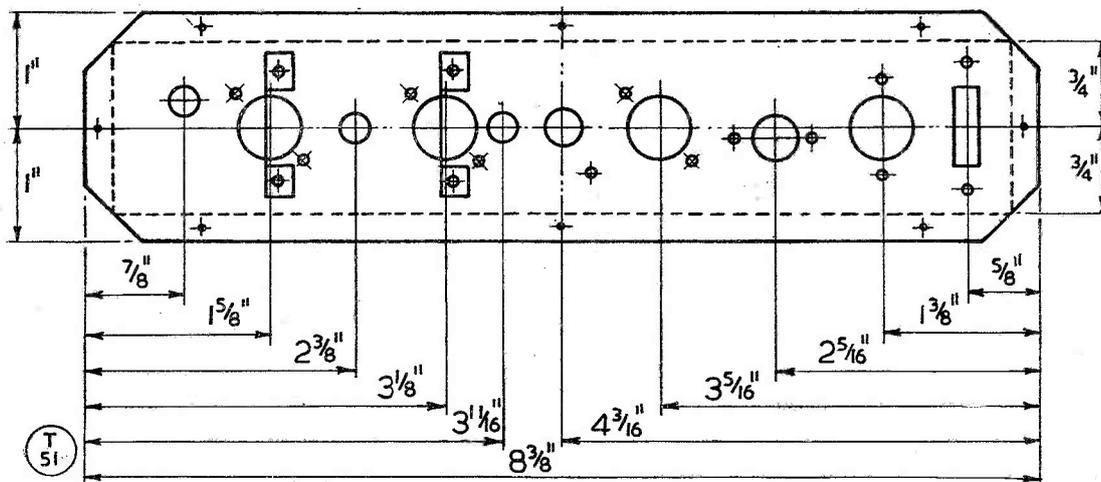


Fig. 3. Chassis constructional details for the two-metre equipment designed by G4CI.

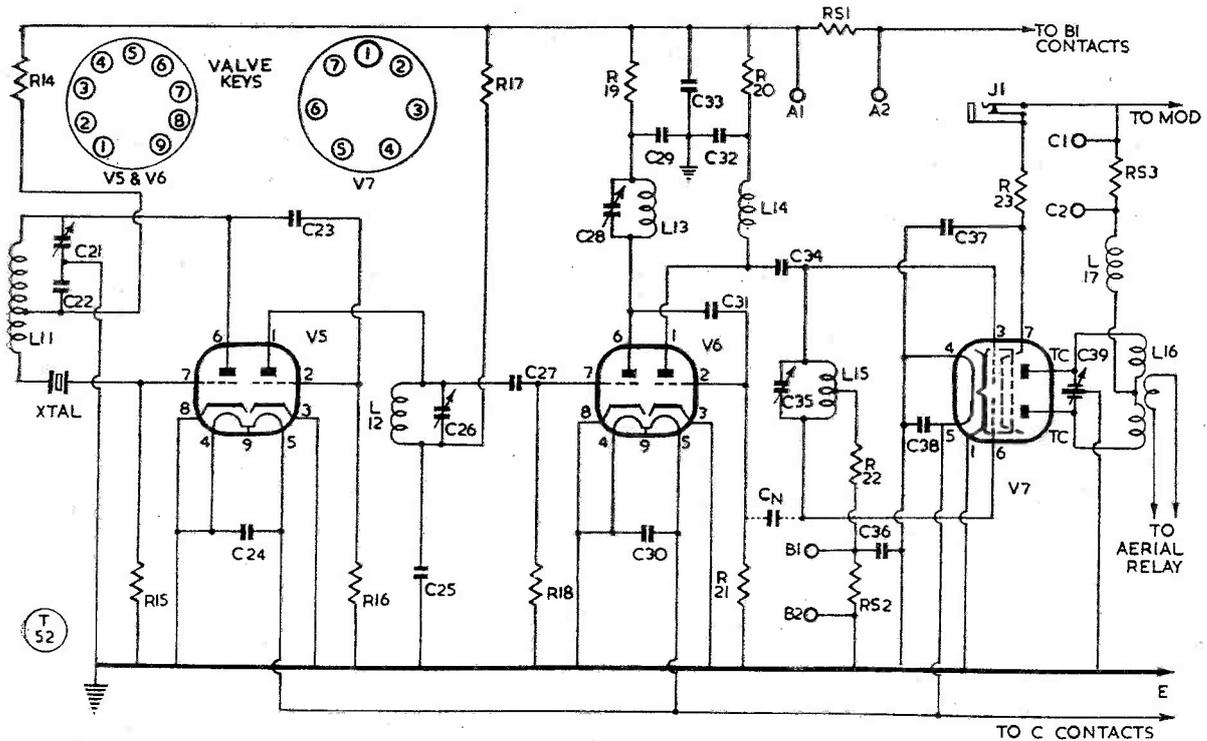


Fig. 4. Circuit of the Transmitter Section of the 144 mc transportable station—see table for values.

then be considered satisfactory. With 220v. HT on all stages a 6-watt bulb and loop coupled to the tank coil will light to full brilliance for an anode current to V7 of 50 mA—if all is well!

Modulator and Power Supply

Mounted behind the receiver and transmitter, this unit also contains the control relays B, C, D and E. Three valves are used in the modulator section, while a 12v. to 250v. dynamotor takes care of the additional HT supply. This dynamotor, together with that carried on the BC-455 chassis, was obtained from the surplus market, and is the same physical size, with identical bottom mounting plate, as the 28v. dynamotor found on the Command receivers.

Circuit.—A conventional resistance-capacity coupled amplifier is used for the modulator, as shown in Fig. 5. Using a carbon microphone plugged in J2, energising voltage is supplied from the 12v. DC line via R25, and decoupled by C40. T1 couples the microphone output to the first half of V8, which operates as a voltage amplifier. The second half of V8 is employed as a phase splitter to feed the modu-

Table of Values

Fig. 4. Transmitter Unit for Composite Assembly.

C21 = 40 μ F Air Trimmer.	RS2 = 2mA. Meter Shunt.
C22 = 500 μ F Mica.	RS3 = 100mA. Meter Shunt.
C23 = 50 μ F Ceramic	RS4 = 100mA. Meter Shunt.
C24 = 500 μ F Mica.	L11 = 18 turns 22 SWG spaced wire diameter on $\frac{1}{4}$ in. former, and tapped at 4 $\frac{1}{2}$ turns.
C25 = 500 μ F Mica.	L12 = 6 turns 18 SWG $\frac{1}{4}$ in. o.d. self supporting, spaced $\frac{1}{8}$ in.
C26 = 3-30 μ F Phillips Trimmer.	L13 = 3 turns 18 SWG $\frac{1}{4}$ in. o.d., self supporting, spaced $\frac{1}{8}$ in.
C27 = 50 μ F Ceramic	L14 = RF Choke. 20 turns 24 SWG enamelled, close wound on $\frac{1}{4}$ in. polystyrene rod.
C28 = 3-30 μ F Phillips Trimmer.	L15 = 4 turns 18 SWG $\frac{1}{4}$ in. o.d. stretched across 832 grid sockets.
C29 = 500 μ F Mica.	L16 = 4 turns 12 SWG $\frac{1}{4}$ in. o.d., spaced $\frac{1}{8}$ in.
C30 = 500 μ F Mica.	L17 = As L14.
C31 = 25 μ F Ceramic	J1 = Closed circuit jack socket.
C32 = 500 μ F Mica.	V5 = 12AT7.
C33 = 500 μ F Mica.	V6 = 12AU7.
C34 = 25 μ F Ceramic	V7 = 832.
C35 = 3-30 μ F Phillips Trimmer.	
C36 = 500 μ F Mica.	
C37 = 500 μ F Mica.	
C38 = 500 μ F Mica.	
C39 = 10 + 10 μ F Buttery Variable.	
R14 = 1,000 ohms, $\frac{1}{4}$ w.	
R15 = 3,300 ohms, $\frac{1}{4}$ w.	
R16 = 47,000 ohms, $\frac{1}{4}$ w.	
R17 = 1,500 ohms, $\frac{1}{4}$ w.	
R18 = 4,700 ohms, $\frac{1}{4}$ w.	
R19 = 1,000 ohms, $\frac{1}{4}$ w.	
R20 = 1,000 ohms, $\frac{1}{4}$ w.	
R21 = 47,000 ohms, $\frac{1}{4}$ w.	
R22 = 22,000 ohms, $\frac{1}{4}$ w.	
R23 = 15,000 ohms, 6w., wire wound.	
RS1 = 100mA Meter Shunt.	

lator valves, V9 and V10, which operate in Class-AB1. The condenser C48 across T2, the modulation transformer, is necessary to attenuate the high order harmonics produced by overall distortion in the amplifier and microphone, so reducing sideband splatter.

C51 and C52 were already fitted to the dynamotor in the writer's case, and it is noticed that their removal gives rise to considerable "hash" in the modulator output. T1 and T2 are home-made, but any carbon microphone-to-grid transformer should prove suitable for T1, while the modulation transformer from a SCR-522 transmitter has been tried and found satisfactory for T2. L17 is a smoothing choke removed from a Command receiver chassis.

Construction.—The chassis for this unit is made in a similar way to that of the transmitter, but measures $9\frac{1}{2}$ ins. along the long side with the slots, and $7\frac{1}{4}$ ins. wide after folding down the sides for an inch. The dynamotor flexible supports from another Command receiver are unscrewed, and the threaded pressed-in bushes remaining on the chassis removed by cutting away the metal around them. These bushes can then be used as nuts to secure the dynamotor mountings on the new chassis.

The connector plug to the dynamotor outlet socket is made by first holding a thin piece of paper over the socket and then pencilling lightly on the paper to produce an impression

which can thus be used as a marking-out template to drill a $1\frac{1}{2}$ in. diameter by $1/16$ th in. thick piece of paxolin. Extract the pins from an old octal valve base, remount them on the paxolin. This makes a very satisfactory plug without having to resort to careful measurement. A plug for the rear socket of the BC-455 can be made in a similar way.

The photographs give a good general impression of the layout of the components, which is not critical. Care should be exercised in the positioning of the holes for the relay coil connections, and it is worthwhile slipping $\frac{1}{2}$ in. of sleeving over the coil tags as a precaution against the live tag coming into contact with the chassis. Referring to the photograph of modulator section, the microphone transformer and pre-set gain control are to be seen in the top left corner, above the dynamotor fixings.

Small anchor tags, and soldering tags for earth returns, are fitted under most of the valveholder fixing screws. Between them they serve to hold the heavier components, e.g., C41 and C44; the remaining small components are suspended in the wiring. On top of the chassis, at the rear, is located a three-way terminal block. One outer terminal serves as a common negative connection, while the remaining two terminate the 12v. positive lead from the unit, and positive lead from the accumulator. The two are bridged with a piece of 10 amp. fuse wire as a precaution against an internal LT short-circuit.

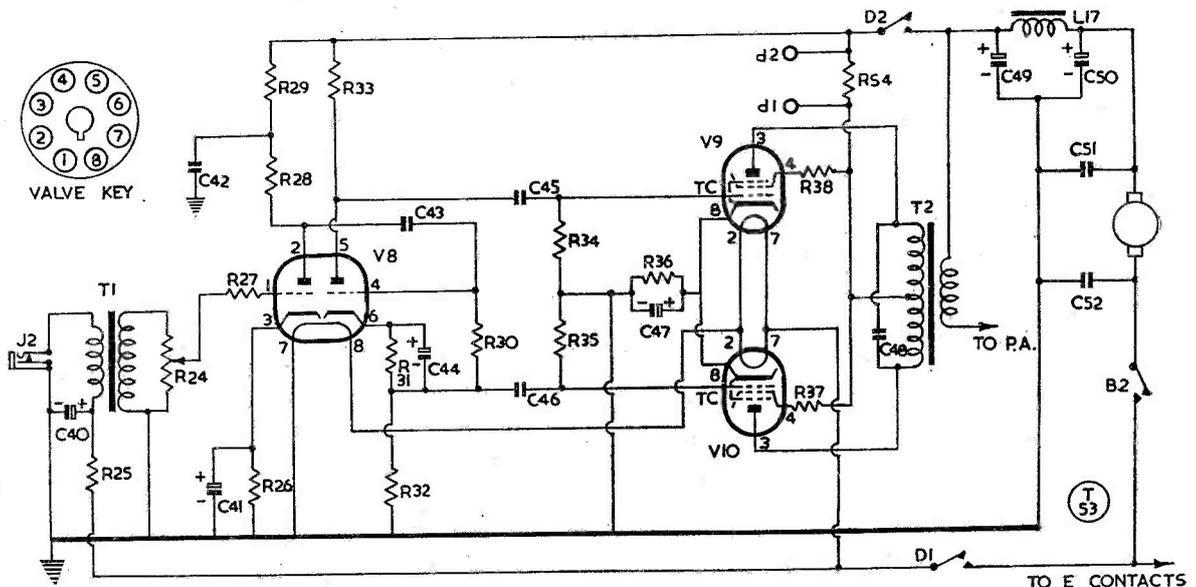
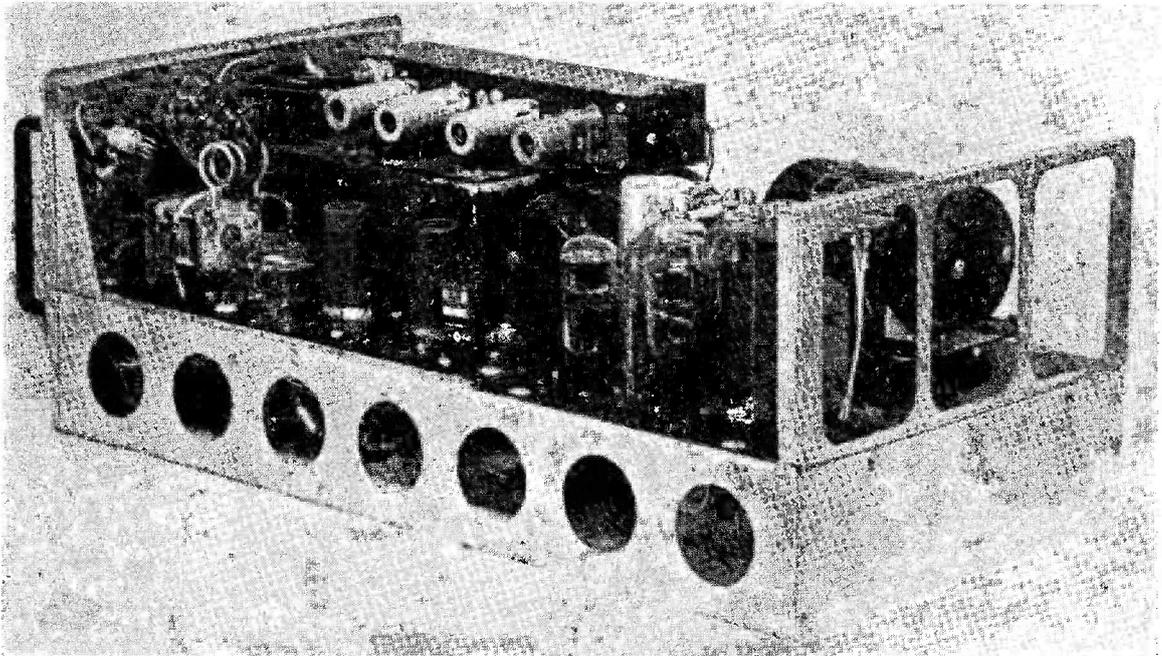


Fig. 5. The modulator unit for the two-metre Transmitter/Receiver described by G4CI, showing also the dynamotor and power supply connections.



General layout view of the G4CI Two-Metre Transportable, showing transmitter section (left end) and power supply (right front). The dynamotor is to the rear.

Checking the Performance. — This is best carried out with a 12v. accumulator as source of power—because, first, there is a chance that “hash” may appear in the modulator output due to the dynamotor; secondly, because the DC requirements of the microphone energising circuit rule out the use of an AC heater supply. During these test operations, it is assumed that the control switch has not been wired up, so therefore relay-contacts B2, D1 and E need to

be held closed. This can be accomplished by either a system of “croc clips” to energise the respective relay coils, or by packing up the relay armatures with paper.

Connect the microphone into circuit, and load the secondary of the modulation transformer with a 3 to 6 watt resistor value 5,000 ohms or so. With the gain control at maximum, normal speaking close to the microphone should produce a reading of at least 150v. on an AC voltmeter connected across the load resistor.

The anode current of the EL32's should vary from 20 mA to 50 mA at the same time. This is a reasonable indication that the modulator is giving the five watts of audio for which it was designed. A check can best be made for stability by connecting the Y-plates of an oscilloscope across the load resistor. If an oscilloscope is not available, the connection of a pair of phones *via* a suitable attenuator across the output will serve as a good guide.

Table of Values

Fig. 5. Modulator Unit and Power Supply Connections for Composite Assembly.

C40 = 25 μ F, 12V.	R32 = 100,000 ohms, $\frac{1}{2}$ w.
C41 = 25 μ F, 12V.	R33 = 100,000 ohms, $\frac{1}{2}$ w.
C42 = 1 μ F., 250V., Metallised paper.	R34 = 330,000 ohms, $\frac{1}{2}$ w.
C43 = .01 μ F., 350V.	R35 = 330,000 ohms, $\frac{1}{2}$ w.
C44 = 25 μ F., 12V.	R36 = 350 ohms, 1w.
C45 = .01 μ F., 500V.	R37 = 100 ohms, $\frac{1}{2}$ w.
C46 = .01 μ F., 500V.	R38 = 100 ohms, $\frac{1}{2}$ w.
C47 = 50 μ F., 50V.	T1 = Carbon micro- phone input transformer.
C48 = .005 μ F., 1,000V.	T2 = Modulation trans- former from SCR 522, or as suitable.
C49, C50 = 8 + 8 μ F., 350V.	J2 = Microphone jack socket (located on front panel).
C51, C52 = .001 μ F. Mica across motor brushes.	V8 = Mullard ECC33.
R24 = 0.25 megohm Po- tentiometer.	V9 = Mullard EL32.
R25 = 1,000 ohms, $\frac{1}{2}$ w.	V10 = Mullard EL32.
R26 = 2,200 ohms, $\frac{1}{2}$ w.	L17 = Smoothing choke removed from BC 453/4/5.
R27 = 4,700 ohms, $\frac{1}{2}$ w.	
R28 = 100,000 ohms, $\frac{1}{2}$ w.	
R29 = 10,000, $\frac{1}{2}$ w.	
R30 = 330,000 ohms, $\frac{1}{2}$ w.	
R31 = 2,200 ohms, $\frac{1}{2}$ w.	

The Modified BC-455

The general modification of this unit is in accordance with the details given by F. E. Wingfield, G2AO, in his article in the September, 1948, issue of *Short Wave Magazine*. This article (it discusses the BC-453) includes a circuit diagram, which although not correct in

every detail for the BC-455, serves as an adequate guide. Filament wiring, BFO switch, tuning control and front socket are modified according to the instructions given G2AO. The headphone jack is mounted external to the receiver as mentioned earlier.

Before replacing any of the shields, the following additional modifications need to be made :—

- (A) Remove the 1F transformers and BFO coil and replace them with the corresponding components from a BC-454. This is a worthwhile improvement to the selectivity of the receiver, as the original transformers have only single-tune circuits on a frequency of 2830 kc.
- (B) Insert a $40 \mu\mu\text{F} \pm 5\%$ silver mica condenser in series with the lead to each stator of the tuning condenser. The existing trimmer condensers are set at minimum capacity, but they may be needed later to increase the bandspread if required.
- (C) Remove the existing oscillator fixed padding condenser, and replace with one of $.001 \mu\text{F}$ capacity. The variable paddler trimmer is connected across the oscillator tuned coil to act as bandset condenser.
- (D) A $20 \mu\mu\text{F}$ max. trimmer is positioned between the moving vanes of the tuning condenser, and connected between the anchorage point of the mixer grid lead and earthed screen on tuning condenser. This trimmer acts as a bandset condenser for the mixer grid tuning.
- (E) Reduce oscillator valve grid condenser to $50 \mu\mu\text{F}$.
- (F) Replace 12SK7 RF valve by a 12SG7. In practice this gives a noticeable increase in the receiver gain but is not essential.
- (G) An insulated socket is fixed on the tuning condenser cover, in the top corner nearest the RF valve, and positioned to receive the plug from the converter without it fouling the RF valve.
- (H) Break into the main smoothed HT line in such a manner as to leave the 12A6 output valve supplied with HT at all times, while the rest of the receiver is dependent on relay contacts B1. In this way, quite a good signal can be heard in the headphones for monitoring while telephony transmissions are being made. Use rear socket for external connections to headphones jack, relay B1 contacts, and relay E contacts.

- (I) Finally, break down the existing 6-9 mc coil pack into three separate assemblies. The RF stage coil, identified by a red spot of paint, has the tuned winding stripped to 6 turns, starting from the top, and the last $1\frac{1}{2}$ turns are spaced out to reach the hole at the top of the former. A one-turn link is made from a piece of PVC covered wire wrapped around the former, near the bottom of the tuned winding. One end is connected to the earthy end of the grid winding, the other to a spare tag, the opposite of which on the coil base is connected to the insulated socket in (G).

The mixer grid coil, identified by a yellow spot, has the tuned winding reduced to 5 turns, the last $1\frac{1}{2}$ turns spread out to reach the hole in the former at the bottom of the original winding. The coupling winding is reduced to 3 turns.

The remaining coil, marked with a blue spot, is the oscillator coil. This coil has the tuned winding reduced to 5 turns, and the regeneration winding cut down to $2\frac{1}{2}$ turns.

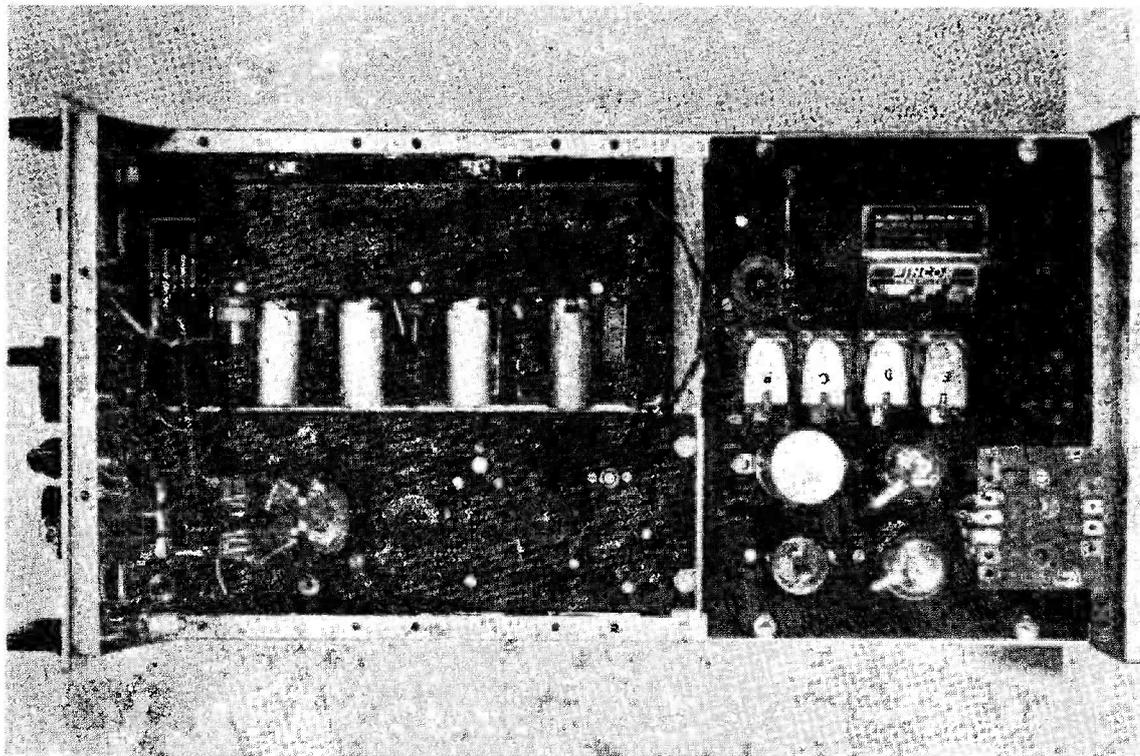
On all the coils, the tuned section is identified by being wound with spaced turns in grooves in the former.

Alignment.—With the dynamotor removed, convenient connection can be made from an external power supply to the chassis plug which connects to the dynamotor. Alignment of the 1415 kc IF stages and BFO is conventional, presents no difficulty, and so no detailed instructions need to be given here. However, having completed the IF alignment, a certain amount of cut-and-try technique is required to get the RF section working satisfactorily.

First of all, a strong 25 mc signal from a signal generator is fed into the input socket which normally receives the output from the converter. With the tuning condenser set half-way and its trimmers at minimum, rotate the

RELAY TABLE

RELAY B—P.O. Type 3000. 500 ohm Coil, fitted with one set of change-over light duty contacts, and one set of 4 amp. "make" contacts.
RELAY C—P.O. Type 3000. 500 ohm coil, fitted with one set of 4 amp. "make" contacts.
RELAY D—P.O. Type 3000. 500 ohm coil, fitted with one set of light duty "make" contacts, and one set of 4 amp. "make" contacts.
RELAY E—P.O. Type 3000. 500 ohm coil, fitted with one set of 8 amp. contacts.



Plan view of the VHF transmitter/receiver described in the accompanying article. The Tx section is lower left, two-metre converter above, modulator and power supply to the right, with the relay set and dynamotor. In this photograph, the panel end is to the extreme left.

oscillator bandset condenser until a signal is heard, then find the image signal, and select that signal which requires the least capacity. Adjust the mixer bandset condenser for maximum output, reducing the signal generator output if necessary, and adjust similarly the front panel trimmer, which now has the dual role of RF bandset condenser and input trimmer. Now check the frequency coverage of the receiver on the main tuning condenser. With the coil data given, the range should be approximately 23.5—26.5 mc. If the range be much greater than this, mesh one of the two trimmers in parallel with each tuning condenser section about one quarter in, and repeat the alignment procedure.

The use of these trimmers will enable satisfactory bandspread and tracking to be obtained. If the frequency coverage is too small increase the 40 μF series condensers to 50 μF and repeat alignment procedure again. Somewhere between these extremes will be found the required bandspread. This completed, replace all screens, and place the converter into position, connecting it up. With the power and aerial on, peak the front panel

trimmer for maximum noise, and if all is well (and the band active) 144 mc signals should be heard !

Assembly and Interconnection of Units

It is easiest to complete the front panel assembly first. Mount all the components which are visible in the panel photograph, and in addition the aerial relay and a 4 in. length of $\frac{1}{2}$ in. angle aluminium which supports one end of the transmitter chassis.

The BC-455 is supported mainly by the panel, partly by the fixing bushes on the controls, and partly by removing the four screws holding the tuning condenser, retapping the condenser feet 6BA, and passing new screws through from the front of the panel. A rubber grommet supports the "monitor lamp," which has a single turn link soldered directly to it for light coupling to the 832 output coil. The lamp makes a simple but effective indicator that all is well during transmission. Long identifiable leads are left from the microphone jack, headphone jack, meter switch, aerial relay coil, and keying jack.

A word here about the meter switch. This consists of a two-pole four-way wafer switch, and is used to switch both meter connections to the required shunt. Position 1 connects to RS1, reading the combined anode currents of the 12AU7 and 12AT7 in the transmitter exciter stages—about 20 mA. The second position connects to RS2 and reads the grid current of V7, about 1.8-2.0 mA. The third position likewise connects to RS3, reading the anode current of V7, which is 50 mA, on CW, and slightly less on phone. Position four connects to RS4, and indicates the anode currents of the EL32 modulator valves, which varies between 20 mA and 40 mA during modulation of the carrier.

To return to the assembly, the control switch is wired before mounting, and also has long leads, about 12 inches, for external connections. A small piece of the lip of the transmitter chassis nearest the panel is cut away to form a hole approximately $\frac{1}{4}$ in. x $\frac{1}{4}$ in. between the chassis and the BC-455. Through this hole pass the connecting wires from the above panel components.

At the rear of the BC-455 another piece of $\frac{1}{2}$ in. angle aluminium is fitted across the main frame, and the bottom cover securing screws of the BC-455 pass through it. Again behind the BC-455, but this time on top of the supporting frame, is fitted another piece of aluminium, across to support the rear end of the transmitter chassis, and is visible in the plan view photograph. The modulator and power

supply chassis rests across the main frame, and both units are fixed into place by drilling and tapping their respective supports and inserting 2 BA mushroom headed screws.

The free wires from the above panel components, after passing through the top deck hole previously mentioned, are routed under the meter to join the leads from the control switch, with the exception of the meter leads, of course. They then continue down the side of the transmitter chassis, picking up and dropping off wires as required. At the end of the transmitter chassis, the bunch turn, come to the centre, and pass down the line of relay contact tags, as can be seen in one of the photographs. Small rubber rings contain the wires at various points, but a much neater job could be made if the wires were cable-formed with a strong thread.

Final Points

The power consumption of the equipment from a 12v. accumulator is reasonable. On Receive only, it is 40 watts; while transmitting CW, 60 watts; and transmitting telephony, 90 watts. Experience has shown that one *good* 72 amp/hr. accumulator is enough for a day's competition operating.

It is two years since the writer constructed this equipment, and results have exceeded expectations. During the occasions when the equipment has been operated in the field, it has proved itself by consistent and trouble-free working and good reports.

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SURFACE WAVE TRANSMISSION LINE

An interesting practical article in the April issue of *CQ* discusses the application of the SWTL—or "G-String" as it has come to be called—to UHF feeder-line systems. The SWTL is a single-conductor form of wave-guide and at frequencies around 2,000 mc would have one-eighth the loss of the best coaxial cable. In these UHF applications, SWTL's have been constructed up to 120 ft. in length, giving RF energy transfer at a high degree of efficiency. In practice, there would be nothing to be gained by using the SWTL technique on frequencies below about 1,000 mc; this is strictly a UHF application.

JAMBOREE AT LAUSANNE

We have received from USKA, the Swiss amateur organisation, some details on the preparations for the IARU Region 1 Congress at Lausanne during May 14-17. The proceedings will be conducted in three languages by immediate simultaneous translation, there will be an Amateur Radio exhibition, various excursions to Castle Chillon and the Jungfrauoch, as well as what is described as "a gay hamfest with an abundant special program." It is understood that all this is being offered at a special all-in price, payable on registration. For anyone wanting a quick holiday in Switzerland at short notice, the programme looks very interesting—all meetings are open to any amateur, and the address is c/o ADIL, 7 Av. Benj. Constant, Lausanne, Switzerland.

PHOTOGRAPHS

Remember that we are always interested in seeing clear, sharp photographs of Amateur Radio interest—whether stations, equipment or personalities. Payment is made for all prints used, but in the nature of things it is not always possible to publish photographs immediately they are received.

Self-Powered Top Band Tx

PHONE / CW WORKING ON
ONE-SIXTY

R. H. WEBB (G6XY)

This article gives the essential information on the design and construction of a transmitter for the 1.7 mc band, adaptable for whatever suitable parts may be available. The main points are the circuitry, values and general arrangement—it is not necessary to have the particular components used by the author. His idea is to show how a good-sounding transmitter can be built up from parts that may be to hand.—Editor.

THE design and construction of the transmitter to be described were prompted by a number of factors, the most important ones being as follows:

(1) Capital outlay; (2) use of available components—this requirement is very closely allied to No. 1; (3) compactness—the whole rig, including modulator, power pack and aerial change-over relay to be contained in a small metal cabinet; (4) a desire to break away from the inevitable 6V6/6L6 or 6V6/807 valve sequence in common use on the 160-metre band.

With these requirements in mind, a search was made through what is popularly known as the "junk box," and the following pieces of gear unearthed:—A BC610 exciter tuning unit, type TU61, a small metal cabinet 9 ins. × 9 ins. × 10 ins., a rather battered SCR-522 transmitter, a slow motion dial taken from a TU5 unit, an 0-100 mA meter, a receiver replacement-type mains transformer, a surplus 6v. change-over type relay, and the usual array of minor components. Nothing new was purchased for the construction of this transmitter with the exception of the electrolytic smoothing condensers.

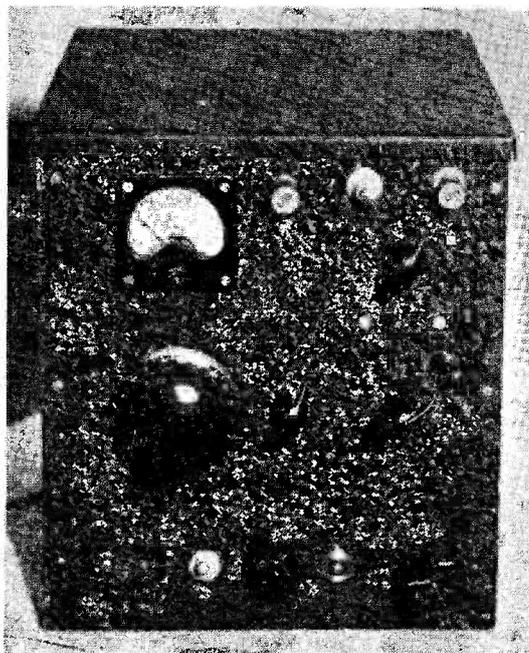
Having spread the foregoing conglomeration on the bench a little contemplation resulted in the transmitter almost designing itself with the exception of the choice of valves. Now valves are never consigned as junk at this station; even the most unlikely types removed from surplus apparatus are carefully packed away in a tea chest with the thought that "it might come in useful for something one day."

A careful survey of the contents of the tea chest resulted in the happy discovery that the RF and modulator sections of the transmitter could utilize miniature or near-miniature valves, thus fulfilling (3) and (4) above. The fact that suitable valves were on hand also took care of (1) and (2).

General Design

The layout chosen was 9003 ECO, Z77 FD, VT501 (TT11) PA, Z77 speech amplifier, 6C4 driver and 12AX7 zero-bias Class-B modulator. A 5Z4 rectifier and VR150 stabiliser completed the valve complement. The only valve which may not be familiar to most people is the 12AX7, a miniature high *mu* twin triode which will give around 6 watts of audio in zero-bias Class-B with 300 volts HT. A British-made version of this valve is readily available in the Brimar series.

A start was now made upon the actual construction of the transmitter. The TU61 unit was stripped and yielded the VFO coil L1, together with fixed and variable tuning condensers and the grid condenser C3; the doubler coil and tuning condenser and the PA anode coil and input condenser of the Pi-tank network. The DPDT switch is used as the



Front panel view of the self-contained 160-metre transmitter. The only externals required are microphone and/or key, AC power point, earth connection and a random-length wire for the aerial.

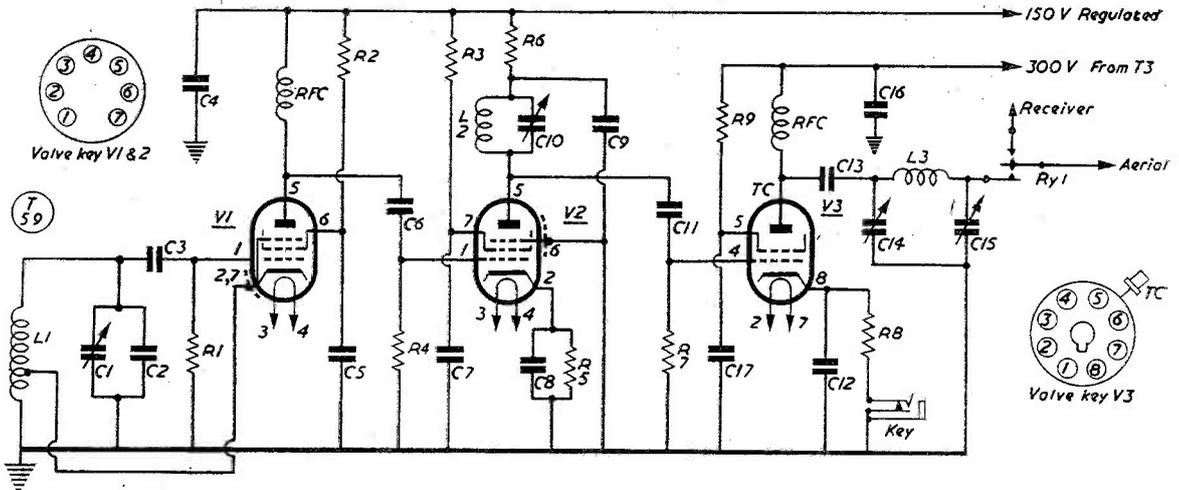


Fig. 1. Circuit of the VFO-controlled self-powered 160-metre transmitter described by G6XY. The network L3, C14, C15 permits a random aerial length to be accurately matched and loaded.

Table of Values

Fig. 1. RF Section of the 160-Metre Transmitter.

C1, C3,	R1 = 82,000 ohms.
C6, C11 = 100 μ F.	R2 = 50,000 ohms.
C2 = 75. μ F.	R3, R7 = 22,000 ohms.
C4, C5,	R4 = 100,000 ohms.
C7, C8,	R5 = 680 ohms.
C9, C12 = .01 μ F.	R6 = 100 ohms.
C10 = 120 μ F.	R8 = 470 ohms.
C13, C16,	R9 = 33,000 ohms, 1-w.
C17 = .001 μ F.	RFC = RF chokes.
C14 = 180 μ F.	Ry1 = Relay (see text).
C15 = 600/1,000 μ F.	V1 = 9003.
(see text).	V2 = Z 77 (EF91,
L1, L2,	6AM6).
L3 = See text.	V3 = VT501 (TT11).

(Resistors all 1/2-watt rating except as stated).

hole at the bottom and a corresponding hole in the chassis, and the lead to the grid of V2 through the lid, exactly opposite V2 grid pin. The doubler was made in exactly the same manner in a similar box and bolted to the chassis alongside the VFO, as may be clearly seen in the interior photograph. The PA valve is mounted on the chassis proper and is directly below the relay in this view. The two variable condensers and the coil comprising the Pi-tank network are mounted on the panel in front of the PA valve, the coil being located

transmit/standby control. If a TU61 unit is not available suitable coils may, of course, be wound to standard formulae and available variable condensers utilized. From the SCR 522 transmitter came the modulation and driver transformers T2 and T3.

VFO Construction

The VFO was built in a small metal box (an Eddystone diecast box may be used), all components being mounted on inside walls of the box. the power leads going through a small

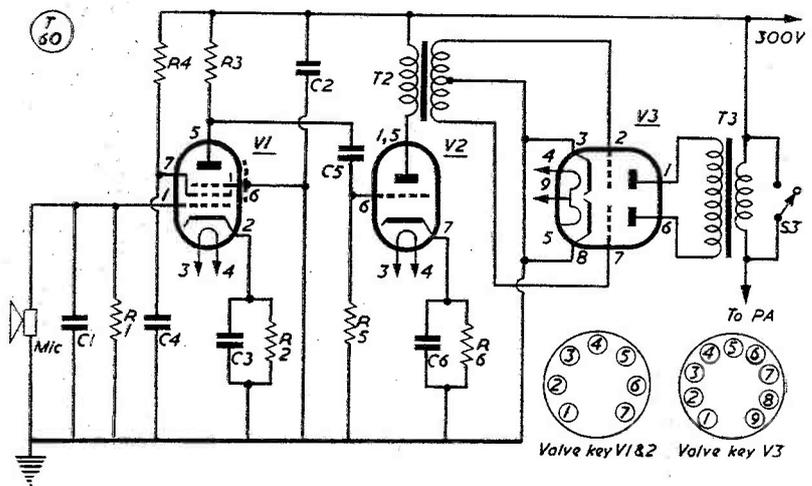


Fig. 2. Modulator section of G6XY's 1.7 mc. transmitter, described in the accompanying article. Other valve types could, of course, be used with any necessary changes in values. The placing of the modulator parts can be traced in the plan view. (Note: In this circuit there should be an HT feed connection to the centre-tap of T3).

Table of Values

Fig. 3. Power Pack for the 160-Metre Transmitter.

C1 = 25 μ F., 25v.	Rect = Suitable 6v. rectifier.
C2 = 8 μ F., 500v.	S1 = SPST switch.
C3 = 16 μ F., 500v.	S2a, S2b = DPDT switch (see text).
R1 = 5,000 ohms, 10w.	V1 = 5Z4.
LFC = 10 Hy. 100 mA Choke.	V2 = VR150/30.
T1 = 350-0-350v., 100 mA Transformer.	

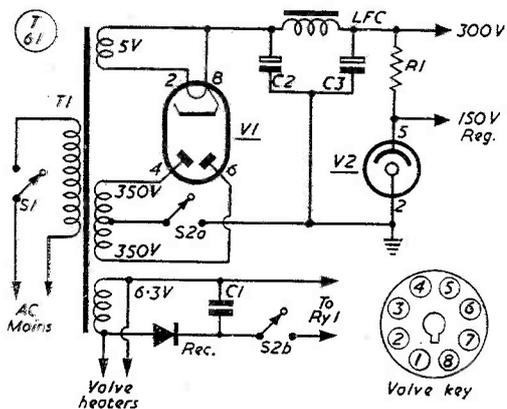


Fig. 3. Power pack as used by G6XY for his 160-metre transmitter, and built into the cabinet containing the RF and modulator sections. The transmitter is thus entirely self-contained.

between the condensers. The aerial change-over relay is bolted to the side of the cabinet and wired up after the chassis and panel are in the cabinet.

The audio section is to the left in the plan view photograph, the speech amplifier being at the front, followed by the driver valve with pre-set gain control between, and the modulator valve between the driver and modulator transformers. The mains transformer is at the upper right with rectifier beside it, also the VR150 (removed in the photograph). No detailed chassis drilling measurements are given as these will vary according to available components, but the general layout may be readily seen from the photographs.

The Pi-tank output condenser in the original is an old high capacity receiving type, but a small surplus twin-gang tuning condenser could be used with the sections in parallel to give slightly greater range of loading. A normal tank circuit can be adopted if desired, but the Pi-tank does enable almost any random length of wire to be loaded up as an aerial, and is therefore very useful where portable operation is contemplated; it does also considerably suppress any harmonics which may otherwise be troublesome in TV fringe areas. No TVI

is caused by this transmitter in a district near Sutton Coldfield.

CW Operation

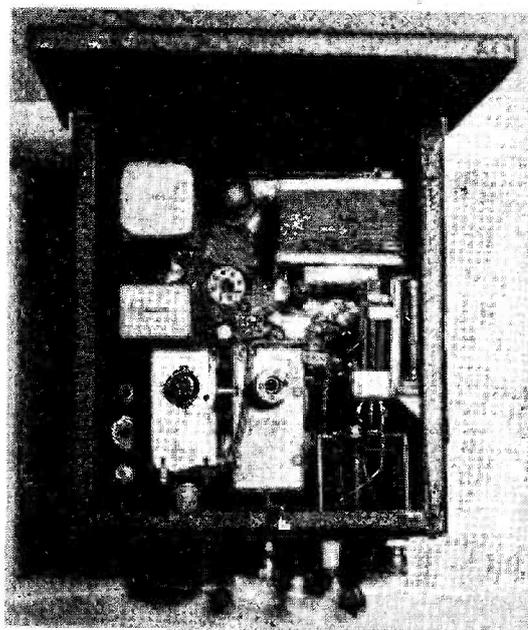
It will be seen that the cathode circuit of the PA is keyed for CW working; this is purely a personal preference as the writer does not like the sound of most keyed VFO's on the air. If break-in operation is essential it is suggested that the screen of the VFO be keyed, the cathode bias on doubler and PA being sufficient to safeguard the valves under no-drive conditions.

The transmit/standby switch uses one section to break the HT centre tap and the other section to actuate the change-over relay, power for this being taken from the 6v. heater supply via a small surplus rectifier and 25 μ F smoothing condenser. The Phone/CW switch merely short circuits the modulation transformer secondary for CW and leaves HT on the audio valves; this again is a matter of choice, but.

Table of Values

Fig. 2. Circuit of Modulator Section.

C1 = 50 μ F.	R5 = 500,000 ohms.
C2 = 8 μ F.	R6 = 1,000 ohms.
C3, C4, C6 = 1 μ F.	T1, T2 = See text.
C5 = .005 μ F.	S3 = Phone/CW switch, SPST.
R1 = 2 megohms.	V1 = Z77.
R2 = 1,500 ohms.	V2 = 6C4.
R3 = 330,000 ohms.	V3 = 12AX7.
R4 = 1 megohm.	



Plan view of the G6XY Top Band Transmitter, showing the general arrangement inside the box. Further details are given in the text.

if HT is removed from these valves, care must be taken that the voltage applied to the PA does not rise to allow the input to exceed 10 watts or the PA valve to be over-run under CW conditions. The audio arrangement outlined will give ample gain for full modulation from a crystal microphone.

No PA grid current meter is provided, the grid current being measured during preliminary testing and adjusted, if necessary, to between 2 and 3 mA by selection of the doubler screen dropper resistor.

General Notes

Using the TU61 components specified above gives the transmitter a frequency range of 1.7 to 2 mc. The panel layout as shown in the

front view photograph is as follows: Bottom row; l. to r., microphone input, standby switch, Phone/CW switch, keying jack. Middle, l. to r., VFO tuning, FD tuning, PA tuning. Top right, PA loading. The three terminals at the top right are for connection to Aerial, Earth and Receiver input, the last-named being in the centre in the photograph.

This article is not intended to be a step-by-step "How to make it" complete with specifications for all parts used, but is rather an indication of how components already in possession at the average fairly active station may, with the exercise of a little ingenuity, be combined into a cheap, serviceable transmitter of reasonable appearance and modern design.

Design for a Communications Receiver

AF AMPLIFIER, POWER
SUPPLY AND CRT MONITOR
UNITS—PERFORMANCE

TESTS

PART II

W. H. SEGROTT (G8SI)

The first part of this interesting article appeared in our April issue, with a block schematic of the receiver layout and circuits for the RF and 1st and 2nd IF/AF amplifier units. The general design as here discussed can be adapted to individual needs and ideas.—Editor.

(a) *AF Section.* V1 (6AB7) functions as a microphone pre-amplifier which, in conjunction with V2a-b and V3a-b, enables the unit to be used as a speech amplifier for the modulator of the transmitter. Circuitry is conventional and provides ample gain for use with a crystal microphone. A balanced 600 ohm output from the output transformer (T2) transfers the audio to the grids of the push-pull Class-B modulator through a low impedance line and hence the modulator may be located at any convenient distance from the receiving position (Fig. 5).

(b) *Power Supply Section.* Circuitry here is conventional except possibly for the inclusion of V6 (6H6G) as a rectifier for the negative bias

supply. The purpose of this bias is to reduce the overall gain of the receiver during transmission periods, *i.e.*, receiver muting. Two voltages are available each being independently adjustable, RV2 (Send Bias) and RV3 (Net Bias). This provides for the independent adjustment of receiver gain in both the "transmit" and "net" positions.

Four octal sockets, fitted to the rear of the chassis, provide outputs for the AC and DC voltages to the various units. Additional sockets are also fitted for the AF outputs from transformer T2. Interconnecting cables between units pass through half inch diameter conduits fitted to each side of the equipment rack. These conduits, which run the full length of the rack, are split at appropriate points to allow exit of cables to the various units.

CRT Monitor and S-Meter Unit—Fig. 6

This unit performs the following functions :

- (i) Visual display of the 465 kc, 50 kc or AF outputs of the receiver according to the setting of S2a-b. This permits observation of the keying characteristics of CW signals or the modulation depth on Phone signals.
- (ii) External use as a general purpose oscilloscope.
- (iii) Visual alignment of the IF transformers in the 1st and 2nd IF/AF Units.
- (iv) Keying and modulation checks on own transmissions.
- (v) Panoramic reception and display.⁽⁶⁾

(a) *CRT Power Supply.* The EHT for the CRT (VCR 139A) is obtained in a rather unorthodox manner, but has given satisfactory service over the past few months. An AF transformer, T1 (Ferranti AF3) is utilised (230 volts AC across the primary) which, in con-

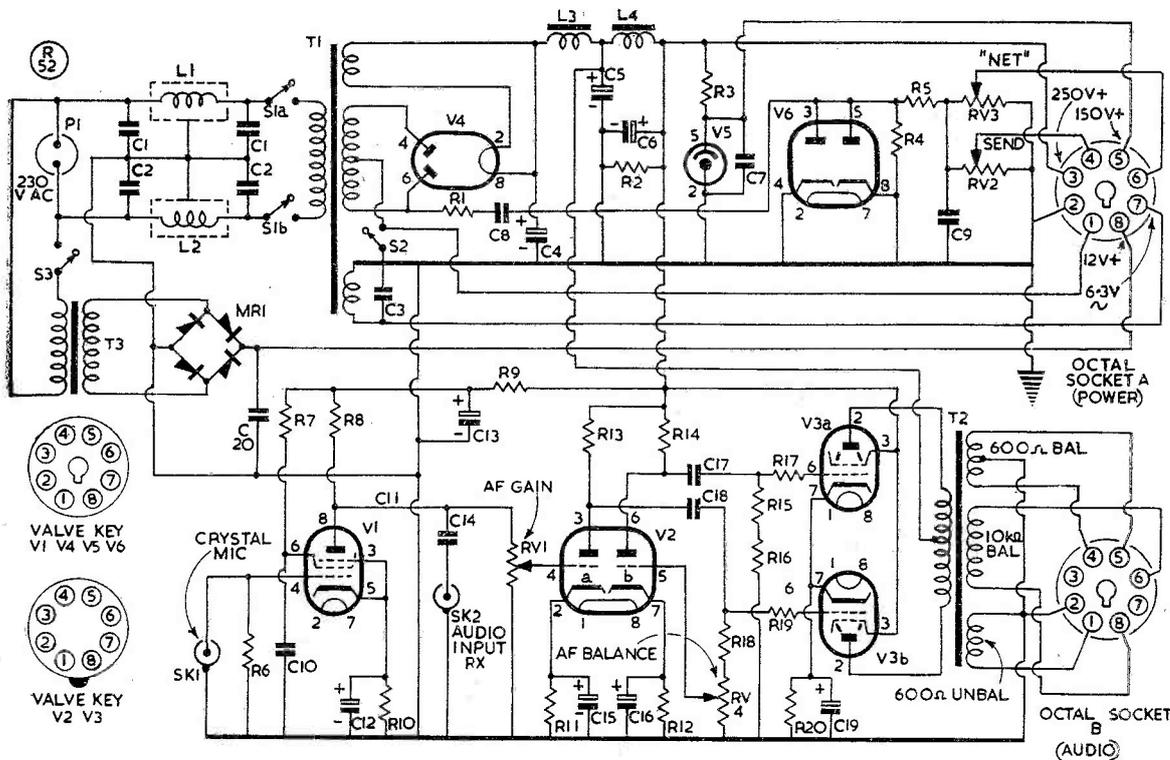


Fig. 5. The push-pull output amplifier and power supply unit for the communications receiver described by G8SI.

junction with V3 (6H6G) provides approximately 600 volts DC at a load current of 1 mA. A further transformer (T2), with separate windings, supplies the heater voltages for the CRT and V3.

(b) *Time Base Circuits.* A "Miller Integrator" (7) (V2), arranged as a free running time-base, supplies the necessary sweep voltage to the X-plates of the CRT. The frequency range is switched (S5a-d) to cover 10 to 2,000 cycles in four ranges. This frequency range could be extended,(8) for the purpose intended ; however, an upper limit of 2,000 cycles is adequate.

(c) *"Y" Amplifier.* The appropriate input signals are selected by S2a-b and amplified by V1 (EF50). Tuned input and output circuits (IFT 1-4) are selected in the 50 kc and 465 kc positions, overall gain being insufficient to give adequate deflection on the CRT with resistance capacity coupling as used in the AF positions of S2a-b. The second position of this switch transfers the grid of V1 to SK4. This socket is located on the front panel and provides for the application of the unit as a general purpose oscilloscope. Sockets SK1

Table of Values

Fig. 5. Circuit of Push-Pull Output Amplifier and Power Unit.

C1, C2, C3, C7, C10, C11, C17,	= .01μF.	L4 = Smoothing choke, 10H. (250 mA.).
C4, C5, C20,	= 8μF. electrolytic (350v. wkg.)	S1A,B. = DPST toggle switch.
C13,	= 16μF. electrolytic (350v. wkg.)	S2, S3 = SPST toggle switch.
C12, C15, C16, C19,	= 25μF. electrolytic (50v. wkg.)	MR1 = Metal Rectifier, 12 volt, 1A.
C6,	= 32μF. electrolytic (350v. wkg.)	T1 = Power Transformer, 230v., 50 cycles, secondary, 250-0-250v., 0.25A., secondary, 5v. 5A., secondary, 6.3v., 15A.
R20,	= 250 ohms.	T2 = Audio Transformer, primary (centre tapped), 10,000 ohms. Secondary, 10,000 ohms, secondary, 600 ohms, secondary, 600 ohms (centre tapped).
R10,	= 1,000 ohms.	T3 = Power Transformer, 230v., 50 cycles, secondary, 12v., 1A.
R3,	= 3,000 ohms.	V1 = 6AB7.
R11, R12, R17, R19,	= 5,000 ohms.	V2a-b = 7F7.
R9,	= 50,000 ohms.	V3a-b = 7C5.
R1,	= 80,000 ohms.	V4 = 6U4G.
R2, R5, R16, R8,	= 100,000 ohms.	V5 = VR150/30.
R13, R14, R15, R18,	= 250,000 ohms.	V6 = 6H6G.
R4, R7, R6,	= 470,000 ohms.	
RV1, 2, 3,	= 1 megohm potentiometer.	
RV4,	= 100,000 ohm potentiometer.	
L1, L2,	= RF. chokes, 10mH	
L3,	= Smoothing choke, 10H. (100 mA.).	

(465 kc), SK2 (50 kc), and SK3 (AF) are located on the rear apron of the chassis, the appropriate inputs forming part of the permanent wiring of the receiver. The first position of S2a-b applies a 50-cycle calibrating voltage (6.3 volts) to the grid of V1 for time-base frequency checking purposes.

The amplified signal at the anode of V1 is applied *via* S3a (in position 2) to one Y-plate of the CRT. This Y-plate, and also one X-plate, are brought out to terminals on the front panel (Y Input, X Input). Thus external signals may be amplified or applied direct to the CRT.

(d) *Receiver Alignment.* Reference has already been made to the application of this unit to the visual alignment of the tuned circuits in the IF/AF Units. Although work on this is at present incomplete, a brief description of the system will be given as a matter of interest.

Fig. 7 shows the circuit of a reactance valve. This circuit is located on the RF Unit chassis, SK1 (Fig. 7) being connected to SK4 on the RF Unit (Fig. 2); that is, across the tuned circuit of the 2nd RF oscillator. Application of the time-base sweep voltage (SK5, Fig. 6) to the reactance valve (SK2, Fig. 7), causes the resonant frequency of the tuned circuit to vary in synchronism with the frequency of the time-base, *i.e.*, frequency modulation of the 2nd RF oscillator occurs. If now the crystal selector switch (S1a-e) on the 1st IF/AF Unit (Fig. 3) is set to the 1 mc position, the frequency modulated output of the 2nd RF oscillator mixes with the 5th harmonic of the crystal. Resulting from this, a frequency modulated signal appears at the anode of the mixer (V7, Fig. 3). Since the mixer is followed by the frequency selective circuits of the IF amplifier, the instantaneous amplitude of the IF output will be a function of IF bandwidth. Selection of the 465 kc input to the CRT Monitor Unit (Position 5—S2a-b, Fig. 6) therefore results in the display of the overall frequency response of the 1st IF/AF Unit.

For several reasons it is preferable to rectify this signal of varying frequency and amplitude, before application to the Y-plate of the CRT. By so doing, and applying the resultant DC component to the CRT, the spot simply traces the outline of the IF response curve so providing a picture of better definition. Referring to Fig. 6, this rectification is achieved by use of a miniature diode (V4-EA50), switching to position 1 of S3a-b bringing the circuit into operation. Display of the 1st and 2nd IF/AF Unit combined response curve is effected by

operation of S2a-b to select the 50 kc signal input.

(e) *S-Meter.* The circuitry associated with this has already been discussed (*see* 1st IF/AF Unit). The S-meter is located on the CRT Monitor panel, interconnection with V12 on the 1st IF/AF Unit being *via* suitable plugs and sockets. A jack (J1) is provided which, in conjunction with S4a-b, enables the meter to be used externally for other purposes if required. A duplicate meter is used at the "remote" operating position.

Control Panel and Switching

The controls on this panel comprise those used for both receiver and transmitter circuits. Since in some instances these are interconnected, each will be discussed in turn. All switches are of the multi-contact "key" type, being ideal for this particular application having a "neutral" in addition to two operational positions.

It should be noted that in the following description the BFO switches, on both the 1st and 2nd IF/AF Units, are considered as being in the "Off" position.

(a) *Selectivity Switch*

Position 1 (Key Down)—Broad Selectivity. In this position a jack (J2) (also located on the Control Panel) is connected in parallel, *via* contacts on the Selectivity Switch, with J1 on the 1st IF/AF Unit (SK4); thus, the AF output is applied to the headphones *via* J2.

Additional contacts are made which connect the energising voltage to relay A/1 in the 1st IF/AF Unit, the contacts of which (A1), short out the crystal filter. This selectivity position is primarily intended for reception of Phone. If CW operation is required the BFO switch (S3, Fig. 3) on the 1st IF/AF Unit is placed in the "On" position.

Position 2 (Key Neutral)—Narrow Selectivity. The headphone jack (J2) on the Control Panel remains switched in parallel with J1 on the 1st IF/AF Unit. Relay A/1, however, is de-energised by the opening of the appropriate contacts and the crystal filter is brought into operation. Additional contacts switch on the BFO of the 1st IF/AF Unit, these contacts being in parallel with S3 of this unit.

Position 3 (Key Up)—Sharp Selectivity. The headphone jack (J2) on the Control Panel is now switched in parallel with J1 on the 2nd IF/AF Unit (SK2) so transferring the AF output of this to the headphones. Additional contacts switch on the BFO of the 2nd IF/AF Unit, the BFO on the 1st IF/AF Unit having

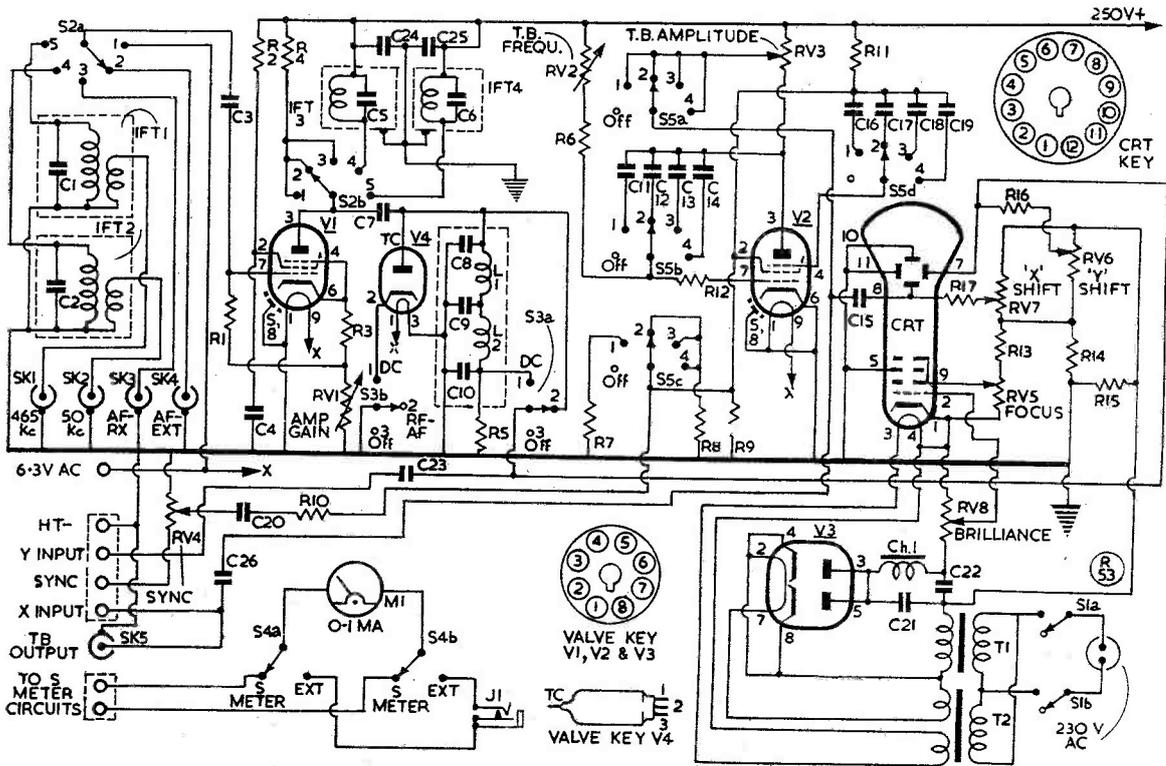


Fig. 6. In his home-built communications receiver, G8SI has incorporated a CRT unit; this diagram also shows the S-meter connections.

been switched off in the process of changing from Position 2 (Narrow Selectivity).

Since the 465 kc signal is continuously applied to the input of the 2nd IF/AF Unit no further switching is required in order to change from Narrow to Sharp selectivity.

b) Send-Receive Switch

Position 1 (Key Down)—Send. In this position the "Send Bias" from the Power Supply Unit (Fig. 5) is connected, via the appropriate contacts, to the AGC line of the receiver. Adjustment of RV2 enables the receiver to be suitably muted during transmission periods. Additional contacts are used to apply the requisite supply voltages to the various relays in the transmitter which also includes the transfer of the aerial from the receiver to the transmitter.

Position 2 (Key Neutral)—Receive. In this position the muting bias is removed and the receiver functions normally, the aerial having been transferred to the receiver with the de-energising of all relays in the transmitter.

Position 3. (Key Up)—Net. By adjustment

Table of Values

Fig. 6. CRT Monitor and S-Meter Unit.

C1, C6 = 60µF. (Silver mica) ± 1%.	IFT1 = IF Transformer, primary, see text; secondary, 15mH.
C2, C5 = 600µF. (Silver mica) ± 1%.	IFT2 = IF Transformer, primary, see text; secondary, 2mH.
C8, C9, C10, C13, C25, C18 = .005µF.	IFT3 = IF Transformer, 15mH.
C4, C12, C16, C17, C24 = .01µF.	IFT4 = IF Transformer, 2mH.
C15, C26 = .03µF.	L1, L2 = R F Choke, 150mH.
C11 = .05µF.	CH1 = Smoothing choke, 100H., 5mA.
C3, C7, C20 = 0.1µF.	S1A-B = DPST toggle switch.
C21, C23 = 0.5µF.	S2A-B = 2-pole, 5-way, wafer switch.
C22 = 2µF.	S3A-B = 2-pole, 3-way, wafer switch.
R3, R12 = 200 ohms.	S4A-B = 2-pole, 2-way, wafer switch.
R11 = 40,000 ohms.	S5A-D = 4-pole, 5-way, wafer switch.
R2, R8, R13 = 47,000 ohms.	T1 = AF Transformer (Ferranti AF3)
R7, R9, R10 = 100,000 ohms.	T2 = Filament transformer, primary, 250v., 50 cycles; secondary, 4v., 1A., secondary, 6.3v., 2A.
R4 = 150,000 ohms.	V1, V2 = Mullard EF50
R5, R14, R15 = 250,000 ohms.	V3 = 6H6G.
R1, R6, R16, R17 = 1 megohm.	V4 = EA50.
RV1 = 5,000 ohms.	CRT = VCR139A.
RV3 = 50,000 ohms.	
RV5, 8 = 100,000 ohms.	
RV4 = 500,000 ohms.	
RV6, 7 = 1 megohm.	
RV2 = 4 megohm.	
M1 = Milliammeter, 0-1mA. F.S.D.	

of RV3, the "Net Bias" from the Power Supply Unit (Fig. 5) adjusts the receiver gain to permit monitoring of the low level stages of the transmitter when changing VFO frequency.

(c) *Phone-CW-AF Filter*

Both the BFO switches on the IF/AF Units, and the associated contacts on the Selectivity switch, are looped *via* this three-position switch. In the Phone position, therefore, the BFO's are inoperative in all positions of the Selectivity switch. Additional contacts short the keying circuit, operation of the Send-Receive switch to "Send" thus bringing the transmitter fully on the air.

The AF Filter position is self-explanatory, the filter simply being switched into circuit.

The remaining components on the Control Panel consist of speaker on/off switch, keying jack and an additional headphone jack. This latter output is derived from the P/P AF Amplifier *via* the 600 ohm unbalanced winding of T2 (Fig. 5).

Receiver Performance Tests

"On the air" tests have been conducted in comparison with two well-known commercial receivers. These will be designated receivers "A" and "B." For any particular comparison the same aerial was used on each receiver.

(a) *Signal to Noise Ratio Comparisons.* The readability of weak signals is a function of signal-to-noise ratio; therefore, by selecting the same signal on each receiver (weak DX signals on 14 mc were used), the one providing the best copy can be regarded as having the superior operational performance from this point of view.

Under these conditions receiver "A," using maximum selectivity, proved to be somewhat inferior in the case of CW reception. In the case of Phone reception, however, receiver "A" was decidedly superior. This results from the fact that such signals are not intelligible on the home-constructed receiver as described here unless Broad Selectivity is used. In the case of receiver "A," several switched positions of selectivity were available hence the optimum bandwidth could be chosen relative to signal-to-noise (or QRM) ratio and intelligibility requirements.

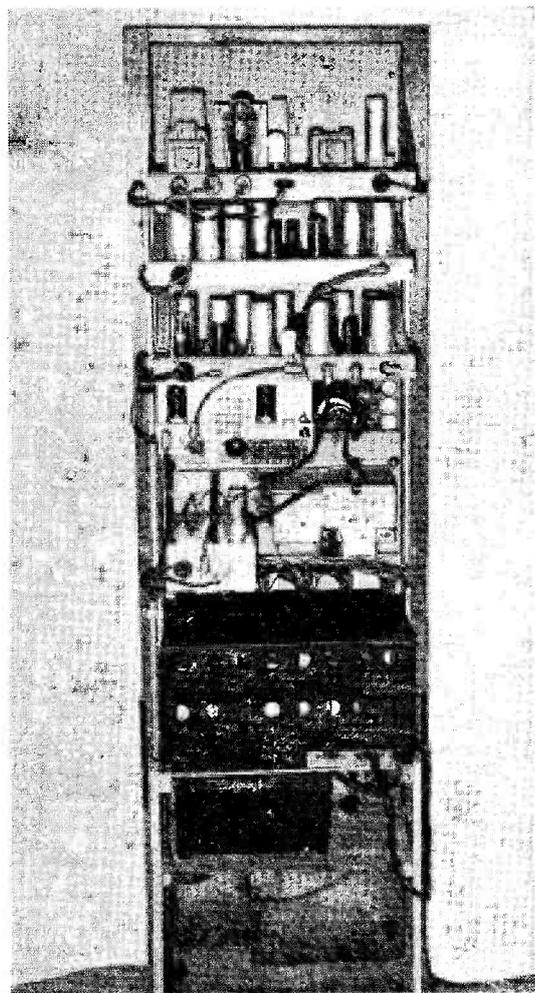
Receiver "B" was decidedly inferior in the case of CW and only slightly superior for Phone.

(b) *Selectivity Comparisons.* Without the aid of the requisite test equipment, this is the most difficult characteristic to assess. Completion of the frequency modulation facilities of the

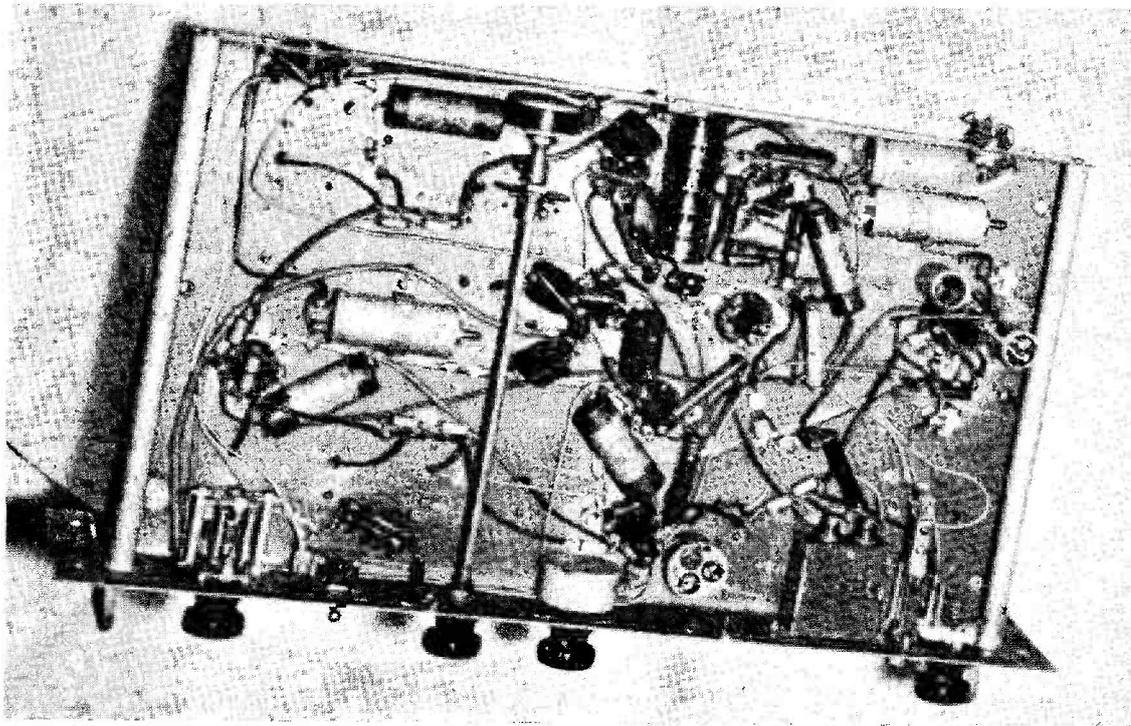
2nd RF oscillator will, in conjunction with the CRT Monitor Unit, enable the overall bandwidth to be measured with sufficient accuracy for the required purpose.

"On the air" trials indicated that, with reference to receiver "A," separation of strong adjacent channel signals was definitely in favour of the constructed receiver (both receivers using maximum selectivity). This improvement was due to the inclusion of the 2nd IF/AF Unit, removal of which resulted in performance being about equal.

The measured bandwidth of receiver "A" was unknown, figures quoted by the manufacturer, however, indicated this as being nominally 400 cycles at 6 dB down.



Rear view of the G8SI receiver. It is designed and constructed in sections, and as this and the other photographs show, is a well-engineered and neatly built job throughout.



Beneath the chassis in the second IF/AF section of G8SI's receiver; this operates at 50 kc and the circuit is given at Fig. 4.—see p. 91, April issue.

Performance relative to receiver "B" was materially superior, the bandwidth of this receiver apparently being appreciably wider than the constructed receiver. Manufacturers' figures for this receiver were not available.

A full discussion of all the tests conducted is not possible but have served to indicate that the original aims can be regarded as having been achieved.

Components

The average amateur, if only on economic grounds, endeavours to utilise available components as far as possible. Physical dimensions and so on of the various coils and IF transformers have therefore been omitted. Since the majority of the RF tuned circuits are pre-tuned, the necessary details regarding the required number of turns for available formers, can be obtained from data (9) (10) (11) available on this subject. For this reason inductance values have been included in the Table of Values for each unit. Data for the 2nd RF oscillator tuned circuit were calculated.

Although the values of inductance have been quoted for the IF transformers used, the adoption of any circuit, either completely or in part, will again depend on availability of suitable

components and a few comments on this may be of value.

Standard type 465 kc transformers can be adapted to single tuned circuits by the expedient of slicing the coil former into two parts, the two halves then being mounted in separate screening cans.

Tuned circuits for the 50 kc amplifier stages offer ample scope for ingenuity in the adaption of "surplus" components, such as BC-453 IF cans, broadcast band and low frequency coils, and components ex-R1155 receivers.

In order to provide low impedance coupling between units, additional windings are required on the appropriate coils. The number of turns is not critical and may be determined experimentally.

Inductance values quoted in the Table of Values for each unit are measured values. All windings are "slug-tuned" by means of dust-iron cores, the values quoted being with the "slug" set at approximately mid-position.

28-30 mc Coverage

As mentioned earlier, it is not proposed to discuss the VHF side of the receiver, for the bands above 28 mc. However, the presence

of the HRO receiver in the photographs requires some explanation! Since the receiver as described covers only the 7, 14 and 21 mc amateur bands, the HRO is used for the 1.7 and 3.5 mc bands. In addition, it is proposed to utilise the RF/Mixer section of this receiver (using the 28-30 mc bandspread coil) as the "tunable converter" for this band. A cathode follower (already fitted for other purposes) makes available, at low impedance, the 456 kc output from the mixer stage. Further modification to the HRO will be necessary in order to provide the required 5 mc signal input to the 1st IF/AF Unit, or, as an alternative, the inclusion of a further mixer stage for the conversion from 456 kc to 5 mc.

Receiver Alignment

Detailed information regarding alignment will not be given since this conforms to standard practice except, as previously stated, for the simplification in RF alignment that results from the absence of ganged tuned circuits.

Due to the number of tuned circuits in use, the main difficulty encountered is the achievement of resonance in each circuit, having regard to tolerance on component values and the existence of varying "stray" capacities. For this reason the availability of a Grid Dip Meter (covering all the frequencies involved) is considered to be an essential requirement.

Some initial difficulty was experienced in the alignment of the 465 kc tuned circuits to the frequency of the crystals in the IF filter. This was finally overcome by the removal of one of these crystals from the filter and substituting for the 100 kc crystal in the Crystal Calibrator stage (V13, Fig. 3). By this means, test signals of the correct IF were injected into the mixer stage (V7). This enabled the tuned circuits to be adjusted approximately to the correct frequency, subsequent replacement of the crystal in the IF filter resulted in satisfactory alignment and phasing.

Alignment of the RF section of the receiver was achieved by utilising harmonics from the VFO and/or crystal oscillator of a frequency meter. This comprises a VFO covering a frequency range of 2-4 mc with crystal check facilities from a 1 mc crystal in addition to 10 and 100 kc multivibrators. Alignment of the 5 mc mixer circuit in the 1st IF/AF Unit was carried out in a similar manner, using the 5th harmonic of the crystal frequency.

Initial alignment of the 2nd IF/AF Unit to 50 kc was effected by using the oscillator of the grid dip meter as the test signal. Final alignment of this unit was achieved by utilising the

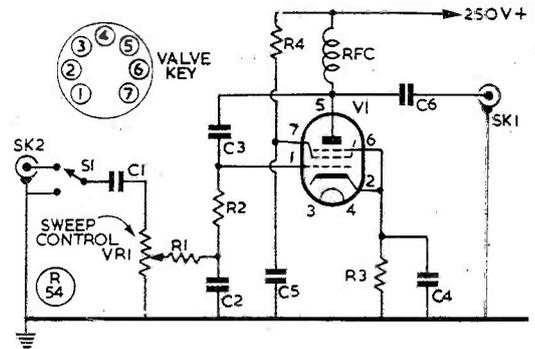


Fig. 7. The reactance valve circuit, the function of which is explained in the text.

Table of Values

Fig. 7. Circuit for the Reactance Valve Unit,

C3 = 10 μ F.	R2 = 400 ohms.
C6 = .01 μ F.	R4 = 6,000 ohms.
C4,	R1 = 50,000 ohms.
C5 = 0.1 μ F.	VRI = 0.5 megohm potentiometer.
C1 = 0.5 μ F.	RFC = RF choke, 2.5mH
R3 = 200 ohms.	V1 = Mullard EF91.

465 kc output of the 1st IF/AF Unit as the test signal.

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DX COMMENTARY

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

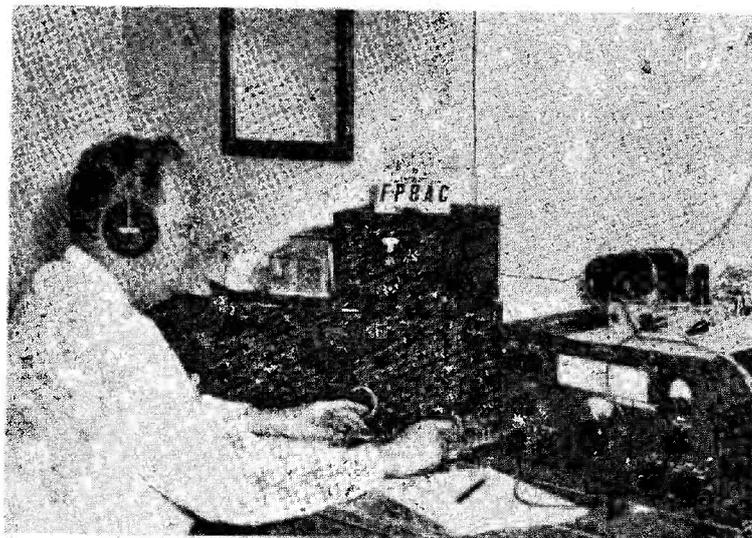
DO we detect a slight glimmer of light through the fog, or is it imagination? The bands sound poor enough to a casual listener, but many of this month's letters express the opinion that perhaps they are just a *very little* bit better than this time last year. At any rate, it's something to be grateful for if they are no worse; once we are round that bend there will be no stopping us. Just think of it—by this time next year we shall probably have quite perceptibly better conditions, and five years of steady improvement to look forward to. What a prospect! (Wonder what will happen to mess it up?)

There are many more signs of activity on 14 and 21 mc this month, although the Top Band is still our main customer. But it is nice to have a little more news of real DX filtering through, especially on 21 mc, which seems to have gone mad once or twice since we last saw you! Compared with last month, in fact, the reports on the HF bands are so good that we will go back to the old order and start, once again, with the highest frequency. So here goes.

The DX on 21 mc

G5BZ (Croydon) mentions the big opening on Easter Day, when the DX was rolling in from all parts. New ones for 'BZ were CE and CX on the key, and HP on phone. CR4AI (phone) was one that got away. G5FA (London, N.11) collected four new ones with VS9AP, VQ4AQ, ZS2A and MD5XZ.

G3DO (Four Oaks), working phone, connected with VQ5CB,



W6SAI/FP8AC

CALLS HEARD, WORKED AND QSL'd

KZ5DG and HP3FL. G2BW (Walton-on-Thames) has found conditions very good at times; he has heard many new countries, and, in addition to short-skip Europeans, has worked HP, TI, SU, VS9, CR7, 4X and 5A.

G3CMH (Yeovil Radio Club) returned to the air after a rebuild, and in two hours on phone they raised MD5EB, OD5AD, VQ2DT and 4RF, and 5A2CA. Nice ones heard were CR4AI, HP3FL, KG4AJ, TI2RC, VQ5CB, ZD1SW and ZD9AA—all on phone.

G3GUM (Formby) has pushed his score up to 71C on the 21 mc band, new ones including VP4LZ, CR7AF, 5A3CA, VS9AP, CT1CF, OD5VA, VQ2GL. YS10 was a nice Gotaway, and other good DX like our old friend VK9GW has been heard. 'GUM insists that the band is *wide open* for long periods when people are just sitting and listening to it; and he suggests that CQ's at fifteen-minute intervals are most desirable, and would be profitable.

G3BDQ (St. Leonards) hooked VQ4, VS9, ZD9AA and ZE3JO on CW, plus 5A2CA on phone. He also discovered an afternoon when the band filled up with W3's! G2WW (Penzance) has been wielding his phone to some effect, putting up his band score by 21 countries. The best of them were VU, AP, VQ5, ZD2, ST (CW), OA, HP, VP9, CR7, KZ5, VS1 and PJ. On Easter Day 'WW worked a couple of W1's, and one of them said it was the first time he had heard a G on phone!

G3FPQ (Bordon) complains of lack of activity, but has found such new ones as OA4C, SUIXZ, VP4LZ and ZD9AA on CW, also SVØWP and TA3AA on phone. 'FPQ is now off to VE for flying training, so he will be off the air for nine months or so. He looks forward to an 813 rig on his return.

G2YS (Chester) pushed his score up to 48, some of the new ones being VS9AP, VP7NM

(1830), OD5BA (phone), VS1FE (1320) and 5A2CA (1115).

The DX on Twenty

Even much-maligned *Twenty* has been "giving" on occasions, although it spends far too many hours with little occupying it but the OH's and SM's. G5BZ's bag includes ST, PJ, VS7, VS1, VP6, KV4, KZ5, EL, VQ3 and F18; nothing of breathless interest but enough to show that the band is still conscious.

G5FA managed to find OY2Z on the band, as well as VP9, VS9, ST, VU and the like. G3DO did some nice phone work with the Far East, including contacts with KA2LG, 7LJ, 7SL, DU7SV, KG6FAA, VS6CG and 6CL, and also a QSO with ZA1F—who may be genuine (see later).

G3BDQ was surprised and pleased to find CR9AH on the band—a brand-new one for him. G3GUM pounded brass with PJ2AA, HH2FL, OA4AK and 4ED, VP6BM and 6EG, VS2DF, VS6CG, YV5FL, KL7AJR, VP8AP and JA6AD. The Got-aways make an even nicer list, though—ZS9I, VS3BC, ZC5VS, KR6LL, VP2AD and HR1BG.

G8PL (London, N.W.3) returns to the fold and reports that *Twenty* is being given less attention than it deserves. He even thinks that the increase in the number of commercials on this band is probably due to lack of amateur activity. Nice prefixes heard by 'PL in the last few weeks include AP, EP, FU8, JA, KH6, SV (Rhodes), UAØ and ZS8—to mention only a few. ZS8D was heard on 14030, but blotted out; ZD2's, FQ8, FF8 and MI3 have been regular performers. 'PL still uses an indoor aerial—actually in the shack and just above his head! He had a card through from LU4ZI (Deception Island), but someone had stamped it "Unlicensed" three times and he fears it will not count. (We had one from the same station, direct, and therefore unspoiled—but we don't see what difference some anonymous person's comment should make!)

G3FJU (Welling) reports the following, with 80 watts to a dipole and his CR100 receiver: MP4BBD, YI2AM, VU2MD,

ZS7D, ZS3Q, KC6QY, OY2Z and "the usuals." He tells us that ZS7D's XYL goes on the key with her "personal call" of ZS7F, so you may get two ZS7's for the price of one. . . . Got-aways were CR9AH, KG4AF, HS1VR, HE1EO, KR6IG, F18AD and VP8AP—too bad!

GM2DBX (Methilhill) still keeps his phone going to some effect, and has worked AP2L, CR6, CX, HP, OD5's, PJ, CR7, KG6AEX, VP6, KA3AC and a few more. He tells us that PJ2AD really does QSL 100 per cent. 'DBX also had a QSO with ZA1F (see G3DO's report); this, too, was on phone. We've had ZA's before, but never a genuine one; let us hope the luck changes.

G3FPQ says he finds that CQ calls are some good after all, and they raised ZD4BD and HH2FL for him. Other QSO's were with CR7CH, JA8AA, KA8AB, KG6ADX, KR6IN, ST2AR and VQ3AV.

G8KP (Wakefield) worked F18AD and gives his QTH as Box 527, Saigon. This might cheer up those who (like ourselves) have worked three or four F18's but have never had a QSL.

G3EHT (Wadebridge) was active on phone, and found the VK's very easy at 0730—sometimes at S9+. Other DX was VP6, LU, PY, HR1UA, HH3FL, HP1AP, VS6CG, YV5AB and many more.

DX on Forty

Activity on *Forty* has fallen off somewhat, although it remains the best band for VK's and ZL's. G8KP worked five new ones—OD5AD, VQ2GW, VS9AP, ST2AR and VP5SC—and says there is still plenty of good DX there if you don't mind digging.

G3ESY (Hereford) raised VK3CP, VK6WT and VS7XG one evening with 20 watts, together with KG4AF, VE3AFO, ST2AR, an IS1 and OH8OG (in the Arctic Circle). G5FA's bag was SVØWE, MI3AB, SU, VO, YI, VS9AP, ST2AR, VP5SC, VP9GX, MP4BBL and KV4AA.

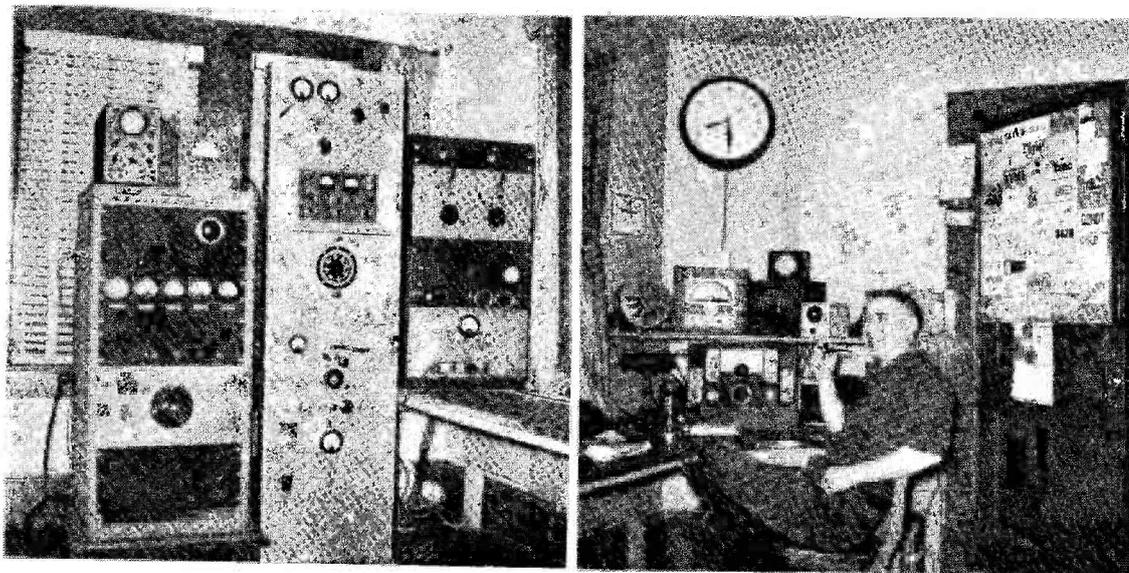
G3BDQ pulled in VS7XG, VS9AS, VQ4AQ, ST2AR, ZC4XP, ZS2HI and ZL1AH. G2BJY (West Bromwich) still sticks to the band and has worked ZL's (usually there 0700-0815). VK (in-

frequent), VE and LU. Phone contacts were made with 9S4AC and TF5TP. 'BJY has also been amusing himself by improving his

TOP-BAND COUNTRIES LADDER

(Starting Jan. 1, 1952)

Station	Confirmed	Worked
GM3OM	78	79
GM3EFS	75	80
G16YW	73	77
G8KP	73	77
G3ELZ	73	76
G6VC	72	75
GM3IGW	71	72
G13HFT	70	71
G4XC	69	72
G2NJ	69	71
G6ZN	68	72
GM3JDR	67	69
G3ESY	67	68
OH3NY	66	73
G3IAF	65	73
G3HDQ	65	68
G5LH	62	69
G5JU	61	70
G3AKU	61	63
G3GZJ	61	63
G3FNK	60	69
G3HIS	60	69
G3HQQ	60	69
G3HTI	60	64
G2YS	46	61
G2BJN	46	53
G3IEF	45	58
G3HIW	44	62
G2AOL	42	66
GW3CKB	35	55
G3DO	28	39
G13CVH	24	52
G3HWH	20	41
G3DVG	20	29
G5FA	20	28
G3NA	18	31
G3ITY	17	43
G3FZS	15	33



WILYV, Waquoit, Mass. will be remembered as one of the most consistent and successful East Coast stations during our Top Band Trans-Atlantic Tests. The transmitter puts 160 watts into a 1,000 ft. doublet, and the receiver is an NC-100X with DB20 pre-selector. All the cards on the door are for QSO's on the 1.7 mc. band.

(Photograph W1BB)

French on the many S9 French-speaking stations coming in during the daytime! One way of making good use of the band.

G6QX (Hornchurch) gave 7 mc a whirl and worked VK3XB, VS9AP, ST2AR, VQ2GW, CR5AE and YV5ER—the first five being new ones. G3FJU extended his twenty-metre dipole and raised HH3L, YI2AM, an IT, W's and VE's; gotaways were KP4CC and VP8AP.

G3FPQ thinks the BC QRM is not quite so bad as it was. His best QSO's were EA9AP, F9JD/FC, VS9AS, KT1, PY, VK and ZS. He also worked several ZL's and some easier stuff. An interesting one was LU0AAW, on board ship in European waters.

G2YS hooked with VS7XG (1915), PZ1WX (2140), VP5SC (2315) and YI2AM (2114). G5CP (Manchester) also found the latter one—his first 40-metre CW contact for years!

Eighty-Metre Doings

DX on Eighty has been pretty sparse, but for those interested in picking up the odd addition to their five-band score it can still be quite rewarding. G5FA worked VE, TA and sundry distant Europeans with 20 watts, and heard

VS7NG. G6QX spent most of his time, as usual, on the band, but worked only VE, VO, W and locals.

G3FPQ made new ones out of TA3AA and ZL3GQ, and also worked CT2BO, who, he says, is on Eighty most nights at about 2300. He often calls CQ without getting any replies—doesn't anyone want a CT2 any longer?

G3ESY winkled out ZC4IP, CT3AB and IT1AGA, giving the latter his first G contact on the band. G3ITY (Chester) started up quite recently and has a score of 17 countries on 3.5 mc.

G2AOL (Oxford) has been trying QRP on Eighty, and 10 countries, including OZ and SM, have been raised with *half a watt*. He wants a DX-chasing session on the band but fears that he will have to QRO to about 50 watts to make any real impression.

Top-Band Topics

News of *One-Sixty* falls under two headings: The aftermath of the Trans-Atlantic Tests and the DX on the one hand, and the WABC-chasing technique on the other. Both seem to have interested a lot of people, but we will clear off the real DX news first.

G8WF (Leeds) tells us that he worked five W's, including W4KFC, on March 8, and that he heard KV4AQ on March 13 and KP4KD on March 22. He adds that G3ERN and G3US also made contacts with W's.

G3HKC (Birmingham) suggests that the "G3HYG" reported as working WILYV was a garbling of his own call-sign, since he did work 'LYV, and on November 9, 1952, at that! It was 'HKC's first W contact on any band.

G5JU (Birmingham) continued long after the official tests were over. On March 15 he raised three W's and a VE; on March 22 he heard VP9BDA and KP4KD working W's. March 29 was quite blank, but on April 5 'JU worked VE1EA, WILYV, 2BLR and 2GGL, signals averaging 559. On April 12 he heard W1AW, 2GGL, 2RLD and 9CZT.

Some very fine and comprehensive SWL reports prove that DX conditions remained good until long after the Test sessions closed. C. L. Bradbrook (Alton) heard VP9BF and 11 W's on CW, plus KV4BB and two W's on phone (March 8); then on March 22 he logged KP4KD, VP9BDA and four W's; and on April 5 two W's and a VE were logged. C.L.B.

missed KG4AF but was naturally pleased about VP9 and KP4.

G. C. Allen (Thornton Heath) sends a full report which ties up with the above; in addition, he thinks he heard W5BRK on March 21. J. L. Hall (Croydon) was also active right up to March 22, and on the 21st he logged KG4AF, KV4AQ and VP9BDA. On April 12 he heard W4HQJ and W2GGL at 0530.

W1BB (Winthrop, Mass.) tells us that his skeed with ZS3K still continues, and the ZS still hears him, but there has been no luck in the other direction. VP9BDA and KP4KD were apparently looking for multipliers in the ARRL DX Contest, and 'BB worked them both. VE1EA (Windsor, N.S.) also writes to say that he worked ZC4XP a second time on March 5, and followed him up with a contact with G3ERN. So VE1EA has had three contacts with Asia, his first being with HZ1KE in the 1951 tests.

And so to the WABC-chasers, whose ardour doesn't seem to abate in the slightest—look at some of those scores in the Table! First of all, we must pass on the thanks of many readers to G5PP for his Welsh expedition. GW5PP/P operated from three Welsh counties during the Easter week-end (mostly in really foul weather) and quite a few 'chasers are already in possession of all three cards. So here is a com-

munal vote of thanks to him, on behalf of his numerous happy clients.

G8KP added Montgomery and Brecknock to his score, as well as Roxburgh (GM31PU) and Armagh (GI3CVH). Other additions were two new OH's, and three 579 reports from CN2AP were more than welcome, though no QSO resulted.

G3ITY suffers from a pirate on this band; he is licensed for CW only, but keeps getting cards for phone contacts. (He had 22 of them in one batch, so this guy seems pretty determined!) Please note that G3ITY is only on CW and is in Chester; the other one appears to be near London.

GM3OM (Larbert), who sits at the top of the Counties Ladder, held his place there with GW5PP/P in all three counties, Roxburgh, Kinross (GM3IGW/A), Perthshire (GM3HSB), Fife (GM3IXD) and Renfrew (GM3HZN and GM4NK). G16YW also raised G5PP from the three locations, but is sad at not yet having worked Cambridge.

G3HIS (Ashbourne) listened while at work on Easter Monday, and heard GW5PP/P right near his crystal frequency. So he grabbed the motor-bike, rushed home and got him, and returned to work a happier man. This must be a record of some kind...

G3HTI (Cleethorpes) chalks up yet another WABC for Lincs., after having been stuck at 59

cards for many weeks. G3IAF (Guildford) has found the band patchy, but usually in good shape for contacts over 300 miles. Several of these have been made, including one with HB9T.

GM3EFS (Dumbartonshire) thinks One-Sixty is falling off now, but he did hear a lot of OH's having their last fling, and also logged a YU, who may not have been genuine. 'EFS has actually been chasing Counties, instead of sitting back and letting them chase him, and his score is up to 75/80 in consequence. GM3IGW (Alloa) made the first GM/MF2 contact, duly confirmed. His two trips to Kinross brought good results, including phone reports from OH. OK and GC.

G2NJ (Peterborough) has heard TF5TP on the band, and reports that his /A call has now been transferred to a new QTH in Hunts., from which he hopes to operate soon. G2BJN (Loughborough) would like some CW activity from GD and EI. (The latter isn't possible—they are not normally licensed for the band). 'BJN has been portable from Rutland (during April) and hopes to do more of it next month.

G3HDQ (Cheshire) is another WABC claimant, and mentions G3FDG (Shropshire) and GM3HZN (Renfrew) as new ones. DL2PT was also worked during March. G4FN (Westcliff) has got himself up to 60 worked, in 50 evenings on the band. This work stopped at 2200 and was done with 3 watts and a 14 mc dipole! Now it's a question of getting those cards...

G5LH (Horbury) has added a few, including GW5PP/P on phone, and tells us that G6ZN is expecting mains at his house in a few weeks. G3AKU (Hunts.) made a very rapid WABC—in twenty days on the air, mostly for an hour or so each time. Now, with a sigh of relief, he is getting married and changing QTH!

G3IEF (Aylesbury) raised OH2MA and OK1HI, but didn't like the scrum around GW5PP/P. He says that lots of stations were giving long calls on his frequency while he was actually transmitting (twenty-metre specialists know all about that one). G2AOL mostly uses about 2 watts and has worked

FIVE BAND DX TABLE
POST WAR

Station	Points	3.5 mc	7 mc	14 mc	21 mc	28 mc	Countries	Station	Points	3.5 mc	7 mc	14 mc	12 mc	28 mc	Countries
DL7AA	568	74	131	210	53	100	217	G6QX	370	50	90	142	31	57	165
G6QB	561	52	103	215	56	135	231	G4ZU	333	11	9	175	18	120	189
G5BZ	493	56	101	216	55	65	220	G3GUM	309	31	38	168	71	1	177
G2VD	468	46	84	175	55	108	184	G2YS	307	42	52	125	48	40	145
G2BJY	437	48	77	141	55	116	179	G3ABG	303	35	79	142	17	30	149
G2WW	434	23	70	188	46	107	195	G2BW	303	24	57	144	35	43	151
G3DO	414	24	45	192	46	107	219	G8VG	268	34	76	123	9	26	140
G3FXB	403	54	102	168	40	39	174	G3FPQ	254	47	40	120	35	12	127
G5FA	398	33	116	150	26	73	165	G2DHV	173	20	21	107	10	15	111
								V57XG	116	1	17	93	2	3	93

66 counties and 13 countries, including ZC4XP and ZB1BJ!

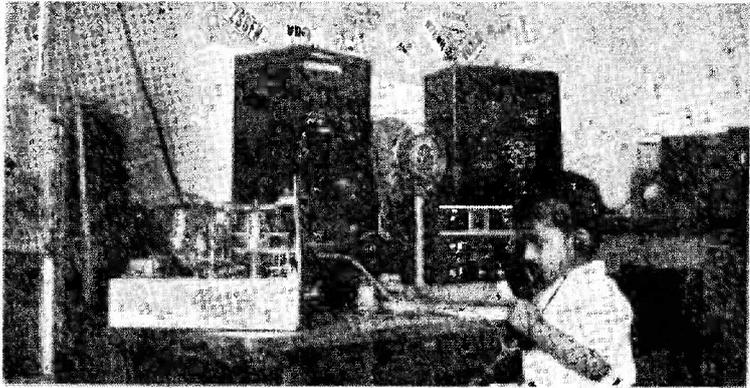
G13CVH (Armagh), with 4 watts to a 6V6, raised OH3NY and OH7NW. His Tx is driven from a 24-v. lighting plant; all his QSO's will be QSL'd direct if an s.a.e. is sent. G6VC (Northfleet) mentions G3FDG (Shropshire) and GC3EBK (Guernsey) for those interested; he also worked OH5PN and HB9T, but has had no luck yet with ZC4XP.

G2YS suggests that some daylight tests in the summer might be interesting; so many people are working locals that they don't bother to listen for signals from 100 miles or more. At nights the QRN gets troublesome, but some semi-DX tests between 1200 and 1600 BST might be illuminating. On Easter Monday 'YS put the theory to the test, and from 1500 onwards he made several contacts of 100 miles *plus*, including GC3EML (over 300 miles) at

21 MC MARATHON

(Starting July 1, 1952)

STATION	COUNTRIES
G3GUM	71
G6GN	62
G6QB	56
G2VD	55
G2BJY	55
G5BZ	55
DL7AA	53
G8KP	50
G2YS	48
G5CP	46
G3DO	46
G2WW	46
G3FXB	40
ZE3JO	36
G2BW	35
G8OJ	32
G6QX	31
G5FA	26
G3CMH	18
G3ABG	17
G3TR	10
G2DHV	10
G8VG	9



VS7SR, Vavuniya, Ceylon, with the second harmonic at the operating position. First licensed in 1950, the station is situated in a remote jungle town; there are power supply difficulties, involving use of a petrol-driven generator. The Clamp modulated transmitter runs 40 watts on 7 and 14 mc, aeriels include a two-band Windom, a Vee-beam on Europe and a 20-metre dipole, and the receivers are an HRO and an AR88, with LM-13 frequency meter. The station is shortly to be re-built in rack form.

1545. We will remember this one and try to organise something next month.

Final note on this band comes from OH3NY (Lyly), whose score stands at 73 counties. (Matti is now going in for VHF, as Top-Band activity is over for him). He says that ZC4XP, whom he has worked, arranged a sked with SU1XZ, which didn't come off. But, as his final fling, Matti will be calling CQ Africa on Saturday nights and early Sunday mornings.

Late Flash: G3HIS (Ashbourne) has just made his WABC, using one crystal on 1895.5 kc—and all this year except for one county. This is probably the only crystal-WABC as yet!

The Overseas Mail

Ex-G3BAA writes from Egypt to say that any signals from G3BAA emanate from a pirate; he will be in SU for 2½ years and hopes to do some listening, although transmitting is still quite illegal out there for Service people.

ZB1AH (Sliema) wants some more phone activity on 21 mc, as the ZB1's have all the band now, plus phone permits. He finds the inactivity a bit trying and says "surely the old hands haven't forgotten how to make their doubler triple?"

G3CHN (M.S. *Benedick*) listened for the Trans-Atlantic Top-Band tests while between Pakistan and the Persian Gulf, but has nothing

to report but an S9 noise level. He has been meeting some of the MP4's, and tells us that they are straightening their calls out, so that B as the first letter will always mean Bahrein, K Kuwait, and Q Qatar. There are three chaps in Qatar, and their direct QSL address will be "c/o Communications, Petroleum Developments of Qatar, By Bahrein, Persian Gulf."

VQ4DX (Nairobi) is ex-G3HQB, and he says operation is a bit erratic at present, but he hopes to work some G's on 7 and 14 mc before long. VQ4CW (Nairobi) says someone has been pirating his call on 80 metres, a band that he doesn't use. He has been doing some nice stuff on 14 mc with his B2—62 countries up to date—and says the European signals have been very good on 7 mc round about 2000 GMT.

VS7XG (Colombo) is perking again, but has to move QTH. However, in August he will have a bungalow and "no great aerial difficulties." Peter is concentrating on 7 mc and tries to find a quiet spot round about 7030 kc. He met G2AJU and family, *en route* for VK6.

W9SRB/6 (Dixon, Calif.) is none other than our old friend DL4FS/3A2AB, and he describes conditions in W6 as "absolutely putrid." During the ARRL Contest very few W6's made any European contacts, and, as Guy

Short Wave Magazine DX CERTIFICATES

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

WFE

- No. 6 W8PQQ (West Virginia)
- 7 W2BXA (New Jersey)
- 8 G8KP (Wakefield)

WNACA

- No. 36 G3DO (Four Oaks)
- 37 G5XG (Paignton)
- 38 GM6MD (Glasgow)
- 39 HC2JR (Guayaquil)
- 40 F8EJ (Cambrai)
- 41 OQ5RA (Leopoldville)
- 42 ON4GU (Gerpinnes)
- 43 DL1DX (Bamberg)
- 44 SM6HU (Gothenburg)

WABC

- No. 18 G3IAF (Guildford)
- 19 G4XC (Grimsby)
- 20 G3AFL (Berwick on Tweed)
- 21 G3FNK (Derby)
- 22 G5JU (Birmingham)
- 23 G3GZJ (London, S.E.8)
- 24 G3HQQ (Worthing)
- 25 G3AKU (St. Ives, Hunts)
- 26 G3HDO (Woodford)
- 27 G3HTI (Cleethorpes)
- 28 G3HIS (Ashbourne)

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

says, "if those boys can't make it with their rigs, the band is *really* bad."

ZE3JO (Salisbury) finds 21 mc heavy going, although he picked out six new ones with VU2RX, ZD9AA, VQ5CB, ZS3O, SP6AQ and VS9AP; but he says Ten is "dead as mutton."

"Double Brandy" of VS2DB (Box 250, Ipoh) will be back on the 14 mc band during May with his 60w. table-topper, most days 1430-1600 GMT, and will QSL all new contacts—he still wants to work GI. Incidentally, the QSL manager for Malaya is now VS2DV, Box 600, Penang.

ZC4DT is home on leave but will be heading for an unknown destination overseas again in June. As MP4KAA-VT1AC he worked 57C in 5½ months; as ZC4DT he managed 75C in 18—this sort of

thing makes DXCC a bit hard! He thinks all his ZC4 contacts have duly been QSL'd, but if not—write him at 31 St. Margarets, Rottingdean, Sussex.

Miscellany

G3GUM tells us that the Easter Island trip has been postponed yet again, and that CE3AG now hopes to sail some time during May. KV4AA says that HZ1MY is now CN8MY and plans expeditions to Ifni and Rio de Oro; also that ZC3AA (Christmas Island) was to begin operations on April 26, on 14 mc CW and phone. The operator is an ex-VK7. YJ1AC and FU8AB are said to be active, the first on 14 mc and the second on 7 mc. ZC5VS is also on 7015 kc.

Mirko, of YU1AD, whose station description appeared recently, is home again after the operation on his foot, and enjoying himself on the bands. VS9AP and MI3AB on 80 metres brought his score there to 69 worked. He heard a YV up there, and says that an SVØ will be on this month. On *Twenty* he found ZC5VS (1300) and worked a host of other DX, including FI, KR6, KA, JA and CR9; on phone he collected DU, KL7, OD5 and HZ.

G5VT (Bishops Stortford) expresses the disappointment of many of us concerning the absence of QSL's from EA9DC (Ifni). He even suggests that we should go into the QSL business and *send* him some! This is the sort of thing we must leave to some public-spirited individual—otherwise all the DX-peditions of the future would be jumping on the band-wagon. But we have hopes of Ifni—see two paragraphs back!

On the Certificate front, G2WW has claimed the WEA, WASM, WAI and the first two parts of the DUF. He awaits one card each for WFE and AAA. WAIP and WASP are also tantalising

him. Incidentally, we said last month that G2ZA used to hold the call G2WW. Well, G2WW used to be G6BJ! (Come to that, G5LH used to be G5KZ, and G5KZ used to be G2FM. And G6QB once held the call G6LT for a *portable*. Sort 'em out!)

G6BS (Great Shelford) passes on the word that Egyptian nationals are now being licensed again, and that the SU1MR on 20-metre phone is the old station, operated by Margaret and Ray, with their new permit. Cards to Box 672, Cairo.

Regarding G6XY's recent QSO with NEP1NMC, which we thought might have been a "first," G8KP tells us that he worked VU7AF (Nepal) on May 1, 1949, and has a card from him. 'KP thinks VU7AF worked quite a number of G stations around that time.

ZS8MK is off the air for the present and will be docking at Tilbury on June 24. Between then and October he hopes to meet many G's in person (thanks to G6GN for this item).

From KV4AA's DX notes we gather that Fletcher's Ice Island, home of KF3AA, has drifted out of the Alaskan Air Command and is in the Northeast Air Command. The eastward creep might even result in a signal signing KF3AA/UAØ!

W2GT and GM2DBX have both sent in some interesting gen. on the situation in Bulgaria. This will appear elsewhere in *Short Wave Magazine*, being a little outside the scope of this Commentary.

So that concludes the homily for one more month. Deadline for the next issue is **first post on May 13**, and for the following one first past on *June 10*. Note these dates and address everything to "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. 73 and BCNU.

ARE YOU IN

The *Radio Amateur Call Book*? If not, send us your call-sign, name and address for publication in "New QTH's," which will automatically ensure appearance in the next available issue of the *Call Book*; changes of address can likewise be notified

through our QTH Section. These facilities are available to any holder of a U.K. call-sign, even if not a regular reader of *Short Wave Magazine*. We only publish call-sign/addresses at the direct request of the licensee.

VHF Weather in Early March

METEOROLOGICAL CONDITIONS RELATED TO OPERATING RESULTS

A. H. HOOPER (G3EGB)

This article, specially commissioned by SHORT WAVE MAGAZINE, discusses the weather effects which produced the extraordinary DX results enjoyed by VHF operators early in March, as reported fully in "VHF Bands" in our April issue. Meteorology may still be an inexact science, but in his most interesting appreciation our contributor shows just how the weather worked to build up an enormous, stable reflecting surface at the low level of 1,000 feet or so during the period February 28 to March 7. An understanding of these phenomena will help all VHF operators to get the most out of our 144 and 430 mc bands—see "VHF Bands," p.488, October, 1952. It is evident from G3EGB's researches that communication over even greater distances would have been possible on both bands had there been more European stations available at these distances.—Editor.

MOST VHF enthusiasts will have been able to enjoy the remarkable spell of extended propagation which occurred early in March. It is thought that they will be interested to see how far the fundamental ideas of radio meteorology can explain their experiences. For the sake of brevity it will be assumed that they are familiar with the principles set down in the February issue of *Short Wave Magazine* ("Predicting VHF Conditions").

Surface Conditions

Towards the end of February an anti-cyclone existed over Eastern Europe, with a ridge extending westwards over the UK. On the 27th an anti-cyclone developed in this ridge, with its centre over Southern England, and began to drift north-eastwards. It travelled out over the North Sea during the 28th, then, turning south-eastwards, reached the vicinity of Hanover in the early hours of March 2. A rapid move westwards followed, reaching Dublin 24 hours later, where it remained during the 3rd and 4th. Then drifting eastwards it was over Lincolnshire by the evening of the 5th, only to turn westwards again over Eire as a weak cold

front passed across the UK during the night March 6-7.

Such was the size of this anti-cyclone that England was under its influence at all times during the period February 27-March 7, even when centred 450 miles away over Germany.

Anti-cyclones are usually irregular in shape, with ridges of high pressure extending outwards from the centre for a greater distance in some directions than in others. In so far as extended propagation can be associated with higher pressure, the arrangement of these ridges at a given time is likely to indicate the orientation and extent of the longer communication paths within the system.

A study has been made of issues of the *Daily Weather Report* of the Meteorological Office, London. The result is most simply expressed by listing the evenings when the anti-cyclone and its ridge extensions dominated certain routes from England, thus:

England—North Eastwards

Feb. 27: to Southern Scandinavia
Mar. 1: to Southern Scandinavia
Mar. 5: to South Western Norway only

England—Eastwards

Feb. 27: to Eastern Germany	Feb. 28: to Poland
Mar. 1: to Czechoslovakia	Mar. 2: to Austria
Mar. 3: to Low Countries	Mar. 4: to Western Germany
Mar. 5: to Austria	Mar. 6: to Austria

England—South Eastwards

Feb. 27: to Bavaria	Mar. 2: to Austria
Mar. 3: to Switzerland	Mar. 4: to Luxembourg
Mar. 5: to Austria	Mar. 6: to Switzerland

England—Southwards

Mar. 6: to Massife Centrale

It is, however, very misleading to rely solely upon an association of propagation conditions with barometric pressure patterns. To achieve these paths, it is necessary for bending in the vertical plane to take place and we must at all times take into account the vertical changes in radio refractive index. It does *not* follow that the right conditions exist in every anti-cyclone or indeed only in high-pressure systems.

At this time of year the temperature of the Southern North Sea is about 42°F. and with the light winds experienced one cannot expect a surface inversion to form by a drift from

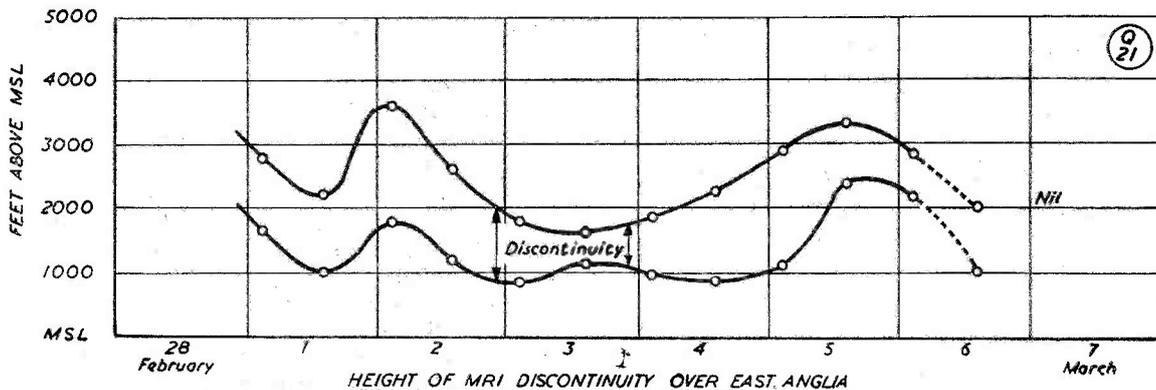


Fig. 1. Upper and lower limits of a discontinuity in modified refractive index (MRI) occurring over Eastern England during early March, and producing the exceptional DX results enjoyed by VHF operators during that period. The low levels indicated are extremely rare in these latitudes.

the land out over the water. An alternative method of bridging the gap to the Continent is required.

Conditions Aloft

The *Daily Aerological Record* of the Meteorological Office gives the results of soundings upward through the atmosphere, made twice daily at various places. Taking East Anglia as roughly near the centre of our several paths we find that warm, dry, air was subsiding towards the ground and first appeared at low levels during the night February 28-March 1. The conditions for a discontinuity in radio refractive index can be established by subsiding air, noting that when very near to the surface exposure to surface moisture results in the level of refractive index discontinuity being somewhat higher than the base of the subsiding air.

In Fig. 1 the lower of the two curves shows the changes in height of the MRI discontinuity over East Anglia during the period. It is below 2,000 feet for nearly the whole of the period and near 1,000 feet for much of it. Over Lancashire and much of the Continent to the East conditions were similar. Fig. 2 gives the same information for Northern Ireland, where the discontinuity slowly descended from 3,000 feet to 1,000 feet during the same period. The fresh air arriving behind the weak Cold Front on March 6-7 at first showed no subsidence. It will be noticed that as the anti-cyclone centre moved away eastwards during the evening of March 1, the discontinuity over East Anglia rose, and then sank again with the centre's rapid return on the 2nd. Over Northern Ireland, further from the centre, the MRI discontinuity was, in general, at a higher level throughout the period.

We can picture this reflecting surface as saucer-shaped, extending over the anti-cyclone at about 1,000 feet from the surface for great distances, and then rising towards the edges. Propagation across the sea, then, will have been by reflection from this surface. As indicated in the author's article in the February issue, subsidence at such low levels is a rare occurrence — as were the VHF propagation conditions observed.

From the foregoing we can imagine everything as happening by reflection from this huge saucer, poised about 1,000 feet above mean sea level and extending over a vast area.

Discussion

Vertical plots of MRI for the surface layers at a number of places show that, despite excellent conditions for night-time cooling by radiation, no duct formed at any time over the UK. The rapid formation of fog every night, which retarded further cooling and maintained large quantities of water vapour in the lowest layers, appears to account for this. Propagation over land paths was not, in this instance, much extended by cooling effects. Instead, the major part of the extension arose from reflection aloft. This implies little variation in propagation from day to night-time, both for land and sea paths, a conclusion in agreement with reports—G5YV was able to work EDX stations at mid-day. It is worth observing that had surface effects existed in the presence of such strong reflection aloft then there would have been extensive areas where *both* paths were receivable, and it seems likely that appreciable fading would have been reported. Signals were in fact remarkable for their steadiness.

Apparently stations in Ireland and in Lancashire failed to hear those on the Continent. The upper limit of MRI discontinuity is less clearly defined, but in Figs. 1 and 2 the upper curves show the most probable values. Regarding the "reflection" process as a bending downwards taking place within the discontinuity limits, and remembering that the limits over Lancashire were similar to those in East Anglia, we see that reflection was, in general, occurring between 1,000 and 2,000 feet above m.s.l. (mean sea level). Fig. 3 shows the approximate outline, in the G area, of ground over 1,000 feet above m.s.l. Many places within the shaded districts exceed 2,000 feet. We can regard these areas, then, as interruptions in the reflecting layer. To the extent that this is true, we can now see why stations to the west of our mountain ranges failed to QSO with the Continent. We infer that for these stations to enjoy unobstructed paths the subsiding layer should not sink below about 2,000 feet, and such is usually the case. From Figs. 1 and 2 it would appear just possible for these stations to have achieved a QSO, over the mountains, in the late evening of February 28 and again in the early hours of March 2. But these are the only chances they would have had. It is worth noting that QSO's through the Cheshire Gap should have been practicable in directions between SSW and SSE over Lancashire, and over a narrow arc south-eastwards through the gap from the vicinity of Belfast.

The GM Chances

The same argument implies segregation of the Scottish stations north of the Southern

Uplands. There, a discontinuity lay between 900 and 1,400 feet for the evening of March 1 and the following day-time, and later rather weakly from the early hours of March 4 until the 6th. It seems possible that for the GM's Scandinavia was within reach during the late evening of March 1, but in general, this area was on the extreme edge of the anti-cyclone, with little chance of joining in the general activity.

The Seventy-Centimetre Results

For effects at 430 mc to be similar to those at 145 mc surface ducts can be shallower and elevated discontinuity layers thinner. The former, beginning at the surface, become progressively deeper, while the latter begin as weak diffuse layers and become progressively thinner. Excluding equipment limitations, extended propagation over the surface is *easier to achieve at the greater frequency*, while aloft the reverse holds true. Ideally the discontinuity aloft is abrupt, in practice it occurs over a considerable depth. The strength of reflection is determined by, amongst other factors, the depth in terms of wavelength. In Fig. 1 it is particularly interesting to note the reduction of depth during March 2 and 3, and the subsequent increase from March 4 onwards. The minimum depth occurred during the early afternoon of March 3. It was the same evening that produced the 360-mile contact GW2ADZ-ON4UV on the 70-centimetre band.

Attempts to assess the relative intensity of reflection during this period failed because of difficulty in obtaining the layer thickness with sufficient accuracy.

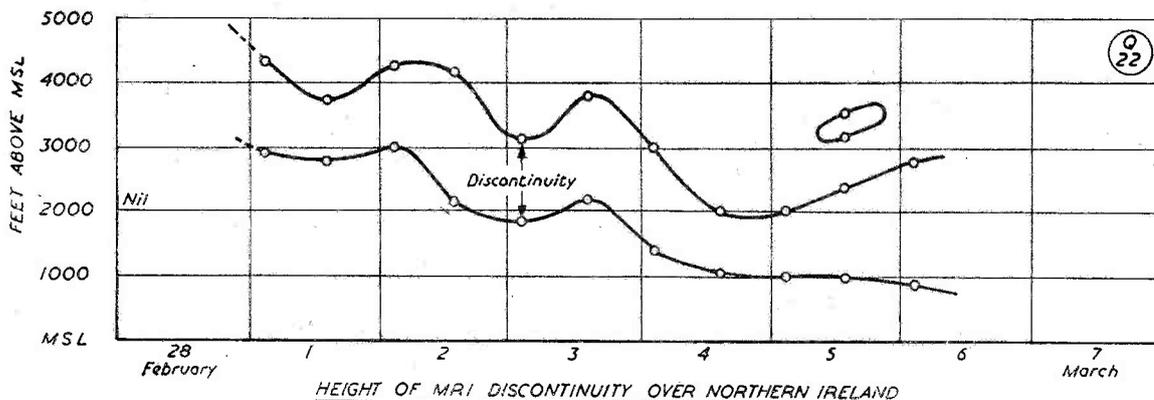


Fig. 2. The conditions existing over Northern Ireland during the early-March period, showing the fluctuating but progressive lowering of the MRI discontinuity towards the ground. It is this discontinuity that produces the DX—for a definition of MRI see p. 741, February. It is now known that during the period indicated by these curves conditions within GM, and between GI and GM, were superlatively good, though these areas were cut off from the European DX—see map at Fig. 3.

The writer would particularly like to learn of QSO's in apparent contradiction of this appreciation and is wondering, for example, whether the path G5YV-E16A is effectively through the Leeds-Skipton-Preston gap in the Pennines.

Predicting Conditions

It is interesting to consider whether or not the presence of subsidence could have been detected for this period by surface observation. On the afternoon of February 28 there was scarcely any low cloud and an observer using dry and wet bulb thermometers would have deduced the presence of a temperature inversion below 3,800 feet. By the following afternoon over-night fog had largely cleared and, again with no low cloud, reported temperatures indicate an inversion below 2,500 feet. On subsequent days many places failed to clear from over-night fog. Other than that stagnant conditions with little likelihood of change now existed, no definite conclusion was possible. At all times recourse to a weather chart is necessary to indicate the extent of conditions, and it should always be borne in mind that reflection of signals will occur, if at all, over some place well along the intended path.

The association of propagation conditions with the anticyclonic weather which followed the Cold Front on March 7 and which, after various fluctuations, resulted in another low level discontinuity over East Anglia during the period March 18-24 will also have produced EDX conditions*. Perhaps those then experiencing exceptional results will feel inspired to

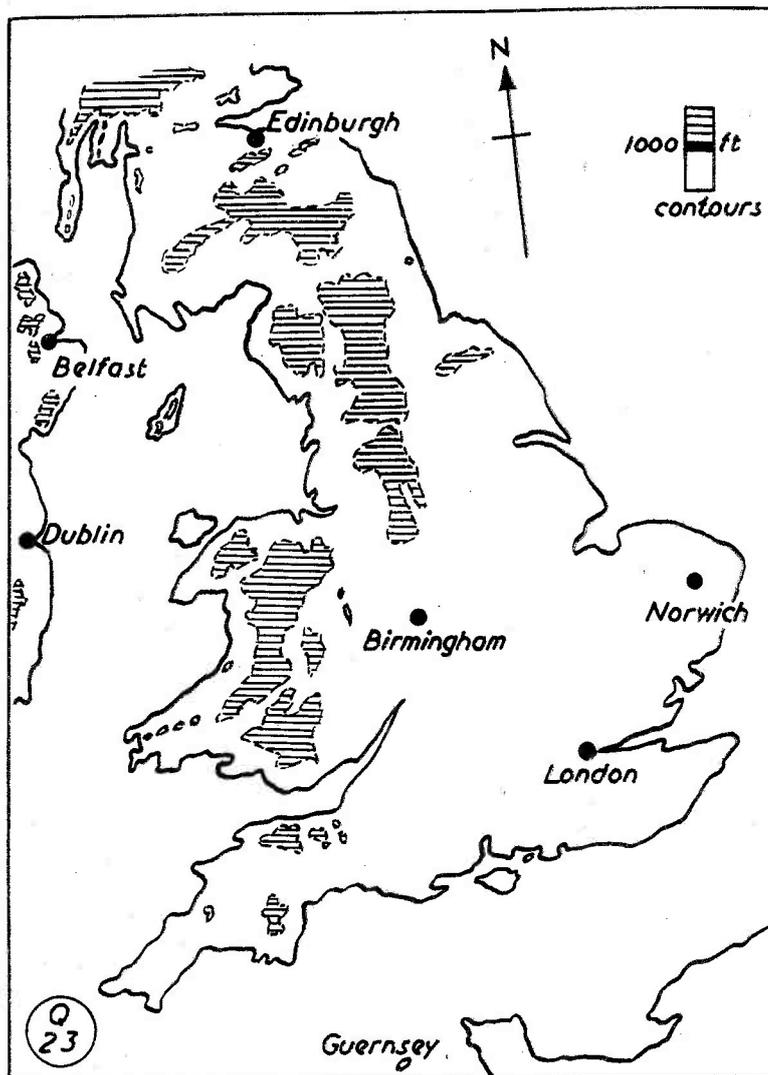


Fig. 3. Stations in England situated below the 1,000 ft. contour—that is, in the unshaded areas of this sketch map—had a free run during the phenomenal VHF conditions of early March, as explained in the accompanying discussion on the weather effects producing these conditions. The map, which should be studied in conjunction with Figs. 1 and 2, shows how Scotland and Northern Ireland were "blanked off" from Northern Europe by reason of the level at which atmospheric bending was occurring. On the other hand, the curves of Fig. 2 indicate that conditions were good for GI/GM working, as some stations in these areas found. Operators on the VHF bands during the period February 28-March 7 can now see how their geographical location affected their results.

investigate for themselves, in the light of the foregoing discussion.

The writer is indebted to the Director, Meteorological Office, for permission to quote observations appearing in the official publications mentioned.

*See results reported in "VHF Bands" in this issue.—
EDITOR.

VHF BANDS

A. J. DEVON

BEFORE discussing all the interesting things that have happened on the VHF bands since our last appearance, we have a report on an outstanding achievement which changes the whole meaning of the term VHF DX as we now know it.

It will be remembered that last month in this space we mentioned the results obtained by W3GKP/W4AO in recording one-second CW pulses bounced off the moon by W4AO's 1-kW transmitter in the 144 mc band. Going further back still—in fact, right back to p.24 of the March 1948 issue of *Short Wave Magazine*—these prophetic words occur by (we are compelled to admit it) none other than your old A.J.D.: “. . . the progressive amateur will be conducting local surveys for the placement of reflectors . . . and *Short Wave Magazine* will be publishing as a regular feature tables showing when the moon is in position for DX communication with different parts of the world. It almost looks as if the moon was cast for this role in the great pattern of Nature. It is quite a thought . . . It means that as side-lines, the micro-wave operator will have to study surveying and astronomy . . . the more one thinks of it, the more exciting it sounds . . .”

And exciting it is, for at 1800 GMT on Sunday, February 15 last, DL3QA and W1RFU exchanged signal reports on the 144 mc band by moon reflection, following planned tests.

We take these details from the D.A.R.C. (German Amateur Radio Society) periodical *Das DL-QTC* for April, which, *inter alia*, remarks that “this means that the two-metre band has prospects of being the ideal DX channel of the future”—and how right they are! DL3QA was running his usual 100 watts, into a 24-element beam which could be aligned in both horizontal and vertical planes, and an ON4BZ converter with additional IF stage into an ex-German Army receiver type MWEC. W1RFU has a one-kilowatt transmitter and what is described as a

**DL3QA/W1RFU Establish
Moon Reflection Contact on
Two Metres, 15 February,
1953—**

**Good Conditions Continue
for EDX/GDX Working—**

VHF Bands Open March 17-25—

Many New Stations Active—

**Increasing VHF Interest
Abroad—**

“stacked spiral beam”—receiver not stated, but we are finding out about this.

Signal reports were DL3QA 549 at W1RFU, who was 539 at DL3QA. The gist of the story is that they heard one another at these RST levels, but it is not clear whether these reports were actually exchanged *via* the moon.

There are many very interesting angles on all this. The first schedules were for 1300 and 1500 GMT on February 13 and 14. On the Friday, the moon was heavily obscured by cloud and could not be accurately sighted on the DL3QA beam. On the 14th, when the moon was new, it was very thin, and though visible, was difficult to sight accurately. By the Sunday, DL3QA had borrowed a theodolite—which, for those who may not know, is a surveying instrument on which vertical and horizontal angles can be measured to a high degree of accuracy—from the Rhine-Westphalian Technical College, and had also obtained from them calculations for the position of the moon at 5-minute intervals. Sunday, 15th, turned out cloudy, but that did not matter, as with the aid of the theodolite and the calculated angles for the moon positions, he was able to aim his beam accurately and so give W1RFU a signal.

The foregoing summarises what has so far been reported on the DL3QA/W1RFU experiments, and is the essence of the account given in April *Das DL-QTC*.

And so we pass another great milestone in the enthralling story of Amateur Radio achievement. These first moon-reflection tests, by W3GKP/W4AO and DL3QA/W1RFU, blaze the trail and show what can be done, and to these pioneers must go all the credit for bringing about a practical result which can be followed and, perhaps, improved upon by other workers in the amateur VHF field. As we have so often said in *Short Wave Magazine* during the last seven years, it is on the VHF bands that

the future of Amateur Radio lies, and moon reflection gives us the method by which world-wide communication can be achieved on these bands—and unless we can *communicate*, Amateur Radio will die, to become nothing more than the relaxation of the scientific *dilettante* instead of, as it now is, a scientific hobby open to everybody blessed with a grain of normal intelligence.

Discussing Possibilities

What of the future? It is evident that our words of more than five years ago were indeed prophetic—though your A.J.D. must admit that he expected results rather sooner than this! Indeed, had certain plans matured (of which two operators who are probably reading these lines have knowledge) it might have been done three years ago, with a G station at one end, too. However, that is another story, and need no longer concern us.

For world-wide DX on VHF—for we are discussing nothing less—you need a beam which can be aligned in azimuth (horizontal angle) and in the vertical plane. You need to know where the moon is in both the day and night sky in relation to, say, Greenwich, and you must be able to fix your own position at least as accurately as you can by knowing what NGR means (explained in an article in our issue for July 1948). If you are without the references, you can find out about NGR by studying the one-inch map issued by the Ordnance Survey for your district, usually obtainable at the local branch of W. H. Smith or any good bookseller—but it must be the Ordnance Survey series if you want to fix your position in terms of NGR (National Grid Reference).

This means that if we were to provide moon-position tables based on the NGR of, say, Greenwich—which can only be produced by the Astronomer-Royal, whose business it is to know exactly where the heavenly bodies will be at any given moment in the next 100 years—you could then align your beam at angles in azimuth and elevation which should, at the given time, bring down your two-metre (or 70-centimetre) signals in VK, ZL, ZS or wherever.

It could be as easy as that, theoretically—providing you are using enough power (gained largely by an efficient beam system) to overcome normal attenuation, and you can cope with the expected frequency change due to Doppler effect. From calculations made by the professionals, it would seem that the RF powers used in all the amateur moon-reflection experiments so far carried out have been much too low, and that no allowance has been made for Doppler effect. Nevertheless, and this is the point, *results have been obtained*, and it is clear from the successful DL3QA/W1RFU tests that the way is now open for a serious approach to the practical problems of long-distance amateur VHF working by moon-reflection.

Further Test Schedule

According to *Das DL-QTC*, W1RFU is standing by, at moon-set for Europe, on Mondays, Wednesdays and Fridays on 145.21 mc. with his

one-kW and stacked spiral beam. Evidently the idea is that at moon-set horizontal beam systems of the usual type should give results, as the vertical angle of the moon is small enough to be within the vertical lobe of any of the normal types of array. Furthermore, with the moon setting, its angular change in the horizontal plane is less.

If perchance you visited the Dome of Discovery at the South Bank Exhibition (Festival of Britain) you may remember seeing, up in the gallery, that scaled-down working model showing the orbits of the earth, moon and our planets; if so, you may recollect that even allowing for scale and time, the passing speeds are high, with which is combined the angular displacement due to the rotation of the earth and the moon about their axes. So it is easy to understand why the bearings do not remain steady for very long.

You can check this for yourself any clear evening when the moon is visible by setting up a couple of sighting sticks in the garden and seeing how much the angles change in 20 minutes or half-an-hour. In fact, you could mark out your horizontal angles by sighting on the centre of the moon at regular intervals.

Broadly speaking, for any fixed alignment with a high moon, it would remain in the cone of the beam for a comparatively short period—this has been put at 10 minutes only, but is obviously a variable factor depending on the angles. This in turn brings up the delightful prospect of a motorised, steerable array, adjustable in both planes, and geared to the earth's rotation and the travel of the moon—like the watching telescopes at the big observatories.

But let's leave those ideas for the moment, and concentrate on trying to shoot accurately on the moon as she sets, using full power and a really high-gain beam.

The odd twist on all this is that there would be no use even trying it under what we have hitherto regarded as "good VHF conditions," like the March openings; this is because then our transmissions would not penetrate the lower atmosphere. Rather, the time to get to the moon is under these conditions normally classified as "very bad," when only the 100-mile stations can be heard. The slightest tendency for refraction in the lower atmosphere would distort the path, resulting in the radiated energy, or a large proportion of it, missing the moon altogether. In other words, we have to look for openings in quite the reverse sense—what we must have is an absolutely unimpeded path, so that errors due to refraction are at a minimum. It is probably because of these factors, not always appreciated in amateur circles, that success has been so long in coming.

What an extraordinary business it all is—one can see the pattern of the DX future beginning to shape itself. Fortunately for us, successful moon-reflection could not give a 24-hour (or even a 6-hour) service, so that there is no immediate prospect of the commercials wanting to push us off Two Metres in order to establish new long-distance circuits; that is not likely until we get satellite reflectors.

The Month's Survey

After the magnificent DX openings on both bands during the early part of March—fully reported in our April issue—there were some further manifestations along very much the same lines until about March 25. Conditions then went rather flat (and so did the activity) until early April, and there were times—as during Easter—when good GDX working was again possible. As the weather changed again towards the middle of April, so once more conditions improved.

Actually, it is a little difficult to assess conditions with accuracy because the general level of activity has not been high since the end of March, and it is probable that GDX paths were open often than the reported results suggest. By general consent, March 22/23 period was the outstanding period since we last appeared.

Incidentally, on this theme of the weather and its effect on conditions, there appears in this issue an authoritative and extremely interesting article showing how and why we got the results we did during the early-March openings. This article is worth close study, as it explains a great deal.

Some Interesting Reports

The evenings of March 22 and 23 gave, again, the remarkable propagation conditions previously experienced, when both bands were wide open. On the 23rd, G2WJ (Great Canfield) worked no less than four PA's on 70 centimetres—PA0JOB (433.8 mc),

PA0NL (435 mc), PA0WAR (434.6 mc) and PE1PL (435.00 mc)—all at a steady S9+, between 2045 and 2255 GMT.

During the evening of March 22, G2FKZ (London) was receiving G5YV (Leeds), now fully operational on 430 mc, at RST-559.

Also on the 22nd, but at 1005-1040, G3BKQ (Blaby, Leics.) worked ON4UV again on 70-centimetre phone; between March 4 and April 17 G3BKQ had more than 30 QSO's with GW2ADZ—they found their 85-mile path quite reliable during the whole of that period. Over the month, G3BKQ worked 12 different stations on 430 mc, and heard G2FKZ, G3HTY, G5DT, G6NF and G6YP; four of these are in the London area, at a mean distance of about 90 miles. Having re-modified his 70 cm receiver with an improved low-noise mixer, G3GKQ is now getting his semi-locals (at up to 40 miles or so) at much better signal levels than the same stations give on two metres—this being partly due, G3BKQ suggests, to the lower angle of the main lobe of his 16-element stack on 430 mc.

On Two Metres, G5YV achieved the amazing total of 90 different stations worked *outside the British Isles* during the month of March alone—and has been kept rather busy with QSL cards thereby!

GD3DA/P on Snaefell

It will be well remembered that one of the keen /P performers is G3DA (Speke, Liverpool), who writes to say that he will be up on Snaefell, Isle of Man, again during May, signing GD3DA/P and equipped for both bands—on these occasions he will be more interested in 70-centimetre than in two-metre QSO's and looks forward to some good GDX working on 430 mc.

Still talking portable, G5MA made his first foray of the season over Easter, when he journeyed right down to Pembrokeshire, and from a site near Tenby worked a total of 18 stations; most of them again have Bob to thank for a new "oblast." Conditions were not at all good, but several of the contacts were over the 200-mile

TWO METRES

COUNTIES WORKED SINCE SEPTEMBER, 1, 1952

Starting Figure, 14

Worked	Station
45	G3BLP
43	G3WW
42	G3GHO
41	G5YV
39	G2HDZ
38	G5DS
37	G2AHP, G4SA, G5ML
35	G3IOO
34	G3FAN
32	G3HWJ, G8IL
29	G2FJR, G6TA
28	G2HOP, G3HBW
27	G6YU
26	GC3EBK
25	G3HXO
24	G3HCU, G5BM
23	G2FCL, G3DO
22	G5MR
21	G3GVL, G4RO, G8DA
19	G6CI
17	G3GJZ
16	G3IRA, G3YH
14	G2BRR, G3DMK

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

mark, and therefore a great tribute to the efficiency of his portable gear. We shall no doubt be hearing more of Bob's /P sorties as the season goes on.

Some Station Reports—North

Last month we talked of GM3DIQ (Stevenston) — see "VHF Wedding"—who, in spite of a certain amount of inactivity due to his late pass on honey-

TWO METRES

COUNTRIES WORKED

Starting Figure, 8

- 13 G3BLP (DL, EI, F, G, GC, GD, GI, GM, GW, ON, OZ, PA, SM), G5YV (DL, EI, F, G, GC, GD, GI, GM, GW, ON, OZ, PA, SM).
- 12 G2HIF, G3WW.
- 11 G2AJ, G3ABA, G6NB.
- 10 G2FQP, G2HDZ, G3BK, G3EHY, G5DS, G6LI, GW5MQ, ON4BZ (DL, EI, F, G, GC, GW, ON, OZ, PA, SM).
- 9 EI2W, G5BD, G5MA, G6RH, G6XM, G8IC.
- 8 G2AHP, G2XC, G3FAN, G3GHI, G3GHO, G3VM, G5BY, G5ML, G5UD, G8SB.

moon, reports that he was on during the big March openings and had some terrific GM contacts as well as good QSO's with G12FHN and G15AJ, the latter a newly-active call on the two-metre band. He confirms that nothing was coming through from South of the Border. GM3DIQ has improved his receiver set-up, and is now open to accept schedules from 2030 BST onwards, with G stations.

G3DMK (Catterick Camp, Yorks.) gets into the Annual Counties Table, and is on from 1830 onwards, looking for QSO's in any direction. G3GCX (Acomb, Yorks.) also registers for Annual Counties with 19C.

Brian G6CI, of Kenilworth, worked DL3FM and DL6EP on March 22, hearing also F8NW, who was vigorously chased but got away. G2DCI used to be a Liverpudlian but is now in Four Oaks, Sutton Coldfield, within yards of the most powerful TV transmitter in the world—it gives 100 microamps. through 4,000-ohm headphones using a 1N21 detector on the bench without an aerial. Nevertheless, he is operational on Two and puts in a calls h/w list—see "Activity Report"—which is interesting having regard to the location. When he gets settled at the new QTH, G2DCI will be functioning on both bands.

G2FCL (Shipley, Yorks.) has now got his 12-element stack up at 35 ft. with the matching unit in the eye of the beam, and it is all working out even better than expected. On March 22 he raised eight F's and a lot of new GDX, the total of different stations worked now standing at 182; an almost daily schedule is being maintained with Jolly Roger, G2FJR at Sutton Bridge, Lincs. G3GVL (Derby) is pleased to be able to report 42S worked in 21C, in spite of having little time for coming on the air, and G6YU (Coventry) goes up in both Tables.

Now for news of G3BA, ex-GM3BA, who has thrown away his tartan hat (which is like swallowing the anchor when you retire from the sea) and returned to the old home QTH at Daventry—but only for two days in eight, as G3BA is in the service of the

BBC. He hopes soon to be active on both bands, and the Tx projected will run 12AT7 24-72 mc into 5763 doubler into 5763 driver into QQVO6/40 PA running 75 watts phone or 100 watts CW; then, by changing the plate lines and operating the PA as a trebler, a good 6-7 watts of RF should be available for the 430 mc band. In the course of an interesting letter, G3BA remarks that though we may not hear a great deal about the GM's, they are very keen, and particularly active on 70 cm. Another point he makes is that, in listening round the two-metre band since he was last in the Midlands, activity has increased very much—as G3BA puts it, "many more people are seeing the light." He suggests a calling frequency, somewhat analogous to the 600-metre wave, for the two-metre band, so that the many people who spend evenings, either working at the bench or watching TV, could leave their two-metre receivers running on this frequency and would hear a call from anyone wanting a QSO. Curiously enough, we have a somewhat similar suggestion in this month's mail from G2AOL (Otford, Kent), who puts forward the idea of reserving a narrow band for CW-only QSO's, irrespective of Zone allocations. While both these notions have much to commend them, our own reaction is that they do involve crystal changes and the hazards of beam directivity, so that even if we had a recognised calling channel many general CQ's would be missed. The real answer is a panoramic receiver, as used by G2HCG, of Northampton, who can see stations calling him—or, if watching TV, an automatic search receiver using slow motorised tuning. But that begins to make it all a bit of a business, and really it remains a matter of getting enough stations regularly active on Two to make it worth anybody's time to have a general listen round as opportunity offers.

For Freddy of G5ML (Coventry), the period March 15 to April 11 produced 37 new stations worked, including several Europeans; the best evenings were March 17 and March 20-22. On the 17th, though the PA's were

workable from the Midlands, activity was low; on the 20th, 12 London stations were QSO'd from G5ML; on the 21st, two ON's were raised and G5MR (Hythe, Kent) was the loudest southerly GDX station in the band; on March 22 conditions were again good for the south-east and DL3QA was worked on phone. The general log at G5ML shows contact with about 100 different VHF stations in just over a month—it must be that 16-element stack, now up at 60 ft. and a local landmark for miles around.

G3GHO (Roade, Northants.), who again puts in a good calls h/w list summarising the DX getting into the central part of the country, worked 20 new G's, including G3IOE up in Newcastle, as well as DL6EP, F3XY and PE1PL, with OZ and SM heard; GW5MA/P was heard, called and missed when down at Tenby. G3GHO is now at 42C in Annual Counties—but still wants 16 cards before he can claim his certificate for 40C worked since September. (This month, just when the QSL situation looked like getting better, we have had a number of caustic comments about cards owing and the cost of providing s.a.e.'s for direct QSL's. There is absolutely nothing we can do about it; QSL'ing remains, as it always will be, a matter for the conscience of the individual.)

G6NB is on again, from a fine new QTH at Brill, near Aylesbury, Bucks., at an elevation of 600 ft. and clear in nearly all directions. During the early part of April he was working GDX with his beam at ground level; now that it has been put up again, G6NB is a very potent signal and should do well on both bands. G5RZ (Leighton Buzzard, Beds.) is building for increased power and more modulation, and G6FO (Maids Moreton, Bucks.) has been heard on phone with a strong signal to the south-east; the RF stages of his CC converter were found to be flooded with injection volts, which will explain why many calls have been unanswered. G3HAL (Drayton Parslow, Bucks.) put together a simple 12AT7 converter and, with the normal long-wire aerial, heard the stations listed in the Activity Report.

Stations South and West

G5MR (Hythe, Kent) was getting out nicely during the March openings, and goes up substantially in the Counties Tables—in the Activity Report section, he would like to see more lists of stations *heard*, rather than worked only, as being more useful to those who want to know where their signals are going.

G3FAN (Ryde, I.o.W) brings his scores up to date, with no less than 6 new counties for the Annual Table; using a gamma-matched 4/4 beam and 80 watts to the 829B, he is a very nice signal in all northerly directions and is now at 8 Countries worked. Construction for 430 mc is in hand here. G3IRA (Swindon) has spent most of his time on 70 cm, with G2AOK/A and G8PX (Oxford) for new stations heard on that band; his aerial is a stack of eight dipoles fed in phase, backed by a wire-netting reflector, which is working very well. Also writing from Swindon after a long absence is G3EUP, who has completely rebuilt for Two with NBFM on the transmitter, and a three-stage converter with IF at 7.1 mc; his aerial is a 4-element c.s. Yagi. In addition, G3EUP is equipped for 430 mc, though at present the Tx output from an 832 tripling is not very much.

A new station now on regularly is G3HWF (R.A.F. Yatesbury, Wilts.) operated by G3IBY, with a modified T.1131 and a G2IQ-S.640 receiver, the beam being a 5-ele Yagi. G3HWF has been in on the DX, as their calls h/w listings show; in reporting, G3IBY makes the challenging remark, "Can G8FC be far behind"—the latter is at R.A.F. Locking, Somerset, so we sense a local-Derby here!

G2HIF (Wantage, Berks.) was lucky with GW5MA/P for Pems. under rather poor conditions, and what with GC3EBK and some other useful contacts, goes up to 54C in All-Time Counties.

GC3EBK (Guernsey, C.I.) was on every evening, except Easter Monday, from March 11 until April 11, best conditions for him during the period being March 17-25; he is always there at 1900-1930 BST and asks particularly that South Coast stations

TWO-METRE ACTIVITY REPORT

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

G3HWF, R.A.F. Yatesbury, Wilts.
WORKED: DL3FM, 3VJ/P, 6EP, F8AA, G2DTO, 3AEP, 3BNC, 3FAN, 3FIH, 3GHO, 3GOP, 3IEI, 3IRA, 3MY/P, 4DC, 4SA, 5BM/P, 5HB, 5ML, 6NB, 8DV/A, 8IL, 8PX, ON4HC.
HEARD: F8NW, G2FJR, 3WW, 4AP, 5NF, 8DM, GC3EBK, ON4BZ, 4UV.
 (During March).

G4SA, Drayton, Berks.
WORKED: DL3QA, 3VJ/P, 6EP, F8DB, G2AOK/A, 2BFT, 2BMZ, 2BTY, 2CBB, 2DDD, 2FCL, 2HCG, 2HIF, 2JU, 2MN, 2XV, 3BI, 3BK, 3BKQ, 3BNC, 3DKZ, 3DO, 3EUP, 3FAN, 3FUM, 3GCS, 3GDR, 3GHO, 3HAK, 3HCU, 3HTY, 3HVO, 3HWF, 3HWJ, 3HXS, 4AU, 5BM, 5BM/P, 5HB, 5ML, 5YK, 5YV, 6NB, 6XX, 8DM, GW5MA/P, 2ADZ, ON4BZ, 4HC, 4HN, 4WW, 4XB.
 (During March).

G3BI, Seer Green, Bucks.
WORKED: F8LO, G2AHP, 2AII, 2BTY, 2BUJ, 2DDD, 2DTO, 2DUV, 2FTS, 2FVD, 2FZU, 2HCG, 2KF, 2MQ, 2UJ, 2WA, 2YB, 2YC, 3CGO, 3CVO, 3DIX, 3EDD, 3EYV, 3FAN, 3FOU, 3FQS, 3FSD, 3FUH, 3FUM, 3GBO, 3GHO, 3HAK, 3HVO, 3HXS, 3HZK, 3IEX, 3ISA, 3ION, 3SM, 3ZI, 4AU, 4IJ/P, 4SA, 5AA, 5DS, 5HB, 5LQ, 5NF, 5RZ, 5YH, 6AG, 6FO, 6NE, 6PG, 6QH, 6RH, 6TA, 6UH, 6XM, 6YP, 8DV/A, 8CK, ON4BZ. (All since March 12).

GC3EBK, Guernsey, Channel Isles.
WORKED: DL3VJ/P, G2AOL, 2BMZ, 2DDD, 2DGB, 2DSW, 2HQ/P, 2PU, 2XV, 3AGA, 3ANB, 3AUS, 3BK, 3BEX, 3CGE, 3FIH, 3GDR, 3GOP, 3HVO, 3IER, 3MY/P, 4MW, 5BM, 5MR, 5RO, 6CW, 6RH, 8IL, ON4BZ.
HEARD: G2FTS, GW8UH.
 (March 17 to April 7).

G3GHO, Roade, Northants.
WORKED: DL6EP, F3XY, F8GH, G2AOL, G2ASF, 2BFT, 2DDD, 2FKZ, 2FWW, 2IT, 2UQ, 3AEP, 3ANB, 3AVO, 3BI, 3BNC, 3EHY, 3FAN, 3FIH, 3FQS, 3GHU, 3GJZ, 3GMW, 3GWB, 3HAZ, 3HSD, 3HO, 3IHZ, 3IAI, 3II, 3IOE, 3ION, 3IPG, 3ISA, 3SM, 3YH, 4GR, 4SA, 5DS, 5IG, 5YV, 6CI, 8DM, 8DV/A, GW8UH, PA0FC, PE1PL.
HEARD: DL3FM, 3QA, 3VJ/P, F3CA, 3LQ, 8AA, 8NW, 8OL, 8OY, 9MX, G2DKH/P, 2FCL, 2FJR, 2FNW, 2FZU, 2HDZ, 2HGR, 2HIF, 2NM, 2XV, 3BEX/P, 3BK, 3BKQ, 3BLP, 3FMO, 3FUM, 3GDR, 3GNJ, 3HWF, 3IUK, 3WV, 4AP, 4MW, 4UA, 5ML, 5RW, 6CW, 6XY, GW5MA/P, ON4BZ, 4HC, 4HN, 4UD, 4UV, 4XB, OZ2FR. (All since March 12).

GW5MA/P, The Ridgeway, 2 miles S.W. of Tenby, Pems.
WORKED: G2AOK/A, 2HDZ, 2HIF, 2NH, 2YB, 3BLP, 3EHY, 4CI, 4GR, 4SA, 5BM, 5HB, 5ML, 6NB, 8DA, 8IL, 8ML, GW8UH.
 (April 4 and 5).

G3HAL, Nr. Bletchley, Bucks. NGR 42/842287.
HEARD: DL3FM, 3VJ/P, F8AA, 8NW, G2AVR, 2BCB, 2BCP, 2DDD, 2FJR, 2FKZ, 2FPS, 2FZU, 2HCG, 2HDZ, 2HOP, 2MV, 2UJ, 3ANB, 3APY, 3BI, 3BK, 3BLP, 3CNF, 3DR, 3EDD, 3EYV, 3FEX, 3FOU, 3FUM, 3GBO, 3GDR, 3HGO, 3HZK, 3II, 3ISA, 4AU, 4DC, 4SA, 5DS, 5ML, 5YV, 6CW, 6RH, 6YP, 6YU, 8VR, ON4BZ, 4HC, 4HN, 4UD, 4UV. (All March 20 to 22).

G2DCI, Four Oaks, Sutton Coldfield, Warwick.
WORKED: G2AVQ, 2BFT, 2FZU, 2IJ, 2NV, 3BKQ, 3CAQ, 3CXD, 3DJQ, 3HAZ, 3FXK, 3FXR, 3IOO, 3NL, 5BM, 5BM/P, 5FH, 5ML, 6PC, 8KL, GW2ADZ.
HEARD: G2ATK, 2AV, 2BFO, 2COP, 2HGR, 2HQ/P, 3AOK/A, 3ASC, 3BPL, 3CCH, 3DO, 3EDD, 3EHY, 3FRY, 3FTY, 3FUR, 3GBL, 3IUK, 3NR, 4SA, 5JU, 5RW, 5YV, 6CW, 8MW, 8SC.
 (March 16 to April 11).

GW3BNO, Cardiff, Glam. NGR 31/179789.
WORKED: G3DLU, 3FIH, 3FMO, 3HSD, 3YH, 5ML, 6NB, GW8SU, 8UH.
HEARD: G3BLP, 3EHY, 3HVO, 8IL. (March 16 to April 10).

G2AOL, Otford, Kent.
WORKED: F8AA, G2BRR, 2YB, 3GHO, 3HVO, 3HZK, 3ISA, 3MY/P, 4FB, 5ML, 5NF, 6PG, 8DV/A, 8VR, GC3EBK.
HEARD: DL6EP, F8GH, 8NW, G2AHP, 2AII, 2AIV, 2AOK, 2AVR, 2BUJ, 2DDD, 2DSW, 2FCL, 2FKZ, 2FNW, 2FTS, 2FZU, 2HCG, 2HDZ, 2HQ/P, 2KF, 2NM, 2RD, 2UJ, 2UN, 2WJ, 2XV, 3AEX, 3ANB, 3APY, 3AUS, 3BI, 3BKQ, 3BLP, 3BNC, 3CGO, 3CNF, 3DIV, 3DJX, 3DQY, 3EOH, 3EYV, 3FAN, 3FD, 3FEX/P, 3GBO, 3GDR, 3GHI, 3GHO, 3GOP, 3GVL, 3HVB, 3HCU, 3HWF, 3HWJ, 3SM, 3WV, 4AU, 4DC, 4HQ, 4HT, 4SA, 5BC, 5DS, 5HB, 5LK, 5MR, 5UM, 5YK, 5YV, 6CW, 6LL, 6NF, 6RH, 6SG, 6TA, 6UH, 6WU, 6XH, 6YP, 8DM, 8LN, 8MW, 8SK, ON4BZ, 4HN, PE1PL. (March 1 to April 3).

G3YH, Bristol.
WORKED: G2BUJ, 3DIX, 3DLU, 3FIH, 3FKO, 3GBO, 3GHO, 3GNJ, 3HSD, 5ML, GW3BNO.
HEARD: G2FJR, 2HCG, 2HIF, 2XV, 3BI, 3BW(?), 3BLP, 3CCH, 3EHY, 3FAN, 3FD, 3FRY, 3HWF, 3IEI, 3ION, 3II, 4AP, 4SA, 5BM, 5HB, 5UF, 6NB, 8DA, 8DM, 8OU, 8MW, GW8UH. (March 12 to April 16).

G6RH, Bexley, Kent.
WORKED: DL1LB, 3FM, 3QA, 6EP, F3LZ, 8GH, 9DI, G2AVR, 2BMS, 2BUJ, 2CD, 2CRD, 2DTY, 2RD, 2UN, 2WA, 2XV, 2YB, 3AEX, 3AGR, 3ARL, 3AVO, 3BEX/P, 3BI, 3BLP, 3CNF, 3DA, 3DAH, 3DIV, 3CGO, 3EOH, 3FUL, 3GBO, 3WV, 4AU, 4MW, 4OT, 5BC, 5ML, 5UM, 5YK, 6AG, 6CH, 6GR, 6PG, 6SG, 6YP, 8AO/MA, 8AO/MM, 8LN, 8VR, GC3EBK, ON4BZ, 4HC, 4HN, 4PH, 4PJ, 4UV, 4XB, OZ2FR, 9R, PA0HA, 0FF, 0WI, PE1PL, SM7BE.
HEARD: DL3VJ/P, 6LT, F8DB, 8JR, G2BRR, 2CYN, 2DSW, 2HCG, 2HDZ, 2HIF, 2KJ, 2PU, 2MV, 3ABA, 3ANB, 3APY, 3AUS, 3DO, 3FAN, 3FUH, 3GHI, 3GHO, 3HAZ, 3HBW, 3HWJ, 3IAI, 3IOO, 3ISA, 3NL, 3YH, 3ZI, 4AP, 4HQ, 4SA, 5DS, 5YV, 6TA, 6XH, 8DM, 8DV/A, 8IL, GW2ADZ, ON4BD, OZ2IZ, PA0FB, ORA. (March 1 to April 12).

G3DLU, Weston-Super-Mare, Somerset.
WORKED: G2DTO, 3ANB, 3BMZ, 3FIH, 3FKO, 3FMO, 3HSD, 3YH, 5HB, 8DA, 8IL.
HEARD: DL3VJ/P, F8AA, G2BUJ, 2HDZ, 2MV, 3AEP, 3AGA, 3BK, 3BLP, 3GDR, 3GNJ, 3GOP, 3HWF, 3ION, 3WV, 4DC, 4GR, 4SA, 5MA, 5ML, 6AG, 6RH, 8DM, 8MW, GC3EBK, GW8UH, ON4BZ. (March 12 to April 9).

G2HDZ, Pinner, Middx.
WORKED: DL3FM, F8EC, G2BTY, 2DDD, 2FCL, 2FZU, 2HCG, 2HGR, 2HQ/P, 2UJ, 3AVO, 3DQY, 3GBO, 3MI, 5BM/P, 5DS, 6BO, 6GR, 8CK, 8DV/A, GW5MA/P, PA0FC. (March 11 to April 13).

G5ML, Coventry, Warwick.
WORKED: DL3FM, 3QA, F8JR, G2ACV, 2AHP, 2AII, 2AIV, 2AOK/A, 2AOL, 2ASE, 2ATK, 2AVQ, 2AVR, 2BFT, 2BMZ, 2BUJ, 2BVW, 2COP, 2DCI, 2DSP, 2DFO, 2FJR, 2FNW, 2FO, 2FPQ, 2FTS, 2FWW, 2FXK, 2HCG, 2HDZ, 2HOP, 2NM, 2UQ, 2YB, 3ANB, 3ASC, 3AVO, 3BHS, 3BKQ, 3BNC, 3BPD, 3CFR, 3CNF, 3CWW, 3DMK, 3DO, 3EDD, 3EHY, 3FAN, 3FOU, 3FUM, 3FXR, 3GBO, 3GJZ, 3GNJ, 3GVL, 3GZM, 3HAK, 3HAZ, 3HCU, 3HSD, 3HTY, 3HWF, 3HZK, 3IER, 3IOE, 3IOO, 3SM, 3YH, 4AP, 4SA, 5BM, 5BM/P, 5IG, 5LK, 5MR, 5QI, 5RW, 5SK, 5TP, 5UM, 5YV, 6AG, 6CW, 6NB, 6RH, 6TA, 6XX, 8DA, 8DM, 8IL, 8MZ, 8OY, GC3EBK, GW2ADZ, 3BNQ, 3FYR, 5MA/P, 8UH, ON4BZ, 4HC, 4XB, PA0ALO, ODOK, 0FC, 0FF.
HEARD: DL3VJ/P, 3BK, 3BLP, 3DKZ, 3DLU, 3GFT, 3GHI, 3GHO, 3IRA, 3IAI, 3MY/P, 3NL, 3WV, 4CR, 4RO, 5DS, 8DV/A, 8MW, GW5MW, ON4UV, OZ2FR, 2IZ, SM7BE. (March 1 to April 11).

look his way when conditions seem "off"—GC3EBK can often hear weak phones who could easily be identified and worked if they would sign on CW. On March 22 he worked DL3VJ/P for the GC/DL "First," and the

GC/GW "First" was only just missed with GW8UH (Cardiff), who called and was answered by GC3EBK for an abortive QSO. At the Guernsey end, matters have been improved with more power and a better aerial—GC3EBK also

mentions that he gave us his frequency incorrectly last month; it is actually 145.26 mc. Also of interest is the fact that GC2FZC is building for Two Metres, to reinforce the Channel Islands VHF effort.

Round to the West—Louis of G3EHY (Banwell) goes up to 58C in the All-Time Table and to 10 Countries with ON4BZ and GC3EBK worked. G3YH (Bristol) reports that G3GNJ, G3HSD and G3IFV are active in that area, with OT G6VF also preparing. G8DA (Gloucester) moves in both Tables and remarks on the terrific signals he now gets from G5ML (Coventry) and G6NB (Brill)—he thinks that some of the erstwhile top men on Two will have to look to their laurels! G3DLU (Westons-Mare) was on for a total of 19 evenings between March 12 and April 9; he confirms that the conditions of March 22 reached to the West Country—DL3VJ/P at 450 miles was S7 and ON4BZ was well heard; some new GDY was also logged, but has not yet been worked. G3DLU notes an improvement in the QSL situation, with 48 cards received for 56 stations worked—but a number are still outstanding for QSO's made last year.

Though GW3BNQ (Cardiff) has been with us for seven years, this is the first time he has reported. His transmitter is a 5-stage job with p/p 8012's running 25 watts on 145.62 mc, the beam 3 stacked dipoles with reflectors, and his converter has no less than four RF stages: Three CV66 in GGT with a neutralised 6AG5 in the fourth stage; the mixer is $\frac{1}{2}$ -12AT7, with EF50 osc.dblr. and EF54 head amplifier, IF output being on 14 mc into a 15-stage home-built double superhet receiver. GW3BNQ would like to thank GW8UH for much encouragement and help; another South Wales station on every evening is GW8SU (Porthcawl), 145.71 mc. They all ask for more beams to be aimed in their direction.

Reports from the London Area

G3SM (North Harrow) worked 15 new stations during March, hearing F, ON, PA and some of the GDY. After more than a year's inactivity, G2AOL (Oxford,

SEVENTY - CENTIMETRE STATIONS

Second List

<u>CALL</u>	<u>LOCATION</u>	<u>FREQ.</u> (mc)	<u>EQUIPMENT</u>
DL3FM	Mulheim-Ruhr	434.2	Tripler, 32-ele stack, SEO Rx
G2BVW	Leicester	?	Tripler, 5-ele Yagi, (? Rx)
G2CNT	Cambridge Airport	435.2	Tripler, CC Rx, 12-ele stack
G2FKZ	London	435.95	<i>no details</i>
G2FNW	Melton Mowbray	?	Tripler, 5 ele-Yagi (? Rx)
G2WJ	Great Canfield, Essex	436.00	Straight PA, CC Rx, 16-ele stack
G2XV	Cambridge	435.24	<i>no details</i>
G3ABA	Coventry	?	Tripler, 16-ele stack (? Rx)
G3DA	Liverpool	432.6	Tripler, 6-ele Yagi, CC Rx
G3EUP	Swindon, Wilts.	433.9	Tripler, 3 stk'd dipoles, CC Rx
G3FFC	Leicester	?	Tripler, 16-ele stack (? Rx)
G3FZL	Dulwich, S.E.22	435.24	Doubler, CC Rx, 12-ele stack
G3GZM	Tenbury Wells, Wores.	?	Tripler, 16-ele stack, (? Rx)
G3HAZ	Northfield, Birmingham	435.00	Tripler, SEO Rx, 4/4 Yagi
G3HTY	Kidderminster, Wores.	?	Tripler (? beam array and Rx)
G3ILI	London, S.E.22.	434.97	Tripler, 6-turn Helix. R.1294 mod.
G3IRA	Swindon, Wilts.	436.50	Tripler, SEO Rx, 8 d'ples stk'd
G4AP	Swindon, Wilts.	436.50	Tripler, CC Rx, 3 stk'd D'ples
G5DT	Purley, Surrey	?	<i>no details</i>
G5YV	Leeds	432.72	Tripler, 8-ele stack, G2DD C'vrtr.
G6CW	Nottingham	?	<i>no details</i>
G6NF	Shirley, Surrey	435.47	Straight PA, 5-ele Yagi, SEO Rx, ASB8 cavities
G6RH	Bexley, Kent	434.7	Tripler, 16-ele stack, ASB8 C'vrtr.
G6YP	London, S.E.5.	435.75	<i>no details</i>
G6YU	Coventry	434.10	Tripler, CC Rx, 16-ele stack
G8QY	Birmingham	?	Tripler, 24-ele stack (? Rx)
GW2ADZ	Llanymynech, Mont.	?	Doubler, 32-ele stack (? Rx)
GW5MQ	Mold, Flint.	?	Tripler, 3-ele Yagi (? Rx)
ON4UV	Fayt-lez-Mange, Nr. Charleroi	434.7	Straight PA, CC Rx, 32-ele beam

This list is incomplete as regards many stations known to be equipped for the 70-centimetre band. All 430 mc operators are asked to forward details for inclusion in this Table, under the headings given.

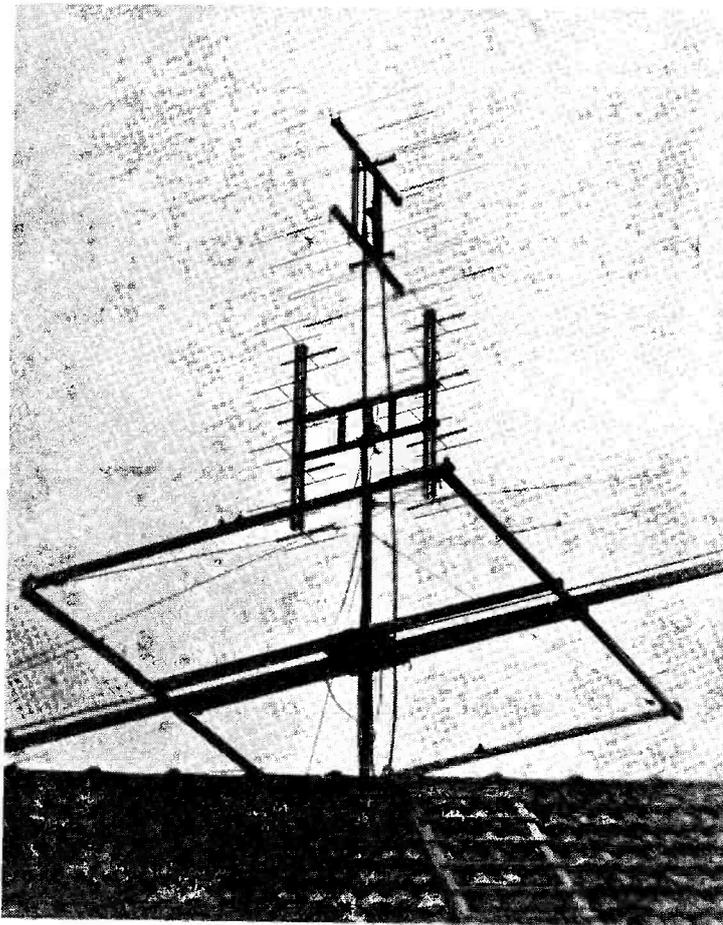
Kent) returns to the VHF fold; explaining that his location is somewhat discouraging, he nevertheless worked F8AA, G3MY/P and GC3EBK, and heard DL6EP, two ON's and PE1PL. The G2AOL receiver set-up is a G6VX converter into a CR100 tuning 16-18 mc, and the transmitter runs 18w. to a pair of 6C4's in push-pull; beam is 4-ele w.s. Yagi G2AOL also has feelings about the QSL position, and a further point he wants to make is that when the band is open for EDX, stations in the Kent area would like to be remembered by the northerly GDX.

An interesting note from G6NF (Shirley, Surrey), who has a 5-watt straight PA on 430 mc, is that he has now worked a total of 22 stations on that band, with GW2ADZ at 170 miles as best DX—nice going. His receiver is RF 446B into CV102 mixer into 6AC7 IF amplifier, with a 6J6 3rd harmonic oscillator; cavities from the ASB8 are used for the tuned circuits. G3ILI (London, S.E.23) reports himself in on 430 mc, as does G6RH (Bexley, Kent), who will be on 434.7 mc with a QQVO6/40 tripler by the time this is in print. G6RH worked plenty of the DX on Two during the late-March openings, and is now at 9 in the Countries Table.

It must be nearly two years since we last heard from G2NH (New Malden)—one of the old VHF hands, who was in on the pioneer work on both Five and Two. So we were particularly pleased to see his new claims for Counties Worked; and, incidentally, Ernie remarks that G5MA, G5MA/P and GW5MA/P have given him no less than 8 of his total of 52! This shows how Bob has been getting around. G2NH also says that having got SSB going on the 3.5 mc band, he is thinking of trying it on Two.

From the home pitch, Bob G5MA has chalked up DL1LB, GC3EBK and OZ2FR—the routine is EDX from Ashted and GDX when /P, and a QSL card every time. A lot of us lean heavily on Bob.

G4SA (Drayton, Berks.) has been trying a 12-element stack at 35 ft. against a 4-over-4 at 50 ft. and on direct change-over com-



The aerial complex at ON4UV, Fayt-lez-Manager, whose outstanding results on the 430 mc band were reported in detail in our April issue. In this photograph, the 70-centimetre stack is below the two-metre array. His station was pictured on p. 619 of our issue for December, 1951.

parisons, the stack, though lower, gives better reports every time, on EDX and GDX. This is interesting and will be food for thought to many. G4SA has made several good 100-150 mile contacts under conditions which could be said to be poor, and thinks that too many people give up when the band does not seem to be wide open. (This is, again, all a matter of getting more stations regularly active; actually, the activity position is gradually improving, and is very much better than it was this time last year).

G2HDZ (Pinner) has a 20-element stack for 430 mc ready for erection, and on Two "bolstered up his self-respect," as he puts it, by working DL, F and

PA and some distant G's on phone; though GW5MA/P gave Pems., there has been no improvement in Countries Worked in spite of diligent listening. G3GBO (Denham, Bucks.), on 144.78 mc, has moved indoors from what he says was "literally a shack in the garden." This makes for more operating comfort and convenience, and though the feeder-line is now 90 ft. long (Telcon K.35) it does not appear to have lost him any performance; since the beginning of March, he has worked 29 new stations, several at EDX and GDX, with a substantial addition of six to the counties score. G4CI (Worcester Park) also goes up in All-Time Counties. From Seer Green,

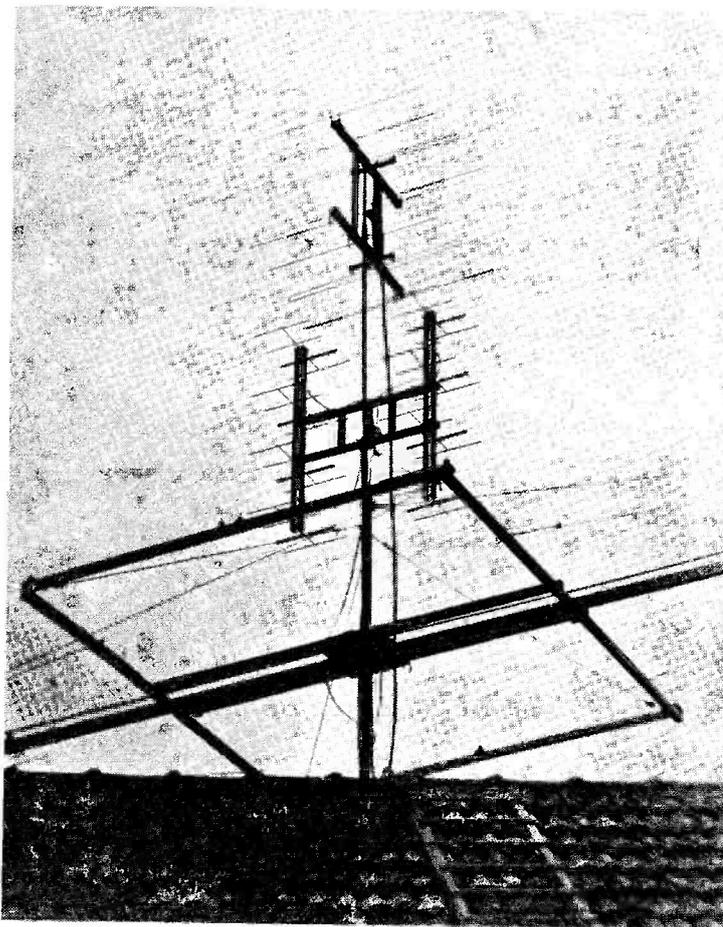
Kent) returns to the VHF fold; explaining that his location is somewhat discouraging, he nevertheless worked F8AA, G3MY/P and GC3EBK, and heard DL6EP, two ON's and PE1PL. The G2AOL receiver set-up is a G6VX converter into a CR100 tuning 16-18 mc, and the transmitter runs 18w. to a pair of 6C4's in push-pull; beam is 4-ele w.s. Yagi G2AOL also has feelings about the QSL position, and a further point he wants to make is that when the band is open for EDX, stations in the Kent area would like to be remembered by the northerly GDX.

An interesting note from G6NF (Shirley, Surrey), who has a 5-watt straight PA on 430 mc, is that he has now worked a total of 22 stations on that band, with GW2ADZ at 170 miles as best DX—nice going. His receiver is RF 446B into CV102 mixer into 6AC7 IF amplifier, with a 6J6 3rd harmonic oscillator; cavities from the ASB8 are used for the tuned circuits. G3ILI (London, S.E.23) reports himself in on 430 mc, as does G6RH (Bexley, Kent), who will be on 434.7 mc with a QQVO6/40 tripler by the time this is in print. G6RH worked plenty of the DX on Two during the late-March openings, and is now at 9 in the Countries Table.

It must be nearly two years since we last heard from G2NH (New Malden)—one of the old VHF hands, who was in on the pioneer work on both Five and Two. So we were particularly pleased to see his new claims for Counties Worked; and, incidentally, Ernie remarks that G5MA, G5MA/P and GW5MA/P have given him no less than 8 of his total of 52! This shows how Bob has been getting around. G2NH also says that having got SSB going on the 3.5 mc band, he is thinking of trying it on Two.

From the home pitch, Bob G5MA has chalked up DL1LB, GC3EBK and OZ2FR—the routine is EDX from Ashted and GDX when /P, and a QSL card every time. A lot of us lean heavily on Bob.

G4SA (Drayton, Berks.) has been trying a 12-element stack at 35 ft. against a 4-over-4 at 50 ft. and on direct change-over com-



The aerial complex at ON4UV, Fayt-lez-Manager, whose outstanding results on the 430 mc band were reported in detail in our April issue. In this photograph, the 70-centimetre stack is below the two-metre array. His station was pictured on p. 619 of our issue for December, 1951.

parisons, the stack, though lower, gives better reports every time, on EDX and GDX. This is interesting and will be food for thought to many. G4SA has made several good 100-150 mile contacts under conditions which could be said to be poor, and thinks that too many people give up when the band does not seem to be wide open. (This is, again, all a matter of getting more stations regularly active; actually, the activity position is gradually improving, and is very much better than it was this time last year).

G2HDZ (Pinner) has a 20-element stack for 430 mc ready for erection, and on Two "bolstered up his self-respect," as he puts it, by working DL, F and

PA and some distant G's on phone; though GW5MA/P gave Pems., there has been no improvement in Countries Worked in spite of diligent listening. G3GBO (Denham, Bucks.), on 144.78 mc, has moved indoors from what he says was "literally a shack in the garden." This makes for more operating comfort and convenience, and though the feeder-line is now 90 ft. long (Telcon K.35) it does not appear to have lost him any performance; since the beginning of March, he has worked 29 new stations, several at EDX and GDX, with a substantial addition of six to the counties score. G4CI (Worcester Park) also goes up in All-Time Counties. From Seer Green,

Irish DX Project

Plans in hand with EI2W and his group of VHF helpers for attempting Trans-Atlantic working on Two Metres are approaching fruition. A site has been selected at Kilkee, Co. Clare, and the station will be on the air, with beam systems heading west, from July 4-12 next, inclusive. Operation will be practically continuous, with a team of watch-keepers, and W1AW—the ARRL's broadcast station—will co-ordinate the effort on the American side.

We wish EI2W well in this important and ambitious project, and hope that during the ten days or so the station is operating, the EI's will encounter the sort of propagation conditions that could make a QSO possible. And having regard to the DL3QA/W1RFU results, it would seem to be a good opportunity for trying a moon-reflection QSO if the main array can be made tiltable in the vertical plane.

Now ex-G2XC

As many readers will know, Ted Williams, G2XC, of Portsmouth, was in charge of "VHF Bands" for the long period from November 1947 until May 1952. He laboured earnestly in the VHF cause, and made a large and important contribution to the success of our undertakings in the VHF field. Since giving up "VHF Bands" a year ago, he has gradually become more absorbed in non-radio interests and responsibilities, and now he writes to say, that he has given up Amateur Radio altogether, even to the extent of surrendering his licence! This will be sad news to all his old friends on Two Metres, to whom he has asked us to pass his good wishes and remembrances. Maybe the bug has bitten deeper than he knows—if so, we shall be hearing of him again, sooner or later!

VHFCC Elections

The following are new members of the VHF Century Club, they having shown the necessary proofs of 100 or more stations worked two-way on the VHF bands: G3YH, Bristol, No. 143; G5LK, Reigate, No. 144; G2FZU, Ilkington, No. 145.

G5LK is, of course, the well-known sightless amateur, and his success in achieving VHFCC is a fine tribute to his ability and enthusiasm—he himself attributes it largely to the practical assistance he has had from several of the active two-metre men. The cards supporting G3YH's VHFCC award included 23 QSL's from 7 European countries worked on the old 5-metre band, as well as 34 G's from the 56 mc days. On the other hand, all G2FZU's cards were for two-metre contacts.

The ON4BZ Converter

Touching upon the circuit which appeared on p.114 of the April issue, there are three points which should be noted—an RF choke will usually be necessary across the input end of L1 and earth, and the junction of R5-R6 should go to the earthed side of the heater line; the tap on L3 controls, with the value of C17, the degree of injection obtained, and either or both need to be adjusted to give the injection voltage suggested in the text.

Calls Heard and The Tables

Once again it has been a heavy month in the tabular department, with some 50 movements notified for the Tables. We hope and believe that everyone has been properly credited—there were only two misplaced entries in the April issue. In this connection, correspondents are, again, particularly asked to put their claims on a separate slip, marking clearly the table for which the movement is intended. The reason for this is the obvious one that the Tables are made up separately from the main text, and it doubles the load on your A.J.D. if he has to dig claims out of letters. Most readers would be utterly astonished if they saw the pile of material which has to be sifted through again and again to produce "VHF Bands" each month. It helps us considerably if attention is paid to these small requests we make from time to time.

Similarly with Calls Heard—please use a *separate sheet* for your list and set it out exactly as you see it in print, with call-signs in strict alphabetical and numerical order. The ones we get in the

TWO-METRE FIRSTS

G/DL	G3DIV/A-DL4XS/3KE	5/6/50
G/EI	G85B-EI8G	23/4/51
G/F	G6DH-F8OL	10/11/48
G/GC	G8IL-GC2CNC	24/5/51
G/GD	G3GMX-GD3DA/P	29/7/51
G/GM	G3BW-GM3OL	13/2/49
G/GW	G5MQ-GW5UO	22/10/48
G/ON	G6DH-ON4FG	25/9/48
G/OZ	G3WW-OZ2FR	1/6/51
G/PA	G6DH-PA0PN	14/9/48
G/SM	G5YV-SM7BE	1/6/51
GC/DL	GC3EBK-DL3VJ/P	22/3/53
GC/EI	GC2CNC-EI2W	8/10/51
GC/ON	GC3EBK-ON4BZ	4/3/53
GC/OZ	GC3EBK-OZ2FR	2/3/53
GD/EI	GD3DA/P-EI2W	30/7/51
GD/GM	GD3DA/P-GM3DAP	29/7/51
GD/GW	GD3DA/P-GW5MQ	28/7/51
GI/EI	G13GQB-EI2W	13/6/51
GI/GD	G12FHN-GD3DA/P	29/7/51
GI/GM	G12FHN-GM3OL	1/7/49
GI/GW	G12FHN-GW3ELM	8/7/49
GM/EI	GM3BDA-EI2W	12/6/51
GW/EI	GW2ADZ-EI8G	19/4/51
DL/OZ	DL6SW-OZ2FR	4/3/51
DL/SM	DL2DV-SM7BE	10/3/51
EI/DL	EI2W-DL3VJ/P	29/8/52
EI/ON	EI2W-ON4BZ	21/9/51
ON/OZ	ON4BZ-OZ2FR	3/6/51
ON/SM	ON4BZ-SM7BE	2/3/53

proper form—and fortunately they are the majority—can be pasted straight down and hours of work saved.

So Finally—

We come to the end of another "VHF Bands"—one of the most interesting months we can remember, and your A.J.D. again records his grateful thanks to all correspondents for their helpful, stimulating and interesting letters.

For next month's issue, we want them all again **by Friday, May 15**—not long after you see this, in fact, as once more the calendar has caught up with us and we go to press early for June. Address everything to: A. J. Devon, "VHF Bands," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. With you again on June 5—and have a good Whitsun.

*Take Care—
HT Can Kill*

NEW QTH's

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

G3GTM, P. Morey, Star Hotel, Helston, Cornwall.

G3HFG, D. H. Strudwick, 53 Cedar Road, Romford, Essex.

G3HWB, F. V. Greenleaves, 264 Old Road, Ashton-in-Makerfield, nr. Wigan, Lancs.

G3IGC, A. Garforth, 12 Turf Lane, Royton, Lancs.

G3IHC, F/Sgt. R. E. Langfield, R.A.F. Station, Hullavington, Chippenham, Wilts.

G3IIA/A, S. Johnson, Windlesham, Crowborough, Sussex.

G3IHH, G. L. Flint, 108 Prenton Road West, Birkenhead, Cheshire.

G3IJU/A, Sgt. E. Briggs, 78 Donegal Park Avenue, Belfast.

G3IKA, A. B. Hutchence, 12 Chiltern Bank, Peppard, nr. Henley, Oxfordshire.

G3IKG, D. Corsi, 52 Lintaine Grove, West Kensington, London, W.14.

G3IKV, C. W. Janes, 1 Ainslie Street, Barrow, Lancs.

G3ILW, H. C. Salmon, The Blue Ball, Kintbury, Newbury, Berks.

G3IMO, E. D. Shepard, 122 Folkestone Road, East Ham, London, E.6.

G3INQ, W. J. Fuller, 204 Victoria Road, Middlesbrough, Yorkshire.

G3IOA, A. B. Langfield, 43 Thornham Crescent, Moston, Manchester, 10.

G3IPG, G. Phipps, The Haven, St. John's Avenue, Harlow, Essex.

G3IPW, K. W. Lord, 44 Higher Causeway, Barrowford, Nelson, Lancs.

G3IRA, J. P. Wren, 330 Marlborough Road, Swindon, Wilts.

G3ISF, J. Andrews, 2 Lower High Street, Shirehampton, Bristol.

G3ISX, C. J. Leal, 1 Deepdene Road, Welling, Kent.

G3ISZ, P. Morris, 206a Great West Road, Hounslow, Middlesex.

G3ITT, J. S. Cairns, 9 Vogan Avenue, Great Crosby, Liverpool, 23, Lancs. (Tel.: *Waterloo 5794*).

G3IUD, R. A. Norrington, Dorny, Kings Road, Wilmslow, Cheshire.

G3IUO, G. W. Allen, 3 Bickerton Close, Henbury, Bristol.

G3IUS, V. H. Emms, Cross Keys Inn, Bradenstoke, Chippenham, Wilts. (Tel.: *Bradenstoke 279*).

G3IUU, J. Elliott, 1 Moor Road, East Dene, Rotherham, Yorkshire.

G3IUU/A, 1920216, Cpl. Elliott, J., SHQ. Signals, R.A.F. Lindholme, Doncaster, Yorkshire.

G3IUV, G. Loveday, 16 Stanbury Road, Bedminster, Bristol.

G3IUY, J. Presland, 71 Star Street, Ware, Herts.

G3IVG, F. Stocks, 7 Waingate, Rawtenstall, Lancs.

G3IVH, E. J. Younge, Colkirk, nr. Fakenham, Norfolk.

G3IVH/A, E. J. Younge, Y.M.C.A., St. Giles Street, Norwich, Norfolk.

G3IVJ, C. J. Rourke, 13 Ravenhill Avenue, Belfast.

G3IVL, Bath Spa Radio Club, 13 Moorland Road, Oldfield Park, Bath, Somerset.

G3IVN, T. R. Castle, 5 Augustus Road, Stony Stratford, Wolverton, Bucks.

GW3IVS, J. E. Roberts (*ex-ZB2A*), 33 Lloyd Street, Llandudno. (Tel.: *Llandudno 7000*).

G3IVT, W. K. Dodgson, 53 Barrington Road, Wavertree, Liverpool, 15. (Tel.: *Sefton Park 4660*).

G3IVY, G. Sibley, 49 Strathmore Road, Teddington, Middlesex.

G3IWG, D. F. Scott, Radio Department, Northern Polytechnic, Holloway Road, London, N.7.

G3IXX, E. H. Hamlet, 6 Greenhill Grove, Manor Park, London, E.12.

G3JAD, J. Drury, 61 Queens Road, Hull, Yorkshire.

G3JAM, B. J. P. Howlett, 219 Chigwell Road, Woodford Green, Essex.

G3JEP, Rev. J. E. Penney, Wisborough Green Vicarage, Billingshurst, Sussex. (Tel.: *Wisborough Green 339*).

GW3JET, C. W. C. Richards, Croesfaen, Pontyclun, Glam.

G3JFM, E. F. Moore, 5a Manor Road, Bowes Park, London, N.22.

CHANGE OF ADDRESS

G2DCI, R. S. J. Smith, 15 Russell Bank Road, Four Oaks, Sutton Coldfield, Warks.

G2HKW, R. Uphill, 39a Hurlingham Road, Bexleyheath, Kent.

G2QY, G. P. Anderson, 56 Latimer Gardens, Pinner, Middlesex.

G3AHV, G. W. Ripley, 436 Meanwood Road, Leeds, 7, Yorkshire.

GC3EBK, B. B. Gale, Myberne, Jerbourg, St. Martins, Guernsey.

G3GAH, A. W. Foster, 56 Park Grove, Barnsley, Yorkshire.

G3GRI, E. W. Marsh, (*ex-ZBII*), Hillside, Carn Grey, St. Austell, Cornwall.

G3HEK, J. B. M. Smith, Glan Hafren, Pant, Oswestry, Shropshire.

G8HT, R. H. Taylor, Brook House, London Road, Sunningdale, Berks.

CORRECTION

G2ACZ, G. Whitehead, c/o 1 Pumping Station, Goole, Yorkshire.

G3IOS, A. E. Kenmuir, 71 Newcastle Street, Kilkeel, Co. Down.

A COMMENT was recently made here on the contrast between the voice on the air and the operator in the flesh. There is often an even greater contrast between the station itself and the signal that issues from it. No two stations are alike, but lots and lots of signals sound more or less the same. There is no means of telling (short of paying a visit) whether that beautiful T9x signal, or that BBC modulation, issues from a junk-pile or a professional-looking "station." The fact is, of course, that untidy junk is all very well if the operator knows what he is doing. The mere act of *looking* tidy does not necessarily make the station more efficient, although it does indicate that the owner takes a pride in his gear. A neat-looking station is therefore a rather better bet in the efficiency stakes than a spaghetti factory; but one has been surprised, on one or two occasions, to note that a station which looks an absolute model of constructional efficiency has had some very sad goings-on behind the beautiful crackle-finished panels.

MULTIPLICITY

Does any other industry suffer, to the same extent as radio, from the terrific multiplicity of small, non-standardised parts? Can you imagine *anything* so ridiculous as the tremendous number of valve types now in use, not forgetting the numbers of different bases into which we have to fit the things? How many receiving valve types would be really necessary today, if manufacturers had got together 'way back with a view to some standardisation? And, having asked three questions in a row, we will drop the interrogation and make the bold but possibly risky statement that we can't see the need for more than, say, a couple of dozen receiving types altogether. Instead of this, we have several hundreds to choose from, and the prices are, of course, correspondingly higher than if a smaller number of standardised types were in use. It is worth remembering that during



the war the Germans did very well with *one* receiving valve type—the RV12P2000—which could be used in either the HF, AF or rectifier stages merely by appropriate connection of the elements. Thus, in any given receiver, up to quite high frequencies, one valve type was a spare for *any* stage.

PRACTICAL EXAMINATION

We were very interested to note that an enterprising Club set its members a practical problem at a recent meeting. They were split into two teams, each of which was presented with a handful of miscellaneous "bits." The test was to construct a receiver which tuned (and received signals!) in the 80-metre band in less than one hour. We could suggest other practical problems, some simpler and some considerably more difficult; but they would all require the exercising of that type of ingenuity which is truly *amateur*. Anyone who has had to make a variable condenser out of two postcards and two packets of milk chocolate will know just what we mean! Too many of us are in danger of losing our ability to improvise.

CONTROLLED REFLECTIONS

Those enthusiasts who spend their time designing space-suits and studying the niceties of rocket propulsion, in readiness for their first passage to the moon, look upon us radio amateurs as a poor

lot. How enterprising it would be if we stole a march on the mere joy-riders and shot something out into space with a real purpose behind it! When the first space-station has been sent up there in bits, assembled, and left in its fixed position, we shall all have to alter our ideas about the best angle of radiation in a vertical plane! Just get your vertical angle right, hit the thing fair and square with your beam, and you can't fail to be S9+ in New York.

OLD-TIMERS' QUIZ

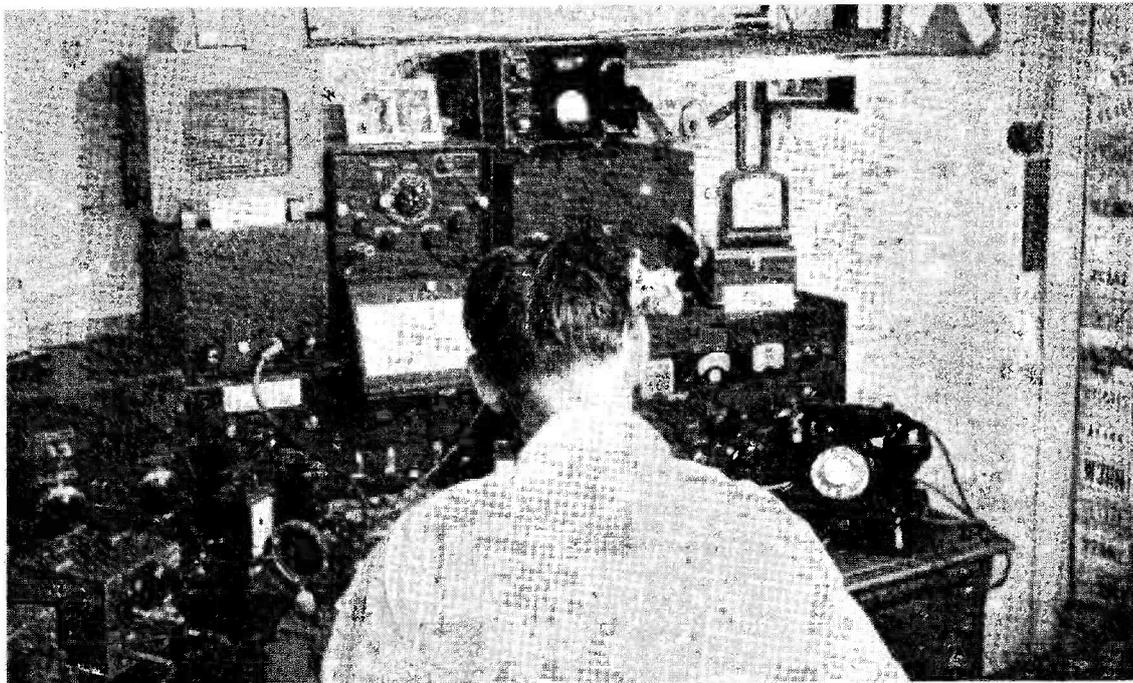
No prizes are offered for correct answers to the following, but they may provoke a few arguments here and there. The answers will be given next month. Anyone with 25 years on the air and a fairly good memory should know them all:—(1) Who was "F. B. Arnyne"? (2) What was the special claim to fame of Léon Deloy, and what was his call? (3) Which of these calls were used by amateur stations, and who were the others?: PCGG, PCII, 2ZY, 5IT, 6BM. (4) Who used the prefixes FO, SB, OA and OZ prior to 1928? (5) What was the meaning of the abbreviations ATI, QSS and CRAC?

UNCONTROLLED REFLECTIONS

We have been in an "if only" mood for a long time now, and were thinking, not long ago, that several branches of the radio art have gone off in the wrong direction, simply because of some of the early discoveries. If only someone had developed television along quite different lines . . . if only someone had done a lot of hard thinking about methods of generating RF, instead of being blinded by that early invention, the thermionic valve . . . and so on. We should probably have had a television system as simple to operate as a magic-lantern, and in colour, too; and we should have produced our kilowatt of RF (any frequency you like) by switching on something about the shape of a bowl-fire but perhaps less cumbersome. Or should we?

The Other Man's Station

G2BBZ



THE story of G2BBZ—owned by C. Levy, A.M.Inst.B.E., and operated by him at 174 Holders Hill Road, Mill Hill, London, N.W.7—is of unusual interest because it goes right back to 1920. He first started in the days of “special experimental licences” (to build a crystal set), hand-made components, and the peculiar smell of drilled ebonite, never forgotten by those who have ever built up a TRF receiver or a switching panel on $\frac{1}{4}$ -in. ebonite sheet. The early receiving equipment at G2BBZ included HF and LF amplifiers using Marconi-Osram V24's, various kinds of bright-emitter valve, and the soft Dutch R-type as detectors. Much experimental work was also done with energised crystal rectifiers—and it might also be remarked that G2BBZ still uses his original pair of Brown's headphones, over 30 years old and even now as good as ever.

During August, 1923, G2BBZ visited 2LO—the original BBC station—and met Capt. P. P. Eckersley, who was the BBC's first chief engineer. In 1931, he was a member of an experimental group, under the leadership of Cecil Page, G6PA, working on the old 56 mc (five-metre) band. As G2BBZ says, all this contrasts very oddly with present-day practice and technique.

In this photograph, the transmitter now in use is to rear left, capable of 40-50 watts input, but usually run at 20w. only; the valve sequence is 6J5 CO into 6L6-6L6-6L6 doublers into P/P TVO5/12 neutralised triodes. The speech amplifier-modulator used with this transmitter is 6SJ7-6J5-P/P 6L6's, and the equip-

ment as a whole can be operated on all bands Eighty to Ten, with various aerial systems. Activity has been mainly on the 10-metre band, using a rotary beam at 45 ft. chain driven from the operating position, and also on 80 metres with the QRP input of 20 watts.

At the centre of the photograph is seen the control panel for all power switching, this panel also carrying the relay transformer and rectifier. The control relays are contained in one of the two hinged boxes on the left, monitoring equipment and a microphone head amplifier being accommodated in the other. At G2BBZ, the BC-221 is used not only as a frequency meter, but also as an RF driver (VFO), its output being taken to a buffer-doubler unit using 6AG7-6AG7-6L6 and thence into the main transmitter, which is otherwise crystal controlled by the 6J5 CO stage.

The station receiver is an AR88, matters being so arranged that the send-receive switch on the '88 effects all change-over functions through the relay panel, making for quick and easy operation. The receiver output can be switched into a number of speakers, and on the control and switching side provision is also made for rapid fault finding and independent isolating of all units in the layout.

So from all this you will know, when you meet G2BBZ on the air, that he has a long practical experience of radio, and has been through many of the experimental and constructional stages of the early days of amateur activity in this country.

The Month With the Clubs

Acton, Brentford & Chiswick Radio Club

A meeting and exhibition arranged for the local Press, with the Club Tx in action, attracted a record attendance. A Top-Band aerial system is now being erected from the roof of the local power station, and better results are hoped for! Meetings every Tuesday, A.E.U. Rooms, 66 High Road, Chiswick.

Barnsley & District Amateur Radio Club

At recent meetings the members heard a very instructive and interesting talk on Mass Production of Commercial Radio and Television Receivers, given by Mr. Isaac, of the M.R.G. Co., and a General Survey of TVI by Mr. D. Westwood, B.Sc.

Bradford Amateur Radio Society

New officers were elected at the AGM, held on March 31. Events in the near future include NFD and a D/F Hunt. On May 29 members will visit the offices and works to see a local paper printed.

Chester & District Amateur Radio Society

The Annual Dinner was held during April, with members of other North Western Radio Societies attending. Plans for NFD are well ahead, and final arrangements are being made on May 26. Other May meetings are as follows: 5th, Oscilloscope Demonstration; 12th, A Light-Beam Tx, by F. Withall; 19th, Radio Exam Paper, 1953.

Most Clubs are switching over by now to their summer programme, with the accent on visits and field days, rather than on organised lectures. We shall be glad to receive advance particulars of all local field days in order that they may be published and brought to the notice of other Clubs who might be able to co-operate on the same occasion.

In addition to reports this month, we are glad to acknowledge the following publications:

"News Letter" (CHESTER); "News Sheets" (SOUTHEND); "News Bulletin" (STOCKPORT); "Newsletter" (CLIFTON); "Journal of the QRP RESEARCH SOCIETY"; "News-Sheet (PURLEY); "QRV" (ROYAL AIR FORCE AMATEUR RADIO SOCIETY).

Next month's deadline is first post on May 13; address all material to "Club Secretary," SHORT WAVE MAGAZINE, 55 Victoria Street, London, S.W.1.

And now follow this month's reports, from 27 Clubs.

Coventry Amateur Radio Society

Several new members have been welcomed recently, and plans for a varied summer programme have been made, including BBC visits, a MARS/CARS field day and a big social event. The MARS/CARS annual contest takes place on April 19. Club Night on the air continues on the second Thursday of the month, usually mustering ten or more stations on the Top Band.

East Grinstead & District Amateur Radio Club

At the AGM, Mr. R. A. Lord was re-elected Chairman. It was decided to continue the Morse instruction classes and the lectures on transmitter theory. Meetings will now be held every Thursday at 7.30, and a series of lectures on fault-finding, with practical demonstrations, will begin shortly.

Edinburgh (Lothians) Radio Society

The meetings continue regularly at 25 Charlotte Square, Edinburgh, the next being on May 14 (Low Power Transformers), May 28 (Tape Recorders) and June 11 (Question Night)—all at 7.30 p.m. Plans are in hand for NFD and a visit is planned to the Kirk o' Shotts TV station.

Lincoln Short Wave Club

The Lincolnshire Hamfest will take place on May 10 at the Welcome Café, Lincoln (assemble 1.30-2 p.m.). There will be a

Grand Junk Sale, and the tickets, which include high tea, are priced at 5s. 6d. and may be obtained from Mr. L. Gostelow, G2OW, 21 Cannon Street, Lincoln.

Hastings & District Amateur Radio Club

The Club strength now stands at 31, and the last meeting was attended by 26 members. G3BDQ gave an interesting talk on Oscillators, with a demonstration. At another recent meeting members were split into two teams and given a handful of small parts, then being left to build an 80-metre receiver which worked. The Club will be exhibiting at the forthcoming Hobbies Exhibition, July 4-11, during Hastings Carnival Week. May meetings are on the 5th and 19th, 7.30 p.m. at the Saxon Café.

Portsmouth & District Radio Society

Forthcoming meetings: May 12, Films by G2MN and G3CHQ; May 19, Field Day progress report, etc.; May 26, Business Meeting; June 9, Field Day—Final Tie-Up. The Club will have a Stand at the Coronation Ideal Home Exhibition—Connaught Drill Hall, May 9-23. A complete station will be operating with the call G3DIT/A.

Purley and District Radio Club

The Annual General Meeting will be held on May 28. As this is the most important (and usually the worst attended) meeting of the



Officials and Committee of the Spen Valley Radio & Television Society at the annual dinner held in Cleckheaton on March 28. Two of them are real Old Timers—G2SU, lower left, and G8OK (Vice-Chairman) on his left. The Chairman, third from left, is G2BMC.

year, it is hoped that this advance notice will cause members to rally round on that occasion.

QRP Research Society

A new contest for SWL's and transmitting members is announced this month, being a monthly "set band" contest. Scoring is on a points system for countries heard or worked, with bonus points for hearing or working other QRP R.S. members' stations. The "set band" for May is 7 mc.

Sheffield

Amateur Radio Club

We have been advised of the recent change of Secretary. Please see panel for the correct name and address.

Slade

Radio Society

During April the Society visited a local firm who manufacture transformers; for May 29 a visit is planned to the Dunlop Rubber Co.'s research department. Forthcoming events: May 15, Receiver Selectivity; May 17, First D/F test.

South-West Essex **Radio Club**

This Club meets weekly at 367 Rush Green Road, Romford

—every Tuesday at 8 p.m. New members are always certain of a welcome at these informal meetings.

Spen Valley **Radio & Television Society**

The season's officers were elected at the recent AGM. Future meetings are as follows: May 6, Visit to N.S.F. Works, Keighley; May 20, Visit to Leeds University.

Stoke-on-Trent **Amateur Radio Society**

Meetings continue every Thursday at 7.30 p.m., and membership is increasing steadily. The AGM was held on March 26 and new officers elected. April lectures covered Negative Feedback, Receiver Principles, Tape Recording and a 100-watt Table-Topper—as well as talks covering the R.A.E. Syllabus.

Isle of Thanet **Radio Society**

The sixth annual dinner and dance was held in March, with some 70 members and guests present. A large "Ham Cake" was cut, and the usual raffle was held. The Club has now left its previous premises at Margate, and meets every Thursday at Hilder-

stone House, St. Peters, Broadstairs (except during August). A welcome is extended to all amateurs on holiday in the area.

Torbay

Amateur Radio Society

At a recent meeting the manning of two NFD stations in the area was discussed, but it was finally decided only to run an "A" station, in view of the shortage of qualified operators. The AGM was held on April 18, together with a Junk Sale. Meetings take place on the third Saturday of each month, 7.30 p.m. at the Y.M.C.A., Torquay.

Radio Society of Harrow

Forthcoming events will be as follows: May 8, G3IMI on Frequency Measurement; May 15 and 29, Practical and Transmitter evenings; May 22, G2TA on Speech Clipping.

Reading

Radio Society

The officers for the year were elected at the recent AGM, which showed the society to be in a very healthy state, and a fine programme of lectures, demonstrations and debates has been arranged for the coming season.

Meetings take place on the second and last Saturdays, 7 p.m., at the Abbey Gateway.

South Manchester Radio Club

This Club is now actively on the air with the call G3FVA, and operates on alternate Friday evenings from 1930-2200 on CW. The frequencies (all crystal) are 3538, 7016, 7040 and 7048 kc, and the next regular operating evenings will be May 15, June 12 and June 26. The next lecture is on May 22, when the subject will be Audio Amplifier Design and the Lane Tape Recorder, by Mr. K. Ross.

Cambridge & District Amateur Radio Club

Next meeting is on May 8 at the Jolly Waterman, Cambridge, beginning at 8 p.m. It takes the form of a Junk Sale and, judging by the last, should make an interesting evening.

Yeovil Amateur Radio Club

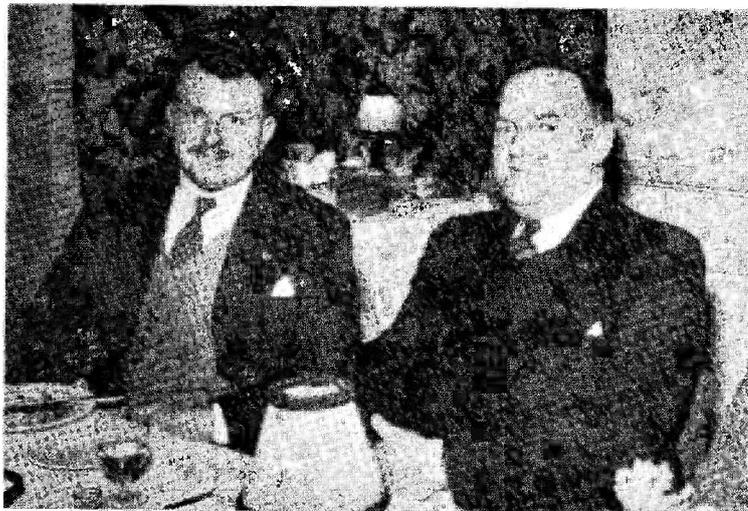
The Club Tx. G3CMH, is finished and is now testing on the air. Good results have been obtained, particularly on 21 mc, and no TVI is experienced on a receiver in the same building. M. G. H. Hitchcock, ZE3JQ/SU3JQ, is a Club member who is home on leave; he hopes to be active again from SU if that is possible.

York Amateur Radio Society

Meetings are held every Tuesday and Thursday at the Clubrooms in Fetter Lane, York (facing rear of Queens Hotel), at 7.30 p.m. The Club Tx. G3HWW, is now on the air on 1.7 and 3.5 mc CW on most meeting nights. Lectures and demonstrations are a monthly feature, and plans are being made for a film show soon.

Stockport Radio Society

Meetings are well attended, and new members being enrolled. Future lectures are on Power Supplies (G3EJZ on May 12). Operating Techniques (G3A00



At the Isle of Thanet Radio Society's Annual event at Ramsgate on March 7 last, when the evening's festivities included dancing and a raffle.

on May 26) and Field Day Working (G3LX on June 9).

Clifton Amateur Radio Society

Two recent lectures on Running a Morse Class, given by G3ANQ,

have been well received by a large audience. Average attendance has been about 30, with 50 for a Junk Sale! The first Field Day of the year will be held at Green Street Green on June 21, the challengers being the Cray Valley Society.

NAMES AND ADDRESSES OF SECRETARIES REPORTING IN THIS ISSUE

ACTON, BRENTFORD and CHISWICK : R. G. Hinds, 51 Rusthall Avenue, Bedford Park, London, W.4.
 BARNESLEY : P. Carbutt, G2AFV, 33 Woodstock Road, Barnsley.
 BRADFORD : A. R. Bailey, G31BN, Scarr Croft, Parkside, Bingley, Yorks.
 CAMBRIDGE : T. A. T. Davies, G2ALL, Meadow Side, Comberton, Cambridge.
 CHESTER : N. Richardson, 1 Victory Villas, Upton Lane, Chester.
 CLIFTON : W. Wooller, G3GYZ, 7 Neptune House, Neptune Street, London, S.E.16.
 COVENTRY : K. Lines, G3FOH, 142 Shorncliffe Road, Coventry, London, S.E.16.
 EAST GRINSTEAD : L. E. Miller, 30 Forest View Road, East Grinstead.
 EDINBURGH (Lothians) : I. Mackenzie, GM3FGJ, 41 Easter Drylaw Drive, Edinburgh, 4.
 HARROW : S. C. J. Phillips, 131 Belmont Road, Harrow Weald, Middx.
 HASTINGS : W. E. Thompson, 8 Coventry Road, St. Leonards on Sea.
 LINCOLN : G. C. Newby, G3EBH, 18 Birchill, Fiskerton, Lincoln.
 PORTSMOUTH : L. Rooms, G8BU, 51 Locksway Road, Milton, Portsmouth.
 PURLEY : A. Frost, G3FTQ, 18 Beechwood Avenue, Thornton Heath.
 QRP RESEARCH SOCIETY : J. Whitehead, 92 Ryden's Avenue, Walton on Thames.
 READING : L. Hensford, G2BHS, 30 Boston Avenue, Reading.
 SHEFFIELD : L. Sarjeant, G3HGG, 86 Western Road, Sheffield 10.
 SLADE : C. N. Smart, 110 Woolmore Road, Birmingham 23.
 SOUTH MANCHESTER : M. Barnsley, G3HZM, 17 Cross Street, Bradford, Manchester 11.
 SOUTH WEST ESSEX : B. W. Le Grys, G3GOT, 75 Shaftesbury Road, Romford.
 SPEN VALLEY : N. Pride, 100 Raikes Lane, Birstall, nr. Leeds.
 STOCKPORT : G. Phillips, G3FYE, 7 Germans Buildings, Buxton Road, Stockport.
 STOKE ON TRENT : J. R. Brindley, B.Sc., G3DML, 45 Rosendale Avenue, Chesterton, Newcastle, Staffs.
 THANET : J. Barnes, G3BKT, 18 Grange Road, Ramsgate.
 TORBAY : L. D. Webber, G3DW, 43 Lime Tree Walk, Newton Abbot.
 YEOVIL : D. L. McLean, 9 Cedar Grove, Yeovil.
 YORK : G. Nottingham, G3DTA, 51 Carr Lane, Acomb, York.

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XTAL XCHANGE

This space is available for the convenience of those wishing to exchange crystals. Notices should be set out as below, on a separate slip headed "Xtal Xchange — Free Insertion" and all negotiations conducted direct.

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G3IOZ, 1 Hillington Road, Edgeley, Stockport, Cheshire.

Has CTC 3505 kc, $\frac{1}{2}$ in. mounting; Bliley 3510 kc, $\frac{1}{2}$ in. mounting; frequencies 6497.9 and 6522.9 kc, $\frac{1}{2}$ in. mounting; and FT-243 type 7100, 7150 and 7175 kc crystals. Wants frequencies for CW end 7 mc band, and 6.0 or 8.0 mc crystals for multiplying into Zone E on 144 mc band, any mounting.

THE R.E.C.M.F. EXHIBITION

Nearly 120 component manufacturers were represented at the recent Exhibition organised by the Radio & Electronic Component Manufacturers' Federation, showing an enormous range of parts and materials for the radio industry at home and abroad. Good business was done at most stands, and there was a large attendance of invited visitors — buyers, technical representatives and scientists working in the electronics field. This Exhibition, which was inaugurated during the war largely to effect liaison

between the industry, the Services and their research establishments, has become one of the most important shop-window events of the year.

STOP PRESS—TOP BAND CHANGES

We have been informed that it has been decided to give effect to the Atlantic City Regulation regarding the present 1715-2000 kc band, as laid down by the 1951 Radio Conference (Region 1) at Geneva.

With effect from May 1st, 1953, therefore, our Top Band officially became 1800-2000 kc—and our continued use of it is subject to strict non-interference with other services with whom we are sharing the band. Concurrently with this change, alterations are taking place in the allocated frequencies of ship and coast stations within the 1800-2000 kc range; for a time there will be the possibility of serious interference.

Frequencies to avoid are: 1827-1855 kc in 7 kc intervals; 1855-1883 kc in 14 kc intervals; 1911, 1925, 1953, 1960 and 1974 kc; and 1981-1995 kc at 7 kc gaps. Even these frequencies are subject to a 6 kc bandwidth.

These are all marine frequencies and what it all comes to is, of course, that in the usual way we have to be very careful not to interfere on them. For most stations it is an after-dark problem. Indeed, the GPO recommends that for the time being the 1800-2000 kc band should be used as little as possible, until the fixed stations have settled down on their new frequencies.

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Two Wafer Type—2 pole 11 way, 7/6. 4 pole 5 way, 7/6. 6 pole 3 way, 7/6. 8 pole 4 way, 7/6.

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FOR SALE: Radiovision Hambander Communications Receiver, 32 mc to 1.7 mc in 5 wavebands; good condition; one owner; £15 0s. Od., carriage extra.—Box No. 1244, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

BC348 BUILT-IN POWER/PACK: LF band modified to cover 21 mc; £18 0s. Od. XL Tape Recorder, £50 0s. Od. CDP Disc Recorder, £10 0s. Od., or offers?—J. S. Pivey, G2HHV, Healey Cottage, Batley, Yorks.

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FOR SALE: S.640, mint condition, £19 10s. 0d.; Class-D Wavemeter, £4 15s. 0d.; FL-5-D Filter, 7/6. Buyers collect S.E. London area. WANTED; AR88D spares, particularly R.C.A. S-meters.—Box No. 1248, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

6 FT. heavy channel-type rack, £5 (carriage extra). Would consider part exchange in valves; require EF86, EF40, A1834.—Box No. 1249, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

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