The SHORT WAVE Magazine

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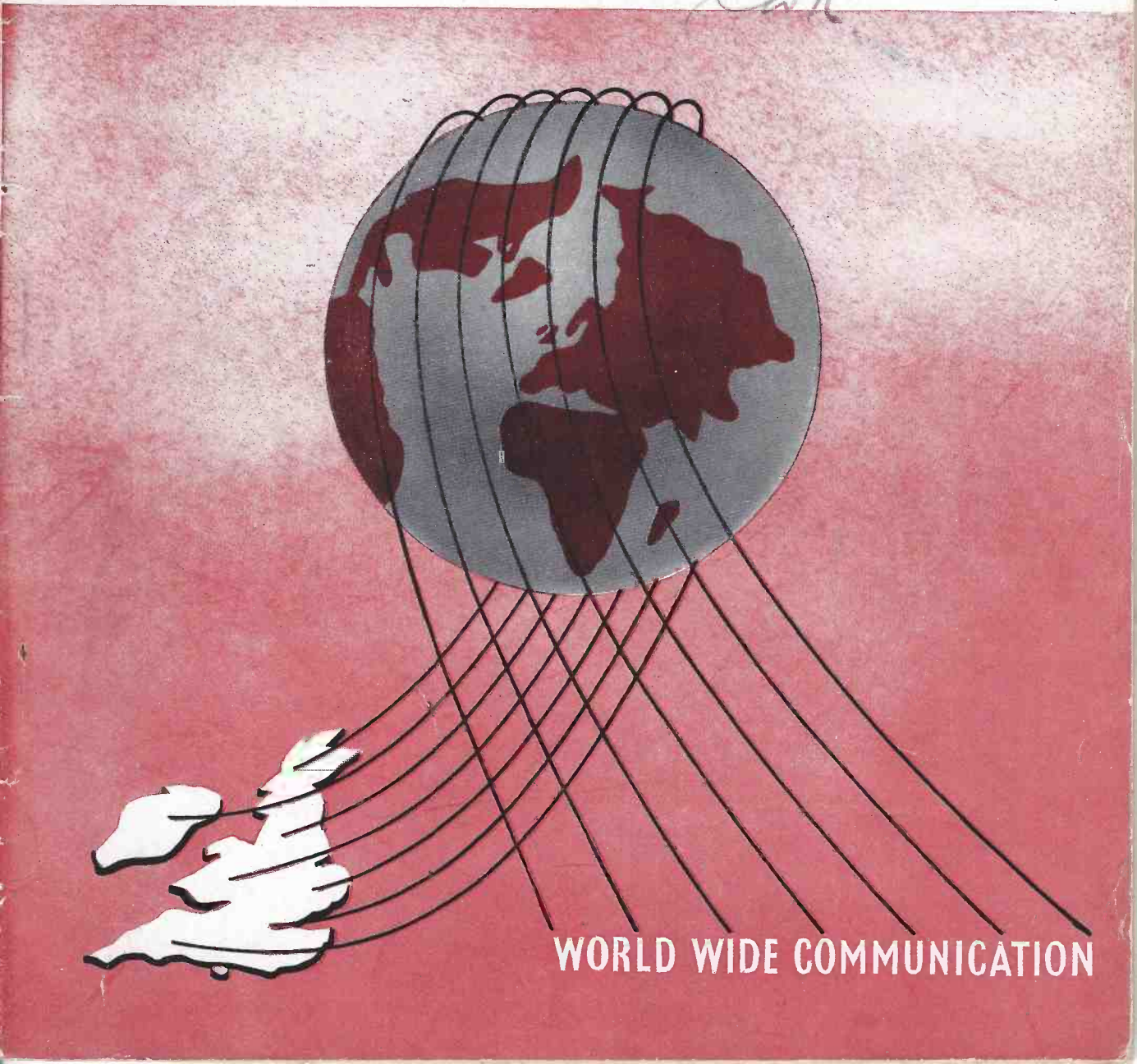
VOL. XII JULY, 1954 NUMBER 5



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The SHORT-WAVE Magazine

EDITORIAL

Repercussion *Arising directly from the comments in this space last month—on the subject of unauthorised commercial stations operating in the amateur bands—a Question was asked in the House of Commons on June 16 last by Mr. Ian Orr-Ewing, O.B.E., the Member for Hendon North. The following passages are taken from the* HANSARD *report of the proceedings:*

> **Mr. C. I. Orr-Ewing** asked the Assistant Postmaster-General whether his attention has been drawn to the increasing number of unauthorised British and foreign broadcasting stations and armed services transmissions now taking place in frequency bands reserved by international agreement for Amateur Radio; what action he is taking in respect of United Kingdom transmissions; and to what foreign administrations have protests been made about the breaking of this international agreement.
>
> **Mr. Gammans:** On the few occasions when an unauthorised British station is detected in the amateur bands, steps are taken to try and locate it, but there is no evidence of any large increase in unauthorised stations either in this country or abroad. The problem of interference caused by broadcasts from abroad is difficult to deal with, but protests have been sent to Spain, Greece and Iraq. Possibly my hon. friend is referring to authorised stations which are allowed to operate in bands used by amateurs. There are 14 such in the 7 m/c band. If my hon. friend has any particular points in mind, I shall be glad to make enquiry.
>
> **Mr. Orr-Ewing:** Would my hon. friend draw the attention of the Commonwealth signals officers who are meeting in this country at present to the desirability of keeping the reserve amateur bands free?
>
> **Mr. Gammans:** I will certainly keep that point in mind.

The inferences to be drawn from the A/PMG's reply are that there is unauthorised interference, but the G.P.O. is in difficulty in dealing with it; hence, they are unable to protect us against encroachment. Without taking the matter any further at this stage, we can say that it has been ventilated at the highest level, that the A/PMG's statement is in the record, and that the subject can be returned to at other opportunities.

All British amateurs will wish to thank Mr. Ian Orr-Ewing—who is himself an ex-G, incidentally—for his intervention, and will be glad to know that we have a protagonist within the House who is prepared to interest himself in our problems.

Austin Forbes G6FO.

Low Noise High-Gain Converter for 430 mc

DESIGN AND CONSTRUCTION—FULL DETAILS

D. R. DRYDEN (G3BKQ)

Readers interested in VHF will already be aware of the exceptional, and consistent, results now being obtained on the 70-centimetre band by our contributor. Much of G3BKQ's success is due to the 430 mc converter, designed by himself, which has been in use for over a year, and of which several copies are in operation at other VHF stations. In this article, he discusses his converter in detail and from the ample data he gives it will be possible for any experienced VHF constructor to build a similar receiver. This, with a good beam, will enable full advantage to be taken of the EDX opportunities on the 430 mc band—and it will also show that in many cases signals from a particular VHF station are better on 70 centimetres than on two metres.—Editor.

FOR successful 70 cm operation a station must have an efficient low-noise receiver, and a good high-gain aerial, as some signals on the 430 mc band at the present time are very weak. This situation may alter in years to come as more efficient high-power valves for 70 cm become available.

In 1952 it was found that the use of a 446A RF stage preceding a crystal mixer gave a considerable improvement in gain and noise at 435 mc, which made it possible to receive weak signals at a much better level than when no RF stage was present. Even so, the received signals at 40 miles were only S3-5 as compared with the equivalent signal of S9+ received from a similar station on 2 metres.

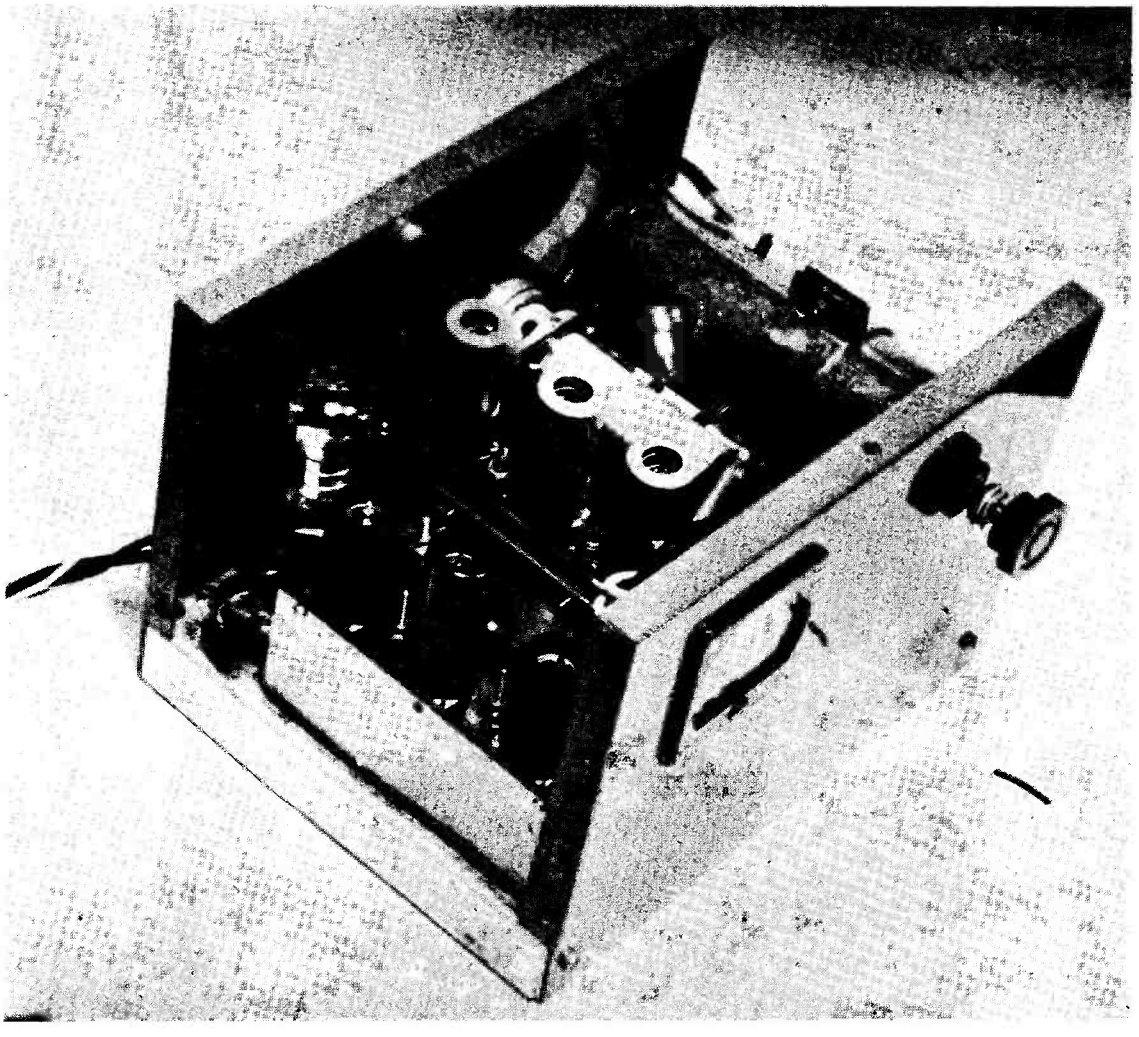
The writer found that, in theory, signals should be better on 70 cm than on 2 metres for the same power output with stations situated up to 50 miles apart, so intensive development of the converter was initiated. Since 1952 a converter has been produced which *will* receive signals from 70 cm stations using low power up to 50 miles distant with a reasonable degree of reliability, the station at the other end, of course, still using the same aerial and similar power output. This is usually between 3 and 10 watts at 435 mc.

The converter to be described here has no RF stage. An alternative RF head can be added at a later date to make the receiver suitable for 2 metres as well as for 70 cm. The noise figure, on both 144 mc and 435 mc, is in the region of 1 to 2·5 dB. It is suitable for receiving ordinary television, CW and narrow band crystal controlled signals.

Design Consideration

The design of UHF and VHF receivers is largely governed by the necessity for a low noise figure. Conventional types using an RF amplifier stage, *e.g.*, 446A valve or the more modern 6AJ4 yield a noise figure of about 6 dB at the best at 435 mc—and this is only with careful selection of the valves. It was felt that if any marked improvement in reception was to be obtained, this figure would have to be considerably less. As valves suitable for RF amplifiers did not seem to offer much prospect of a radical improvement in noise figure, as well as being difficult to obtain, it was thought worth while to investigate the possibility of designing a low noise, high conversion gain mixer, which we will call an "RF head." This was achieved by using a crystal diode in a new type of mixer stage. To obtain a low-noise figure, the mixer must have high selectivity, a high conversion gain crystal with low noise, and be followed by a high gain low noise head amplifier. If the mixer bandwidth is excessive, noise from the aerial, and reflections in the mixer cavity caused by the second channel, are presented to the crystal diode, thus giving rise to unwanted noise at the IF.

Post-oscillator injection was adopted, as this allowed the crystal diode tapping to be made near the earthy end of the mixer line, thus giving high selectivity and low noise. Selectivity may be varied from less than 50 kc to 10 mc by changing the tapping point of the crystal diode on the inner of the mixer line, and there is practically no variation in conversion gain.



General appearance of the G3BKQ 70-centimetre receiver unit, full constructional details for which are given in the text.

although the noise figure increases slightly with bandwidth.

As the noise figure of the mixer is low, careful layout is necessary to ensure that there is no radiation from the head amplifier or the earlier stages of the oscillator chain to reach the crystal diode. To overcome such defects, and to simplify construction, separate small chassis are used for the oscillator chain and head amplifier, both chassis being identical in size and shape. They are assembled together with the mixer cavity and voltage stabilizer valve VR150, on a main chassis, which allows easy maintenance and simplifies the incorporation of modifications as they become necessary.

The low noise figure of the "RF head" makes a cascode head amplifier necessary. It was found in practice that the first valve of the head amplifier determined the overall noise figure of the converter. A 6AK5 was chosen for this position, as it is easily obtained and inexpensive. General-coverage communications receivers usually have a very poor noise figure between 18 and 32 mc. The type of head amplifier described here will overcome this when the main receiver is operated in the tunable IF mode.

Briefly, the basis of the converter is as

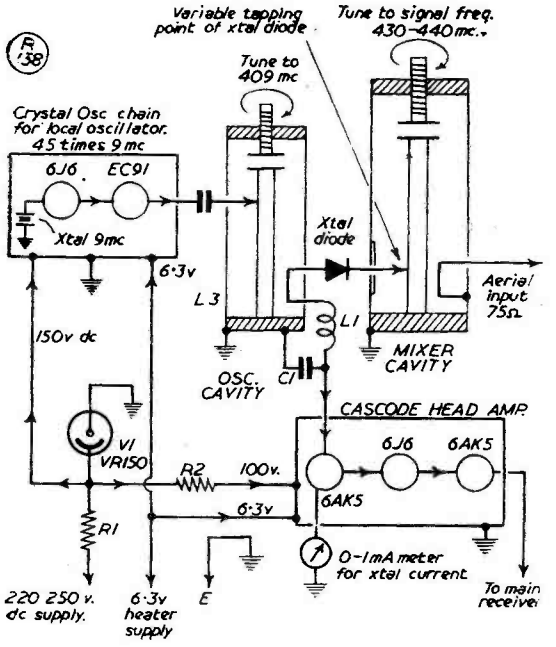


Fig. 1. Block schematic of the complete 430 mc receiver designed and constructed by G3BKQ.

Table of Values

Fig. 1. Block Diagram of Complete Converter.

R1 = 2,000 ohms 3 watts	L1 = 5 Turns 24 SWG tinned copper ¼in. diameter
R2 = 2,500 ohms 2 watts	V1 = VR150
C1 = 10 μμF	Crystal Diode = CV364 (BTH)

follows:

(1) A mixer ("RF Head").
(2) Cascode head amplifier with low noise, wide bandwidth, and high gain, and fed into a general coverage communication receiver used as the tunable IF.
(3) Crystal controlled oscillator chain for the local oscillator.

RF Head (Mixer)

The complete block diagram is shown in Fig. 1 and the graphs at Fig. 2 show the effect on crystal current and incoming signal of tuning the cavities. The aerial is loop-fed into the mixer cavity, and tuned by a tuning disc to the signal frequency at 435 mc. The crystal is tapped into the inner line about half to three-quarters of an inch from the earthy end, and loop fed into the oscillator chain cavity. This is tuned to 409 mc to give an IF of 26 mc, which is taken out between the bottom of the oscillator cavity feed-loop and earth. The cold end of the loop is fed into a 5-turn coil L1 (Fig. 1), and by-passed with a 10 μμF condenser to the outside of the earthy end of the oscillator cavity. The loop and 5-turn coil make up a resonant circuit at 409 mc, the hot end presenting maximum RF voltage to the crystal diode. The cold end, of course, will have no RF at 409 or 435 mc, and will be left with the IF which is fed into the input of the head amplifier.

Ordinary 2" and $\frac{5}{8}$" copper water tube (as used by plumbers) is employed for the mixer cavity, and can easily be obtained in all sizes and gauges. The gauge of the tube is not important, but a light gauge is preferable to avoid excessive weight. The 2" dia. end plates can be made of ¼" thick brass, to fit snugly into the outer tube, and are securely held by three 6 BA screws evenly spaced. The $\frac{5}{8}$" diameter inner line should be soldered into the end plate

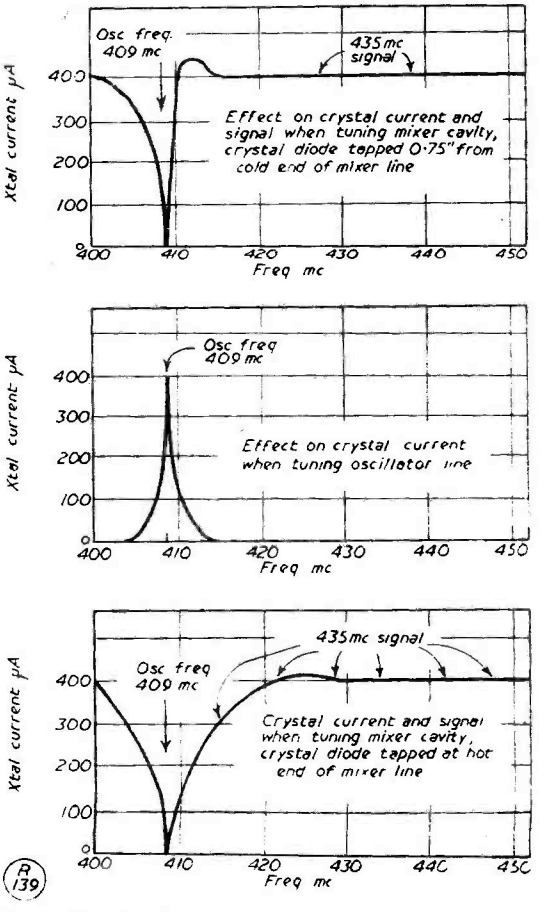
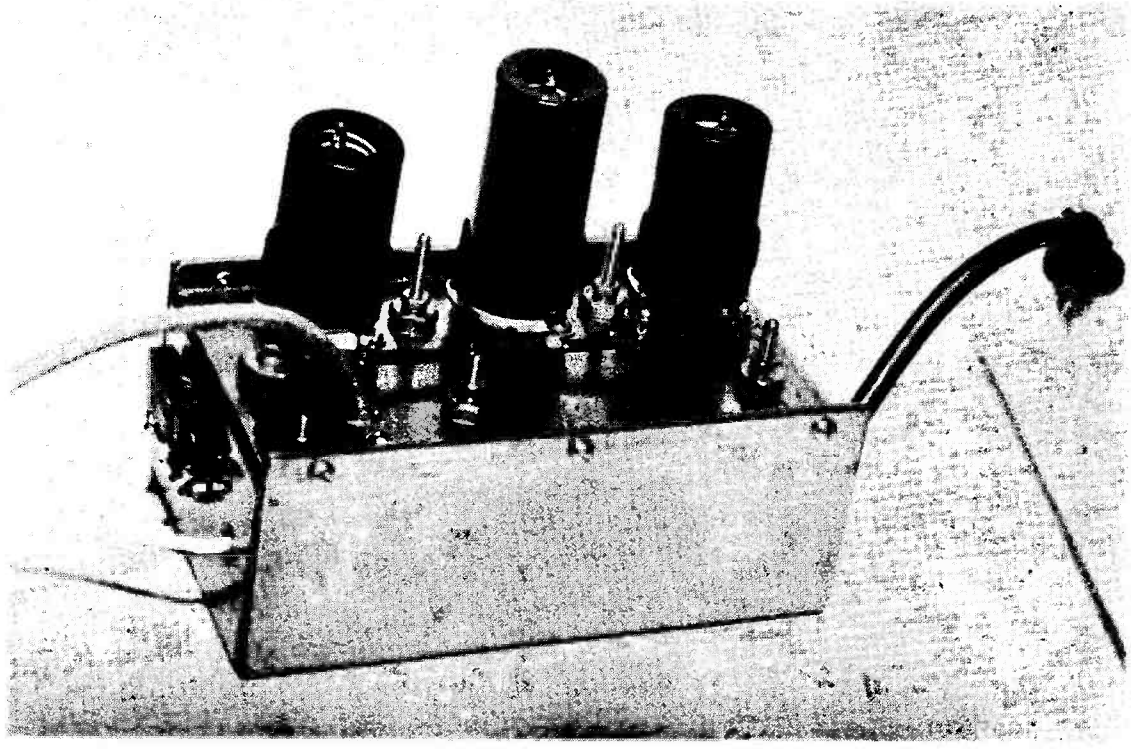


Fig. 2. Showing the effect on the crystal current and on the signal when tuning the cavities. *(Note: In the top curve, the "435 mc" point should indicate much higher selectivity—the band width as drawn is too wide).*



The head-amplifier in the G3BKQ 70-centimetre receiver is a cascode arrangement. It is constructed underside as shown in another photograph and the circuit arrangement is as Fig. 7.

to give mechanical strength. This forms the "shorted end." The tuning disc is $\frac{5}{8}$" diameter, approximately 1/16" thick, and fitted with a 6 BA countersunk screw to a short length of 0 BA threaded rod. The wire loop for the aerial input is made from 16 SWG tinned copper wire, passing through a short length of insulating material to carry the loop through the outer of the line. Two small holes are drilled in the side of the line for the aerial loop, shown in Fig. 3, the earthy end of the loop being soldered to the line outer. These soldering operations *cannot* be performed with an electric iron. They are best done with a gas burner, methylated spirit lamp or large fire iron. The inner of the 2" and outer of the $\frac{5}{8}$" line are polished with fine wire wool. Silver plating the line is not necessary for frequencies up to 470 mc. A small improvement might be noticed with silver plating, but would amount only to 3% at most. Super high finish makes no further improvement on the wire wool polish.

Crystal diode and total Noise Figure of Receiver. This type of RF head (Mixer) has been found to work well with crystals that have been useless in other types. A good CV102 crystal diode (bought on the surplus market) gives a total noise figure of 4 to 8 dB. The G.E.C. GEX-66 germanium crystal is consistent in noise figure; each of several different specimens tried produced a noise figure of 8 to 9 dB at 435 mc.

The CV102 silicon crystal diode has been superseded by the CV291, which gives an overall noise figure between 2·5 and 6 dB in this converter. An even better crystal diode is the CV364 with a total noise figure between 1 and 1·5 dB—which seemed unbelievable at first! Exhaustive tests were carried out with professional diode noise generators and the result fully confirmed. These noise generators use the diode CV2171 not yet generally available. The terminating 72-ohm resistor is a high stability cracked carbon type. Both items are designed for work at 500 mc.

The crystal diode CV364 is manufactured by the British Thomson Houston Co., Ltd., Rugby, but they are unable to supply them direct to individual users. They may, however,

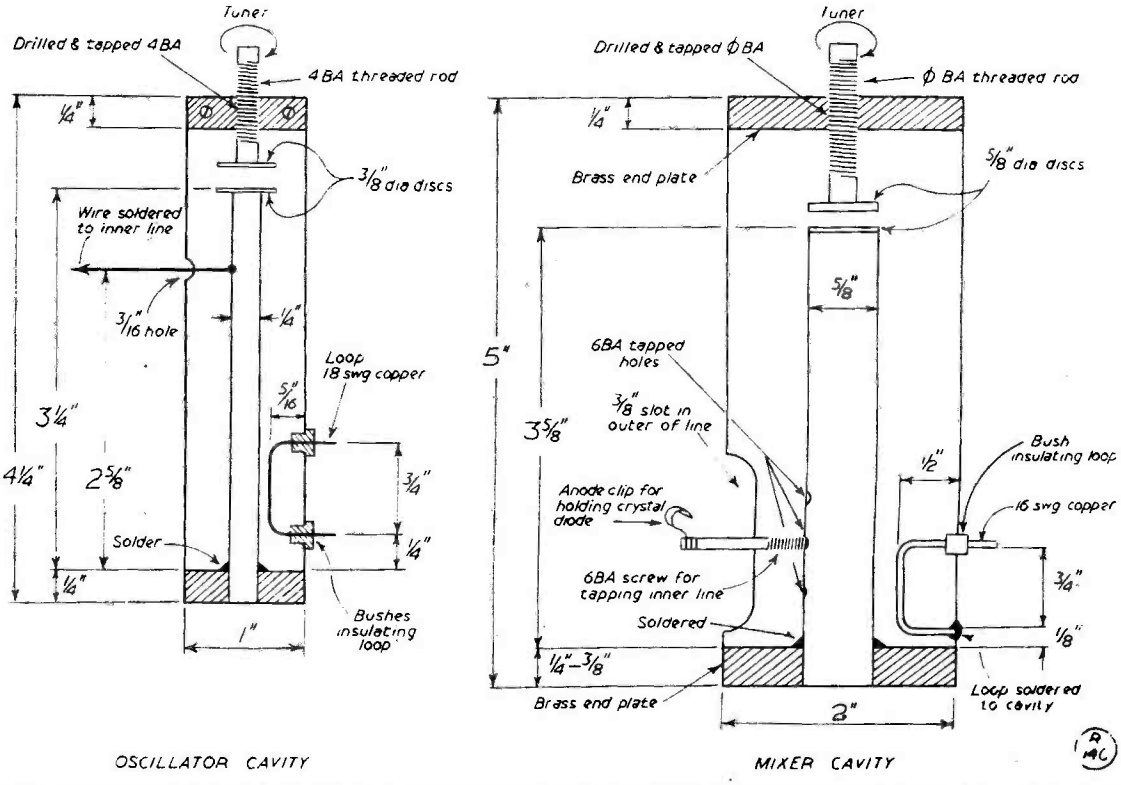


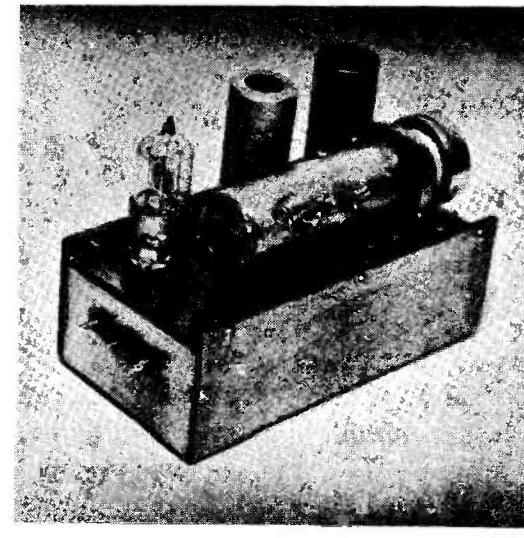
Fig. 3. Dimensions of the oscillator and mixer cavities for the 70-centimetre receiver described in the article. Some fairly careful metal work is called for here.

be obtained through normal retail channels.

The Oscillator Chain

The oscillator chain was kept simple, as in Fig. 4, although an alternative circuit is shown in Fig. 5.

The chain used by the writer for the latest version of the receiver (Fig. 4) consists of a regenerative crystal oscillator and two tripler stages. The crystal oscillator employs a 9 mc crystal operating on the fifth overtone to give an initial frequency well above the IF used. There are no spurious responses while tuning through the main receiver. The valve sequence is 6J6 overtone oscillator in the first half, kicking off at 45 mc, capacity coupled *via* C3 to the second half, which is a tripler to 135 mc, capacity coupled *via* C6 to an EC91 valve, again operating as a tripler to a frequency of 409 mc. The final tank circuit is a quarter-wave coaxial line parallel fed *via* C7, from the EC91 anode. This concentric line is fitted to the oscillator chain chassis, as shown in one of the photographs. The chassis size is 4¼" x 2½" x 1½" (see Fig. 6) with a simple cover to screen the underside. The quarter-wave



The oscillator chain for the 430 mc receiver, showing the method of fitting the oscillator cavity. Dimensions are given in Fig. 3.

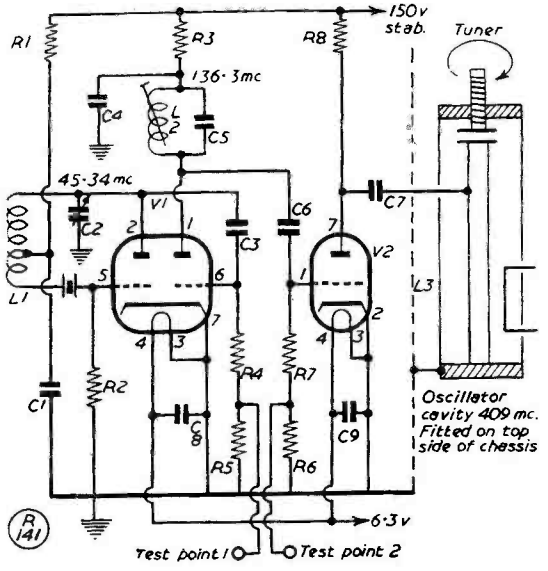


Fig. 4. The oscillator chain for the 70-centimetre receiver when a 9 mc crystal is used; the actual frequency is 9.067 mc for avoiding disturbances in the band and in the main receiver.

line consists of 1" copper water tube 4¼" long with a ¼" thick brass plate for both ends. The inner of this line is ¼" brass rod with a small ⅜" dia. disc soldered at the "hot" end. The cold end is soldered to the ¼" brass end plate. The tuning disc is of ⅜" diameter brass 1/16" thick fitted to a short bit of 4 BA threaded rod. The tuning end plate is drilled and tapped 4 BA. The construction is exactly the same as that of the mixer line already described.

Table of Values

Fig. 4. Oscillator Chain using 9 mc Crystal.

R1, R3 = 1,000 ohms ½ watt
R2 = 3,000 ohms ½ watt
R4, R7 = 47,000 ohms ½ watt
R5, R6 = 100 ohms ½ watt
R8 = 10,000 ohms ½ watt
C1 = .005 μF mica
C2 = 3/30 μμF trimmer (Philips)
C3 = 15 μμF ceramic
C4 = 500 μμF mica
C5 = 5 μμF ceramic, (*see text*)
C6, C7 = 2 μμF ceramic
L1 = 9 Turns 20 SWG tinned copper ½in. dia., ⅜in. long, tapped 3 to 4 turns from crystal end
L2 = 3 Turns 24 SWG tinned copper, slug-tuned, wound on Denco 0.375in. dia. former
L3 = *See Text*
V1 = 6J6
V2 = EC91
Xtal = 9.067 mc.

Cascode Head Amplifier

The head amplifier is a cascode 6AK5/6J6 in cascade with a 6AK5 RF amplifier, as Fig. 7 and one of the photographs. This will give a flat response of 6 mc as shown in Fig. 8. The IF range recommended is 23 to 29 mc, to reduce the possibility of breakthrough from powerful broadcast stations operating on the bands below 21 mc. If the IF is above 40 mc

Table of Values

Fig. 5. Alternative Oscillator Chain using 7.5 mc Crystal.

R1 = 1,000 ohms ½ watt
R2, R6, R8 = 10,000 ohms ½ watt
R3, R5, R7 = 47,000 ohms ½ watt
R4 = 470 ohms ½ watt
C1, C4 = .001 μF mica
C2, C5, C7 = 3/30 μμF trimmer (Philips)
C3, C6 = 25 μμF Ceramic
C8, C9 = 2 μμF Ceramic
V1, V2 = 6J6
L1 = 15 Turns, 20 SWG tinned copper ⅜in. dia. ⅜in. long tapped at 5 turns from crystal end
L2 = 5 Turns, 20 SWG tinned copper ½in. dia. ⅜in. long
L3 = 3 Turns, 20 SWG tinned copper ½in. dia.
L = *See Text*
Xtal = 7.574mc.

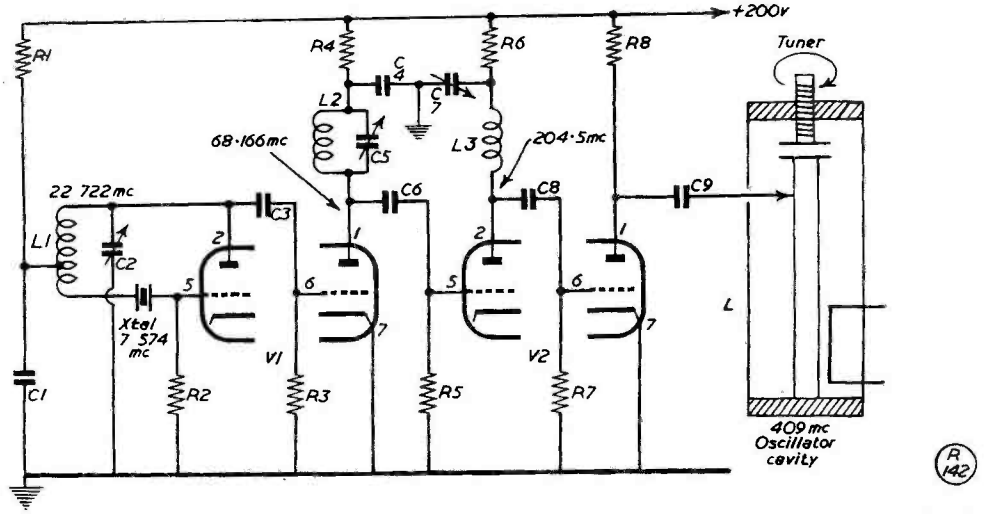


Fig. 5. An alternative arrangement to Fig. 4 is possible, using a 7 mc (actually 7.574 mc) crystal — see table for values.

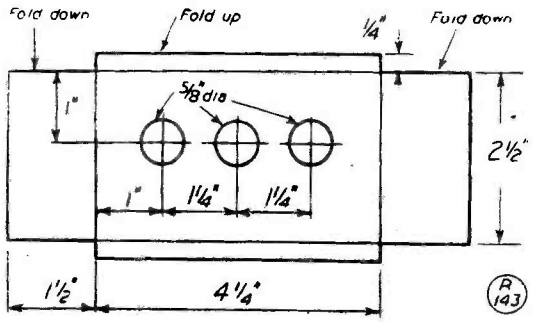


Fig. 6. Chassis dimensions for the oscillator chain and the head amplifier. The photograph of this section of the receiver will confirm the general details.

the noise figure is not so good. The noise figure of this amplifier is 0·5 to 1 dB, and the gain is 32 dB. The crystal is fed into the amplifier *via* a ·001 μF condenser C1 to the tap on the input coil L1. This arrangement *must* be used, otherwise the current from the 6J6 (V2) valve passes through the crystal diode. It will be noticed in the photograph that no screens are fitted between valves, the coils being phased to prevent positive feedback, *i.e.*, condition of oscillation. However, screens are recommended if phasing the coils is not possible. The output from the head amplifier is taken *via* a short length of 70-ohm coaxial cable to the main receiver. If the main receiver has an input impedance of 200 to 400 ohms, connect a 250-ohm (¼ watt rating) resistor between the main receiver terminal and the core of the coaxial cable, otherwise serious damping will occur on the first tuned circuit of the main receiver, due to the capacitance of the cable. A poor noise figure would then result on account of the bad match.

Adjustment of the Receiver

(A) *Oscillator Chain. Fig. 4.*

(1) Check that HT and LT volts are 150v. DC and 6.3v. respectively.

(2) Check that the oscillator is not free running and adjust C2 until the oscillator is crystal locked. A BC221 or 1191 wavemeter is useful for this purpose.

(3) Tune L2 to resonance to give maximum output as shown on an 0-1 mA meter placed

Table of Values

Fig. 7. Circuit of the Head Amplifier.

R1, R3 = 100 ohms ½ watt
R2, R4 = 1,000 ohms ½ watt
R5 = 4,700 ohms ½ watt
R6 = 220 ohms ½ watt
R7 = 22,000 ohms ½ watt

C1, C2, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, C15, C16 = .01 μF Hunts Midget Mold-seal, 150volt Type W99.

C3 = 2-7 $\mu\mu$F trimmer (Philips)

L1 = 24 Turns, tapped 10 turns from earthy end, 20 SWG enam. copper on Denco 0.5in. dia. polystyrene former. No dust core. O BA chassis fixing

L2 = 15 turns, 24 SWG enam. copper close wound on Denco 0.375 in. dia. polystyrene former with dust core. 2 BA fixing

L3 = 39 turns, 38 SWG enam. copper close wound, former as L2 with dust core

L4 = 17 turns, 24 SWG enam. copper close wound, former as L2 with dust core

L5 = 28 turns, 24 SWG enam. copper close wound tapped 5 turns from cold end. Former as L2 with dust core

RFC = 60 turns, 38 or 40 SWG enam. copper close wound on former as L2. No dust core.

M1 = 0-1 mA Meter
V1, V3 = 6AK5
V2 = 6J6

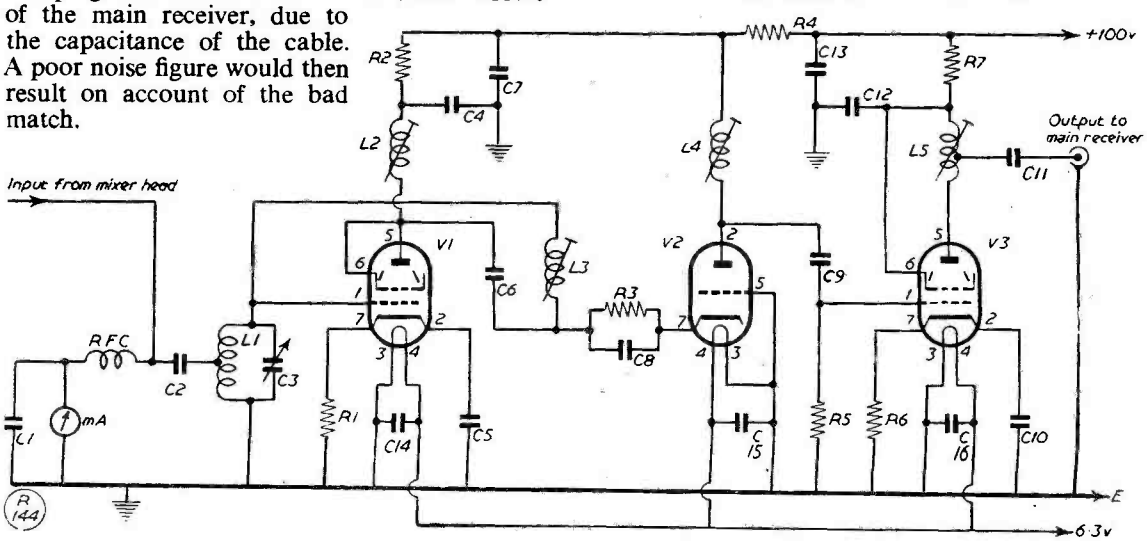
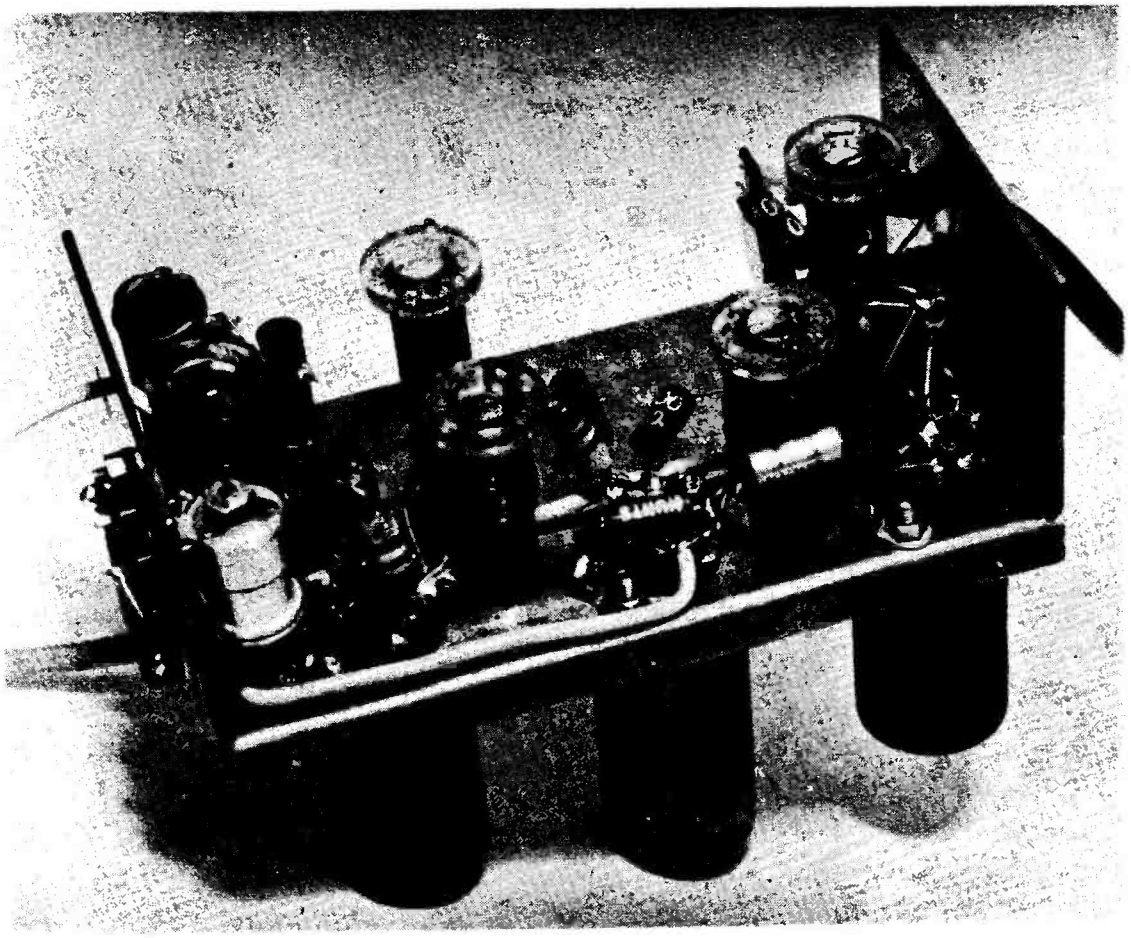


Fig. 7. Circuit diagram complete of the head-amplifier section of the G3BKQ 430 mc receiver unit, the finished appearance of which is shown in two of the accompanying photographs. (*Note : In the original, the heaters are separately wired to the LT feed points, to maintain the noise figure and prevent regeneration*).



Construction underside of the cascode head amplifier — see Fig. 7 for circuit and values.

across R5 (Test Point 2). Condenser C5 might have to be added to counteract stray capacitance, as the layout may not be the same as the original.

(4) Check that this output is 135 mc.

(5) Earth the cold end of the oscillator cavity loop, fit a crystal diode to the "hot" end and a 1 mA meter between the free end of the crystal diode and earth. The oscillator cavity L3 is then tuned to give maximum current. The unit is now ready for fitting to the main chassis.

(B) ***The Head Amplifier. Fig. 7.***

(1) Terminate the input tapping on L1 with a 300 ohm ¼-watt rating resistor to earth.

(2) Feed the head amplifier output to the main receiver, which is tuned to the IF required (say 25 mc).

(3) Apply LT and HT, 100 volts DC and 6.3 respectively, to the amplifier. Noise will be heard in the main receiver. Any instability can be removed by adjustment of the neutralising coil L3. This is done by removing the heater supply from the first 6AK5 valve V1, and feeding in a strong signal in the centre of the IF band. The main receiver is tuned to this signal, and the neutralising coil L3 is adjusted for minimum output (shown on an S-meter if fitted in the main receiver). The heater volts are reapplied to the 6AK5 valve, and L1, L2, L4, and L5 are adjusted for maximum noise in the main receiver. If the response is not flat over 6 mc, adjust L4, and L5 slightly, to give the best overall response as shown in Fig. 8. Remove the 300-ohm resistor.

The head amplifier is now ready for fitting to the main chassis. The voltage stabilizer is wired in to complete the receiver wiring to Fig. 1.

(C) *Overall Adjustment.*

(1) Connect the LT and HT, 200/250 volts DC supply, and feed the head amplifier output to the main receiver.

(2) Check crystal current, which should be 300 to 600 microamps.

(3) With no incoming signal and aerial disconnected from the mixer, adjust the tuning control on the mixer cavity until it touches the line inner. The crystal current at this stage should be about 400 μA. Unscrew the tuning control till the current falls to zero (*see* Fig. 2), when the mixer cavity will be tuned to the oscillator frequency 409 mc. If the minimum current obtainable is not zero, outside interference is responsible, *e.g.* local oscillator RF is getting to the crystal diode direct, and not through the oscillator cavity. This must be tracked down, otherwise the noise figure will suffer. The zero having been reached, connect the aerial to the receiver, when the crystal current will probably rise. The tuning plate is then unscrewed a little further and will be at the correct point when maximum noise is heard in the main receiver. (If you live near a main road, car interference makes this process very simple!) The set is finally adjusted on a full-scale signal from another 70 cm station. When tuning over the band, the mixer tuning has to be slightly adjusted for maximum noise or signal. No other tuning is required.

In order to obtain optimum noise figure, further adjustments can be made as follows :

(*a*) Adjust the main receiver by turning the audio gain control to maximum, and then advancing the RF gain control until a barely perceptible amount of noise can be heard in the speaker. This condition is best because the noise figure of most main receivers is 15 to 20 dB at 30 mc, so if the RF gain control is left at maximum, the advantage of the low noise factor of the cascode is lost. Reducing the RF gain control gives considerable improvement.

(*b*) *If a noise generator be available*: Adjust the tapping point of the crystal diode on the mixer line to produce the best noise figure. This point is usually about half to three-quarters of an inch from the shorted end of the mixer line.

(*c*) Adjust the neutralising slug L3 on the cascode head amplifier to give the best noise figure. Having done this, noise due to the radiation resistance of the aerial should be distinctly audible on connecting the aerial to the converter, assuming that no man-made interference is present.

Performance

The new receiver as described here was taken to three VHF operators who regularly work on the 70 cm band. They allowed checks to be made against their own converters, to provide a basis for comparing the new converter with existing types.

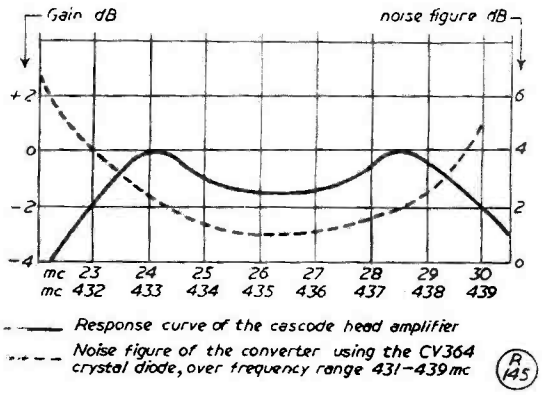


Fig. 8. The response curve of the head amplifier, with the overall noise figure — see text for discussion.

The best converter of the three used a 2C40 valve as an RF stage preceding the mixer, and this was fed into an AR88 main receiver. The noise figure of this arrangement was 6 dB at 435 mc, while the new converter fed to the *same* main receiver produced a noise figure of only 1·2 dB. Checks were then made on a steady signal at 435 mc from another station 20 miles away. The RF stage converter gave a level of S7 measured on the main receiver S-meter, which on detuning, gave an indicated random noise level of S3. The new converter produced a signal of S9 + 5 dB, with a random noise reading of S1. Naturally, the vast improvement in signal-to-noise ratio was very noticeable ! During 1953, using this design of 435 mc receiver, 54 stations were worked with good readable signals (*see* " VHF Bands," p.105, April), representing 22 counties and 4 countries. It should be mentioned that the site at G3BKQ is only 220 feet above sea level.

G2HCG, G3HAZ, G3IOO, and G6YU have built and are using this design of converter for 70 cm operation. The writer's sincere thanks are offered to G2FNW, G3HAZ and G6YU for co-operation in carrying out over-the-air tests and giving lengthy transmissions when required. The writer also wishes to thank the B.T.H. Co., Ltd., for permission to publish this article.

Can you Shut Down with One Switch ?

Tri-Band VFO

DRIVING ON ALL BANDS FORTY TO TEN

W. E. RIGG (VQ2WR)

This is an interesting VFO design, arranged to give output on 21 mc as well as on the other three bands above 3·5 mc. Three fundamental tuned circuits, selected by switching, are used to minimise doubler stages, and full coverage is obtained with two valves only. The author claims good stability and negligible drift, with adequate drive output and good note characteristics.—Editor.

THE practise generally adopted in designing an oscillator for the amateur bands is to provide for one fundamental frequency-band only. The frequency chosen is invariably a low one, such as 1·8 mc, necessitating a chain of doublers if the 3·5, 7, 14, 21 and 28 mc bands are to be covered by the transmitter.

The adoption of a low frequency, whilst sound both in theory and practise, ensuring stability of a high order, is nevertheless inconvenient, particularly in equipment of less than 100 watts power. The current trend is to encase apparatus in match-box size cabinets—hence the popularity of table-top sets over rack-and-panel equipment. And it was with this in mind that the tri-band oscillator described here was produced.

It was decided that in spite of the frequent warnings given in text books to "adhere to a low frequency," that the lowest used would be 3·5 mc. Even so, in order to reach 28 mc it would have been necessary to double to 7, to 14, and finally to 28 mc, calling for three valves — apart from the oscillator and final amplifier—whereas the maximum desired was two, the power amplifier operating "straight," and not as a doubler for 28 mc.

The inclusion of 21 mc meant doubling to 7, followed by tripling to 21 mc. And while frequency tripling is quite feasible and is often carried out most successfully, results are sometimes not encouraging, inadequacy of drive so often being evident, occasionally even necessitating the use of a 0-1 milliammeter in order to discover the precise value of the feeble current actually available at the grid of the succeeding stage !

Thus it was decided to make the oscillator extremely flexible, providing three fundamental frequency bands, so avoiding tripling. Three switched coils were introduced, covering 3·5, 5·25 and 7 mc, the second frequency being for use for 21 mc, *i.e.*, 5·25 doubled to 10·5, and again to 21 mc, while 7 mc enables 28 mc to be easily attained, with adequate drive for the final amplifier.

There may be some objection to the employment of a basic frequency of 5·25 mc on the grounds that both that frequency and 10·5 mc are outside the amateur bands—yet this is no more serious than the use of 3·5 mc, the third and fifth harmonics of which fall outside the amateur bands.

The basic circuit is the series-tuned Colpitts or Clapp, the heart of which is the three grid

Table of Values

Fig. 1. Tri-Band Amateur VFO

C1, C2 = 100 $\mu\mu$F variable.
C3 = 60 $\mu\mu$F variable.
C4 = 50 $\mu\mu$F variable.
C5, C6 = 400 $\mu\mu$F mica (high stability).
C7, C8, C9, C11, C13 = 0.01 μF paper.
C10, C12 = 100 $\mu\mu$F ceramic.
R1 = 56,000 ohms, ½w.
R2 = 100,000 ohms, ½w.
R3 = 10,000 ohms, ½w.
R4 = 400 ohms, ½w.
RFC = 2.5 mH.
V1 = 6AG7.
V2 = 6J5.
S1, S2 = Three-pole ceramic.
S3 = Two-pole ceramic.

COILS

7 mc L1. 36 turns, 16 SWG on 1in. diameter ceramic former, close wound.
5.25 mc L2. 40 turns, 20 SWG on 1in. diameter ceramic former, close wound.
3.5 mc L3. 50 turns, 24 SWG on 1in. diameter ceramic former, close wound.

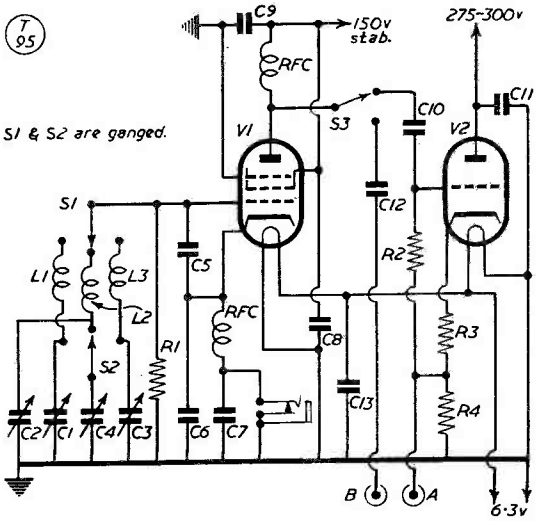


Fig. 1. Circuit of the VFO designed by VQ2WR. The tuned circuits select the output frequency and provision is made for drive to be obtained over the 21 mc band. Provided the constructional precautions suggested in the text are taken, and a good slow-motion drive used for C4, a smooth and easily-operated multi-band driver should result.

coils. These, close-wound on 1-inch diameter ceramic formers, are switched by means of heavy-duty ceramic switches, S1 and S2. By virtue of ganging, these switches are controlled by a single knob, enabling the correct connections to be made at both ends of each coil. Connected between the coils and earth are three air-spaced ceramic trimmers, C1, C2, C3. The series-tuning condenser, C4, is switched from one coil to another by S2, the connection being made at the end remote from the grid. This condenser is of the high-stability, double-ended type, ceramic insulated, taken from a TU5B unit, together with the vernier tuning mechanism. Two-thirds of both the stator and rotor plates were removed from C4, reducing its capacity to approximately 50 $\mu\mu$F. The two important 400 $\mu\mu$F fixed mica condensers connected between grid and cathode and earth, were also taken from the TU5B unit, together with ceramic mounting pillars, enabling a very rigid mounting to be secured.

Both screen and anode are fed from a common 150v. regulated power supply, the stabilising element being a VR150/30 gaseous regulator. Output is from the anode of the oscillator valve, which is untuned, providing excellent stability and isolation; this is still further improved by feeding the output into the grid of the 6J5, arranged as a cathode follower. This arrangement results in virtually complete isolation between the oscillator and the following stages, thus any tendency to "pull" is avoided. There is a certain degree of loss in the cathode follower stage, but this is to be expected since it is not an amplifier. The maximum that could be anticipated would be unity—in theory, at least, if not in practise.

Output from the triode is taken at the cathode; then directly to the co-axial socket, A, connection to the transmitter being made by means of co-axial cable. The switch, S3, is not essential, the reason for its inclusion being to provide a means of taking the output from the oscillator anode directly to the co-axial socket, B, thus by-passing the cathode follower. Such an arrangement permits, if required, a greater RF input to the first stage of the transmitter since the isolator (the cathode follower) is by-passed. As the anode circuit of the oscillator is a non-resonent one it has practically negligible effect upon the frequency, therefore the cathode follower may be omitted although its inclusion is a refinement providing superior isolation characteristics.

The 6AG7 was selected for the oscillator as it ranks high among the best valves yet available for oscillatory circuits not involving a crystal for frequency control. A sharp cut-off pentode, the characteristics of the 6AG7 include low anode-grid capacity (0·06 $\mu\mu$F), excellent internal screening and adequate stability. It should be noted that the suppressor-grid in this valve is *not* internally connected to the cathode, like the average pentode, but is brought out to a separate pin. It should be directly earthed and not connected to the cathode pin.

Construction

Any convenient layout may be adopted, bearing in mind the cardinal rule—make short, direct connections. Heavy-gauge tinned copper wire should be used, all joints being mechanically sound before being soldered with a clean, hot iron, using cored solder. Construction must be rigid.

The prototype was constructed on a BC-458 chassis, the 6AG7 and 6J5 being mounted in two of the three existing valve-holders at the rear. Immediately in front of the valves the three 1-inch diameter coils were mounted vertically upon a $\frac{1}{4}$-inch bakelite plate and screened by a heavy-gauge aluminium box. The connections to the fixed contacts of S1 and S2, and to C1, C2 and C3, were made *via* two holes formerly used for the holders of two power valves.

The tuning capacity, C4, was mounted on ceramic insulators between the front panel and the coil box, together with the slow-motion drive. The whole was boxed-in by means of an aluminium cover, with the exception of the 6AG7 and 6J5 at the rear, these being exposed to facilitate heat radiation from the metallic envelopes.

The remainder of the components were mounted in the base of the chassis, the switches S1 and S2 being controlled by a knob on the right side. On the opposite side three $\frac{1}{4}$-inch holes were drilled to provide a means of screwdriver adjusting the trimmers, C1, C2 and C3. An aluminium base-plate seals the chassis; thus screening is complete.

To the front panel were added a 0-300 voltmeter and a 0-30 milliammeter, providing a constant check on the stabilised voltage and the screen and anode current of the oscillator. (The plate potential of the 6J5 is unregulated, being 275v.)

A keying jack and an on-off switch are fitted to the front panel, the latter enabling the oscillator to be silenced during reception whilst working telephony.

Power connections are made at the rear of the chassis by means of an octal socket. A

Table of Values

Fig. 2. Power Supply for the VFO

T1	= 0-350v Transformer, with 5v and 6.3v windings	LFC	= 15-henry 50mA filter choke
S1	= On-Off switch	R1	= 10,000 ohm, 10w. wirewound, variable
C1, C2, C3	= 8μF 450v. electrolytic condenser	V1	= 5Y3G rectifier
		V2	= VR 150/30 stabiliser

green jewel light serves as an " on-off " indicator for filament and HT voltages.

No specific list of components is given as the VFO was built entirely from surplus parts found in the BC-458 and the TU5B unit, with the exception of the three coil formers. Obviously, given the circuit and the principles involved, most constructors will follow their own fancy as regards actual components used.

Power Supply

A separate power supply of the condenser-input type is utilised. Two filter chokes provide adequate ripple filtering, the rectifier being a 5Y3G. A 10,000 ohms 10-watt wirewound variable resistor is used as the series limiter for the VR.150/30 gaseous regulator, the striking voltage of which is approximately 30% higher than the operating voltage.

Operation

With the power supply connected, each band of the oscillator should be calibrated with the aid of a good frequency meter or, failing that, a reliable receiver of the communications type. A graph should be plotted or a calibration chart drawn up. With C4 set to a suitable value, adjust each band in turn by means of the appropriate trimmer, C1, C2 or C3. With a little juggling it is possible to commence each band at a given value of C4, or point on the slow-motion dial. Once the trimmers have been adjusted they require no further attention, all changes in frequency being made by C4.

The L/C ratio is important in this type of oscillator. During the initial tests it was found that at approximately 7·05 mc a sudden decrease of 2·5 mA occurred in oscillator current, causing a change in note intensity, but having virtually no effect upon frequency. The " symptoms " suggested excessive capacity in relation to inductance. This assumption was proved correct by the simple expedient of adding a small coil (four turns wound round a pencil) in series with the 7 mc coil. The current then remained constant throughout the band ;

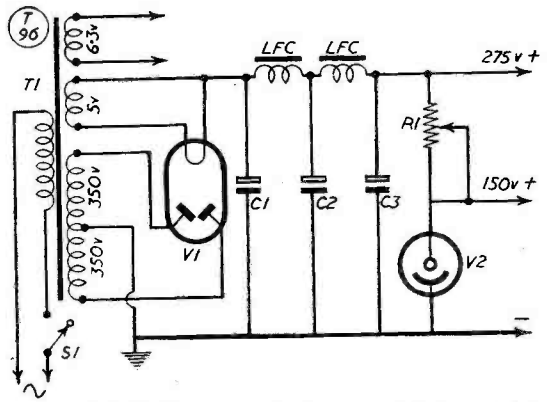


Fig. 2. Suitable stabilised power supply for the VFO. The cathode follower is run at full voltage.

the note was unvarying. The 7 mc coil was then re-wound, two turns being added.

In use the oscillator has proved perfectly stable on all bands, even when keyed on 7 mc, although it is preferable to key some later stage. Drift is negligible once normal operating temperature is attained ; the note is clean and sharp. Measuring 12" x 7" x 5", and weighing 8 lbs., the VFO is quite portable and of a convenient size for use upon the operating table.

HONOURS AND AWARDS

The Honours List published on the occasion of the official birthday of Her Majesty on June 10 last included the names of the following gentlemen engaged in the radio, electronics and telecommunications field: Made ***C.B.***, W. A. Wolverson, Esq., Director of the External Communications Executive, G.P.O. Appointed ***C.B.E.***, T. E. Goldup, Esq., a Director of Mullard, Ltd., a Vice-President of the I.E.E., and prominent in matters connected with technical education ; A. Stewart, Esq., Controller of the Home Service, B.B.C., is also made ***C.B.E.*** The honour of ***O.B.E.*** goes to: W. E. Cleaver, Esq., Manager of the Cable and Wireless Engineering School, Porthcurno, Cornwall ; and to F. M. Colebrook, Esq., Senior Principal Scientific Officer, National Physical Laboratory, and well-known as the author of books on radio subjects. The following are made ***M.B.E.*** : F. N. Calver, Engineer-in-Charge, B.B.C., Daventry ; R. H. J. Cary, Radar Research Establishment, Malvern ; I. A. Dalgliesh, Chief Radio Officer, British European Airways ; R. B. Hosking, Signals Officer, Ministry of Transport ; R. D. Lanser, Superintendent of Radio Maintenance, British Overseas Airways Corporation ; S. H. Lines, Works Manager, A. C. Cossor, Ltd.; F. Rostron, Export Sales Manager, Ferranti, Ltd.; and A. I. F. Simpson, VHF Design Department, General Electric Co., Ltd., Coventry—to all of whom we offer our congratulations and good wishes, representing as they do so many spheres of activity in radio and electronics.

"So You've Passed R.A.E.!"

PART I

PREPARING FOR THE LICENCE

A. D. TAYLOR (G8PG)

This article will be of great interest to many readers, and not only those who are either awaiting a callsign or have just been licenced. Our contributor stresses the desirability of methodical preparation for on-the-air working if the utmost benefit and pleasure are to be derived from operating, and discusses practical arrangements for the average beginner station.
—Editor.

AT this time of year many readers will have left R.A.E. and the Morse test safely behind them and will be looking forward to the great day when the blue form arrives and another G3-plus-3 takes the air. During the waiting period, however, much can be done. It is one thing to obtain an amateur licence. It is quite another thing to operate a successful station with a call known and respected by other operators. The purpose of these two articles is to discuss some of the important jobs which should be carried out while waiting for the licence, and to suggest certain points to be observed.

Operating Comfort

In any active station much time will be spent at the operating position, so this should be designed for the job in hand. The operating desk itself should be comfortable both for writing and for the key, the correct height being between 28 and 30 inches. Ample space should be provided for the equipment, key, log book and scribbling pad, the key itself being mounted on the edge of the table so as to be in line with the operator's right forearm when seated. The operating chair should be comfortable and of the correct height, but should NOT have arms, as these invariably get in the way when sending.

Care should be taken in the arrangement of equipment on the table. The receiver should be mounted so that it can be operated for long periods without strain on the wrist or forearm; the VFO should be placed where it can be controlled with a free hand and it should be possible to use the station frequency meter without having to move from the operating chair.

The Morse key itself is an important item and must be chosen with great care. If in doubt, seek the advice of an experienced telegraphist. When adjusting the key a medium gap and medium spring tension should be used.

Bench lighting is important and should be arranged to illuminate the controls, log book and so forth without dazzling the operator. An Anglepoise type of lamp is ideal, but expensive. With a little thought, however, a cheap lamp shade carefully positioned can provide excellent results.

When the lighting is being attended to, it is a good idea to mount two or three power sockets (including a bayonet socket) on the side of the operating bench. These will prove invaluable for plugging in soldering iron or test gear, and should be additional to the sockets providing power for the station equipment proper.

Safety Precautions

An amateur station incorporates supply voltages which are potentially lethal and the equipment itself is usually accessible to other members of the family. Great care must therefore be taken to see that high voltage points are properly shielded, that the equipment is properly fused and that earthing is carefully carried out. In addition, a master switch capable of breaking ALL mains power to the equipment should be installed in a prominent place and conspicuously labelled "EMERGENCY SWITCH. PULL DOWN (or UP) FOR OFF." A pilot neon can usefully be mounted alongside this switch.

BCI and TVI

These problems should be tackled during initial stages of building the transmitter, as it is far easier to TVI-proof a new transmitter than to modify an existing one. Much valuable data has been published on TVI reduction and this should be consulted when planning the transmitter. Particularly important points are:—

(1) Screening and de-coupling of heater leads.
(2) Filtering of HT supply leads.
(3) Screening of non-RF leads carrying HT.
(4) Carrying out frequency multiplication at low power levels.
(5) Complete screening of all equipment, including the aerial coupler.
(6) The use of a harmonic trap or matched pi-section filter in the PA tank circuit.

(7) Co-axial link coupling between the PA tank and the aerial coupler.

(8) The insertion of a good low-pass filter in the co-axial lead between the transmitter and the aerial coupler.

This last item is a " must " for any station in a TV service area and several good designs have been published. If special equipment for lining up this filter is not available, good results can be obtained by inserting the filter between the aerial socket and feeder of a TV receiver and adjusting for maximum attenuation of the sound and vision signals.

A mains filter should be placed in the mains lead to the equipment and a good key-click filter installed.

The above may seem to involve a great deal of work, but it should be remembered that it may save much unpleasantness and lost operating time once the licence is received.

Station Control System

This item is one on which many newly licenced stations fall short. In the rush to get on the air, equipment is lashed together and very often as many as six different switches may have to be operated when changing over. Apart from the time and effort involved, overlooking only one switch may ruin an important QSO. The ideal change-over system is a completely automatic one, a series of relays being controlled by the operation of the Morse key. Many such systems have been published, but they may be beyond the capacity of the beginner. However, almost as good results can be obtained with a 6-way, 2-pole Yaxley switch. The circuit is shown in Fig. 1 and it will be seen that the change-over is controlled by a single operation. On " Receive " the receiver HT is on and the phones are connected to the receiver. On " Send," the receiver HT is broken, the phones are transferred to the monitor, the exciter HT switched on and the PA also gets HT.

An additional contact is provided to energise an aerial change-over relay. If such a relay is not available separate aerials for transmitter and receiver may be used. The " Net " switch placed across the exciter HT supply allows the VFO to be netted without putting the transmitter on the air. It can be a simple toggle switch. HT and relay supply wiring to the change-over switch can be run in screened cable with the screen earthed, the phone leads being run in twisted pair. A convenient place to mount the switch is in a wooden box screwed to the underside of the operating bench, preferably under the Morse key.

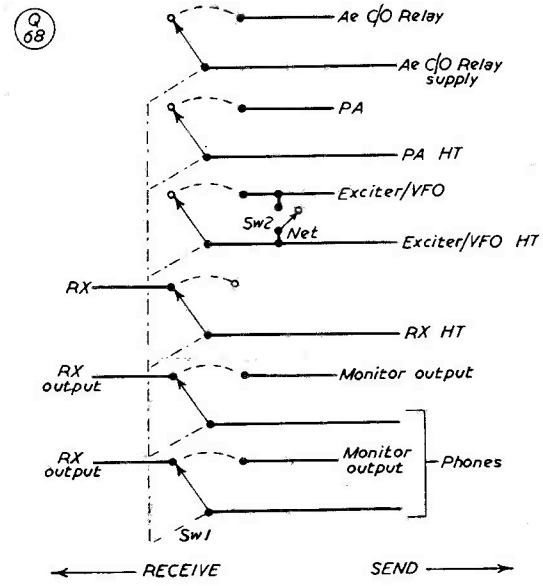


Fig. 1. A suitable switch-controlled change-over system, incorporating all necessary motions for the average beginner station.

Some Hints on Equipment

If time is available, it is a good idea to get used to tuning the transmitter and handling the frequency measuring gear before the licence arrives. The aim of this practice should be to achieve speed and absolute confidence in carrying out the following operations :—

(1) Changing from band to band and setting the transmitter up with the aid of the absorption and heterodyne wavemeters.

(2) Setting the frequency anywhere within a band with the aid of the crystal substandard and station receiver.

During these tests the transmitter should of course be operated into a dummy load.

The receiver should also be looked at critically, particularly from the point of view of stability, degree of bandspread and selectivity. Maintaining communication under difficult conditions is a hard test for any receiver and any small improvements which may be incorporated are likely to pay dividends.

Careful thought should also be given to the aerial system at this stage. The choice of aerial is obviously beyond the scope of this article, but it should be borne in mind that

a good aerial is probably the most important single technical factor in the success of a station. If the LF bands are to be the main interest in the early stages it is best to get out the greatest possible length of wire, even if this must be bent to some extent. On the higher frequencies the possibility of an indoor fixed beam is worth exploring. The aerial coupler is also important and should be of a type suitable for the aerial in use. Much practical information on aerials has recently been given in *Short Wave Magazine*. If a separate receiving aerial is used it should be made as efficient as possible so that the receiver can give of its best.

The above should serve as a guide to some of the major jobs to be carried out before putting the station on the air. They are all worth doing and will add greatly both to the results obtained and the pleasure of operating. The second part of this article (to be published in due course) will contain a number of hints on the actual operation of the station once the licence is granted.

ROYAL AIR FORCE VOLUNTARY RADIO SERVICE

CONDITIONS AND QUALIFICATIONS

We are glad to bring the R.A.F.V.R.S. to the notice of readers, offering as it does the opportunity of joining a Service reserve organisation with attractive conditions of membership. It is with the Service radio reserves that eligible amateur operators can be most useful. Before the last war, it was the R.N.V.(W.)R. and the C.W.R. branch of the R.A.F.V.R. which provided both officer and other-rank personnel at just the time they were most needed; and it was the members of these reserves who did so much to build up Amateur Radio status and the amateur tradition within the Services they had trained with under peace conditions. Here is the opportunity for the new generation of radio amateurs to carry on the tradition.—EDITOR.

THE Royal Air Force Voluntary Radio Service has been formed to provide an adequate reserve of male wireless operators for the support and reinforcement of the Royal Air Force signals organisation in time of war. The service is not yet at full strength, and further volunteers who live in the south of England, roughly below a line drawn from the Wash to Cardiff, can now be considered. Volunteers in the north are also wanted but, for the time being, it is likely that there may be some little delay in dealing with their application.

Members

The Voluntary Radio Service comprises both air force and civilian personnel, the former being enlisted in the R.A.F. Volunteer Reserve under the special conditions outlined below. All candidates must be British subjects and (except in the case of civilian members, for whom no upper age limit is fixed) must be between the ages of 18 and 45. Volunteers with or without previous Service experience may apply to join as service members, irrespective of the trade (if any) in which they were employed, provided they are not already active members of any of the reserve or auxiliary forces. If for any reason a volunteer is unable to join as an Air Force member, he may (if otherwise eligible) volunteer to enrol as a civilian member, in which case he will not be liable to be called up for full-time R.A.F. service on mobilisation. The initial period of service in the V.R.S. is five years, with the prospect of re-engagement for a similar period.

Duties

All members will be required to undertake radio (W/T) duties in their own home in accordance with specified programmes, comprising 16 one-hourly periods in each month, for which a Royal Air Force wireless receiver will be issued on loan to each member, and to attend evening meetings at three- or four-monthly intervals. Members of the R.A.F. Volunteer Reserve without previous Air Force service will be required to undergo one period of 15 days' continuous training at an R.A.F. station during their first year of service.

Qualifications

Technical qualifications required are the ability to receive Morse code at 20 words a minute and previous experience of operating and minor servicing of radio communications receivers.

Finance

Air Force members will receive an allowance of £3 annually to cover the maintenance of equipment on loan, and, in addition, re-imbursement up to a maximum of £2 of any expenditure necessarily incurred in excess of the annual allowance. They will also be eligible for an annual bounty of £7 10s. 0d., plus £1 10s. 0d. if adjudged efficient in their duties. Civilian members will be eligible to receive a general expenses allowance of 12s. per month, to cover the cost of upkeep of the receiver and associated equipment, and to meet normal out-of-pocket expenses (such as fares up to 1s., postage, and local telephone charges paid on official business). Re-imbursement will be allowed in respect of authorised minor repairs and replacements and other necessary expenditure.

Officers

The organisation requires the services of a certain number of officers qualified in the duties mentioned above, who will be granted commissions in the rank of Flight Lieutenant in either the Royal Air Force Reserve of Officers or R.A.F. Volunteer Reserve for appointment as officers i/c Districts, V.R.S. They will be responsible to the Air Ministry for matters connected with training and to commandants of group reserve centres for matters affecting the administration of members, service and civilian, in their area. Their duties also include recruiting, training and supervision generally of the V.R.S. for their district. Officers of the R.A.F. Reserve, other than pilots or navigators fit for flying duties, and officers on the retired list, are eligible for these posts. Civilian volunteers without previous service experience will also be considered, provided they are otherwise suitable for appointment and capable of fulfilling the above requirements.

Anyone interested in the Royal Air Force Voluntary Radio Service should write to:—

AIR OFFICER COMMANDING-IN-CHIEF,
HEADQUARTERS, HOME COMMAND (P.15(c)),
ROYAL AIR FORCE, WHITE WALTHAM,
NR. MAIDENHEAD, BERKS.

REDIFFUSION TV IN JERSEY

The success of the Rediffusion undertaking in Jersey—where, by the use of three sets of tilted beam arrays headed on Alexandra Palace, Wenvoe and Paris, it has been found possible to provide local TV re-transmission—has inspired the BBC to propose their own service for the Channel Isles.

In their pioneering development work, Rediffusion had to overcome a number of technical difficulties, not only in the reception of BBC TV to be worth re-radiating, but also in its own re-transmission over the Island by carrier-frequency cable. This has involved a considerable amount of development work and specialised manufacture; much of this has been done by Television Research, Ltd., the Rediffusion associate company in Jersey. The outcome of the Rediffusion enterprise is that Jersey TV viewers will have the choice of British or Continental programmes (as well as CTV, when it comes) at the turn of a switch. This will be a continuously-available choice for all viewers on the Rediffusion network, and puts Jersey first in all Britain with a genuine alternative programme — British or French.

It is of interest to add that the Rediffusion enterprise as a whole now provides daily sound or TV programmes to about 3 million homes throughout the world, and either broadcasts or relays in no less than 20 languages.

CHANGING CRYSTAL FREQUENCIES

Further to the article on "Crystal Grinding" in the June issue, it is worth mentioning that the well-known household cleaner sold under the trade name of "Vim" can be tried as the grinding medium; a little should be made into a thick paste, the grinding process being otherwise carried out as recommended by G2NX in his article. It will be found that the soapy base used in the manufacture of "Vim" makes a good lubricant.

Another method of treating the crystal is by etching. This calls for the use of a highly corrosive fluid, used in a pan made of some material not attacked by the liquid. An article in the May 1954 issue of the American *Radio & Television News* suggests a saturated solution of ammonium biflouride in a plastic dish, the concentration being as much of the chemical as will dissolve in a pint of water. Ammonium biflouride is a poisonous substance, giving off fumes which should not be breathed. The crystal is immersed in the fluid and "eaten down" by the liquid. The advantage of etching in this manner is that the treatment is even, though it may be slow. In a typical case, a crystal of original frequency 4600 kc was etched in the given concentration at the rate of 3 kc per hour. Rubber gloves should be used for handling amm. biflouride, and the whole process gone through out-of-doors.

RATING OF TRANSFORMERS

Radford Electronics, Ltd., of 149 Newfoundland Road, Bristol 2, offer a wide range of conservatively rated power, auto and audio transformers in a variety of designs and finishes. An interesting feature of their descriptive literature (available on request if *Short Wave Magazine* is mentioned) is that all HT transformers are rated in terms of DC output voltage with current, specifying the DC regulation for a given transformer, rectifier valve and condenser combination. Thus, the type M.623 is rated 375v. at 80 mA with a regulation of 0.95v. per mA; this means that when, say, the load current is 55 mA, there will be a rise of 0.95v. for every 1 mA drop, making the actual output voltage, at 55 mA, 399 volts. Similar figures are quoted on all Radford power transformers, and are accurate to within 2%. This is an entirely logical approach to power transformer rating, since we are not concerned with r.m.s. AC voltage and current, but only with what the transformer will actually give under particular load conditions.

The general design of all Radford transformers is in accordance with modern practice — low DC resistance windings, the elimination of hot spots, high-efficiency laminations, thorough drying and varnish impregnation at 105° C for 15 hours, followed by dip sealing. They are designed and finished to withstand the most arduous conditions of service. All primaries are tapped 10-0-200-220-240 volts and they can be obtained in six different standard finishes. All types in the range 275 to 550 volts DC output have at least two, and in many cases three, LT windings of the usual ratings.

DX COMMENTARY

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

IT is still a little early to start singing "Happy Times are Here Again," but at least we can oblige with a verse of "There's a Good Time Coming." For there is every indication that we have not only reached rock-bottom in this eleven-year cycle, but that the new cycle really has started.

Probably we shall notice little difference until the winter season starts, and then we imagine that it will be noticeably better than the last one. It may be two years before the 21 mc band really opens up, and possibly three before *Ten* is at all lively—but at least one *can* look forward to improvement, not deterioration.

Now is the time, therefore, to throw off that defeatist attitude that has been so evident for the last year or so. Get on the DX bands, not with the idea of proving that conditions are terrible, but for the purpose of finding some DX there. (This commentator searched round a "dead" twenty-metre band this very morning, as late as 0900, and found KH6IJ, VU2CR, a W7 and a PY all jamming each other on the same frequency !)

Certainly the 21 mc band would be a whole lot better if more people would start using it. We should like to see a great deal more week-day activity there, from all parts of the world. How can you detect "openings" if there's no one to look through them (if you follow the metaphor?) And even *Ten* might reveal a thing or two if it had a population. Further comments on this are made under the appropriate heading.

DL2RO

CALLS HEARD, WORKED and QSL'd

Magazine Daylight Test

The "MDT" which we arranged, at rather short notice, for the Whitsun weekend, seems to have been very successful. It produced a nice increase in daylight activity on the Top Band, and many participants were quite staggered to find how far they were getting at that time of day. Contacts of 200 miles and over were made by many stations.

Space does not allow us to print the logs in full, but we will give the best contacts reported to us, which means roughly 10 per cent. of the total QSO's of 100 miles or more.

G3JRD (Tunbridge Wells) worked G3JD (Torquay—180) and GC3EBK (Guernsey—185) on the Sunday; Monday brought two even better ones, with G3IGW (Halifax—205) and G3ABS (Barnsley—195); but perhaps his most interesting contact was with G3IYX (Nr. Wolverton, Bucks.), using 100 milliwatts to a transistor transmitter (TTX) at a distance of some 80 miles. G3JRD runs 10 watts to a 260-ft. aerial and is an all-battery station.

G5JM (Buckhurst Hill) made three contacts between 150 and 200 miles, with G3IGW, G3IYT (Grimsby) and GW4CG (Port Talbot). G3JEQ (Great Bookham) hit the 200-mile mark with G2YS (Filey), 180 with G3IGW and 165 with G3ABS.

G2NJ/A (North Hunts.) claims 230 miles for his contact with GC3EBK. Apart from this, his best were G3COV (Whiteheaven —200) and GW2CPU Cardigan—170). 'NJ says that GC3EBK is to be congratulated on his very fine signal during the tests.

G3JKO (Nottingham) was only available on the Monday, but made the longest hop that has been reported this time, when he raised GM3EFS (Dumbarton) at 255 miles. Apart from this nice one, his best were GW4CG, GW2CPU and G3EUK (Bath), all

around the 140 mark.

G2YS was on the air from his new QTH in Filey, Yorks., which he thinks is rather poor for Top Band work. But he raised G3JEQ for a 200-miler, and G2NJ/A at 130 miles. Several stations between 150 and 180 miles were heard but not worked.

G3BRL (London, W.5) collected G3IGW (165) and GC3EBK (175) for his best pair. Another interesting one was GW3AEF/P in Radnor—around the 140 mark. 'BRL is using 4 watts to an aerial consisting of a 66-ft. counterpoise and a 310-foot length of 30 gauge wire! The long bit starts from a post 10 feet high and rises to 50 feet at the home end, from which the "counterpoise" goes upwards in the roof space, higher than any part of the "aerial." (We have referred this system to "Old Timer" for a possible explanation of its mode of operation. His immediate comments are lively but somewhat confused . . . .)

G3IDG (London, S.W.12) only managed to put in a few minutes on each day, and his best contact was with G3IVH (Norwich—100).

G3IGW himself worked GW2CPU (160 miles) on *phone*, and his CW raised fourteen stations between 150 and 250 miles. He suggests, in fact, that the thing is now too easy, and would like a period centred on mid-day, at which time he often hears the London stations up in Halifax.

For daylight working in mid-summer on our lowest-frequency band, all this is pretty interesting. It also proves the contention that most Sunday-morning nets on 160 metres could be worked with much less than the 10 watts normally used, with a considerable improvement in the mutual-interference situation usually prevailing.

Ten Metres

As is usual at this time of year, *Ten* has been open for short-skip work, and quite a number of European QSO's are reported. More than one of the Top-Band enthusiasts who supported the MDT suggest that the time is ripe for a Ten-Metre Activity Sunday, so we propose that all good Ten-Metre men get together on **Sunday, July 25,** with a view to working whatever presents itself on the band. The interesting hours should be 1000-1300 and 1400-1800 BST. Polish up those tank coils, pretend it's 1947, and give the band a real good punishing that day, reporting your results when you write in early August. And don't forget that CW gets out on Ten, just the same as phone!

In addition to short-skip work, the band has been open more than once to South America and South Africa. Nothing else can reasonably be expected just yet, but the general opinion is that we *are* round the bend; this should mean that within three years *Ten* could be our best DX band once more.

Fourteen Metres

All the foregoing remarks apply equally to *Fourteen*, which will open up before *Ten* really gets going, and therefore is worth watching. After all, if there's no activity on a band, who can possibly say which paths are open? Fortunately, there is a hard core of enthusiasts who keep things going on *Fourteen* all the time. GW3AHN (Cardiff) has made his century there, and has worked 72 on phone, with a total of some 800 contacts on the band. All this with 60 watts to a pair of 807's and a 68-ft. Windom. Recent QSO's have included VP2KM and 3YG, YV5FL, VQ5EK, ZS3B and EL2X (all phone) and VU, EL, OQ5, VQ4 and HZ on CW.

G4ZU (Croydon) is now the top-scoring G, with 102 countries (95 on phone). New ones this month have been FA9KP, HZ1TA, CX5AF, ZD4BL, OA4EU and ZS3B. G3DO (Sutton Coldfield) also managed a few, with I1BNU (Trieste), EL2X and ZB2A.

G2BW (Walton-on-Thames) added IT, ZC6 and EL for new ones, and has been more active of late. G5BZ (Croydon) raised his

TEN-METRE ACTIVITY
SUNDAY
JULY 25, 1954
Use the band and report your results!

W5TVA, Waco, Texas, has an Elmac mobile Tx/Rx equipment fitted in his Chrysler. He holds a certificate in recognition of his services in maintaining communication for the township of Waco on the occasion of the 1952 tornado.

total to the century mark with FY7YC, EA8AX, ZB2A and sundry short-skippers.

G3HCU (Chiddingfold) worked his usual crop of stations, new ones being CX5AF, OA4EU and a PA. Some of his more unusual contacts this month were three CE's, HC1FG, PJ2AP, VP6WR, two W1's and two W2's. G3CMH (Yeovil) raised CR6BH, KP4YC, KV4BD, VQ4AQ and some /MM's. Gotaways were HP1WM, OA4EU, VP5SC and some ZS3's.

The DX on Twenty

Naturally, it is still the *Twenty-Metre* band that carries the bulk of the DX traffic, but conditions have been very patchy and short-skip has been troublesome nearly all the time. And what a lot of lids occupy this band! Many of them have at last found their way down from Forty, and do their worst with wobbly VFO's, creepers, chirpers and general cluelessness. (This is *not* a gibe at newcomers to the air, for most of these phenomena have been at it for years without the slightest sign of improvement).

At times when short skip dies down and these exotic specimens are temporarily removed from our troubled ears, the band can be quite good. KH6's, W6's and W7's have been coming across in the mornings, even as late as 0900 GMT; anything can happen late at night; and, in between, there is usually plenty of activity from the Far East and, of course, from South Africa.

G5BZ's report is "nothing thrilling," but the score includes 3A2AW, KR6OL, ZS3P, TI2BX, VK5AR (2200), FM7WP, CE1BD, JA6AD and OH2ZE/O on Aland Island, which might even be a new one.

G4ZU counters with AC4NC, AB1US (Formosa), HKØDP (San Andres Island), PX1YR, VP1GG and VK9YT.

G2DPY (Shoreham) presents an exhibit in the shape of XA1AB, giving QTH as "Rhodos Island," name Alex, QSL *via* REF. What do *you* make of that one? And 'DPY tells us that VQ4EI will be in the neighbourhood of VQ1-land around July 22-29 and may have 10 watts or so available. Call will probably be VQ1AC. Calls *on* his frequency will *not* be answered.

GM2DBX (Methilhill) still wields his very potent phone, and a few recent ones on Twenty have been HK1DZ, VP9L, CO2MG, ET2ZZ, OA4AI and a bunch of W's. A card from CR9AF (Macao) informs 'DBX that he will be there for another year, then returning to CT1. 'DBX now has over 130 confirmed on Twenty phone, with a folded dipole as the only aerial for that band.

New ones for G6QX (Horn-

"... Perhaps you might QSL, old man .... don't think I've worked a ZL on One-Sixty phone before ...."

21 mc MARATHON

(Starting July 1, 1952)

STATION	COUNTRIES
VQ4RF	108
G4ZU	102
G5BZ	100
GW3AHN	100
G4ZU (Phone	95
G3GUM	91
DL7AA	90
G2BW	89
G2WW	89
G3HCU (Phone)	83
G2YS	74
G6QB	73
GW3AHN (Phone)	72
G3DO	71
G3TR (Phone)	69
ZS2AT	67
G3CMH	64
G3CMH (Phone)	62
G3FXB	62
ZBIKQ (Phone)	58
G6QX	57
ZE3JO	55
GM2DBX (Phone)	42
G2DPY	38
G5FA	31
G8VG	18
G2DHV	11
4S7XG	11

church) were KF3AB (Ice Island, North Pole) and ZP9AY, but we are sorry to hear that 'QX has been laid up and has to go slow, under doctor's orders, so activity is now very slight. A tree has been removed, too, limiting his "aerial farm" to 28 and 14 mc rotary dipoles. Knowing that you can't keep a good man down, we expect to be hearing some nice DX tales from 'QX again before long.

G3CMH raised CO7AH and FF8GP on CW; phone brought in ZC7DO, who is in Jordan and used to be MD5DO. Conditions were found to be good for South and Central America most evenings, but mornings fell short of expectations.

TOP BAND COUNTIES LADDER
(Starting Jan. 1, 1952)

Station	Confimed	Worked
GM3OM	89	90
G6VC	84	84
G5LH	84	84
GM3EFS	83	83
GI3HFT	81	81
GI6YW	81	81
G2NJ	80	80
G5JM	79	81
G3HIS	77	80
G3HIW	71	79
G3CO	71	73
G3IVH	70	73
G2AYG	69	70
G3JEL	67	74
G3HTI	66	70
G3BRL	66	69
G8TS	64	69
G3JEQ	63	75
G3IOX	63	74
G3EUK	62	69
G2DVD	61	63
G3FTV	60	68
G3HYJ	60	65
G3CFG	60	62
G3LP	60	60
G3DO	57	63
G3ITY	52	61
G3IGW	49	68
G8VG	46	60
G3JKO	44	56
G2HKU	43	46
G5FA	37	52
G3HZM	26	39
G3HMF	17	20
G3JKM	15	36

General Chatter

G2YS passes on the news that the French Met. Party bound for Tromelin Island will include a few amateurs, one of the first being FB8BK. There is nothing on the island, and the whole set-up will start from scratch. Tromelin will be a new country for DUF and possibly even for DXCC.

G6QX tells us that the ops. on KF3AB said that they expected to be awarded "country status" in due course, but we rather doubt whether this one will come off.

G6LX (Croydon) agrees with last month's opening remarks (about DX-chasers who keep their doings dark) and is amused by certain types who whisper their mysterious secrets over the air and eventually disclose that they have just succeeded in working "something that most of us worked years ago"! 'LX, we were sorry to hear, is laid up after a bout of pneumonia; he has an AR88 by the bedside, but no rig. In any case, we hope he is up and around—and active again—by now.

Further news of the party on Navassa Island, *via* CM9AA and G3JFD (Derby) suggests that KC4AA, from that spot, should have been on the air between June 18 and 20. Too late to help you now! (But we did mention the thing last month).

The Total Eclipse due on June 30 (only partial for us) reminds us that there will be an Annular Eclipse of the sun, visible in South Africa, on Christmas Day. The Ionosphere Research Laboratory, Rhodes University, Grahamstown, is hoping to have transmitters running continuously in the 7, 14 and 21 mc bands with the call ZS2RU. The help of many transmitters and listeners is required, and all who are willing to co-operate (especially from the Far East and Australasia) are asked to write to A. P. Dale, ZS2JW, before *October 1*. Report sheets will be forwarded to such volunteers. Full address: A. P. Dale, Ionosphere Research Laboratory, Rhodes University, Grahamstown, C.P., Union of South Africa.

On the left CR7LU, the well-known XYL worked on the amateur bands by many G's; she is an exceptionally fine telegraphist, and is employed as an aircraft D/F operator at Beira, Mozambique. On the right, ZE3JO of Salisbury, Southern Rhodesia, who is ex-G2SO.

News from Overseas

Doc Markham, who gave so many G's their only ZS8 contact when he was ZS8MK, has now shifted from Basutoland to Songea, Tanganyika. At present he has no power, but as soon as a good 12-volt charging engine has been located he hopes to be on the air again. Call-sign unknown, but he hopes to retain the "MK" and become VQ3MK.

OD5BH (Beirut) hopes to be on the air soon, and expects to be there for five years. He is ex-G3GLO, formerly of Bournemouth. After a trip to the U.K. he hopes to set himself up with suitable gear; things are very expensive in OD-land, and he mentions, as a specimen, 2s. 6d. for a quarter-watt resistor and 7s. 6d. for a toggle-switch (second-hand)!

DL2US (B.A.O.R.) is also G3HII. From the DL location he has been working cross-band (80/

160 metres) with a G, and has been surprised at the number of G stations audible every night on the Top Band. He is very frustrated at hearing all this and not being allowed to use the band, but will be sitting on 3520 kc after 1900 BST and looking for cross-band contacts.

G3BFC, who has been putting MD2BFC and VQ6BFC on the bands for some time past, is on the move again. He expects to be in Gambia for four months as ZD3BFC, after which he will most probably be in Bahrein for two years as MP4BFC.

Any stations working HH2OT are asked to send cards to W4HYW, as the HH is becoming a W4 for a while. He will be returning to Haiti next year.

W2QHH (Hamilton, N.Y.) tells us that the stations signing VR2BJ and LU4DM on the Top Band were phoneys—and probably the same hoaxer. Fortunately for us, they were not even heard in this country. 'QHH managed to raise FO8AJ (Clipperton) on both 80 and 20, putting his score up to 224 worked, 224 confirmed. This makes us wonder how many stations in the world can claim a 100 per cent. QSL record.

DX Strays

The ubiquitous G2RO appeared in Sarawak as VS4RO around June 5, and was immediately snapped up by a pack of W6's and 7's. Other districts also got him, and we believe he also worked VK's and ZS's. No reports of G contacts are to hand as yet. Next appearances were as VS5RO, Brunei, on June 14, and then ZC5RO, British North Borneo, on June 18. Thence he is due to proceed along the lines of VS6, VS1, VS2, 4S7 and VU. Conditions have not been very kind to his 15-watter, but maybe he would have had an even harder time if they had been good . . . .

SV2RI has been reported as active from Rhodes, and SV9UN from Crete, although only one QSO (with a W8) was reported from the latter.

The Easter Island representative is now CEØAD, and he has been heard and worked around midnight near the LF end.

Other Top Band News

Apart from the summary of the MDT activity, there is little to report on Top Band, except that Counties Worked scores continue to increase month by month. G3BRL added Northumberland, Banff and Guernsey; G3HTI (Cleethorpes) collected Cardigan and Radnor (thanks to expeditions), but is still short of Bedford and Monmouth.

G3JKM (Baldock) is one of our youngest active amateurs and would like to contact other "Young Ops." on the air. He now enters the WABC lists. G2NJ received a SWL card from Germany—he was heard over there at 1600 GMT when working from his /A location on the boat.

Static is now beginning to take charge on this band, and we don't expect anything phenomenal in the way of DX until the autumn, although a few stalwarts continue their early rising tactics in search of W's.

The Eclipse

Between the time we are writing this and the time you will be reading it, there is (for us in the U.K.) a partial eclipse of the sun. This, of course, is on June 30, and conditions on the HF bands between 1100 and 1400 that day are liable to be interesting. Will anyone active at that time please send in an abridged log with next month's news? We shall be particularly interested in the behaviour of the 14 mc and 21 mc bands during that period.

That brings us to the end of this month's news. Deadline for the August issue is **first post on Friday, July 16,** and for the month following it will be *Friday, August 13!* Address all your news and views to "DX Commentary, *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. Until then, Good Hunting, 73, and BCNU.

FIVE BAND DX TABLE
POST WAR

Station	Points	3.5 mc	7 mc	14 mc	21 mc	28 mc	Countries
DL7AA	649	85	154	216	90	104	221
G6QB	587	52	107	220	73	135	234
G5BZ	562	60	110	227	100	65	233
G2VD	493	47	89	178	70	109	187
G4ZU	487	12	45	208	102	120	210
G2WW	479	23	70	190	89	107	197
G2BJY	459	48	77	141	77	116	179
G3FXB	456	64	117	174	62	39	178
G3DO	444	24	46	196	71	107	221
G6QX	407	51	96	146	57	57	170
G5FA	406	34	118	150	31	73	166
G2YS	384	53	68	143	74	46	158
G2BW	357	24	57	144	89	43	161
GM2DBX*	337	27	31	156	92	81	167
G8VG	279	36	76	123	18	26	140
ZB1KQ	276	5	34	117	59	61	138
G2DHV	177	20	23	108	11	15	112
4S7XG	160	1	27	110	18	4	110

* (Phone)

TEN-METRE ACTIVITY
SUNDAY
JULY 25, 1954
Use the band and report your results!

THE STRUCTURE OF THE AMATEUR BANDS

AS there have been piecemeal changes in the limits of our bands, in operating conditions, and in the amateur transmitting licence itself during the last five years, we endeavour here to summarise the present position in at-a-glance form. *(See Table over.)*

This will enable all concerned to see exactly where we are in the spectrum, and, for the more recently licensed operators, show how the CW/Phone divisions should be observed on the bands for which they have been made by amateurs themselves through their national organisations; the CW/Phone areas given are those in which U.K. stations should operate—there are certain variations where some other countries are concerned, but they do not affect the broad picture.

It will be seen from the Table that there are vast territories in the UHF region which are totally unpopulated, largely because amateur techniques have not yet been developed for these bands. But in view of the possibilities for pulse working, it would seem that the 2350-2400 mc area should have more attention from progressive VHF operators.

True to say also that at present the fullest use is not being made of our 21 and 28 mc bands. Both these have a considerable DX potential, are relatively free of interference, and are beginning to show the expected signs of the return of DX conditions as the sunspot cycle becomes more favourable for the higher frequencies. But DX working apart, both these bands are useful and interesting for European and semi-local working, and should be much more populated.

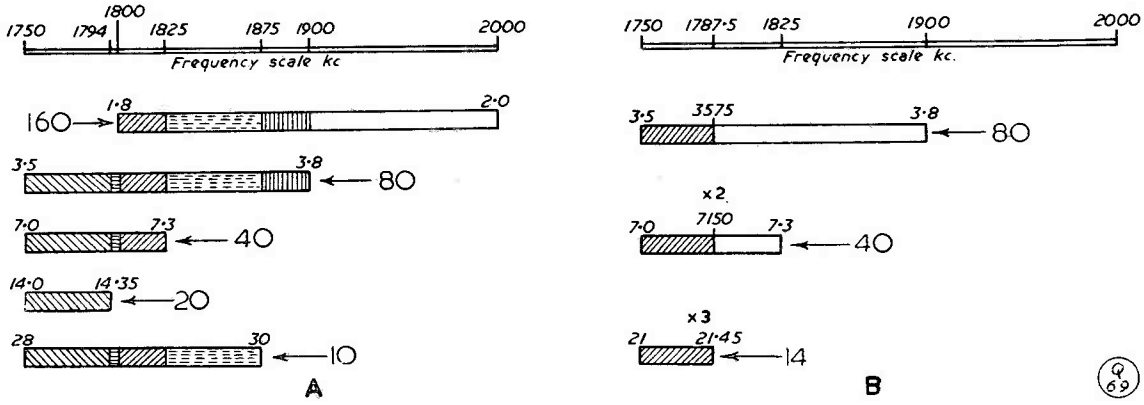
Harmonic Relationships

The diagrams herewith show the harmonic relationship between all our communication bands, as at present allotted.

In (A) is given the even-harmonic relation of all bands 160-10 metres (neglecting for the moment 21 mc), the areas with similar hatching being harmonically related to each other. It will be seen that for the first time in amateur history there is no longer any one frequency which is in harmonic relation through all five of these bands—this is because of the reduction, a year ago, in the width of the 1·8 mc band by 85 kc off the LF end, and the shortening of the 14 mc band by 50 kc at the HF end when the 21 mc band was opened.

By reference to the frequency scale in sketch (A) and using even multipliers depending upon the band(s) involved, it is possible to work out VFO coverage and to choose crystal frequencies which will produce even harmonics in the required area.

In sketch (B) is shown the harmonic relationship—for there is one—between our 3·5, 7 and 21 mc bands. Any frequency 3500-3575 kc times 6 will appear in the 21 mc band: similarly, any frequency 7000-7150 kc times 3



Showing harmonic relationships through the amateur HF communication bands, with a reference-frequency scale related to the Top Band. In (A) similarly hatched areas are in true harmonic relation; it will be noted that there is no longer a frequency which is harmonically related through all five of these bands. In (B) is shown the 2-3 harmonic relationship between 3.5, 7 and 21 mc.

AMATEUR BAND	KNOWN AS	POWER LIMIT	CW/PHONE DIVISION	CONDITIONS	USAGE	REMARKS
1800-2000 kc	Top Band One-Sixty 1.8 mc 160 metres	10w.	None	Shared with short range Coast services	U.K. coverage. DX Test	Effective frequency area about 1800-1920 kc, depending on Loran interference over 1920-2000 kc (varies with district). Many strong Coast R/T stations after dark
3500-3800 kc	Eighty 3.5 mc 80 metres	150w.	3500-3600 kc CW 3600-3700 kc Mixed 3700-3800 kc Phone	Shared with Service stations	Europe and DX	Congested and subject to Service and long-range commercial interference
7000-7300 kc	Forty 7 mc 40 metres	150w.	7000-7150 kc CW 7150-7300 kc Phone	Partially shared	Europe and World-wide DX	Unauthorised BC stations, high powered, and commercial interference
14000-14350 kc	Twenty 14 mc 20 metres	150w.	14000-14100 kc CW 14100-14350 kc Phone	Exclusive	World-wide DX	Subject to commercial interference
21000-21450 kc	Fourteen 21 mc 14 metres	150w.	21000-21150 kc CW 21150-21450 kc Phone	Shared with other services	World-wide DX	At present above average usable frequencies for DX. Conditions variable, but occasional DX openings. Low activity. Some commercial occupation and harmonic interference
28000-30000 kc	Ten 28 mc 10 metres	150w.	28000-28200 kc CW 28200-30000 kc Phone	Exclusive	World-wide DX	As 21 mc band above. Subject to BC harmonic interference, met. balloon transmissions, radar station spread. Very little amateur activity at present
144-146 mc	Two 145 mc 2 metres	150w.	Zoned geographically by frequency areas in U.K. (*See* "*VHF Bands*.").	144-145 mc shared with aircraft services. 145-146 mc exclusive. FM permitted 144.5 to 145.5 mc only	U.K. and Europe, depending on conditions; otherwise semi-local	Occasional aircraft working in 144-145 mc area. Regular amateur activity and many stations equipped. Total of 15 European countries now worked on Two
420-460 mc	Seventycems 430 mc 70 Centimetres	150w.	Area 432-438 mc zoned geographically by frequency in harmonic relation with 145 mc band. 420-432 mc and 438-460 mc specially allotted for ATV and SEO working. (*See* "*VHF Bands*")	Shared with other services	U.K. and Europe, depending on conditions; otherwise semi-local	Will in general give results as good as, if not better than, obtained on two metres. Activity not high, but increasing, with about 100 amateur stations in U.K. equipped for 430 mc
1215-1300 mc	Thousand megacycle 1000 mc	150w.	None	Shared	Experimental	Very little activity.
2300-10500 mc	Various bands in this area allotted for exclusive amateur operation, as follows : 2300-2450 mc ; 5650-5850 mc ; and 10000-10500 mc, maximum input 150 watts. Pulse working is permitted only in bands 2350-2400 mc, 5700-5800 mc and 10050-10450 mc, with 2½ kW peak power. A very few individual amateurs are active in these bands. No organised activity.					

will also fall in this band. Looking at (A) and (B) together, we see that a VFO with its tuned circuit designed to cover, say, 3500-3600 kc, will give even-harmonic output with good coverage over all bands 7-28 mc, including the whole of the 21 mc band on the 6th harmonic.

Though there is this even-harmonic relationship between the 3·5 and 21 mc bands, it is not possible to show this in sketch (A) because it is based on a 2-4-8-16 relationship, with the reference frequency scale covering 1·8 mc.

Notes: *(See Table)*

(1) *On all bands from Top Band to Seventycems, CW and phone operation is permitted in all modes except pulse (but see Notes 2 and 4 below).*

(2) *FM working is not permitted in the frequency areas* 144.0-144.5 *and* 145.5-146 *mc. On bands* 1800 *kc to* 21450 *kc* (160 *to* 14 *metres) the maximum deviation on FM is limited to* 2.5 *kc, with a maximum effective modulating frequency of* 4 *kc. No FM restriction of this kind on any band from* 28 *mc upwards.*

(3) *Amateur TV transmission (vision signal) is permitted on the* 430 *mc band, and is subject to special licensing.*

(4) *Newly licensed operators are no longer restricted to a maximum input of* 25 *watts for the first* 12 *months. Full power may be used from the outset. Phone operation is permitted on application* 12 *months after issue of the first licence.*

(5) *The "CW/Phone Divisions" in Col.* 4 *are as agreed among amateurs themselves; they are not subject to any enforcement by the licensing authority.*

(6) *The annual fee for all amateur transmitting licences (except Amateur TV and Mobile) is* £2.

(7) *Holders of Main Station licences may operate from an alternative-address or portable-location, using then the /A suffix, without payment of an additional fee. If /A operation is to be for more than four weeks, the local G.P.O. Telephone Manager should be notified in writing in advance. (Separate /A and /P licences, for which fees were hitherto charged, are abolished).*

(8) *Holders of Main Station licences may obtain a Mobile licence, permitting operation from a car or caravan while on the move (and from small vessels under certain conditions) on application, and payment of an additional annual fee of* £1.

(9) *The fee for an Amateur TV Licence is* £2 *per annum.*

(10) *Amateur station licences do not cover ordinary domestic sound reception or TV viewing, licences for which must be taken out in the ordinary way.*

(11) *The authority for the issue of all Amateur Radio transmitting licences is the Postmaster-General, the responsible branch being Wireless Telegraphy Section, Radio and Accommodation Dept., Union House, General Post Office, London, E.C.*1. *Changes of address should also be notified to this department. Licence fees are payable to the Postmaster-General, Accountant General's Dept., General Post Office, London, E.C.1.*

(12) *Operating conditions as set out here were effective from 1st June 1954, and may be worked to by all operators already licenced. They will normally receive the new licence with the next renewal.*

NEW LICENCE ARRANGEMENTS

In addition to the Amateur Sound Licence, the Amateur Sound Mobile and Amateur Television Licences, the G.P.O. announces that with effect from 1st June 1954, radio-controlled models became subject to licensing, a fee of £1 covering a period of five years. Another new departure in radio transmitting licences is the Testing and Development Licence, available to firms or individuals who require facilities for designing or proving radio transmitting equipment; if these tests are conducted exclusively under suppressed radiation conditions ("artificial aerial"), the licence fee is £1 for five years; if a radiating permit in this category is required, the fee is £2 a year. Wireless schools, training establishments and technical institutes get a Training Establishment Licence costing £2 for five years, which includes use of radar equipment for training purposes. A ship licence costs £2 a year, and covers BC (but not TV) reception; the aircraft licence fee is £1 annually, also covering the reception of broadcasting.

TRANSISTOR RESEARCH

For all those interested in transistors and transistor circuitry, whether professionally or as amateurs, the *Transistor Research Bulletin* will be found a useful publication. It is produced bi-monthly by National Scientific Laboratories, Inc., of Washington, D.C., U.S.A., and it deals with the latest developments in transistor work. The cost is £2 0s. 0d. for a year, and subscription orders can be placed in sterling through: Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

CARDS IN THE BOX

If the operators listed below will forward a stamped addressed envelope, with name and call-sign, to BCM/QSL, London, W.C.1, they will receive the card(s) held for them in our QSL Bureau. Cards for G stations are despatched fortnightly. If publication of the call-sign/address in our "New QTH" feature and subsequently in the *Radio Amateur Call Book* is also required, that should be requested when sending for the cards.

G2BUN, 2CUW, 2DDP, 2FFP, 2KY, 3AM, 3ANN, 3CGB, 3ENA, 3FNO, 3GIV, 3IKL, 3IXV, 3JAT, 3JIM, 3JIN, 3JIQ, 3JJT, 3JLV, 3JMM, 3JNZ, 3JQI/A, 3JQQ, 3JQR, 3JQS, 3JRN, 3JTU, 3JWT, 3XR, 4QV, GC3BDB, GD4IA, GI3IWB, GM2FHA, 3AEY/A, 3CGH, 3DUS, 3EOW, 3GUI, 3JXP, 5RH, GW3FQL.

TRANSISTOR TOPICS

Conducted By ——— G3HMO

TWO practical transistor circuits are discussed this month: the Clapp VFO, which has been used by G3CCA, and a simple HF and detector receiver which has been giving very good results at the writer's station, on CW and phone reception. As the VFO may appear rather mysterious at first sight, even to users of the valve version of the Clapp, a general analysis of the circuit is given. The broad treatment may be found helpful in following many other similar circuits.

Basic Transistor Circuits

There are three ways of connecting a transistor, as with a valve. The valve circuits are: grid input —anode output (normal arrangement); cathode input—anode output (the grounded grid); grid input—cathode output (the cathode follower). The three basic transistor circuits, stripped of all detail, are shown in Fig. 1. They are called: Grounded base (*a*); grounded emitter (*b*); and grounded collector (*c*) respectively. The grounded base circuit will be familiar to readers by now and is the circuit most commonly used with point-contact transistors. The grounded emitter can give a higher stage gain, but stability considerations make it more adaptable to junction type amplifiers, in which field it is the most poular circuit. We shall have more of this circuit next month. Finally, the little used grounded collector circuit is shown for completeness. It finds its application where a high input impedance is required.

Providing Emitter Bias

Bias for the emitter of a grounded base stage can be obtained in several ways. The most obvious and also the best method for initial experimental work is to have a separate supply or tap on the HT battery. Another possibility is to have a bias resistor in the base. As this introduces positive feedback, instability may result. The resistor can, of course, be decoupled, but even this cannot cover all frequencies. A better method is shown in Fig. 2(b), in which the bias is obtained from a tap on a potentiometer across the HT supply. This lowers the base resistor at the expense of an increase in HT current. The circuit may be redrawn as in Fig. 2(c) without change. At first sight it may be confused with Fig. 1(b), with which it has, of course, no connection.

The Clapp VFO—Transistor Version

Remembering that the normal oscillator is an amplifier with some output fed back to the input, we can now see how this version of the Clapp functions. Fig. 3(a) is the same amplifier as Fig. 2(c) with a modified output. Fig 3(b) shows a tuned circuit of coil and three condensers in series, enabling the circuit to be tapped at different points. This tuned circuit is now incorporated with the amplifier, as shown in Fig. 3(c) to make an oscillator. This is the essence of the Clapp VFO.

The complete circuit as used by G3CCA is shown in Fig. 4, and a table of values is appended. C1 is the bias decoupling condenser which holds the base down to ground as far as RF is concerned. C4 and C5 are the tuning and padding condensers respectively. C5 has a negative temperature co-efficient to counteract drift. The output is taken by a link of three turns round the middle of the coil. The VFO is very stable and gives enough power to drive a transistor push-pull PA stage.

Simple Top Band Transistor Receiver

The receiver, of which the circuit diagram is shown in Fig. 5, is not claimed to be of any great originality, but seems to be worth describing for the benefit of others who may be thinking of building their first TRX. The advantages claimed for it are: Comparatively good selectivity and sensitivity to weak signals. The disadvantages are: The need of a good aerial-earth system, and a very small audio output. The latter can be overcome by adding an LF stage. It is planned to incorporate a grounded emitter output stage using a junction type transistor, and this will be described next month.

The Receiver Circuit. *(see p.283).* Two point-contact transistors are used and, as far as is known, they may be of any type which will perform at 2 mc. The actual transistors used are a GET-1, which is known to oscillate up to at least 2 mc (not all samples will do this), and an OC51. The GET-1 is used for the HF stage and the OC51 for the reacting detector. All components are standard and easily obtainable. Two Wearite PHF6 coils are tuned by a miniature twin-gang air-spaced condenser. Band spread is obtained by C7, and the alignment maintained by the condenser C1, of approximately half the maximum capacity of C7. The emitter of the HF stage is connected to the aerial tuning by the coupling coil, which gives the necessary low impedance input. The emitter is biased by taking the other end of the coupling coil to 1½ volts positive *via* R1, which is decoupled by C4. The HF stage collector should draw about 1 mA, rising to 1½ mA on connecting the bias. Some variation in R1 and R2 may be needed to achieve this.

The detector is coupled to the previous stage by putting the coupling coil of the tuned circuit in the collector of G1. The OC51 can be mounted in a spring anode cap (standard octal size), and connections to emitter and collector made by flying leads with spring clips on the end (clips robbed from a B7G holder are ideal). The detector circuit is the

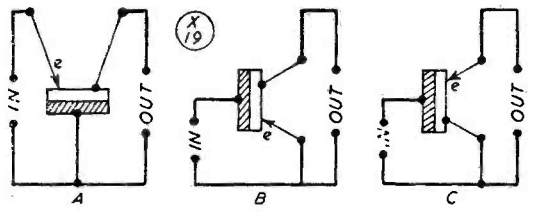


Fig. 1. The three basic ways of connecting a transistor. Circuit (A) is the most useful for point-contact type transistors, while (B) is more common with junction types. Circuit (C) is not a usual one but can be used to provide high-impedance matching, as to a crystal microphone.

same as shown in Fig. 4(b) on p.14 of the March *Short Wave Magazine*. C8 matches the emitter to the tuned circuit, while C9 is the preset reaction control. A 200-ohm variable in series with the base assists in obtaining oscillation should this prove difficult. VR1, which is on the front panel, gives a novel and easy way of providing fine control of reaction. It is the smoothness with which the set slides in and out of oscillation which enables good results to be achieved. This stage should take about 1 mA from the HT. The 22½-volt section of a deaf-aid battery tapped at 1½ volts from the positive end can be included in the circuit. The tap goes to chassis, the positive goes to R1 *via* a DPST switch,

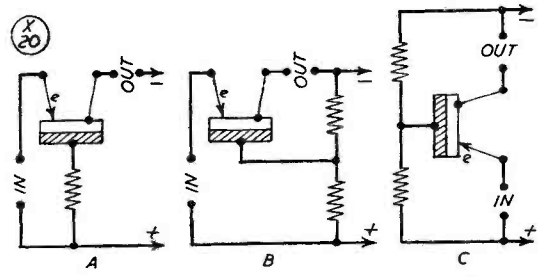


Fig. 2. Positive bias for the emitter can be provided by a resistor in the base circuit (A). Alternatively, the bias can be obtained from a tap across the HT supply (B). This circuit may be redrawn as (C) but it must be noted that it is basically Fig. 1 (A) and not Fig. 1 (B), with which it might be confused.

and the negative end goes to provide HT *via* the other section of the switch.

Setting-Up Procedure. Having switched on and checked the collector currents of G1 and G2, listen on the headset for signals. With the tuning condenser about maximum, the HF end of the BC band comes in and plenty of Continental stations come through after dark. Try varying the setting of C9 and VR2, leaving VR1 at minimum. When comfortable oscillation is obtained, it may be controlled by VR1. The minimum value of base resistance consistent with oscillation will probably give the best results. Next, with the set still oscillating and with C7 about half in, sweep the main tuning round while listening on the main receiver on Top Band until beats are heard. (This is a quick way of finding the 160-metre band.) To get the feel of the receiver, it is a good plan, to start with, to listen to a signal on the main receiver, beat the TRX on to it, and then, having muted the big receiver, listen on the headset. It is surprising to find how many signals, not previously heard, can

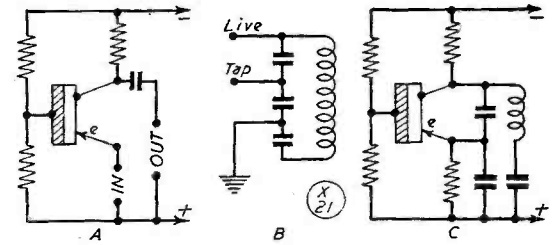


Fig. 3. The circuit of Fig. 2 (C) may be modified as in (A) above. This, together with the tuned circuit (B), gives us the basic Clapp oscillator (C) as used by G3CCA for his transistor VFO.

be picked up in this way. The reason is that though the set is sensitive, the power output is very low, and most of us have lost the art of finding weak signals on head-phones. However, the knack soon returns, and the main set can be switched off with confidence. The writer's twice-weekly schedule with G3IYX on two-way TTX has now become TRX at one end as well.

TTX Test and Contacts

June TTX Communication Test. On the night June 15/16, 2330-0230 BST, a Transistor Transmitter Test took place on Top Band, involving four transmitters and three receivers using transistors only. Many valve-operated stations stood by and gave valuable assistance.

Participating TTX Stations: G3CCA (Leicester), G3HMO (Buckingham), G3IYX (Bradwell, N. Bucks.), G4AP (Swindon).

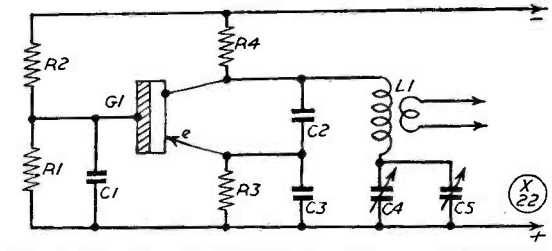


Fig. 4. The Clapp VFO circuit complete as used by G3CCA in his record-breaking TTX. C1 is a by-pass to R1; C4 and C5 are the tuning and band-set condensers respectively. This transistorised VFO gives results directly comparable with a Clapp oscillator using a valve.

Table of Values

Fig. 4. Clapp VFO as used by G3CCA.

C1 = 0.02 μF
C2, C3 = 200 μμF
C4 = 100 μμF tuning
C5 = 100 μμF Neg. coeff. disc trimmer
R1 = 56,000 ohms
R2 = 120,000 ohms
R3, R4 = 15,000 ohms
L1 = Eddystone Miniature Former 75 turns of 32 SWG enamelled, and 3 turns of PVC link in centre of main coil.

TRANSISTOR CONTACT RECORD

TRANSISTOR STATION	Band mc	Phone CW	Input mW	Dist. miles	Station Reporting	RATING m.p.w.
G3CCA, Leicester	1.8	CW	50	170	G2FP, Exeter	6,800*
G3CCA, Leicester	1.8	Ph.	62	100	G3IPB, Cobham, Surrey	3,200*
G3CCA, Leicester	1.8	CW	62	45	†G3IYX, Bradwell, Bucks.	2,150*
G3IYX, Bradwell	1.8	CW	80	45	†G3CCA* Leicester	1,700
G3IZS, Leicester	1.8	CW	20	32	G3HFB/A, Grantham, Lincs.	1,600
G3IYX, Bradwell	1.8	CW	80	120	G3FTV, Wakefield, Yorks.	1,500
G4AP, Swindon	1.8	CW	80	45	G6FO, Maids Moreton, Bucks.	1,100*
G2BOF, Sutton, Sy.	1.8	CW	500	355	GM3GUS, Dumfermlin	710
G3JRH, London	3.5	CW	50	5	G3IQN, London	100

NOTES:

Col. 7 is the Power-Range Rating, expressed as miles per watt. Thus, a report at 100 miles with an input of 50 milliwatts (mW) rates 2,000 miles per watt.

* *Denotes transistor receiver in use for QSO ; power-range rating doubled.*

† *Denotes transistor transmitter in use by reporting station ; power-range rating doubled.*

Entries for "Transistor Contact Record," under the headings shown, are invited from operators using transistor equipment. This Table is not competitive ; it is intended to record progress in transistor communication.

Collaborating Stations: G3ERN (Harlow), G3IPB (Cobham, Sy.), G3JEL (London, N.7), G5JM (Buckhurst Hill, Essex).

Linking and Control Stations: G3CFG (Leicester), G6FO (Maids Moreton, Bucks.).

Results: G3CCA on TTX worked: G3IPB (100 miles), G3IYX (45 miles), G3JEL (87 miles), G5JM (85 miles) and G6FO (45 miles); heard by G3ERN (80 miles) and G4AP (80 miles).

G3HMO on TTX heard by G3CCA (45 miles).

G3IYX on TTX worked: G3CCA (45 miles), G3JEL (45 miles), G5JM (50 miles), and heard by G3ERN (45 miles).

G4AP on TTX heard by G3CCA (80 miles), G3IEL (70 miles) and worked G6FO (48 miles).

Throughout the Tests, G3CCA was receiving on a superhet TRX, and all QSO's were solid with signals varying from 579 on CW to RS-56 on phone. The contact G3CCA/G3IYX was TTX both ways and confirms the QSO so nearly achieved last month. This is probably a record for a two-way TTX QSO. Similarly, G3CCA/G4AP heard one another on TTX, over 80 miles.

G3HMO was using his straight TRX (HF and Det.), and on this received all stations in on the Test except G4AP ; some of G3CCA's phone was audible but not readable on the G3HMO TRX. There appeared to be no lack of carrier, but rather insufficient depth of modulation. It was worth noting that a contact G3CCA/G3HMO, which was nearly achieved, would have been all-transistor both ways. The G3CCA/G3IYX QSO only failed to be all-transistor by reason of the fact that G3IYX was using a normal valve receiver. G3IPB was reading phone from G3CCA, at 100 miles, on the speaker.

G4AP was also using a straight TRX (Det. and LF in his case) and received all stations except G3HMO and G3IYX. G3IPB, G5JM and G6FO were all read easily on a small speaker. This means that an all-transistor QSO G3CCA/G4AP is also now within sight.

Conditions during the period of the Test were generally good, and after midnight the Coast-station activity tended to die down. A number of Top Band operators not actually named in this summary were evidently on and listening, and thereby helped to keep the TTX frequencies clear, for which all concerned are very grateful.

Late Flash. On June 23 at 2330 BST, G2BOF (Sutton, Surrey) on TTX worked GM3GUS (Dun-

COUNTIES WORKED

USING TRANSISTOR TRANSMITTER

Station	*Counties*
G3CCA, Leicester	14
G3IYX, Bradwell, N. Bucks.	14
G3IZS, Leicester	5
G6FO, Maids Moreton, Bucks.	4
G3HMO, Buckingham	3

Claims for this Table are accepted from TTX stations, using a transistor transmitter to establish and maintain a normal QSO, own county scoring as one.

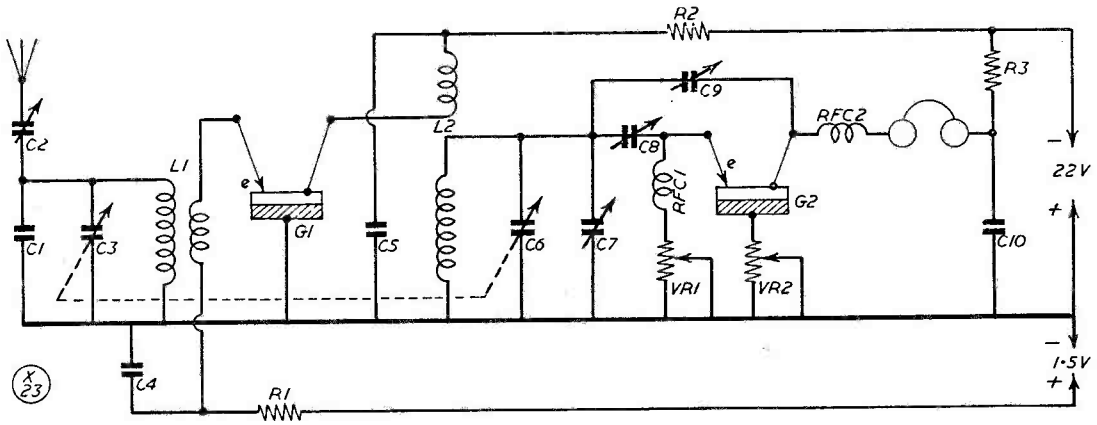


Fig. 5. Simple 160-metre receiver, now in use at G3HMO. Two point-contact transistors are used, with standard components. With a good aerial and earth system, it gives a very useful performance on a headset, as regards both sensitivity and selectivity; in fact, this set handles like any 1-V-O valve receiver. The base resistor VR2 is helpful in obtaining oscillation. Fine control of reaction, giving very smooth handling, is obtained by varying VR1 in the emitter circuit. It is intended to add a junction-type transistor as LF amplifier, making this TRX a "1-V-1" by valve comparison, to bring the weaker signals up to a more comfortable headphone level.

fermline), getting an RST-239 report. His transmitter is a base-tuned CO on 1849 kc, running 500 mW (?) to an OC51. The distance is 355 miles; this gives an m.p.w. rating of 710, but the actual distance is probably the greatest yet covered on a TTX, irrespective of input or m.p.w. rating — so congratulations to G2BOF, and to G2DMR, who actually built the little transmitter.

Other TTX Activity

New stations known to be on TXX are G3JRH (Middx.), who is on 3.5 mc, and G3IZS (Leicester). G3IZS is very active, having had about thirty QSO's, mostly local but including some up to thirty miles. It was a pity that G3IZS was away (serving his Queen and Country in the R.N.V.R.) at the time of the Test mentioned above, but we look forward to hearing him in the near future. His TTX uses a GET-1 in the base oscillator circuit, and is crystal controlled on 1850 kc. G3CCA is now using a new TTX which incorporates *tetrode* transistors in CO, PA and modulator output stages. Transistor tetrodes are not available commercially yet, and G3CCA is using "specials."

Technicalities

The Transistor Tetrode is, as its name suggests, a four-element device, but although it is a junction transistor of the *p-n-p* type, it does not include another layer of germanium. It has two connections to the base (the *n* layer of germanium), and by passing a current through these connections, while leaving the rest of the circuit unchanged, a big improvement in HF properties results. This peculiar phenomenon is connected with the modification to the distribution of holes and electrons resulting from this current, and has a marked influence on the internal capacities and also on the base resistance.

G3CCA is also working on a point-contact transistor for frequency changing, but cannot release any details yet. It would seem to the writer that there is scope for anyone making their own point contacts to make one with two emitters close to and on either side of the collector. Injection from the local oscillator could then be fed *via* one emitter while the signal is fed into the other. The same transistor might function well as a push-push doubler.

Table of Values

Fig. 5. Two-stage 160-metre receiver as used at G3HMO.

C1	= 50 $\mu\mu$F mica	VR2	= 200 ohms
C2	= 30 $\mu\mu$F air trimmer	L1, L2	= PHF6 Wearite (or wound for 160-metre band).
C3, C6	= 500 $\mu\mu$F air two-gang miniature		
C4, C5	= 2000 $\mu\mu$F mica	RFC1, RFC2	= 2.5 mH RF Choke
C7	= 100 $\mu\mu$F air tuning	G1, G2	= Point-Contact Transistors, home-made, or any commercial type (GET-1, GET-2 or OC51).
C8, C9	= 30 $\mu\mu$F air trimmer		
C10	= 0.01 μF mica		
R1	= 5,000 ohms		
R2	= 2,500 ohms		
R3	= 7,500 ohms		
VR1	= 5,000 ohms		

Home-made Transistors

Phosphor Bronze Wire. The supply position is now solved, thanks to Messrs. Johnson, Matthey & Co., Ltd., who have kindly provided free of charge a reel of hard-drawn phosphor bronze wire of 0.005 inch diameter. Suitable lengths of this will be sent to any reader interested in making his own transistors on receipt of a *stamped addressed* envelope, with a statement that he intends to use the wire for home-constructed transistors.

G2AA and G4AP are both working on their own transistors. G3CCA has got a GET-1 up to a comfortable 14 mc by placing the points closer together (about 0.001 inch spacing). This tends to be expensive in GET-1's, but is a point to be borne in mind by those making their own if they hope to get good HF performance.

The Tables

The TTX table has been brought up to date this

month and a Counties Worked table started. The "Transistor Contact Record" shows *new* QSO's since last month's appearance—the object of this Table is to maintain a record of TTX contacts, and it will appear as reports and claims for it are received. In general, it is not intended to duplicate contacts (or entries); here it is noteworthy that G3IYX, of Bradwell, N. Bucks., has repeated, twice, his 120-mile QSO with G3JML (Huddersfield) since the last report appeared; he has also been heard twice by G6QB (Bexhill) at 100 miles. This is a fine record of consistency with an input of well under one-tenth of a watt, and on a crowded band at that.

Next month it is hoped to show a table giving, in concise form, the characteristics of all available commercial transistors. This has taken longer than expected to compile, but we now have the information required.

All news of activity, equipment, progress and results for appearance in the August issue should be posted to reach us by Thursday, July 15, addressed "Transistor Topics," c/o The Editor, *Short Wave Magazine*, 55 Victoria Street, London, S.W.1—and don't forget the s.a.e. if you want a bit of phosphor bronze wire for your home-made transistor.

M.V. "ARIES" ACROSS ATLANTIC

Further to the note on p.218 of the June issue of SHORT WAVE MAGAZINE, the ex-RNLI converted lifeboat *Aries* entered New York Harbour on June 25, after a 33-day crossing in very heavy weather. The owner of *Aries* is Capt. C. Harcourt-Smith, R.N. (retd.), who is manager of the Marine and Aircraft Division of Venner Electronics, Ltd.; the navigating officer is Lt./Cdr. T. E. Hight, R.N.V.R., assistant sales manager of Venner, Ltd., Kingston, Surrey; while Sub/Lt. E. Skelton, C.G.M., R.N.V.R. (G3JOQ), who is acting as signals officer for the trip, is employed by Hawker Aircraft. The fourth member of the crew, Mr. D. Foden, is the son of the managing director of Foden's, manufacturers of the 120 h.p. Diesels with which *Aries* is powered. Apart from the attempt on the small-boat double-Atlantic-crossing record, *Aries* is engaged in a radio communication survey, and is carrying out tests on a wide range of apparatus which will be of great value in the design and construction of radio equipment for small craft. After a fortnight on the American side, *Aries* will start her return voyage, which should take about 20 days, given reasonable weather.

MOBILE ON TOP BAND

Using both CW and phone, G3IVP/M will be operating mobile in the 1800-1850 kc area on Sundays during the coming weeks. He asks for QSO's and reports on his mobile signals. QTH: 32 Feversham Road, Salisbury, Wilts.

G.E.C. MICRO-WAVE LINK IN EUROPEAN TV

One of the more interesting technical achievements in the European TV tie-up is the micro-wave radio link spanning the Alps. This is 125 miles long, and runs from Chasseral in Switzerland, through a relay station high up on the Jungfrau, to Monte Generoso. It is the only link between the Italian and German TV systems.

The equipment for this link was supplied throughout by the Coventry Works of the General Electric Co., Ltd. The service given is a one-way reversible TV channel with a band-width of 5.5 mc, enabling 625-line pictures to be handled. There is a terminal transmitter and receiver at Chasseral, a relay station on the Jungfraujoch, and a terminal transmitter and receiver at Monte Generoso. The relay station is at 12,000 ft. altitude and is about mid-way between the two terminals. The radio-link system is FM, operating on 1776 mc and 1848 mc. The whole equipment has been designed for permanency and the minimum of maintenance; all valves are run to ensure maximum life; triodes are used in all UHF stages; the highest voltage is 300 DC; and the insulating materials will withstand wide extremes of temperature and humidity.

The beam-aerial systems are 12-foot aluminium parabaloids, excited at the focus of the mirror, and fed by 75-ohm air-spaced coax. The effective band-width of the dish is 150 mc, and the SWR is not worse than 1:1.15 over the whole band. The gain (at 2000 mc) is 34 dB, with a beam angle of two degrees.

Some further information on the station equipment will appear in future issues.

OCTOBER LICENCE EXAMINATION

In accordance with the conditions laid down in previous years, the G.P.O. will itself hold a Radio Amateurs' Examination on October 2, 1954, in London, Edinburgh and Cardiff. Applications to take the Examination must arrive by September 4 at the Wireless Telegraphy Section, Radio & Accommodation Dept., Union House, General Post Office, London, E.C.1, accompanied by a remittance of 25s. as examination fee.

Morse Test. During the first week in September, Morse Tests will be arranged at the head post offices in Birmingham, Cambridge, Derby, Leeds and Manchester, the fee for which will be 7s. 6d. Application forms for the Morse Test can be obtained from the address given above.

XTAL XCHANGE

Following are this month's offers. Those interested should negotiate direct.

G3IOZ, The Gables, Kilsby, Nr. Rugby, Warks.
Has 7015, 7017, 7025, 7075, 7150 kc crystals in FT-243 ½-in. mounting. Wants 6 mc frequencies suitable for multiplying into Zone E (144.4 to 144.65 mc).

GM3JQL, 24 Hammerman Building, 35 Dunkeld Road, Perth.
Has six crystals 6200-6800 kc, ½-in. mounting. Wants any frequency 1800-1900 kc.

ZC4FB, Civilian Wing, 2 Wireless Regt., M.E.L.F.3.
Has crystals 3010, 3020, 7010 kc, 3/4-in. pins. Wants crystals 7020, 7030, 7045 kc, FT-243, ½-in. mounting.

VHF BANDS

A. J. DEVON

Shetlands Stations Worked—
New GDX Record, G2FJR/GM3ANG, 496 Miles, June 4—
Swiss VHF Expedition—
More About VHF-VFO's—
Station Reports and The Tables—

AS we go to press with this, the weather has become more settled—in the South, fine and warm as we expect it to be at this time of year. Though these lines are being composed at six o'clock a.m., the sun is already high and warming the being of your old A.J.D., enjoying an early-morning cup of tea and a cough with his first cigarette.

And what, you may say, the heck has all this got to do with Two Metres? Well, the answer is that a period of fine, warm weather is just what we want, and must have, to get VHF conditions out of the doldrums and perhaps give us one of those sustained Continental openings which make VHF so very much worth while.

Not that some interesting and exciting things have not been happening during the month, as those who worked GM3ANG and GM3HGA in the Shetlands would no doubt be happy to testify. The GDX signal from GM3ANG (Sumburgh, 144.14 mc) first appeared at G5YV (Leeds) at 1855 BST on June 3, and a QSO followed with S8 signals both ways; GM3ANG also heard G6XM (York).

On the evening of June 4, GM3ANG worked, in a row, G2FJR (Sutton Bridge, Lincs.), G3CCH (Scunthorpe), G5BD (Mablethorpe), G6LI (Grimsby), G6XM (York) and G6XX (Goole). All these contacts were with good signal levels, and on phone in some cases. Also on June 4, during 1900-2015 BST, GM3HGA (Lerwick, 144.11 mc) was an audible 229 with G5YV, but he was 549 at G5BD, who worked GM3HGA for a 579 report; later, there was a QSO G6LI/GM3HGA. At about midnight on June 5, G5BD was heard again at GM3ANG, but no contact could be made—the peak of conditions had passed for the time being.

New GDX Record

There are many interesting angles on this Shetlands occurrence. In the first place, the QSO G2FJR/GM3ANG is the new GDX ground record, the path being 496 miles, or just about the distance Norwich-Berlin. (In other words, the Shetlands are a good deal further away than one might perhaps imagine). All the contacts made by the Shetlanders are exceptional GDX and mainly over a sea path—yes, even to G5YV. Apparently, the Shetland signals were not coming down on the mainland of Scotland; those GM's who were on could hear the G side of the contacts, but nothing from either GM3ANG or GM3HGA; this is not finally established, however, as GM reports are not complete and it is reasonable to suppose that had anyone been on in the eastern areas of Scotland, the Shetlands stations might have been heard and worked.

An amusing sidelight on the GM3ANG-GM3HGH activity is that at the time these remarkable QSO's were achieved, the two Shetlanders had hardly worked one another, and were only on at all to do some mutual testing, to make sure things were ticking over and that they were, in fact, in the band, and so on! G5BD's QSO with GM3HGA actually resulted from a short test call by 'HGA to attract the attention of GM3ANG. But it was G5BD who came back! The beam had only been put up half-an-hour earlier, and the GM3HGA transmitter was not finally adjusted.

However, as Jim of GM3HGA puts it, "The Shetlands gang 'ANG, 'HGA and 'HTH will be in a better position to cope next time—we have hardly settled on the band yet"! In the circumstances, they did very well, seizing their opportunity and exploiting it to the full while the going was good. When composing that piece on p.232 of the last "VHF Bands," we little thought that all these interesting things would be happening so soon.

Gear at the three Shetlands stations is almost identical: Transmitters are EF50 8-24 mc into QVO4/7 72 mc into QVO4/7 144 mc into 832 PA, with G2IQ converters and 4-element Yagis. (GM3HTH was unfortunately not quite ready when the opening came).

GM3HGA remarks in his report that up to June 13 they had not heard anything from the GM mainland. Any 2-metre station in the North of Scotland should be a routine contact under normal conditions. And here it is proper to add that it was GM6WL, visiting the Shetlands quite often in the course of business, who did a lot to help them to get going on two metres.

Other DX Results

For G5YV, June 17 was a good evening, and Harold found a number of hitherto - unheard Londoners to work.

The famous G5BD/GM3EGW nightly schedule is still running well—they have had more than 150 contacts since starting out on this undertaking, and the distance is still 241 miles. A fine performance, indeed. The only period over which it has been broken for more than a night or two was during a 7-day holiday G5BD took last month, when he motored

1,000 miles and made 14 personal QSO's.

Now take a look at the Activity Report and notice the calls-worked list put in by G6NB. Bill can certainly find them—and raise them—even under the present murky conditions; those call-signs represent eight different countries worked in a period of five weeks, and the G call-signs are merely representative of a great many QSO's made during long spells of almost nightly activity.

An interesting report from G3WW (Wimblington, Cambs.), also a traveller round the VHF country, brings out the following points of DX interest: On May 30, G2XV heard an LX1 who might have been LX1MF, but there was no sure identification, except that it was an LX1. On June 17, F8GH was getting into Cambridge, and on that same evening GM3EGW was 449 with G3WW—who was himself heard at the Dunfermline end but lost in QSB. On the 17th, there was a 449-549 contact G3BW-G3WW.

Then we have an interesting claim from GC2FZC (Guernsey), who worked GW8SU (Porthcawl) on June 16, for the GC/GW "First"—at last! This will duly be entered on the next appearance of the appropriate table. GC2FZC remarks that with him June 15-17 was a period of very good conditions.

G2FJR (Sutton Bridge) is naturally pleased—and rightly so—with his GM3ANG contact; he is on 1230-1300 clock time daily looking for EDX, and there have been signs of good conditions at this sort of time. New locals on Two in his neighbourhood are G2AXQ (Wisbech), G3GPQ (Boston) and G4LO (Thetford). G2FJR closes his letter with the following cryptic remark: "No reports recently because too many people wanted to see the tulip fields—well, somebody has got to help to keep 'em under control."

From June 19-22, conditions improved noticeably, and on the 19th the F's were again being heard and worked from the South Midlands. It is worth noting that F3ER and F8ME, both in the neighbourhood of St. Brieuc in north-west France, are looking for G's every evening round 2030 clock time.

GM3DIQ (Stevenston) says his high-power transmitter—he now has 120 watts to push-pull 834's—is performing very satisfactorily; at any rate, it gets him the contacts when conditions are right, as on June 17 when he worked G3CCH (Scunthorpe) at S8-9 on phone. But the low level of GM activity in the early evening is

TWO-METRE ACTIVITY REPORT

(Lists of stations heard and worked are requested for this section, set out in the form shown below, with callsigns in alphabetical and numerical order).

G3GVF, Hartley Wintney, Hants.

WORKED: F8GH, 9CQ, G2TP, 2UN, 2YB, 3EGV, 3FUM, 3JFR, 4AJ, 4HT, 4PS, 5NF, 5US, 6OU, 6XM. (*May* 16 *to June* 20).

G3GVF/P, Nr. Kingsclere, Hants.

WORKED: G2IT, 2YB, 3IRA, 4PS, 4SA, 5BM, 5NF, 6JK. (*June* 6 *only*).

G3GVF/P, Nr. Farnham, Surrey.

WORKED: G2YB, 2FFY, 3ARL/P, 3AWY, 3EGV, 3GVC, 3ITF/A, 3JHM, 4PS, 4SA, 6TA/P. (*June* 7 *only*).

G3GY, Malvern, Worcs.

WORKED: G2AJ, 3BJQ, 3CVK, 3DO, 3FJR, 3GZM, 3HHY, 3IKR, 3IOO, 3NL, 6WF, 8KL, 8SC.

HEARD: G2AK, 2COP, 2FXK, 2HCG, 3BA, 3BKQ, 3CRH, 3CVD, 3EJO, 3FRY, 3GKZ, 3HAZ, 3IOB, 3IVF, 5BM, 6NB, 6YU.

G6NB, Brill, Bucks.

WORKED: EI2W, F3CA, 3ER, 3LP, 3YE, 8GH, 8JR, 8KF, 8OB, 8TD, 9DI, 9JY, 9MF, 9TV, G2BMZ, 3AGA, 3BW, GC2FZC, 3EBK, GM3EGW, GW2ACW, 2ADZ, 8SU, ON4BZ, 4GG, 4HN, 4IE, PAØBP, ØFB, ØPAX, ØRK, ØUP. (*May* 12 *to June* 19).

G2FJR, Sutton Bridge Lincs.

WORKED: EI2W, G2AXQ, 2CVD, 2DJM, 2DRA, 3AEX, 3CCH, 3CRH, 3CYY, 3DOV, 3ENY, 3FW, 3GBQ, 3GCX, 3GNJ, 3GPQ. 3IUD, 3IUK, 3JGY, 3WW, 4KO, 4LO, 4SA, 5BD, 5IG, 5LL, 5UD, 5YV, 6YU, 6XM, 8KW, 8VN, GM3ANG, GW2ADZ, PE1PL, ON4BZ.

HEARD: G2BMZ, 3HSD. (*May* 7 *to June* 16).

G4SA, Drayton, Berks.

WORKED: EI2W, G2AOK, 2CVD, 2CZS, 2FCL, 2FJR, 2HCG, 2HIF/P, 2YB, 3ABA/P, 3AGS/P, 3AOO, 3APY/P, 3AYT/P, 3BA, 3BEX/P, 3CCP, 3CRH, 3DO, 3DUQ/P, 3DVQ/P, 3ECW/P, 3EPW/P, 3FAN, 3FD/P, 3FIY/P, 3FUM, 3GB/P, 3GEI/P, 3GHO, 3GNJ, 3GOP/P, 3GVF/P, 3GWB/P, 3HHY, 3HSD/P, 3HWF, 3ITF/P, 3IUD, 3IUK, 3MA/P, 3NL/P, G5BM/P, 5JU, 5ML/P, 5NF, 5TZ/A, 5YK, 5YV, 6AG/P, 6KB, 6NB, 6OU, 6TA/P, 6VX/P, 6WF, 8DM, 8KW, 8PX, 8SB, 8SC, GW2ADZ, 5MA/P.

G3CGE, Southampton, Hants.

WORKED: G2ATT, 3ABH, 3ARL/P, 3CTM, 3EUQ/P, 3GOP/P, 3ION/P, 6AG, 6NB, 6UH, 8DA.

HEARD: G2BAT/P, 2HCG, 3ABA/P, 3APY/P, 3FAN, 3GVF, 3GWB/P, 3HSD/P, 3JFR, 4HQ/P, 4SA, 5TP, 5TZ/A, 6OU, 6SG. (*During May only*).

G2DVD, Slinfold, Sussex.

WORKED: G2AHP, 2BMZ, 2DUV, 2UN, 2XV, 3ARL/P, 3AWY, 3DIV/P, 3DO, 3FAN, 3FEX, 3FIY/P, 3FRG/P, 3GHI, 3GJJ, 3GOP/P, 3GSM, 3GVF, 3GXG, 3HCU, 3IAM, 3JFR, 3JHM, 3JMA, 4HQ/A, 4KD, 4RO, 5DS, 5LK, 5NF, 5RZ, 5TZ/A, 6AG/P, 6NB, 8KZ, GC2FZC, 3EBK. (*April* 17 *to June* 17).

G3WW, Wimblington, Cambs.

WORKED: G2CZS, 2DJM, 2DUS, 2FJR, 2HCG, 2YB, 3BKQ, 3BW, 3CGQ, 3CRH, 3ENY, 3GGJ, 3GNJ, 3GPQ, 3GVC, 3IIT, 3IOO, 4KO, 4LO, 5TZ/A, 5YV, 6AG, 6XM, 8KW.

HEARD: G2AIW, 2FNW, 2FTS, 2PU, 2XV, 3CCH, 3DLU, 3IVF, 4HT, 5JO, 5JU, 5UD, 6NB. (*May* 18 *to June* 18).

SWL, Bridgend, Glam.

HEARD: EI2W, F9JY, G2BMZ, 2SC, 3DLU, 3FAN, 3FIH, 3GNJ, 3GVC, 3HSD, 4SA, 5TZ/A, 6AG, 6NB, 8OU, GC2FZC, GW3EJM/A, 8SU, 8UH. (*June* 1-18).

GC2FZC, Guernsey, C.I.

WORKED: F9JY, G2DGB, 2DVD, 2UN, 3AGA, 3CYY/P, 3FMO, 3JGJ, 5TZ, 6NB, GW8SU.

HEARD: G2BMZ, 3CQC, 3FAN, 3FIH, 5NF, 5US, 6RH, 8OU. (*During June*).

G3WS, Chelmsford, Essex.

WORKED: G3EPW, 3FIH, 3FMI, 3GPQ, 3IOO, 3JMA, 5YK, 5YV, 6UJ, GW2ADZ, 3GWA. (*May* 17 *to June* 20).

G3FIH, Bath, Somerset.

WORKED: G2BDQ/P, 2BMZ, 2BVW, 2HGR, 2SC, 3AGA, 3BNC, 3CCH, 3CGE/A, 3CYY/P, 3DJX, 3FMO, 3GNJ, 3GOP/P, 3HSD, 3HWF, 3HXJ, 3IER, 3LP, 3WS, 5SK, 6ZH, 8PX, GW2ACW, 5BI, 5MA/P, 8UH.

HEARD: G3BKQ, 3CRM, 3DLU, 3EPW, 3FAN, 3FRY, 3GHO, 3GVC, 3GVF, 3HAZ, 4SA, 5BM, 5MA, 5TZ, 6AG, 6NB, 6RH, 6WF, 6XM, 8DA, 8SC. (*May* 16 *to June* 19).

GW5MA/P, Mynydd Llanybyther, Carmarthenshire.

WORKED: G2AHP, 2BMZ, 2SC, 3AUS, 3CQC, 3DJX, 3FAN, 3FIH, 3GOP/P, 3IER, 4SA, 5BM, 5BM/P, 5TZ, 6RH, 8DA, 8ML, 8OU, GW8SU, 8UH. (*June* 5 *only*).

G3FYY, London, N.W.2.

WORKED: G2ABD, 2AHP, 2AOL, 2BBN, 2BPC, 2DGY, 2DUV, 2HDZ, 3DF, 3EGV, 3GHO, 3GHS, 3ISA, 3IXE, 3JFR, 3JGV, 3JMA, 3JQN/A, 4CW, 4HT, 4HQ, 5TZ/A, 5YK, 6BO, 6FO, 6GR, 6TA, 6XH, 8CK, 8GD, 8KW, ON4BZ. (*May* 10 *to June* 16).

G2CZS, Chelmsford, Essex.

WORKED: G2BCB, 2HCG, 2WJ, 2XV, 3ANB, 3CCH, 3CYY/P, 3ERN, 3FAN, 3FKJ, 3GGJ, 3GJZ, 3GNJ, 3IIT, 3INU, 3JMA, 3WP, 3WW, 4AV/A, 4HT, 4SA, 5BD, 5TZ, 6TA/P, 6XH, 6XM, 8KW.

HEARD: G3CCP, 3CRH, 3GVC, 3HSM, 5YV. (*May* 14 *to June* 20).

G3JHM, Worthing, Sussex.

WORKED: F8GH, 9JY, G2DVD, 3ARL/P, 3CYY/P, 3FRG, 3GHO, 3GVF/P, 6NB, GC3EBK.

HEARD: F3LP, 3WC, 3XE, 8OB, 9CQ, 9TV, G2BMZ, 2UN, 3DO, 3FAN, 3GVC, 3GVF, 3JMA, 3ZI, 4MW, 4SA, 5NF, 5TZ/A, 6AG, 6AG/P, 6RH, 8KW, 8OU, ON4BZ, PE1PL. (*May* 30 *to June* 19).

G3JMA, Nr. Harlow, Essex.

WORKED: F3LQ, 8GH, G2BMS, G2BPC, 2BVW, 2CD, 2COP, 2CZS, 2DGY, 2DVD, 2KF, 2MV, 2QI, 2UN, 2UJ/P, 3AEX, 3APY, 3BA, 3BEX/P, 3BII, 3BKQ, 3CC, 3CNF, 3CWW/P, 3DFF/P, 3DIV/P, 3DJX, 3DO, 3DVQ/P, 3EGV, 3ERN, 3FAN, 3FD, 3FKJ, 3FNL, 3FUL, 3FYY, 3GDR, 3GSM, 3GVC, 3GWE, 3IIT, 3IUK, 3IXE, 3WP, 3WS, 3WW, 4AJ, 4FB, 4HT, 4OT, 5JQ, 5NF, 5SK, 5UM, 5YK, 5YV, 6AG, 6LL, 6NB, 6XM, 8GD, 8KW, 8SK, GW2ADZ, ON4BZ, 4IE, PAØFC.

HEARD: F3DW, 8KF, 8ZR, 9MF, G2FJR, 3CRH, 3GSE, 3HXS, 3IOO, 5BD, 6UH, ON4VP, PAØFB, PE1PL.

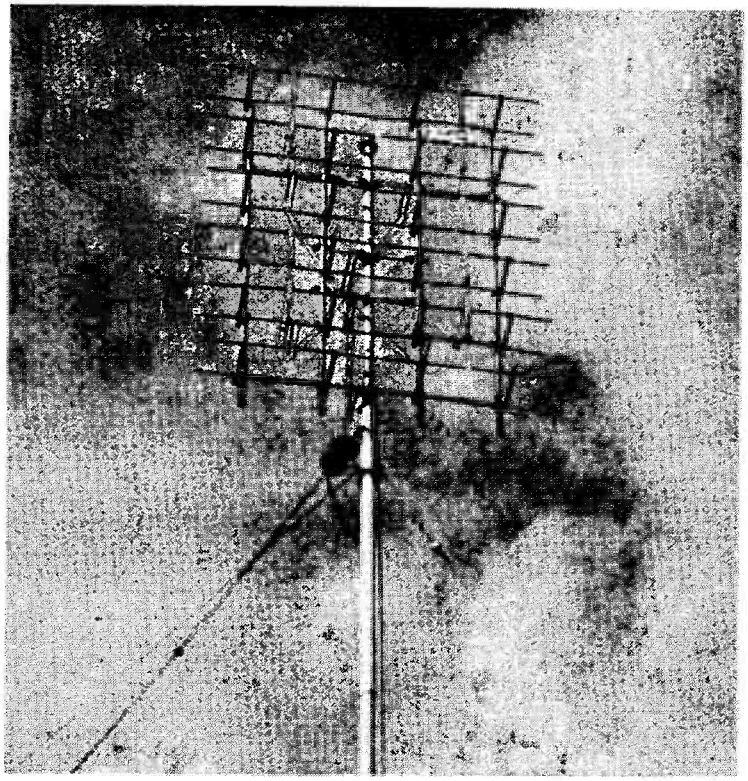
still a sore point with Clarke: during 87 hours put in on two metres in four weeks, only G M 2 B U D, G M 3 D D E and GM3FVX were there before 2230. (And now the latter has departed with his family to ZL for good; all VHF men will wish them fair fortune and happiness in their new home). There is now a regular evening s c h e d u l e GM3DDE/GM3DIQ at 2215, which is giving some rather unexpected results.

Whitsun Weather

On his /P (henceforth /A) trip into Carmarthenshire, poor old Bob was nearly washed away; for the first time, the weather got the better of him, and he had to call off the Sunday session altogether. However, 20 different stations were worked on Whit-Saturday, 1300-0120 BST, with best DX into the London area—G2AHP, G3DJX, G6RH and G8OU were raised successfully. The other GW5MA/P contacts on this occasion were with stations to the south-west, including G3FAN.

G3IOO (Oswestry) was disappointed at not getting hold of GW5MA/P, but says "conditions could not have been worse." During the month, ON4BZ and several PAØ's were heard at different times at G3IOO.

G4SA (Drayton, Berks.) remarks that "conditions have not been half as good as last year; also too many stations listen, and there is not enough calling CQ." G2HIF (Wantage), still very keen on VHF in spite of many months of inactivity, hoped to be /A portable on July 4, in connection with the Bournemouth Radio Society's field day at Ballard Down, near Swanage. G2HIF's suggestion for improving activity is that everyone should aim to work at least one station every evening. Not a bad idea, either—and it is surprising how many people do come on most evenings for the odd QSO, or regular contact. G3CGE (Southampton) puts in a calls h/w list, as does G3FIH (Combe Down, Bath), who also claims for Annual Counties. G6XX (Goole) goes up in both Counties tables and remarks that he is "still using the same gear and still hunting the elusive GI's."



The 48-element beam for 70 centimetres at G3BKQ, Blaby, Leics. This array is an essential part of the equipment which is giving G3BKQ such outstanding results on the 430 mc band.

G2DVD (Slinfold) is on again and noted an improvement in conditions towards the end of the period; he, too, has been doing some visiting. Having seen EI2W and G2BMZ "on site," so to speak, he is undecided whether to move to Dublin or Torquay! G3WS (Colchester) puts in a claim for the Tables, and G3FYY (London, N.W.2) is still surprised at how "VHF operators always seem to pack up after 2330 or so, even when conditions are good," drawing an unfavourable comparison with the level of late-night activity on the LF bands. Well, it so happens that we know of at least one active VHF operator who keeps on until the early hours—and then goes to 7 mc to work DX on CW!

G3CCH (Scunthorpe) goes up several counties and has worked GI5AJ in Co. Down—a nice QSO, that. G5MR (Hythe) rolled in three new F's on the evening of June 17, and found conditions very good to the south-west, raising also GC's '2CNC and '3EBK.

G3IER (Cheltenham) would like the London stations to search QHL for a change—he hears them, but can't raise them if they tune QLH. And if you hear I1TIS (who is on two metres at home) it will probably be from one of the Cheltenham stations, as he is staying down there for a few weeks and has been on with G5BM.

It might be remarked here that WØRAJ visited G6FO (Maids Moreton, Bucks.) on the evening of June 14; by some extraordinary chance, the two-metre machinery at G6FO was in working order, and some quite good QSO's were obtained for the benefit of WØRAJ, whose first experience of two metres it was;

TWO METRES

ALL-TIME COUNTIES WORKED LIST

Starting Figure, 14
From Fixed QTH Only

Worked	Station
66	G5YV
64	G3BW, G6NB
61	EI2W (209), G3BLP (630)
59	G3EHY
57	G2OI (349), G8OU
56	G8SB
55	G2HJF, GW5MQ
54	G4SA
53	G2AJ (519), G2HDZ (416), G3GHO, G3WW, G4CI
52	G2NH, G5BD, G6XX
51	G3CCH (221), G5BM, G5DS (531)
50	G3ABA, G3FAN, G3IOO
49	G5MA
47	G2FJR (272), G5WP
46	G4HT (476), G5BY, G5ML (280), G6YU (205)
45	G2XC, G6XM (356)
44	G3BK, G3HAZ (262)
43	G2AHP (456), G3BA, G3COJ, G4RO, G5DF
42	G3GSE (424)
41	G2FQP, G3DMU, G6CI (184)
40	G3BNC, G3CGQ, G5JU, G8KL
39	G2IQ, G3GBO (434), G3HBW, G3VM, G8DA, G8IL (325)
38	G2FCL (234), G3APY, G3WS (183)
37	G2DDD, G2FNW, G2FZU (180), G6TA (300)
36	G2DVD, G2HOP, G3CXD, G6CB (312), G8IP
35	G3FZL, G3HCU (224), G3HWJ
34	G3BKQ, G3DO (220), G8IC
33	G3IUD (120), G5MR (212)
32	G2FVD, G3DLU, G8VR, G8QY
31	G3HXO, G5RP
30	G3FRY, G3GOP (208), G3GVF (129), G3IER, G3IRA, G5NF, GW8UH
29	G3AGS, G3AKU, G3BJQ, G3FIJ (194)
28	G2CZS (135), G3FIH, G8DL, G8VN (111), GM3BDA
27	G3DAH, G3ISA (160), G6GR GM3EGW
26	G2DCI, G3AEP, G3CFR (125), G3FYY (137), G3SM (211), G4MR (189)
25	G3JMA, G5SK
24	G3FD, G3FXG, G3FXR
23	G3CWW (260), G4LX, G5PY, G6PJ, GM3DIQ
22	G3AGR (135), G3ASG (150), G3BPM, G3HIL
21	G2AOL (110), G3IWJ, G6XY
20	G3EYV, G3HSD, G3YH, GW3GWA
19	G3FEX (118), G3GCX, G5LQ (176)
17	GC2CNC
16	G3FRE
15	G2BRR, G3IWA
14	G2DHV, G3CYY

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

in fact, there were enough stations on to keep G6FO going, with WØRAJ at the microphone, till about 0230 on the Tuesday morning.

More Station Reports

G3JHM (Worthing) found conditions "fair at times" and during May 30-June 1 heard PE1PL; in the week June 14-19, F3LP (Le Havre), F3WC (Paris), F3YE (Le Mans), F9JY (Tourlaville), F9YV (Liancourt) and ON4BZ were all heard or worked with high signal levels.

G2CZS (Chelmsford) goes up in Counties, and gives May 18, 31, June 2-3 as good dates with him, to the West and North respectively. G3GVF (Hartley Wintney) has been doing some portable work and expected to be out from Kingsclere, Hants., on July 4. G3DLU (Compton Bassett) was pleased to work G3BW (Whitehaven, Cumb.) for his best GDX to date, and a new county; this was followed by another "exotic one" in the person of GW3GWA for Denbighshire. G3DLU has now engineered himself a 40 ft. mast, complete with beam and rotary mechanism, which he can raise or lower single-handed with the aid of block-and-tackle.

SWL Lee (Bridgend, Glam.) has not only been hearing some nice DX — see Activity Report — but also American aircraft on 145.1 mc, at which frequency they appear to be out of their band. He also says that if the active G's would beam towards South Wales more often, they would find the following GW's waiting for them: 2ACW, 2FRB, 3EHN, 3EJN, 5BI, 8SU and 8UH. It seems (to the GW's) that people only look West when they know GW5MA/P is in the area!

Caravan Site

G3JGJ (Plympton, S. Devon, *Tel. 3054*) says that any of the VHF fraternity touring in S. Devon or wanting a quiet spot for tent or caravan would be very welcome at his QTH, where he can also charge batteries and give local information on the selection of portable sites, and so on.

BRITISH ISLES TWO-METRE ZONE PLAN

(This is reproduced here for the benefit of newcomers to the band).

Zone A & B: 144.0 to 144.2 mc.	All Scotland.
Zone C: 144.2 to 144.4 m.c.	All England from Lancs. Yorks., northward.
Zone D: 145.8 to 146 mc.	All Ireland.
Zone E: 144.4 to 144.65 mc.	Cheshire, Derby, Notts., Lincs., Rutland, Leics., Warwick and Staffs.
Zone F: 145.65 to 145.8 mc.	Flint, Denbigh, Shrops., Worcs., Hereford, Monmouth and West.
Zone G: 144.65 to 144.85 mc.	Northants., Bucks., Herts., Beds., Hunts., Cambs., Norfolk, Suffolk.
Zone H: 145.25 to 145.5 mc.	Dorset, Wilts., Glos., Oxon., Berks. and Hants
Zone I: 145.5 to 145.65 mc.	Cornwall, Devon, Somerset.
Zone J: 144.85 to 145.25 mc.	London, Essex, Middlesex, Surrey, Kent, Sussex.

G3JGJ is somewhat out on a limb down there and has not been having a lot of luck on two metres. He can hear stations, but cannot get them back; nothing has happened yet on the GC2CNC schedule, though he has worked F9LL (La Rochelle) and can receive other F's; he had the mortifying experience of hearing GW5MA/P, at 579 on peaks, working other S. Devon stations, but no contact for G3JGJ. He also hears and calls G6NB without avail, which is most unusual. We feel that G3JGJ would appreciate a look-up by some experienced VHF operator who happens to be within reach of Plympton during the holiday season. (G3JGJ-QTHR.)

The Mediterranean Basin

Results at last! CN2AO (Tangier) reports that on May 30 he was received at a solid 589x by CN8BE in Casablanca, time 0820-0845 GMT, and distance about 200 miles. The CN8BE transmitter was not ready for it, but we can be sure that now the ice has been broken a contact will soon be made—especially as there is an active group in Tangier, consisting of CN2AO (144.16 or 144.96 mc, on every evening) and CN2AU, with EA9BB (Tetuan) coming on shortly and FA8JO

(Oran) said to be available.

The next reach will be to ZB1, the distance Tangier-Malta being 1,135 miles, and mainly a land path. This will not be easy, but as it comes into the VHF world-record category, and they do get the conditions in those latitudes, the attempt would be well worth the making. On the subject of conditions, CN2AP (Tangier) writes to say that while they are in full agreement with the general conclusions reached in this space and in "VHF Weather Report" recently, regarding VHF DX in the Med. area, the weather at their end of the Basin has in fact been much worse than usually experienced for the time of year. So it may well be that conditions have not yet developed for them. But the band will shape up sooner or later, and we feel sure that a tight schedule CN2/ZB1 would be well worth while.

Swiss VHF Expedition

During the week August 1-8, HB8WG, HB9NL and HB9PQ will be on the St. Gotthard at 7,900 ft. a.s.l., armed with gear for all bands 3.5 to 21 mc, also 144 mc and probably 430 mc as well. They will work CW and phone on VHF, but CW only on the LF bands. The idea is to use 80 metres as a communication channel for fixing VHF schedules, and to this end they will be on 3550 kc at 2000 BST each evening. The actual callsign to be used is not mentioned, but in accordance with the usual Swiss custom, it will no doubt be HB1WG, 'NL or 'PQ depending on who is operating—the figure 1 simply being used instead of 9 to indicate the portable condition.

This is a very interesting prospect, and if all goes according to plan, may give us the opportunity for some really exciting VHF DX, particularly if the HB's can in fact lay on the gear for 430 mc.

While schedules would undoubtedly be useful for 70 cm, they should not actually be necessary for two-metre working, as if conditions are right, the HB signal will be coming across and the G's will be lined up to work them. A number of British VHF operators are equipped for other bands, including Eighty, so it would only be a matter of ringing up the HB's on 3550 kc and asking them what their operating periods on VHF are to be. This could then be passed out and around on Two for the information of all concerned. We suggest that in the general interest, individual schedules should only be made in respect of 430 mc attempts. There will undoubtedly be a large number of European stations on for this event, and the keeping of any two-metre schedules would probably be impracticable anyway. (So that the HB's are informed as to the potential G participation and our ideas on the subject, advance copies of the foregoing have been sent to them, with the Zone Plan.)

Items from Eire

During the GW5MA/P Whitsun trip to Carms., EI2W was getting him at a steady S7-8 between 2310 and midnight on the Saturday—but no response from Bob to any call from Dublin; not knowing Bob had been washed out, EI2W (in brilliant sunshine) tried again for a couple of hours on Sunday, and was also looking for him on the Monday, by which time Bob was on his way home. Between May 13 and June 17, conditions were generally poor at EI2W, and except for the evenings of June 1/2 — when G2FJR, G5TZ/A, G5YV, G6NB, G8OU and GW2ADZ were all good signals—there is not much to report in the way of GDX.

EI4E (Killarney) is putting up a new beam and is still determined to work into G, in spite of the local screening; his main difficulty is the lack of local co-operation, as EI2W is more than 200 miles away in the worst direction. Joining the GI's is GI3CWY (Whitehead, Co. Antrim) of whom we hope to hear in due course.

And it is also of interest to add that certain GD's are "thinking seriously of coming on Two Metres." Well, there is plenty of room for them, and they will be very welcome!

Some Seventycem News

G3JMA (Harlow, Essex) worked 18 different 70 cm stations over May 22-31, all in the London/Home Counties area, which is not only good going but also a measure of the activity that can develop on the 430 mc band. He has an 8-element stack with wire-mesh reflector, the PA is an 832 tripler, and the converter is a coaxial line job.

From London, S.W.15, G2HDY has worked three new 430 mc counties, in the shape of G3JMA, G5TP (Oxon.) and G8SK/P for Bedfordshire. During the week-end May 22/23 he worked 14S in 7C out of 21S heard; in the three months to July 20, he logged

BRITISH ISLES
SEVENTY-CENTIMETRE
ZONE PLAN

FULL BAND, 420-460 MC

Area (mc)	*Service*
420-425	SEO Transmission (MCW and Phone).
425-432	Amateur Television.
432-438	CC Communication Band, Station Frequencies tripled from Two-Metre Zone.
438-445	Amateur Television.
445-455	Future Amateur Development.
455-460	SEO Transmission (MCW and Phone).

SEVENTY CENTIMETRES

ALL-TIME COUNTIES WORKED

Starting Figure, 4

Worked	Station
23	G3BKQ
15	G4RO
14	G2XV
13	G3IOO
11	G5YV
9	G2HDZ
7	G2HDY
6	G3JMA
5	G3FUL, G3IRW
4	G2DDD, G3JGY

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

TWO METRES

COUNTIES WORKED SINCE SEPTEMBER 1, 1953

Starting Figure, 14

Worked	Station
52	G5YV
45	G4SA, G6XX
44	G3GHO, G3IOO
42	G3WW
41	G5MA
40	G2FJR
39	G3CCH
36	G2XV, G3WS
35	G3EPW, G5DS
34	G2DVD
33	G3DO
32	G2AHP, G5BM
30	G5ML
29	G3GVF, G3IRA
28	G2DDD, G3IUD
27	G2CZS, G3CUZ
26	G2FCL, G3BW
25	G3FIH, G3FYY, G6TA
23	G2HDZ
22	G3IER, G5MR
21	G3JFR, G3JMA, G4RO
20	G8VN
19	G3FUW
17	G3JHM, GW3GWA
16	GM3DIQ
15	G2AOL
14	G3FIJ

Note: This Annual Counties Worked Table opened on September 1st, 1953 and will run for the twelve months to August 31, 1954. All operators who work 14 or more Counties on Two Metres 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 for each county as they accrue. QSL cards are not required for entry in this table.

30 different 430 mc stations, which, says he, "is fair, considering 70 cm!"

G3HBW (Wembley, Middlesex) now has a QQVO6/40 amplifier driving a CV-257 as a straight PA on 434.66 mc, and for 120 watts in gets about 80 watts of RF out. The best QSO was with G2DDD (Littlehampton, Sussex, 55 miles) on May 23, with high signal strengths both ways—and peaks to S9+ by aircraft reflection! G2XV (Cambridge) has been heard and called, likewise G3BKQ (Blaby, Leics.), who was 569 on May 23.

G2XV goes up in 70 cm Counties, and G3JGY from 'way over in Malvern gets into that Table with G3BKQ, G3GZM/P, G3HAZ and G6ZP. G3JHM (Worthing) is on 434.92 mc and wants tests. G3IOO (Oswestry) and G2WJ (Great Canfield, Essex) are on schedule at 2100 BST every Monday; on May 20, they both worked G3FZL in London, which was a very nice 430 mc QSO for G3IOO; he and G5YV are now in 70 cm contact.

EI2W is embarking on a big programme of 70 cm work and, to start with, during the period July 10-20 will be listening at (BST) 1345-1400, transmitting during 1400-1415 on 434.727 mc; again QRX 2245-2300, and transmitting 2300-2315, *each day* "come hail, rain, snow or blow." This is a firm schedule, in the nature of an EI/G 70-centimetre Test, and G's interested are invited to let EI2W know if they will be on, giving frequency. We wish Henry success in this undertaking, which should give a very good chance of breaking new ground.

VFO's for VHF

Further to the matter raised in this space in our last—We now have some details of a VHF-VFO in regular use at G2HCG (Northampton) who — in collaboration with G3BA — has given a great deal of time and attention to the design (and the construction) of a really stable oscillator suitable for the exacting requirement of variable drive on VHF.

He is using a 12AT7 in a "Kallitron" push-pull oscillator circuit (Terman, *Radio Engineer's Handbook*, p. 509), with the fundamental on 72 mc. In this oscillator, there is no tuned grid circuit, the ends of the plate inductance being cross-coupled back into the grids of the 12AT7 through 3 $\mu\mu$F fixed condensers; the grids are taken to earth

TWO METRES

COUNTRIES WORKED

Starting Figure, 8

15	G4MW (DL, EI, F, G, GC, GD, GI, GM, GW, HB, LA, ON, OZ, PA, SM). G6NB (DL, EI, F, G, GC, GD, GI, GM, GW, HB, LA, ON, OZ, PA, SM).
14	G3GHO, G5YV, ON4BZ
13	G3BLP, G3CCH, G5BD, G6XX
12	G2HDZ, G2HIF, G2XV, G3WW, G6LI, G6RH.
11	G2AJ, G3ABA, G3IOO, G4RO, G5UD.
10	EI2W, G2FJR, G2FQP, G3BK, G3EHY, G3GHI, G3HAZ, G4SA, G5DS, G5MA, G8IC, GW5MQ.
9	G2AHP, G3BNC, G3FAN, G3FIJ, G6XM, PAØFB.
8	G2XC, G3GBO, G3GSE, G3HCU, G3VM, G3WS, G5BM, G5BY, G5ML, G5MR, G8SB, GM3EGW

through 47K resistors. The oscillator tuned circuit consists of 9-in. lines (though G2HCG thinks that a good solid coil would do as well) and the plates of the valve are tapped about 2 ins. along this line, with the swamp and tuning capacities in parallel. The oscillator section is followed by a buffer (simply for isolation), then a doubler to 144 mc, followed by a 5763 giving 2 watts of RF output over the two-metre band.

The whole exciter, as briefly outlined here, is all in one box, very rigidly constructed, with an open tuning scale—and it gives an absolutely T9 beat with excellent control and stability. The G2HCG signal is, in fact, indistinguishable from crystal, as anyone who has heard him do his xtal-VFO change-over test will know. The "Kallitron" is an inherently stable oscillator, and with the proper precautions in regard to layout and construction, appears to compare favourably with any stable type of LF band oscillator. Moreover, by being able to start at 72 mc, one of the main causes of TVI from two-metre transmitters is eliminated.

To answer the last question which will be in the minds of all who are reading this, the creep is about 20 kc on initial warm-up (in the second decimal place

on most dials) and thereafter the signal is dead steady; G2HCG finds that much of even this relatively small degree of creep can be eliminated by putting on the heaters some time before starting transmission, but as that is not always convenient, is now considering some form of temperature compensation, either by condensers or a thermostatically controlled internal heater.

It should not be necessary to emphasise that to get the sort of results on a VHF-VFO that G2HCG can show, even with a circuit which is inherently stable, does demand a great deal of care as to layout, screening and the mechanical construction of the whole unit. Rigidity and heavy mountings are essential. G2HCG says that his model, which has called for the winkling out of quite a number of bugs, is "built like a battleship" with ¼-in. brass as the foundation.

The other approach to a VHF-VFO is, of course, the xtal-mixer arrangement. With this, it is easier to attain good stability, but the circuitry is rather more complicated and there is also the disadvantage of unwanted beats.

In fact, the considerations *pro* and *con* are essentially the same as those involved in the design of SEO *v.* CC oscillators on the receiving side.

The Tables

Notwithstanding the general plaint of poor conditions and low activity, there are exactly 40 movements shown in the Tables this month. Harold, with his Shetlands break, once again has the bulge on all comers, and keeps G5YV out in front in both two-metre Tables; and having got another five counties on 70 cm as well, goes to 11C in that Table.

VHFCC Elections

Claims are accepted this month from G2DKH, Stanley, Co. Durham, No. 169 on the VHF Century Club roll, whose cards covered two-metre contacts with six countries, including two F's worked during that wonderful opening we had in March last year.

VHFCC Certificate No. 170 goes to G3FUH, Tooting, S.W.17, whose 100 cards are all-G, collected in just about two years on the band.

Dead-Line

And so we wind up another offering, hoping that you may have found in it something useful, interesting and even instructive—for those are the objects in presenting this feature each month. There has been quite a lot to discuss this time and, as your A.J.D. has so often said, it is your report that helps to make the story.

For next month, the grisly fact is that the closing date must be **Monday, July 19, certain,** for once again we are caught by the calendar. So please send it all to: A. J. Devon, "VHF Bands," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. Good luck with the HB's during August week, remember the EI/G Test on 70 centimetres, don't let loose a VFO on Two unless you are absolutely sure it is a good one (and have the dial locked so that you cannot stray out of your Zone!), and get your calls h/w lists in—well, you know! 73.

NEW COMPONENTS FACTORY

Plessey's announce that a new branch has been established, to be known as the Swindon Components Division. It will be devoted to the development, manufacture and sale of electrolytic and paper condensers, and moulded-track potentiometers. Mr. O. G. Cox has been appointed general manager, and the address of this new undertaking is: The Plessey Co., Ltd., Swindon Components Division, Kembrey Street, Swindon, Wilts. (Tel.: *Swindon 3461*).

ANOTHER CHILD PRODIGY

It is reported that Bobby McCauley, "the youngest ham in Texas," has passed the F.C.C. novice examination for an Amateur Radio Licence and is now WN5DSA. Bobby is aged 11 and is said to spend all his play-time on the air. No comment!

TV SERVICE FOR THE CHANNEL ISLANDS

The BBC is putting in hand arrangements for a TV service to the Channel Islands. A receiving station is to be set up at Torteval in Guernsey; this will be equipped with high-gain directive receiving aerials for the reception of the Wenvoe TV. An alternative aerial system headed on Alexandra Palace will also be provided. By arrangement with the G.P.O. the received picture will then be radio-transmitted to Les Platons, Jersey; here, a TV transmitter will radiate vision on 61.75 mc and sound on 58.25 mc, and it is expected that with a 500-watt input it will be possible to give a service over the whole of the Channel Islands area. It should be noted that in this case the BBC will use horizontal polarisation.

THE MULLARD QVO6-20

This is a new beam tetrode intended for operation at full ratings at any frequency up to 60 mc, and at reduced ratings to 175 mc. It will function equally well as driver, frequency multiplier, power oscillator or output valve. A single QVO6-20 in Class-C will deliver 69 watts RF at 60 mc, while at audio frequencies a pair in Class-AB1 push-pull will give 120 watts. The mutual conductance is 7 mA/V, ensuring high power sensitivity. As a precaution against internal feed-back, the anode connection is top-cap and the lower part of the valve is fitted with a short metal screen connected to one pin. The heater voltage is 6.3v, the base is International octal, and the QVO6-20 is a direct replacement for the American 6146.

BROADCAST RECEIVING LICENCES

Of the 13,479,308 receiving licences current in the U.K. at the end of May, the total for TV reached 3,379,366—an increase of 78,528 over the previous month. Car-radio licences totalled 231,848.

VHF WEATHER REPORT

PERIOD MAY 15 TO JUNE 18

A. H. HOOPER (G3EGB)

ONE brief spell to report, breaking this year's poor record of anomalies and placing the Shetland Islands on the VHF map.

A cold northerly airstream for a week was followed by wet, unseasonable weather until the end of May, when an anticyclone extended over us from the Norwegian Sea. It gradually drifted southwards into the northern part of the North Sea, with beneficial results on June 3 and 4, and then departed. More bad weather followed until June 14, when the southern sector opened as a ridge of high pressure extended eastwards over France.

The usual assessment has been made of the results of radio-soundings reported in *The Daily Aerological Record* of the Meteorological Office, London. The estimated effect of discontinuities in radio refractive index in terms of propagation extension along certain routes from South-East England is summarised in Table I. The main openings stand out well and the bias towards northerly directions—an unusual feature—is particularly evident. For the first time this year, at the beginning of June, LA has been within reach of the Home Counties. For southern directions conditions have been mainly poor, with only the last five evenings having much to show.

Nights of radiation cooling, with resulting super-refraction, continued to occur during May, and then, with unseasonable weather, only rarely in June. On the evenings for which there is an entry in the first line of Table I, extensions over inland paths progressively developed up to the hour indicated and then remained with little further change until dawn. In a general sense, later times suggest greater extension.

Fig. 4 gives pressure values for mid-Bedfordshire derived from *The Daily Weather Report* of the Meteorogical Office. Our "critical" value of 1018 was exceeded on several occasions, notably May 17-20 and in early June. These two periods agree with Table I, although the earlier period was very limited. Anyone experiencing tropospheric DX at other times will have caught out both the critical pressure *and* the Table!

The evening of June 3 was notable in the DX sense, and Fig. 1 gives full details of the circumstances on that occasion. While admitting knowledge of some of the results of this spell, the writer had already selected and prepared this particular chart when they were received. G5YV remarks that many other operators tried to achieve the path to Shetland but without success, until the following evening, when GM3ANG, although a weaker signal—borne out in fact by the subsequent chart—worked several people, including G2FJR at 496 miles.

With the reflecting layer as low as 1,000 feet above MSL, our mountain ranges were effective barriers for most areas. One wonders, however, why the stronger signal of June 3 evening failed to reach eastern districts.

It is worthy of note than Harold first heard the Shetlands as a result of anticipating Norwegian possibilities, and, as can be seen from the chart, his expectation was very reasonable. Owing to the lack of information over the sea, the assessment is not, in fact, fully substantiated towards the LA end. The lack of LA signals may be either because the layer did not extend quite far enough or perhaps because the inferior conditions of this year have bred inactivity.

With EI2W/OH in mind, the assessments prior to June 3 were most promising. An anticyclone (with reflecting layer) is shown in the *Daily Weather Report* as drifting south-eastwards from the Norwegian Sea to lie across the path. Fig. 1 represents the best conditions that later resulted. As can be seen, EI2W had bad luck in that the layer was so low over the western part of the route that the Pennines prevented him from beaming beneath it, and in that the north-eastward extension of Sweden did not quite complete the path. It will be remembered that, in a similar way, mountains barred the March opening of last year from EI.

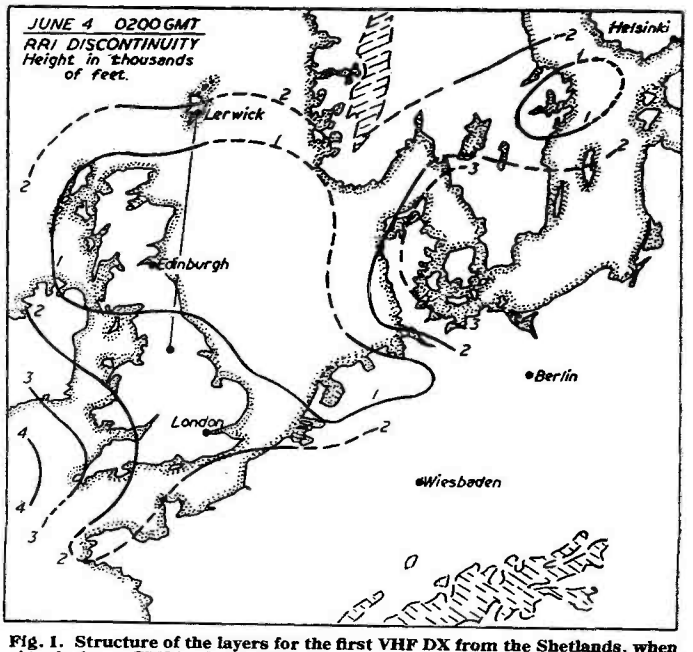


Fig. 1. Structure of the layers for the first VHF DX from the Shetlands, when signals from GM3ANG (Sumburgh) were heard and worked as far south as G2FJR (Sutton Bridge, Lincs.). The near-miss for the path EI-OH can also be deduced. Even if conditions had been just right at the OH end it is likely that high ground was cutting EI2W off from the very low-lying reflecting layer.

Date		MAY																JUNE												
		15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Radiation over Bedfordshire		—	—	—	02	02	01	—	—	—	—	04	02	22	22	—	23	06	—	—	—	05	—	—	—	21	—	—	—	—	—	01	23	—	—	24
Discontinuities aloft, from S.E. England to countries indicated.	*NE*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	LA	LA	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		—	—	OZ	OZ	—	—	—	—	—	—	—	—	—	—	—	—	—	OZ	—	OZ	OZ	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	E	—	PA	—	PA	—	—	—	—	—	—	—	—	—	—	—	PA	PA	—	PA	W	D	—	—	—	—	—	—	—	—	—	—	—	PA	W	D
	SE	—	—	—	ON	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	ON	—	—	—	—	—	—	—	—	—	—	—	—	ON	D1
	S	—	—	—	48	—	—	—	—	—	—	—	—	—	—	—	—	49	47	—	—	—	—	—	—	—	—	—	—	—	43	45	45	43		
	SW	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	GC	—	GC	—	—	—	—	—	—	—	—	—	GC	—	GC	GC	GC	
	NW	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	I,M	I,M	I,M	I,M	—	—	—	—	—	—	—	—	—	L	—	—	—	—	—

The possibilities for EDX and GDX from May 15 to June 18. Especially good dates are shown in bold type and are underlined. Country prefixes show approximate direction and distances from S.E. England to which good conditions are thought to have extended.

Table 1

Notes:—(1) *Conditions listed are for the evenings of the dates shown.*
(2) *Figures in the first line are the times when inland super-refraction had reached its peak.*
(3) *Country prefixes indicate the approximate limit of good conditions.*
(4) *Sub-divisions of distance have been necessary, thus: ED = eastern DL, WD = western DL, L = Lancashire, I = GI, and M = GM. (Sometimes paths to I and M are open together).*
(5) *For the southern path degrees of latitude are given.*
(6) *Paris is about 49° and Marseilles about 43°N. Particularly marked discontinuities are in heavy type and have been underlined.*

In Retrospect

The excellent opening from south-eastern coastal areas to the Continent on the evening of May 12 was indicated in general terms in last month's report —*see* p.234. Being a relatively rare effect, the occasion has been looked at in greater detail.

On May 11 the motion of the air in the lower levels over the region was vague and erratic. During the following morning a change occurred and air began to move westwards from PA and ON out over the sea, reaching our coastline by early afternoon. Although persistent, the current was quite weak at our end of the path and never penetrated far inland. In Fig. 3 the uppermost line gives an idea of surface temperatures in mid-afternoon along the path. From 78°F on the Continent the airstream cools in passing over the sea (temperature only 50°F) to a value of 62°F at our coastline, and then warms up as it penetrates inland to mix with hot, stagnant air. In this way a temperature inversion was formed over a water surface yielding excellent conditions for super-refraction. The remaining curves of the figure show how radiation

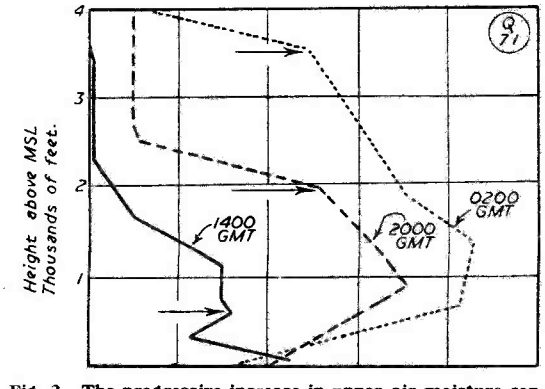


Fig. 2. The progressive increase in upper-air moisture content over the East Anglian coast-line on May 12-13 suggests that reflection processes were present in addition to marked refraction in the surface layers of the atmosphere.

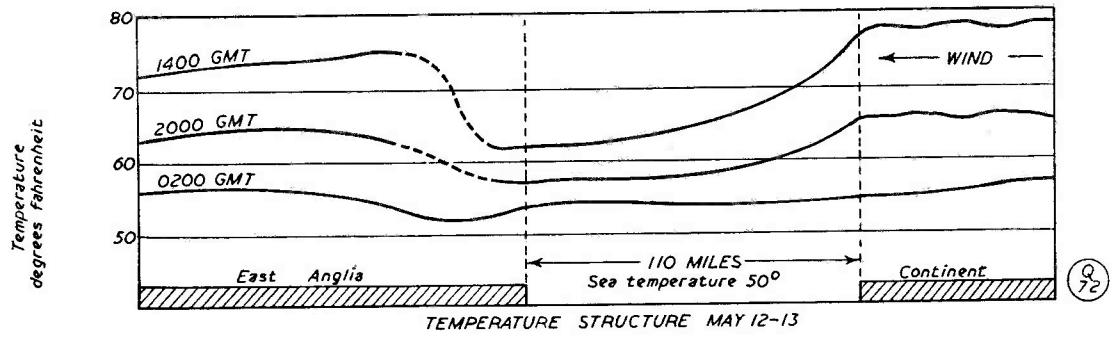


Fig. 3. Cooling of surface layers by the sea can cause refraction capable of bridging sea gaps. The evening of May 12/13 gave an example of this, when cooling of 16 degrees occurred during mid-afternoon.

cooling inland during the evening formed temperature inversions of magnitude similar to that over the sea, with the prospect of extensions of the path.

Further examination has since brought to light an additional effect. The graph of Fig. 2 indicates the distribution of water vapour aloft over our south-eastern coastline, at times corresponding to Fig. 3. The full line, for 1400 GMT, shows with minor fluctuations a general decrease of water vapour with height. This is just as air is first arriving from the Continent, and, taking other factors into account, there was a weak discontinuity of radio refractive index at 600 feet. Six hours later, in mid-evening, air with additional moisture extending up to 2000 feet had arrived (the dashed line), and the RRI discontinuity associated with its upper surface was well marked, and at a useful height for reflection effects to occur. Finally, by 0200 the moist layer was up to 3400 feet, was less abrupt, and the discontinuity was weakening.

Thus it is likely that *two* effects, refraction and reflection, were occurring together from about 1800 to midnight, peaking in mid-evening. Inland extensions of the path were limited on our side by failure of the air current to penetrate far inland. On the Continent conditions were better. From this we can see how it was that G5YV, 600 feet up on the Pennine slopes, was above the inland radiation inversion and too far from the coast to exploit the reflecting layer over the sea, and so spent the evening hearing G5BD at Mablethorpe working what were, for him, inaudible signals. The writer is grateful for those operators who wrote subsequently, giving their experiences on this interesting occasion.

Spain ?

The EA/GC path has been examined for the evening of May 10, in view of this possible advent of a new country. Undoubtedly conditions were above average at the time, as indeed they were for all western districts up to 54°N. They did not, however, exhibit the characteristics we have come to associate with 500-mile VHF DX along other paths. It is mainly a sea path, of course, and the early stages northwards from EA could have been due to refractive effects. Overall, it seems unlikely that tropospheric propagation was involved. The possibility of sporadic-E is left for others to appraise.

Switzerland

HB9PQ, who was associated with last year's VHF signals from Switzerland and later contributed some conclusions on propagation anomalies, has been pursuing things further, with especial reference to crossing the Alpine ranges. In company with two fellow-operators, he will be taking a rest from his paper work for the period August 1 to 8 at about 7900 feet up on St. Gotthard with equipment for HF and VHF bands. Details and schedule information are given in "VHF Bands." All we need are the right conditions . . .

Surveying results for this year so far, it appears that brief one-evening openings are being missed. In so far as this is due to inactivity arising from lack of any prolonged opening, it is perhaps worth comparing last year with this. At the date of this issue we had, last year, experienced 16 days of DX *spells*, *i.e.* openings of 2 days or more, with a further 18 days to come. Our worst year, on the same basis but with inferior equipment, produced a total of 17 days. Although a widespread and prolonged opening is overdue, hope should not be abandoned.

Permission of the Director, Meteorological Office, to make use of information gained from the publications referred to is gratefully acknowledged.

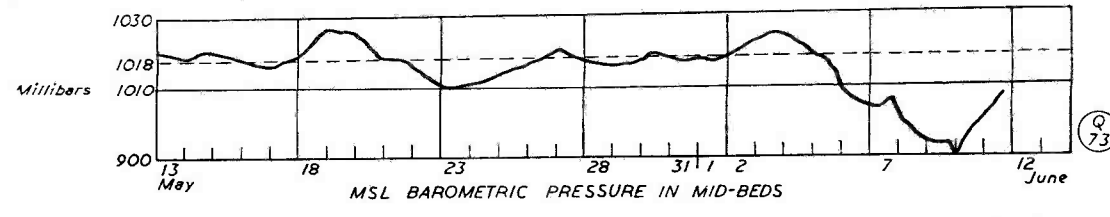
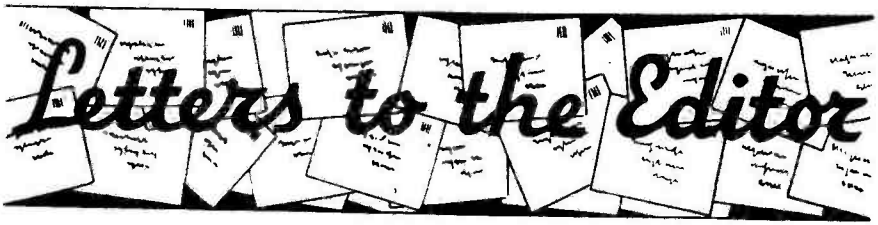


Fig. 4. The mean sea-level pressure graph this month continues to support the idea that VHF DX does not occur when the pressure is less than 1018 millibars. An extension of the curve shows that between June 14 and 16 the pressure was consistently above 1018 mb.



Letters published are those which seem to us to be of general interest, but should not be read as necessarily being in accordance with our own views on the subject. We welcome readers' comments.

THE LATE J. E. NICKLESS, G2KT

SIR,—*It was with a feeling of profound regret and a sharp sense of personal loss that I learnt of the recent death of G2KT, of Rayleigh, Essex* [obit. p.206 June]. *I have no doubt that his many friends in Amateur Radio will miss keenly the cheery voice of "Two Kay Toc." He formed the original South Woodford Radio Society in the early 20's, with which at that time I was associated. The services of G2KT to the science of radio have not been inconsiderable; among his friends in the early days were Capt. P. P. Eckersley, then chief engineer of the BBC, and Gerald Marcuse, G2NM.*

J. Edgington, 27 East Drive, Carshalton Beeches, Surrey.

SIR,—*May I crave space to make a reference to the lamented passing of G2KT, one of Amateur Radio's most enthusiastic stalwarts? My own contacts with him commenced in the 1911-12 period, when he was at Snaresbrook and myself some few miles away. The little coterie of amateurs who could QSO in those days of spark, crystal receivers and plain aerials had to make everything for themselves — and what days they were! 2KT was ever ready to afford a helping hand, and I recall with pleasure many contacts with his station in the pre-1914 era.*

A. J. Hall, G2NU, 82 Church Street, Staines, Middlesex.

"TRIPLER FOR SEVENTYCEMS"

SIR,—*I was very pleased to see that you had inserted a short warning notice in the June issue, p.227, concerning the faux-pas in my article, "Tripler for Seventycems." I would like to apologise to anyone who may have been caught out by this unpardonable mistake. As I was fully alive to the possibility of a heater short when building the pre-production version, I can hardly offer an excuse. Of the two methods suggested for overcoming the trouble (provided there does happen to be a DC return path via the coax feeder) possibly the isolated or earthed centre-tap heater supply, feeding RFC1 through another 500 μμF micadisc condenser, is preferable. The second method, with a 500 μμF micadisc between RFC1 and the Pye socket, has been tested here, with the Tripler running for some two hours. No perceptible drop in grid drive was apparent compared with the straight-through connection. At G3HAZ the central coupling link from the 829B driver circuit is converted to unbalanced coax feed by means of a 4:1 half-wave loop balun; this leaves the loop and centre conductor of the coax up in the air as far as DC is concerned, the arrangement as given in Fig. 1 on p.142 of the May issue then being quite in order.*

R. Rew, G3HAZ, 73 Pamela Road, Northfield, Birmingham, 31.

ABOUT THE MAGAZINE

SIR,—*I gather you have had complaints about the make-up of the Index to the last volume. I find it most convenient to keep indexes separate from the volume, actually in a stiff cover of the spring-back type. In this, I have the indexes of all radio periodicals I take, handy for reference under one cover.*

W. D. Kieller, G6HR, 21 Newton Way, Upper Edmonton, London, N.18.

SIR,—*I would like to see a lot more articles in the Magazine on the lines of the series on Aerials recently concluded by "The Old Timer." I haven't a great deal of time to give to Amateur Radio, and these articles were easy to read because they were not splattered with complicated formulæ.*

R. Reynolds, G3IDW, 136 Beech Avenue, Swindon, Wilts.

SIR,—*I write to say that I approve of the Magazine as it is; I do not think that any improvements could be made that would meet the wishes of everybody. I have no preference for particular articles. Like the members of a piscatorial society, I am prepared to wait and see what turns up. It's usually good, anyway.*

S. H. Mayne, VR2AS, Box 44, Suva, Fiji.

PAGES FOR THE SWL

SIR,—*Whilst agreeing that any lowering of technical standards to suit the newcomer to Amateur Radio would be detrimental to its present subscribers, I think that the Magazine could very easily include in its present make-up a 4-5 page section devoted entirely to the newcomer. After all, don't you think that the old timers, having spent years in Amateur Radio, would want to pass on their knowledge, so that we of the younger generation might benefit? I believe that the inclusion of a short Beginners' Section would certainly prove to be beneficial to Amateur Radio in the long run. This might, indeed, necessitate raising the price slightly; but who would not be prepared to pay an extra 6d. for a magazine of infinite value to those really interested in Amateur Radio? If* SHORT WAVE MAGAZINE *cannot do anything for the uninitiated, then who can? Are we to allow*

would-be hams to pass up Amateur Radio for train-spotting?

G. Jones, Constables, Uppingham, Rutland.

SIR,—*I must say that I heartily agree about the difficulties involved concerning those who are beginners in Amateur Radio. There are several factors to consider. For instance, if a youngster builds a crystal set and then gets the urge to go one better, he is starting on the long road to achieving full status in Amateur Radio; if from the moment of starting he forthwith gets all the help and perhaps most of the equipment he needs, then he will probably expect to obtain everything else just as easily—including DX and the other things in our hobby that call for a little personal effort. On the other hand, if, as most do, our beginner has to fend for himself, coping as best he can with the available books and magazines, then he will probably become a most useful member of the Amateur Radio fraternity. It is a striking thought that in the old days (apparently, for I am no old timer!), the spirit of co-operation and the aim to progress were at their highest. Now we hear complaints about slipshod behaviour and selfishness in one form or another. All this is happening when there is a large influx of types who have had radio taught them in a technical school as a materialistic subject, without the sentiment and romance which actually accompany it being brought out in any way at all. Not that some of these individuals do not make good amateurs in the end. It is just that perhaps those who have to push for themselves a bit are those who become the most desirable members of the fraternity.*

K. Smith, G3JIX, No. 4 Wing, R.A.F., Yatesbury, Wilts.

TOP BAND HISTORY

SIR,—*With reference to the correspondence in the June issue ("Top Band DX—Bit of History"), even this does not go back far enough. In a feature called "The Month's DX" in the old* EXPERIMENTAL WIRELESS *for February 1924, the following passage occurs: "Events have moved very fast since the beginning of December 1923, and it is now ancient history that (British) 2KF established two-way working with (American) 1MO on December 8 . . . this success was quickly followed by (British) 2SH, 2OD and 5BV, all of whom established two-way communication across the Atlantic before the end of 1923 . . . the totals of American and Canadian stations worked by these four, and the approximate powers used were: 2KF, five Americans, one Canadian, 90 watts; 2SH, two Americans and one Canadian; 2OD, one American and one Canadian, 40 watts; 5BV, two Americans and two Canadians, 45 watts." This was around the 200-metre mark, and although not on 10 watts, the (presumably) much less efficient rigs and aerials of those days should surely make up for the slightly higher powers used—although no doubt a further factor was the total absence of the sort of interference we now have to contend with on the 160-metre band.*

W. E. Philpott, G4LC, Russell House, Rye, Sussex.

G4LC is, of course, quite correct, and during 1923-24 there were numerous Trans-Atlantic contacts on or about 200 metres, using in the main fairly high-powered (in the amateur meaning) valve transmitters. But in the progress towards the short waves, then occupying the attention of every active pioneer, 180 metres (as it became) was abandoned as a potential DX band for nearly ten years. By the end of that time, new licence standards were in force, amateur band limits had been defined, and it was the firm belief of practically everyone with a 10-watt licence for 160 metres that the days of DX on the band had passed — indeed, there were very few who even knew or remembered that DX had once been worked on wavelengths around 200 metres. Therefore, in the sense of the "10-watt CO-PA standard" and the fact that it began the series of DX Tests on 160 metres in the form in which we know them today, on the same frequencies and with the accompaniment of Coastal R/T stations on a crowded band, the G6FO/W1DBM contact of February 1933 may fairly be claimed as a "First" for the 1.7 mc band. But for the very first amateur contact across the Atlantic on a wavelength in the region of our present 160-metre band, one must go back a good deal further, as G4LC shows.—*Editor.*

KITE FOR AERIAL HOIST

SIR,—*Many readers must find themselves in the aggravating position of having a large tree conveniently situated near the shack but quite unclimbable and hence useless as an aerial support. A completely successful solution is to fly a fair-sized kite, with an auxiliary cord attached, and when sufficient height has been obtained, walk the angle formed by the two cords across the tree, pulling down the kite when it is above the selected part of the tree. Once the line is over, it is a simple matter to haul a length of galvanized wire over the tree (perhaps using an intermediate draw-line), this wire, of course, supporting the aerial itself. (Sufficient insulated length of support line should be used to keep the end of the aerial clear of the tree). The support line can be the galvanized iron wire sold quite cheaply as clothes-line; if it is terminated at the aerial end with a pulley and a running halyard, aerials can be hoisted up and down as required without having to slip the galvanized-wire support through the tree. At this QTH, a 260-foot aerial with a maximum height of about 75 feet has been attained, and has withstood many gales since its erection last Christmas; even if the kite-flying and galvanized-wire procedure has to be carried out every year, the results would make it well worth while.*

R. G. Dancy, G3JRD, Hook Green, Tunbridge Wells, Kent.

Due to pressure on space, "The Other Man's Station," "New QTH's" and "Random Jottings" are held over for the next issue.

THE MONTH WITH THE CLUBS

By "Club Secretary"

(Dead-line for Next Issue: JULY 16)

CLUB Field Days are an activity requiring good organisation and a good deal of effort by a enthusiastic group of members. But more than this is really needed to make for a successful event — surely the co-operation of other Clubs makes all the difference ?

One Club pursuing its lone Field Day, using a call-sign with " /P " in it, does not have a very exciting time. But half-a-dozen Clubs in the same part of the country, all with their outdoor event arranged for the same day, can really enjoy themselves.

We suggest that Secretaries of open-air-minded Clubs get together on this subject in future, and we will act as their " booking-office " if they wish.

A good forecast of activity comes from ***Chester***, who will be out in force on Hope Mountain on August 15. This will interest the VHF enthusiasts, as Chester will be using a Two-Metre portable, with the call GW3ATZ/P — both phone and CW. Then on August 29 they will operate the Club station from Merioneth on the Top Band, using the call GW3GIZ/P. The Club is open every Tuesday at the Tarron Hut, YMCA, Chester, and a welcome awaits all visitors.

Stoke-on-Trent held their annual Field Day at Whitsun, but the bad weather cut it rather short. Aerials and tents were no sooner erected than the rain came down, but a few contacts were made from G3GBU/P before everything became waterlogged ! Meetings continue, every Thursday at the Club HQ.

Club Visits

Another worthwhile activity in the summer is provided by visits to local places of interest. Most Clubs break out in this way from time to time, but we are always rather surprised that more of them do not take advantage of the wonderful facilities offered by some of the large " non-radio " organisations (motor-car factories, for example). Extremely interesting visits can be laid on by almost any organised party of interested people, whether from a radio Club or a sewing-circle !

Cannock Chase are sending a second group of members to Sutton Coldfield TV station on July 10. ***Spen Valley*** visited Thornhill Power Station on June 16 — their July meetings are on the 14th and 28th, the latter being the " Open and Final meeting " of the season.

Clifton reports a steady increase in membership, and has found constructional evenings popular. One is fixed for July 9 ; July 16 is the date for " Any Questions ?", and July 18 is the second D-F Contest. Meetings are on Fridays at 225 New Cross Road London, S.E.14, where visitors will be sure of a welcome.

Eccles have now installed themselves in a new Headquarters — the Patricroft Sports and Social Club, Eldon Place, Patricroft, where meetings are held every Monday at 8 p.m. Membership is small at present, and new recruits will be welcomed.

Hastings will be finishing their week's session at the local Hobbies Exhibition by the time you read this. " G Six Happy Hastings " will be on the 80-metre band every day and an interesting collection of home-constructed exhibits will be on show.

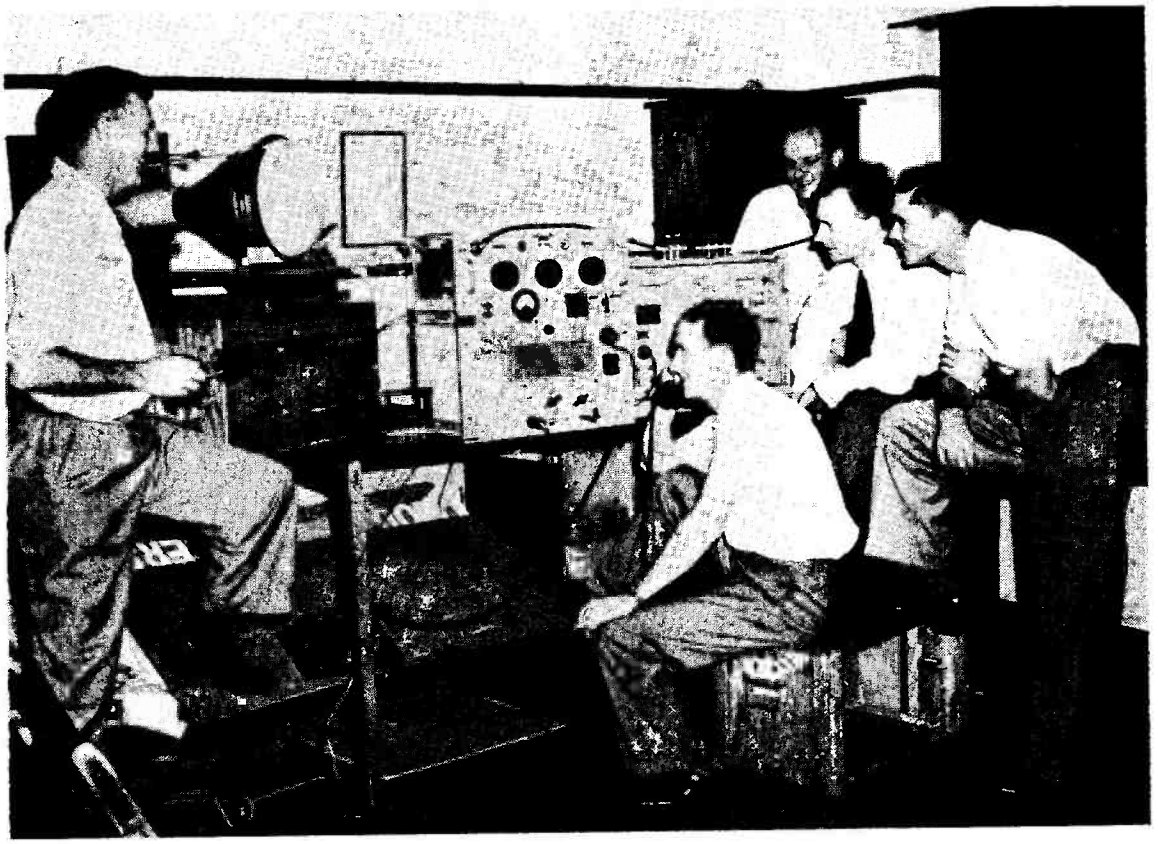
Leicester's July meetings, on the 5th and 19th, will be members' nights, when discussions will take place on equipment that has been built by members. The venue is the Clubroom at the Holly Bush Hotel, Belgrave Gate, Leicester. A very strong Transistor Group has been started here, consisting of G2AA, G3CCA (*père et fils*), G3CFG, G3GVK, G3HIZ and G3IZS, with 1.8 mc as the main working band ; all members of this group are now TTX or TRX in one way or another, G2AA and G3IZS having home-made transistors.

During June the members of ***Slade*** heard two lectures, one on Receiver Design and the other on Servicing Car Radios. ***Cannock Chase*** had an interesting talk from G3BA on Two-Metre Operation, and interest VHF is growing amongst the 37 members.

South Manchester meets on July 16 and 30 to hear a lecture on Transformers and Chokes, and to hold a Brains Trust. The Club also hopes to hold a display of equipment from July 14 to 20 at the Manchester College of Technology, in conjunction with the Ninth Exhibition of the Institute of Electronics. Personal contacts will be welcomed.

Southend heard a very interesting description of " The Work of the Fire Brigade," including, naturally, details of their VHF communications ; they also took their full part in NFD by manning two stations. Despite the weather (they report not only charged rain but charged *tents* !) good contacts were maintained in extremely difficult circumstances throughout the night. It is of interest to add that secretary G3BUJ of Southend puts out regularly to all members a very useful and informative circular letter, which sets out forthcoming events, gives reminders about meetings (and subscriptions due !) and discusses Club affairs generally.

At the AGM of the ***Purley*** Club, new officers were elected (see panel for new Secretary's address) and the year's work was reviewed. Unfortunately their Chairman



A photograph taken recently in the Durban Radio and Television Society's club-room in Durban, South Africa. On left is the Club TV receiver built for the reception of amateur TV from ZS5PA, with vision in the two-metre band and sound on 28 mc. The Club's own communication-band transmitter and receiver are "modified surplus," and the aerial is a ground-plane; the Club call is ZS5DRS. In the photograph, left to right: Chairman ZS5EZ with the absorption wavemeter; ZS5JF on the microphone, and members Houghton, Brokensha and Mayes watching to see if it works.

(G2AYM) has been spending some time in hospital, but it is hoped that he is now fit again and back in the chair.

The last meeting down at ***Torbay*** covered Mobile VHF, the talk being given by a visitor from Exeter. Member G3AVF now has a TTX on 160 metres, running 50 mW, with which he is working 'cross-town. On August 21, the talk will be on Crystal Grinding, by G3FHI. Readers who may be in the South Devon district, on holiday or otherwise, are invited to get in touch with Torbay's secretary (*see* panel) with a view to attending meetings and making local amateur contacts; G3JD of 46 Dower Road, Torquay, will also be glad to help in this respect.

From Overseas

An interesting note comes from ***Durban,*** where meetings are held in the Natal Technical College. Amateur television is one of their pursuits, and members have built a receiver to co-operate with ZS5PA, who is transmitting vision in the Two-Metre band. The Club is setting up an exhibit in conjunction with the Durban Society of Model Engineers' Exhibition in July.

Almost in the "overseas" category is the Isle of Man

NAMES AND ADDRESSES OF SECRETARIES REPORTING IN THIS ISSUE

CANNOCK CHASE: C. J. Morris, G3ABG, 58 Union Street, Bridgtown, Cannock.
CHESTER: N. Richardson, 23 St. Mary's Road, Dodleston, Chester.
CLIFTON: C. H. Bullivant, G3DIC, 25 St. Fillans Road, London, S.E.6.
ECCLES: B. N. Green, 138 Flixton Road, Urmston, Manchester.
HASTINGS: W. E. Thompson, 8 Coventry Road, St. Leonards-on-Sea.
ISLE OF MAN: R. S. Trickey, GD3DRB, Aigburth, 35 Sunningdale Drive, Onchan, I.o.M.
LEICESTER: W. N. Wibberley, 21 Pauline Avenue, Belgrave, Leicester.
PURLEY: E. R. Honeywood, G3GKF, 105 Whytecliffe Road, Purley.
QRP SOCIETY: J. Whitehead, 92 Ryden's Avenue, Walton-on-Thames.
ROMFORD: N. Miller, 18 Mascalls Gardens, Brentwood, Essex.
SLADE: C. N. Smart, 110 Woolmore Road, Birmingham 23.
SOUTHEND: J. H. Barrance, M.B.E., G3BUJ, 49 Swanage Road, Southend.
SOUTH MANCHESTER: M. Barnsley, G3HZM, 17 Cross Street, Bradford, Manchester 11.
SPEN VALLEY: N. Pride, 100 Raikes Lane, Birstall, Leeds.
STOKE ON TRENT: A. Rowley, 37 Leveson Road, Hanford, Stoke on Trent.
TORBAY: L. H. Webber, G3GDW, 43 Lime Tree Walk, Newton Abbot, S. Devon.

Amateur Radio Society. They held their AGM in the new club-room, kindly arranged for them by president GD3FBS, at Manor Guest House, Douglas. The I.O.M.A.R.S. is naturally quiescent during the summer months, but an interesting programme is in hand for the winter session — and there will be some VHF activity on the part of "two or three members." And we should also like to see someone with a GD prefix start up with a Top Band TTX, too; there is much interesting transistor work to be done on the amateur bands, and increasing activity in this fascinating new aspect of QRPP operation.

The ***QRP Society*** is arranging to hold its own exhibition next October, of which details will be available later. New ideas for DX Contests are under consideration, and a special section has been formed for members interested in VHF.

Romford's lecture programme has now ended, but meetings continue every Tuesday at R.A.F.A. House, 18 Carlton Road, Romford — 8.15 p.m. A Junk Sale will be held on the first Tuesday each month, G4KF will be on the air, and the Morse classes may be supplemented by Radio Theory classes.

Acknowledgment

Magazines and News Letters have been received from the ***Southgate and District Group***, the ***QRP Society*** and the ***South Coast Radio Club*** (South Africa).

Deadline for next month's reports is :

First post on Friday, July 16,

addressed "Club Secretary,"

Short Wave Magazine,

55 Victoria Street, London, S.W.1.

TRADE NAME "VASELINE"

We are asked by The Chesebrough Manufacturing Co., Ltd., Victoria Road, Willesden, London, N.W.10, to explain that "Vaseline" is the trade mark or brand name identifying all products of Chesebrough manufacture. Among these is petroleum jelly. The references in the article "All About Crystal Grinding" on p.210 of our June issue should therefore have read "Vaseline petroleum jelly." We are glad to make this clear, and to acknowledge the interest of the manufacturers in bringing the matter to notice.

SMALL POINT

According to the "Popular Television Association," the pressure-group sponsoring commercial television, the BBC itself says that though TV set owners increased by more than a million in the past year, about half the total number of TV sets in Britain are not switched on for evening viewing.

TRADE

VALVES (over 3,000 in stock): 829B, 60/-; 2D21, EC91, 12AU7, 85A1, 85A2, 9/-; 6BR7, 6CH6, 6BW6, 12AT7, 5Z4M, 8/6; EL91, 6F33, 12AX7, 7/-; EF91, EF92, 6AL5, 6C4, EAC91, 6J6, 5/-.—Skillman, Franchise Street, Weymouth.

45/- PAID for new boxed 813 valves. Other surplus valves purchased. — Details to Box 1434, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

QSL CARDS AND LOG BOOKS. APPROVED G.P.O. SAMPLES FREE. — ATKINSON BROS., PRINTERS, ELLAND, YORKS.

WANTED: TUNING UNITS TN17, TN18, TN19 for R54/APR4; £50 each offered.—Box No. 1383, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

TV PRE-AMP., London, with EF42, 25/-; 20w. PA amplifier, RCA, 6 valves, 6L6 P/Pull, £12; 15w. Vortexion Stereophonic Amplifier, 8 valves, PX4's P/Pull, latest model, list price £42, our price £32. Valves: VR100, EF39, L63, EF36, 6B8, 2/-; EF50, 1/-; 6AB7, 6AC7, 3/6; PEN A4, EF9, 6SG7m, 5/6; 9002, 9003, 954, 6/-; 1S5, IT4, 3A4, 7/-; 6C4, 6J6, 6AK5, 6AG5, 6AH6, EF91, 8/-.—N. T. Lowe, 6a, Middle Brook Street, Winchester.

WANTED: BC610 Hallicrafters, ET4336 transmitters. AR88's receivers and spare parts for above. Best prices.—P.C.A. Radio, Beavor Lane, Hammersmith, W.6.

BARGAIN PARCEL unused surplus components for 30/-, carr. paid. One each TCC, etc., block condensers, tropically sealed, 1.5 mF, 4 kV, DC wkg.; 0.1 mF, 5kV, DC wkg.; 0.5 mF, 6kV, DC wkg., and one 0.1 mF, 1.5 kV, DC wkg. Dubilier Mica; 25 fixed resistors ½w. to 3w., and 3 Yaxley-type switches; two 3-gang (.0005) condensers; 6 green vitreous bleeder resistors, 20-ohm to 20k (20w. to 100w.). Satisfaction guaranteed.—GLADSTONE RADIO, Gladstone Place, Newton Abbot, Devon.

FOR SALE: Receivers in good working order. MCR1 with Power Pack and phones and all coils. £8; 1224 Battery Receiver, £6 10s. 0d.; 1132A with No. 3 P/Pack modified to 80 mc, £7 10s. 0d.; R107 6v. and AC, £12; R208, complete, £10 10s. 0d.; TBY8 Tx/Rx, 27 to 80 mc, £15; HRO Junior, P/Pack and 3 coils, £17 10s. 0d.; BC348, fully modified AC, £18; BC342 with auto-trans., £20; CR100, £20; B28, £20; SX24, with speaker, £22 10s. 0d.; Radiovision "Hambander," with Preselector and Speaker, £25; DST 100, less P/Pack, Double Superhet, £28 10s. 0d.; Hammarlund Super-Pro with P/Pack, £30; HRO Junior with P/Pack and 4 coils, £30; HRO Senior Table Top with P/Pack and 4 coils, £31; HRO Junior Civilian Model Rack with Speaker and P/Pack, and coil cabinet and 4 coils, £32 10s. 0d.; AVO valve tester (brand-new and complete with manuals), £10; RCP Valve Tester (American), brand-new, complete with manuals, £15. —N. T. Lowe, 6a Middle Brook Street, Winchester.

QSL's AND LOGS by MINERVA. The best there are.—Samples from Minerva Press, 48 Queen's Road, Brentwood, Essex.

R.F. UNITS: Types 26, 37/6; 25, 17/6; 24, 12/6. Brand-new. — E.W.S. Co., 69 Church Road, Moseley, Birmingham.

SMALL ADVERTISEMENTS, TRADE—*continued*

45/- OFFERED for new surplus 813-type valves; any quantity purchased.—Pype-Hayes Radio, 606 Kingsbury Road, Birmingham 24. (*Erdington 4942*).

WANTED: BC-348 SPARES. If you have a BC-348 modified for mains operation, turn those unwanted dynamotors, plugs, output transformers, etc., into cash.—Details of items and price required to: Box 1447, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: R.C.A. Speech Amplifiers, type MI-11220, J or K, and aerial tuning units BC939A.—Offers, stating quantity and price, to P.C.A. Radio, Beavor Lane, Hammersmith, W.6.

READERS' ADVERTISEMENTS

3d. per word, min. charge 5/-, payable with order. Box Numbers 1/6 extra. Replies to Box Numbers should be addressed to The Short Wave Magazine, 55 Victoria Street, S.W.1.

FOR SALE: Portable S/W Rx; covers all bands down to 10m.; set and spread dials; SM tuning, with separate amplifier in case, portable; ideal field use or standby; mains or battery operated; good DX. Offers over £3 only.—Box 1423, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

R.C.A. RIBBON MICROPHONE on adjustable chrome floor stand; cheap at £7 o.n.o. New R.C.A. AR88, loudspeaker, £3 o.n.o. Exchange for good pick-up, 2-speed motor, testmeter, binoculars or W.H.Y.?—Box 1426, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

150 w. 813 PHONE/CW Tx; finished in grey enamel; employs TZ40 modulators, speech amp.; VFO control for four bands; wide band couplers and variable power control; relay switched. Sacrifice at £20 o.n.o.—Wormald, 23 Coda Avenue, Bishopthorpe, Yorks.

FOR SALE: BC221, £28; Power Pack, 19in. panel, 500v., 340 mA; pair Magslips.—(*Phone HARrow 6945*).

FOR SALE: Eddystone 504, 580 kc - 30.5 mc continuous cover, complete with 12" speaker; excellent working order. Offer nearest £30.—Manchester. (*Gatley 3211. Ext. 108*).

WAVEMETER TE-149, 2.5 - 30 mc, crystal check, portable; in good condition; manual, with self-contained dry batteries, accurate. — Offers to Collin, 32 High Street, Wickford, Essex.

EDDYSTONE 740 and Speaker; one owner; perfect condition; (owner going abroad), £30.—81 AMQ, Topcliffe, Thirsk, Yorks.

FOR SALE: CR100, £17 10s.; Super-Pro with power pack, £25; 1155N with power pack, £10; 7 mc Command Transmitter, £3; spare case and panel for CR100, £1 10s.; BC348, mains pack built in, £12 10s.; SX28 receiver, £42 10s.; SX28 spares; CR100 spares, list your requirements. Valves: 6AL5, 3/6; 6J6, EF91, EF92, 6V6, 5Z4, VR150 at 5/6; TZ40, 35T, 24G at 15/-; KTW61, 3/-.—Box 1427, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS, READERS—*continued*

WANTED: Complete Amateur Station and U.S.A. Test Equipment. Have for sale, or exchange: 16mm. Talkie Projector, 16mm. Ensign Silent and Strip Projector. Collection arranged.—Box 1428. Short Wave Magazine. Ltd.. 55 Victoria Street. London. S.W.1.

WANTED: AR88 Receiver, Table-top Transmitter, BC221. Also require: Two-metre Station, 160-meter Transmitter ; boxed octal valves. —Details to Box No. 1429 (will collect), Short Wave Magazine, Ltd., 55 Victoria Street. London, S.W.1.

QRO Bandswitched CW Tx., relayed, with P/Pack for Mod., £24 ; 145 VFO, £5 ; two 100TH, 30/- each ; six 35T, £1 each ; U.S.A. Bug key, £2 ; matched pair of Magslips, £4.—G3HFP, 16 Hall Street, St. Helens, Lancs. (*Phone 4556*).

R107 FOR SALE, 1.2 to 18 mc. modified output 12A6, good condition, £10.—Gibbins, 13 Mountbatten Place, Kingsworthy, Winchester, Hants.

BENDIX LM12 Frequency Meter, new, unused ; handbook ; carrying case ; power connector ; calibration book ; 6.3v. fils., perfect condition. Offers over £25.—Box 1430, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

MISCELLANEOUS Amateur Gear, valves and components at give-away prices. S.A.E. with enquiries.—E. Parvin, 19 Fellbrook Avenue, Acomb, York. (*Tel. 78283*).

TWO American Field Telephones in leather case (inc. ringer), 110/- ; G.E.C. AC Overseas Receiver, 13-42 metres, 40-130 metres, 200-550 metres, 100/- ; 2 x 4 mF 3000v. wkg. Dubilier, 50/- ; two heavy-duty Morse keys, 15/- ; quantity of components, assorted, 8/6 ; car radio, 6-volt, 160/- ; PA horn, 45/- ; s.a.e. enquiries.—SMITH, 130 HIGH STREET, BRAINTREE.

R1224A, modified with 6-volt valves and extra IF, £4.—J. Foster, Knightcott, Caravan Site, Hill End, Banwell, Somerset.

WANTED: Original condition, BC342, BC453, BC455 and Class-D Wavemeter ; reasonable offers.—Box No. 1432, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: Woden UM1 Mod. Trans, as new, 30/- ; RF EHT Unit, peak 6 kV, in copper box, 50/- (spare rect.) ; 12AT7 (2), 6J6 (2), RK34 (1), 15/- lot ; 807 (2), 1625 (1), 12E1 (1), 25/- lot.—Box 1431, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: *CQ*, January, March, April, June, November, December 1945, May 1946 ; *Radio* before 1936 ; *R/9* before April 1935 ; *QST* before 1924. Lots *Amateur Radio, Break-In, Xtal*, lists on request. Also any quantity other overseas Amateur magazines in English, any period. Air-mail your offers, please. All expenses refunded.—G3IDG, 95 Ramsden Road, London, S.W.12.

HRO SENIOR, 8 coils, 100 kc to 30 mc, P/Pack, £23 ; BC348R, 6AK5 RF, S-meter, built-in Q-Fiver, P/Pack, £18 ; fully-metered power supply, 280v. 150 mA, 6.3v. 10A. 12.6v. 3A variable, AC 100V, 150V, 200V, 220V, 240V, 150W, £5. — E. Jennings, 93 Merlin Grove, Beckenham, Kent.

SMALL ADVERTISEMENTS. READERS—*continued*

SSB EXCITER 10A. also model 20A. for sale at list price.—G2MF. 51 Townhead Road, Dore, Sheffield.

NEW 14" TV offered in exchange for SX28 or SX42 receiver in first-class condition. Also wanted: 5-7 amp. 230v. Variac.—Box 1435, Short Wave Magazine, 55 Victoria Street, London, S.W.1.

WANTED: Complete Amateur Station; collection arranged.—Box 1437, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: BSR LO50A. £25 0s. 0d.; BC348, £15 0s. 0d.; Collins Modulation Transformers, £1 5s. 0d.; Transmitters, Type 1403, new, £6 10s. 0d. Or exchange for AR88, S27, Panda Tx, BC221; cash adjustment.—Box 1438, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

VALVES for sale: 6AC7, 3/-; EF91, EF92, EL35, VR150, 5/6; KTW61, 6N7, TH2, 2/6.—Box 1439, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: Ex-Army Tx, Type 12, good working order; mic., keys, plugs; first £10 secures. Also W.S.48, complete, £7 10s. 0d.—Box 1436, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: R107, mint condition, or unconverted clean. Good price paid for good set.—Lacey, Chapel Green Farm, Napton, Rugby.

HALLICRAFTER Sky Champion, S2OR; good working condition but needs re-alignment (with makers' instruction book). Nearest offer to £12 secures.—G3JGW, 4 Southfield Road, Enfield, Middlesex.

PREMIER RADIO 17" Televisor, £25; vision, sound, time base, p/pack, all valves, instruction book; seen working any time. Tube not for sale.—Bird, G3GDB, 18 Linsted Court, Restons Crescent, Eltham, S.E.9.

TANNOY 60-watt Rack-mounting Amplifier, 4 x L63, 4 x 6L6, 2 x 5U4G, for 230-volt AC mains; £8. Power Unit for Type 19 set, £3. Master Oscillator Unit No. 1 (VFO), Type ZA 15564, 2-4 and 4-9 mc. with built-in power supply for 230 volts AC, new, £7. All carriage paid.—572 London Road, Northwich, Cheshire.

WODEN UM4, £7 (carriage paid); 304TH (2), £1 10s. each; 393A (2), 15/- each; 6B4 (4), 5/-each; Labgear 150-watt split stator, 40, 20, 10 metres, base link, 30/-.—2 Brunswick Avenue, St. George's Road, Hull.

FOR SALE: R.1155, modified, built-in power/pack, separate speaker, £12.—Peter Odell, 20 St. John's Grove, Redcar, Yorks.

6V6M, 6J7M, 6B8M, 5Z4M, 6V6GT (2), 6/- each; 5Z4G, 6X5GT, 6SL7GT, 5/- each; ECC35 (4), 2/6 each.—Box 1433, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: BC342N (original AC P/Pack LS) 3; speaker, plus S-meter; £16. TCS 12, Rx no p/supply with NL, £7. WANTED: AR88D manual, BC453 modified medium wave, or MW coils for this Rx.—Bastin, 53 The Farmstead, Coventry.

SMALL ADVERTISEMENTS, READERS—*continued*

WANTED: One or two American-type masts, aluminium tubing, each having ten sections, as used for portable TBW sets; masts must be in good order and complete with three sets of guy ropes, bottom pin, base plate, stakes and canvas bags.—Box 1440, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: Bandmaster 50w. Phone/CW Tx, 80-2 metres, £25 o.n.o.—G2AMX, 124 Dartmouth Road, Ruislip, Middlesex.

B2, PERFECT, in original watertight cases; complete Tx/Rx, P/Pack and accessories, £20; BC614 speech amplifier with p/pull, 6V6, £10; R.1155, untested but complete, £6. Over 100 valves, Tx and Rx types, mostly new. Offers? S.A.E. list. LM7, new, with complete set spares, crystal, valves, transformer, etc. Offers? UM3, new, £4. Variable condensers, meters, oil-filled condensers, etc. Vidor portable mains/battery, almost new, £12. HRO, S-meter, new.—L. Lyske, 14 Cambridge Road, Farnborough, Hants.

WANTED: any type of Magslip Motors, Tx and Rx. All letters answered. — S. Rees, Incline Cottage, Ponthenry, Llanelly, Carms.

SWAP: B2 and spare receiver for BC348; 1191 Wavemeter, 70/-; Class-D, 70/-; circuit and parts list for Class-D's, 1/4d. Your price paid for manual of 62 set.—Box 1442, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

HRO Senior, with power pack and five coils (four bandspread) for rack mounting; fitted Select-O-Jet; revalved miniatures, black crackle finish; matched speaker; condition as I would buy; £30 or near offer. Also 25w. home-built Tx, 14 and 21 mc, complete except VFO; rack mounting with internal power pack; black crackle. (See RSGB *Bulletin*, November, 1953.) £10 or near offer. Carriage forward Aberdeen on these items. Also many odd components and valves. SAE with inquiries, please.—Box 1441, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

TWO Can 58 sets for sale; complete with p/pack and headsets. Unused condition. Offers? 1155 faulty, 50/-.—Box 1443, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

S. 640 fitted 717A RF and VR150/30, £16. Valves at 5/- 9002, 9003, 6/- TT11, 12SK7, 12SR7, 12A6, 12K8, EL32. 25/- 832, VCR139A with screen and base.—G4LV, 1 Brewery Cottages, Ovingham, Prudhoe Station, Northumberland.

LATEST model Radiocraft Preselector, also R.1155 230/240v AC p/output pack with speaker. Carriage extra. Offers? — Birch, Walkington Park, Beverley.

WANTED: NC81X, state condition and price. 809 valves. Sell: 5-250TH valves, used but OK, £2 each; bases 5/- each; 4-872A £1 10s. 0d. each; 3-50 $\mu\mu$F Eimac vacuum condensers 10/- each. — Box 1445, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

EXCHANGE BC458A. Small aircraft Tx 5.3-7 mc, in perfect condition, for BC221 with power pack. —Write or call: Sandys, 106 Holland Road, London, W.14.

SMALL ADVERTISEMENTS, READERS—*continued*

RECEIVERS B28 (CR100/7) FB condition and performance £16. Bendix Radio Compass with control box and cables. AC mains £8, Collins TCS-12 as new, £6 10s. 0d. SCR522 Transmitter and receiver complete in case, £10. Parmeko 15 watt amplifier with Goodman 12" speaker, £7. 100 kc crystal in 230-volt temperature-controlled oven, 50/-. — Box 1444, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: Eddystone 750. Radiocraft Preselector. Brown's phones Type A. All in perfect order, £39—Box 1446, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

AR88D receiver, beautiful condition, £65. Current model U.S.A., double conversion receiver £85. RME69 6-band superhet, 550kc-32 mc, £20. U.S.A. HE Signal Generator, 330/8 mc, £45. 16 mm. Bell-Howell sound projector, complete, £120. Would exchange for C.J.R. portable tape recorder. SAE inquiries.—Box 1449, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

AVO 40, £10, excellent condition, overload protection. RF 25, 12/6. All carriage paid.—Box 1448, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

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