The SHORT WAVE Magazine

VOL. XI FEBRUARY, 1954 NUMBER 12

WORLD WIDE COMMUNICATION

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

Advertisement Manager : P. H. FALKNER

Assistant Editor : L. H. THOMAS, M.B.E. (G6QB)

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AUTHORS' MSS

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The SHORT WAVE Magazine

EDITORIAL

Survey *In this issue there are reported or discussed matters of deep significance to all radio amateurs, and to which we would draw the attention of every reader. On p.727 appears further comment on the subject raised in this space last month. Then on p.746 there is a statement which, while of particular interest to VHF operators, also has an important bearing on any present or future controversy there may be as to the amateur contribution to radio research.*

Still keeping to the references—On p.764 of the February issue last year, under heading "Coming—The Era of Transistors," we made some general observations and one particular statement, ". . . Broadly, the immediate need in the research field is the study and evolution of an entirely new circuitry to make proper use of transistors . . ."

On p.728 of the present issue appears a detailed report on some practical results obtained as lately as a fortnight ago with home-made transistors. These results are obviously of great experimental interest, even if for the moment the application of transistors in Amateur Radio communication seems somewhat limited. The point is that here again there is scope for a vast amount of original and interesting exploration in the amateur field. In brief, the problem is to make transistors work for us on all the amateur bands, in both modes of operation, and as receivers as well as transmitters.

Readers may be assured that practical information on the making of transistors, and the construction and operation of transistor equipment, will be appearing in early issues of SHORT WAVE MAGAZINE.

Austin Forbes G6FO.

Crystal-Mixer Variable Frequency Oscillator

HIGH STABILITY ON THREE HF BANDS—SELF-CONTAINED FOR POWER—AMPLE DIAL SPREAD

J. N. WALKER (G5JU)

The crystal mixer type of VFO has a number of very positive advantages for amateur working, and these are briefly explained below. This design, specially commissioned by SHORT WAVE MAGAZINE, *describes a self-contained unit which gives output on the 14, 21 and 28 mc bands. Necessarily the output is not high and the VFO is intended to work into a transmitter which incorporates a buffer amplifier, although it will drive direct on 14 or 21 mc a PA stage of the 807 or KT8 variety running at up to 50 watts input. The coverage gives the phone and CW areas of the bands, though for full coverage of the phone sections some slight alteration of the constants of the SEO circuit may be needed.—Editor.*

THE crystal-mixer VFO is a little more complicated in its design than the usual type of plain self-oscillator, but it offers a number of advantages which merit serious consideration by those who are looking for something definitely above the average.

The modern communications receiver is both very selective and very stable. The signal from a crystal-controlled transmitter will generally stay within the narrow pass-band, but every active operator must have had the experience of chasing a VFO-controlled signal which slips slowly out of audibility. This may not be so bad on a quiet band, but, where many other signals are present, it can be a real nuisance. So it is up to the reader to make quite sure that others are not experiencing this difficulty with his signals.

It is in this matter of drift that the crystal-mixer VFO scores heavily. The crystal oscillator is of course inherently stable, but, by itself, inflexible. Its output is therefore mixed with a self-excited oscillator, designed to be extremely stable and operating at a comparatively low frequency. Any slight remaining drift is not then multiplied in the succeeding stages as would be the case with a standard type of VFO using a low fundamental frequency, because the output is taken from the mixer at a relatively high frequency.

For example, in an ordinary VFO, a drift of 200 cycles on a fundamental frequency of 1600 kc would mean a total drift of 1800 cycles (1·6 c) on 14 mc. But a drift of 200 cycles in a crystal-mixer VFO with the self-excited oscillator on say 1300 kc would give a resultant of only 400 cycles on 14 mc.

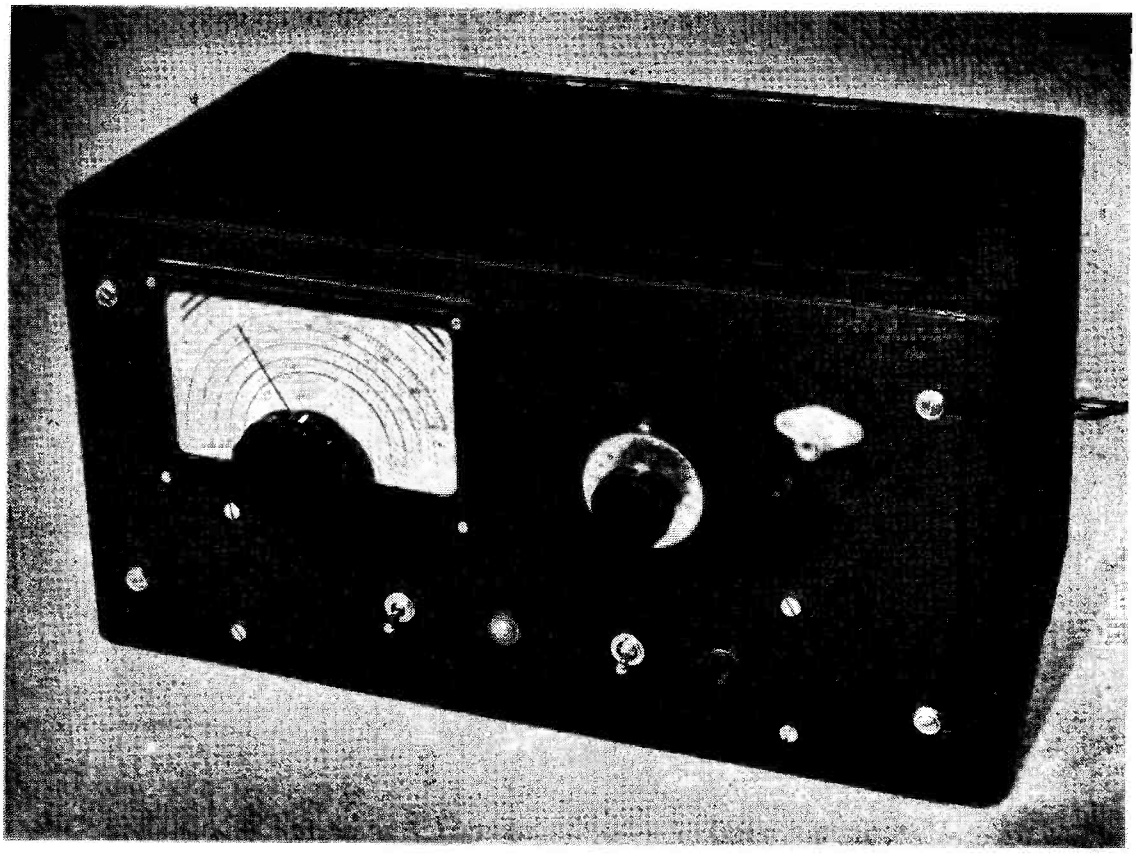
In practice, a further decided improvement in overall stability is brought about by allowing the oscillator to run continuously, instead of switching it off during listening periods, with consequent cooling of the valve and slight unavoidable change of frequency. Keying is also less likely to affect the quality of the signal, whilst break-in working is facilitated.

The main disadvantage of the crystal-mixer VFO is the low output obtained from the mixer stage and the consequent need of subsequent amplification. But from another angle, this process of using low power in the initial stages and amplifying at signal frequency reduces the strength of high order harmonics and this can often be of definite benefit.

Choice of Frequencies

There are two main considerations when making the choice of fundamental oscillator frequencies — one is that harmonics of each separately do not fall within the amateur bands; the other that both frequencies are well removed from the "intermediate frequency" so that only the latter is passed on to the following stages.

In the present design the "IF" is 7 mc and the self-excited oscillator operates over a range of 1300 or 1500 kc, at which frequencies a high degree of stability can be readily secured. The crystal is 5700 kc and the sum-frequency at the mixer anode is selected. It would be quite in order to use a crystal anywhere betwen 5300 and 5800 kc, as this would still permit the SEO being kept below the 1750 kc mark at which harmonics would, of course, come into the higher frequency amateur bands.



General appearance of the Crystal-Mixer VFO Unit, as designed and constructed by G5JU. Full details are given in the article, with constructional views in other photographs. An exceptionally high degree of stability is attainable with this instrument.

Circuit Details

The first stage uses an Osram Z77 valve in the standard G5JU variable frequency oscillator circuit, care being taken to ensure the highest possible degree of frequency stability. For one thing, this means using components of high quality, whilst the coil is placed well away from the influence of any source of heat. It is also kept as far as possible away from metal masses.

It was a debatable point whether to use a separate valve for the crystal oscillator. There are certain advantages in so doing, but since a single triode-hexode can be employed to act both as oscillator and mixer, it was decided to adopt this method and so save putting in an additional valve.

There is of course bound to be a loss in the conversion and all one can do here is to choose a valve which will give a reasonable efficiency. The Mullard ECH42 performs well, but other similar types should prove equally satisfactory. The oscillator utilises the Pierce circuit which is simple, reliable and delivers ample output. It should be noted that the grid leak is returned to the cathode and not to chassis.

The output at 7 mc is necessarily small—incidentally, it can *not* be increased by applying higher RF voltages to the mixer valve, as this will simply bring about a greater harmonic content in the output at unwanted frequencies, with a possible diminution of amplitude of the wanted frequency.

A high gain stage is now required and V3 is again a Z77 valve. Extremely good decoupling and screening of leads which would otherwise be exposed is necessary to prevent self-oscillation, whilst the valve itself should be fitted with a screening can. A wide-band coupler feeds into the Z77 grid and another passes on the amplified voltage to the output valve. (Details of the wide band couplers are given later).

The output stage again called for careful consideration. The valve must be of a type to make the most of the comparatively low input voltage available and give a reasonable output. The Osram N78 has been chosen and in practice it gives about two watts output at 14 mc as a doubler, about 1·25 watts as a trebler at 21 mc and about 0·7 watts at 28 mc. It is intended that the VFO be fed into a buffer amplifier—say an 807—on the main transmitter chassis, and the output, at least on 14 and 21 mc, is adequate. Admittedly, on 28 mc the drive is not as much as one would like, but at the present time a further stage of amplification to bring up the 28 mc output is hardly justified. At a later date, a 5763 valve will be tried in the output stage, and it is expected to give a worthwhile improvement.

The power supply utilises a transformer which happened to be on hand and one which takes up more space than is necessary. Further, it delivers only 250 volts smoothed HT and the anode of the N78 draws its current from the reservoir condenser C29 where the voltage is a little higher. Any slight ripple which may be present here will not affect the note, since the HT applied to the screen of the N78 and to the earlier stages is well smoothed. The intending constructor is advised to choose a mains transformer giving a full 300 volts smoothed HT, when an increase in RF output should be found.

As described, the unit is intended chiefly for use on CW. The panel controls consist of AC on/off switch, main frequency dial, amplifier tuning, output band switch and key jack. There is also a " netting " switch which, when in the net position, brings into operation only the first two valves.

The key is placed in series with the HT supply to the crystal oscillator and, to improve operation, a high value resistor is placed across it. The value is too high to permit the valve to oscillate, but it has the effect of bringing the oscillator into action a fraction of a second quicker than without it, whilst the break also is not so abrupt. Individual experiment will probably be called for in selecting the value which suits a given crystal, according to its activity.

For telephony operation, either another switch can be fitted in parallel with the jack contacts or, alternatively, a lead can be made up which plugs into the jack and terminates in a " push-to-talk " type of switch. This would enable extremely rapid phone change-over to be made.

LIST OF PARTS

Cabinet and Chassis (*see text*)		Philpotts
1 Mains Transformer	300-0-300 volts, 80 mA., 6.3 volts 2 amp., and 5 volt, 2 amp. outputs.	
1 Smoothing Choke	12/20 Henry 60/80 mA.	
2 Valves (V1, V3)	Z77	Osram
1 Valve (V2)	ECH42	Mullard
1 ,, (V4)	N78	Osram
1 ,, (V5)	VR150/30	Brimar
1 ,, (V6)	5Z4G (or equivalent)	,,
3 Valveholders	B7G (one with screen)	McMurdo
1 Valveholder	B8A (for V2)	,,
1 Valveholder	Int. Octal	,,
1 Full Vision Dial	Cat. No. 598	Eddystone
1 Knob and Dial	,, ,, 844	,,
1 Flexible Coupler	,, ,, 50	,,
1 Bar Knob (for Yaxley Switch)	,, ,, 846	,,
1 Variable Condenser	(C1) 100 $\mu\mu$F Cat. No. 738	,,
1 ,, ,,	(C2) 140 $\mu\mu$F ,, ,, 586	,,
1 ,, ,,	(C26) 27 $\mu\mu$F ,, ,, 588	,,
1 RF Choke (RFC1)	,, ,, 1010	,,
1 ,, ,, (RFC2)	,, ,, 737	,,
1 ,, ,, (RFC3)	,, ,, 1022	,,
4 Coil Formers	,, ,, 646	,,
1 Yaxley Ceramic Switch 2-pole, 3 or 4-way		Webbs Radio
1 Insulated Jack		Igranic
1 Coaxial Socket		
1 On/off Switch (for mains supply)		
1 D.P. Change-over Switch (Net)		
1 Crystal FT243 (*see text*)		
1 Panel Lampholder and bulb		

A ceramic Yaxley switch brings in one or other of the three final coils, each of which is provided with a low impedance output winding. This stage is fully tuned to secure maximum output, but constant re-tuning is not necessary when once set to the band in use.

Construction

The VFO is built into a Philpotts metal cabinet of a size which is becoming a standard in Amateur Radio work — it measures 16½" long, 8½" deep and 9¼" back to front. The front panel is separate from the cabinet and to this panel is firmly bolted an aluminium chassis measuring 12" by 8¾" by 3" deep.

The layout, indicated in the drawings and in the photographs, follows a logical sequence. The self-excited oscillator occupies one corner of the chassis, the valve being mounted horizontally about 2" above the chassis on a small aluminium bracket (made up from heavy gauge metal). Below it are the C3 and C4 fixed condensers. The coil is mounted on a U-shaped metal bracket, with sides 1¼" long, to keep it away from metal surfaces. By placing the coil on that side of the coupler away from the valve, the heat generated by the latter has little effect. C2 is below the chassis, but its spindle is readily accessible for adjustment by a screwdriver blade. The main tuning condenser is of the high stability type, having comparatively wide vane spacing. This con-

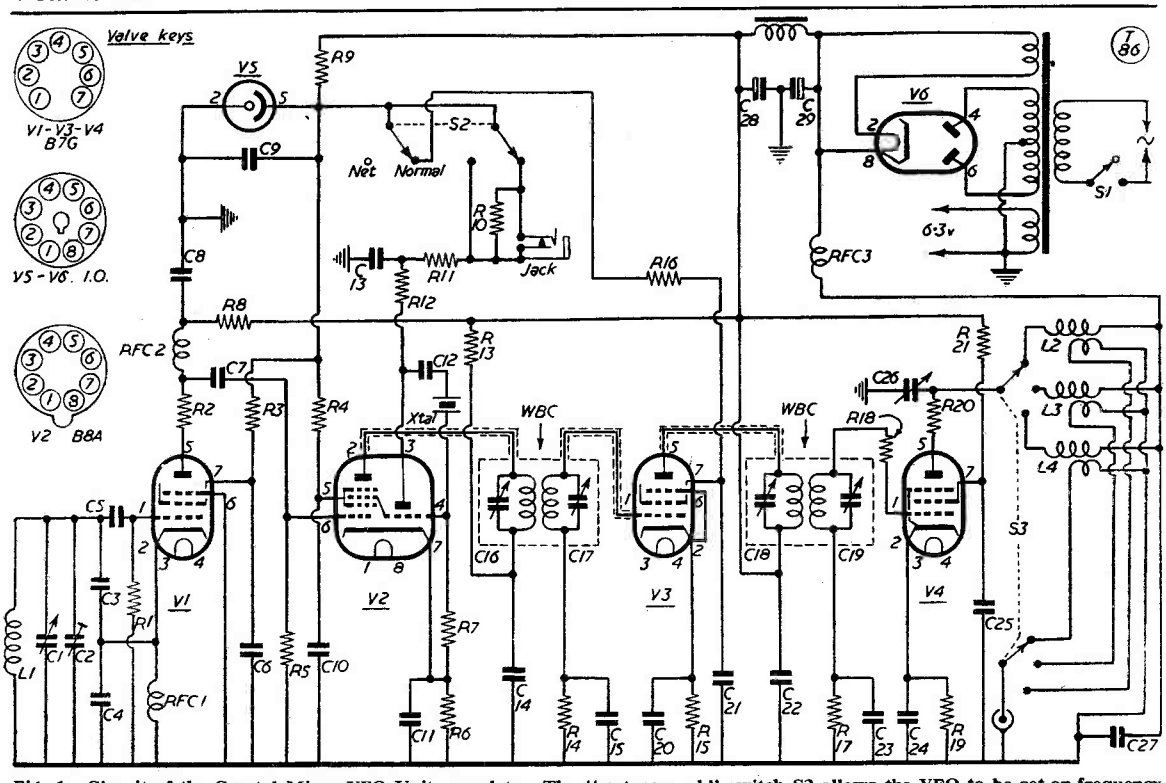


Fig. 1. Circuit of the Crystal-Mixer VFO Unit complete. The "net-normal" switch S2 allows the VFO to be set on frequency during reception. The wideband couplers WBC1 and WBC2 are surplus items (see text and table) or can be home-made in the manner described in recent articles on this subject. The general design of this VFO will appeal to the discriminating operator who wants the best.

denser is two or three hole mounting, which means a little more work than with the single hole mounting type, but the trouble is well worth while. The bracket holding this condenser measures 2" wide and 2½" high, and the spindle is 1¼" above the chassis. An Eddystone full vision dial is fitted to the panel in an appropriate position. A lead has to be brought up through the chassis from the stator section of C2, but otherwise most of the wiring associated with V1 is above the chassis. The anode stopper R2 is close to the anode tag and the lead then passes through the chassis to the RF choke RFC2 mounted below. Use is made of tag strips wherever necessary to ensure firm support for the various components.

The mixer-cum-crystal oscillator valve is mounted directly behind the SEO stage. Since the crystal is a permanent feature, it is clipped to the side of the chassis and connections made direct to the pins (using the minimum amount of heat when doing the soldering !).

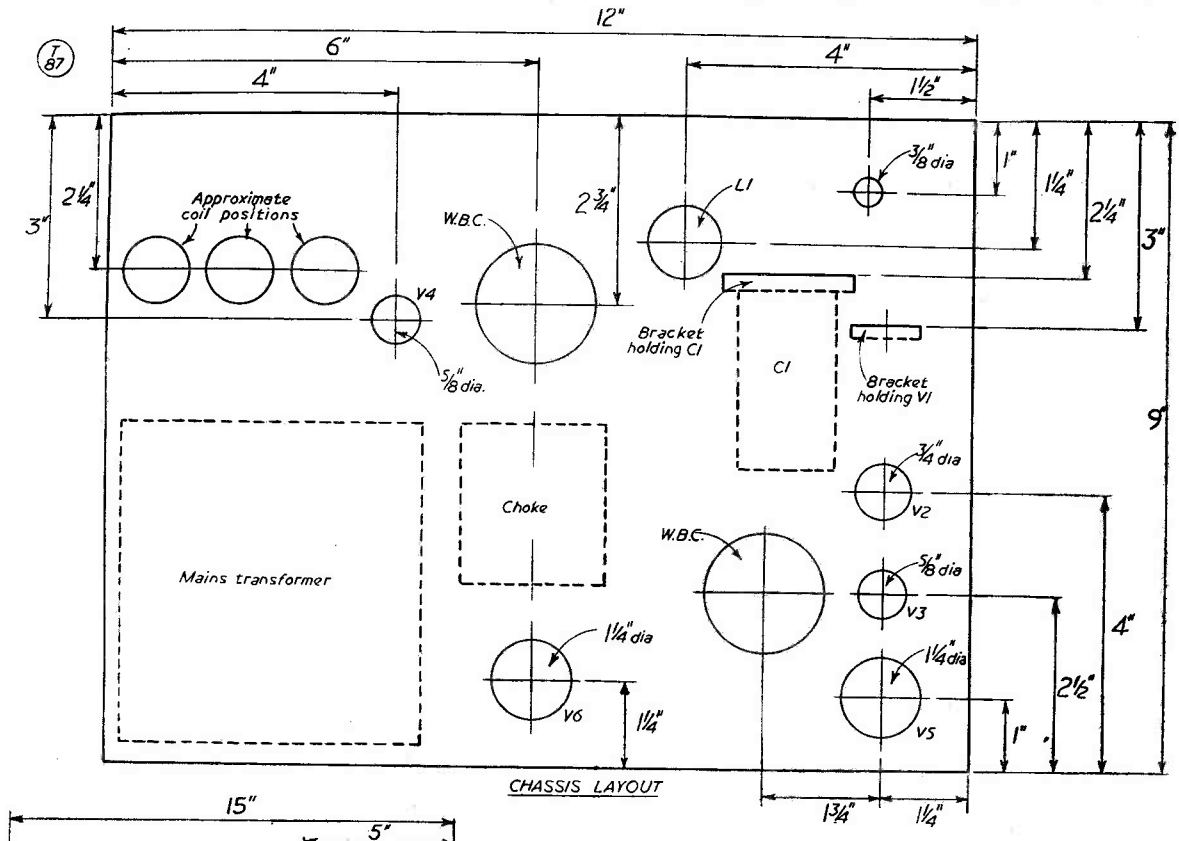
"Hot" leads associated with V3 and the two wide-band couplers are screened by slipping metal braiding over the insulation. The second wide-band coupler has to be mounted some distance from V3 and the anode lead from the latter is actually coaxial cable running up inside the WBC screening can. Instability here would affect the wide band characteristics and will do no good at all, hence the use of physically small but electrically large

Table of Values

Fig. 1. Circuit complete of the Crystal-Mixer VFO.

C3, C4	= 880 μμF Silvered Mica	C22	= .01 μF M. Mica
C5, C7	= 100 μμF Silvered Mica (or ceramic)	C28, C29	= 32 or 50 μF Electrolytic 350/450 v wkg.
C6, C10, C11, C13, C27	= .002 μF Moulded Mica	R1, R14	= 47,000 ohms
		R2, R18	= 22 ohms
		R3	= 3,000 ohms
C8, C9, C14	= 0.1 μF Metal-cased Paper	R4, R8, R11	= 1,000 ohms
		R5, R7, R17	= 100,000 ohms
C12	= 200 μμF Silvered Mica	R6	= 220 ohms
		R9	= 7,500 ohms 10 watt wirewound
C15, C23	= .0005 μF Moulded Mica	R10	= 180,000 ohms (*see text*)
C16, C17, C18, C19	= 15/45 μμF Ceramic Trimmers	R12	= 10,000 ohms
		R13, R16	= 470 ohms
C20, C21, C24, C25	= 2,200 μμF Hi-K Ceramic (T.C.C.)	R15, R19	= 150 ohms
		R20	= 10 or 12 ohms
		R21	= 20,000 ohms (1 watt)

All resistors ½ watt carbon type except where otherwise specified.



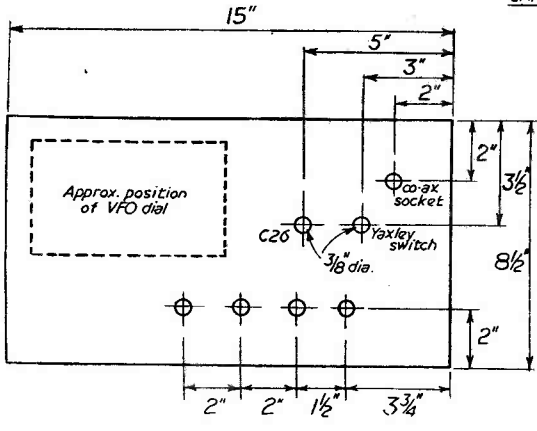


Fig. 2. Drilling details for the chassis and panel if the VFO is built exactly as described and illustrated.

Hi-K ceramic by-pass condensers—they are again used with the final valve.

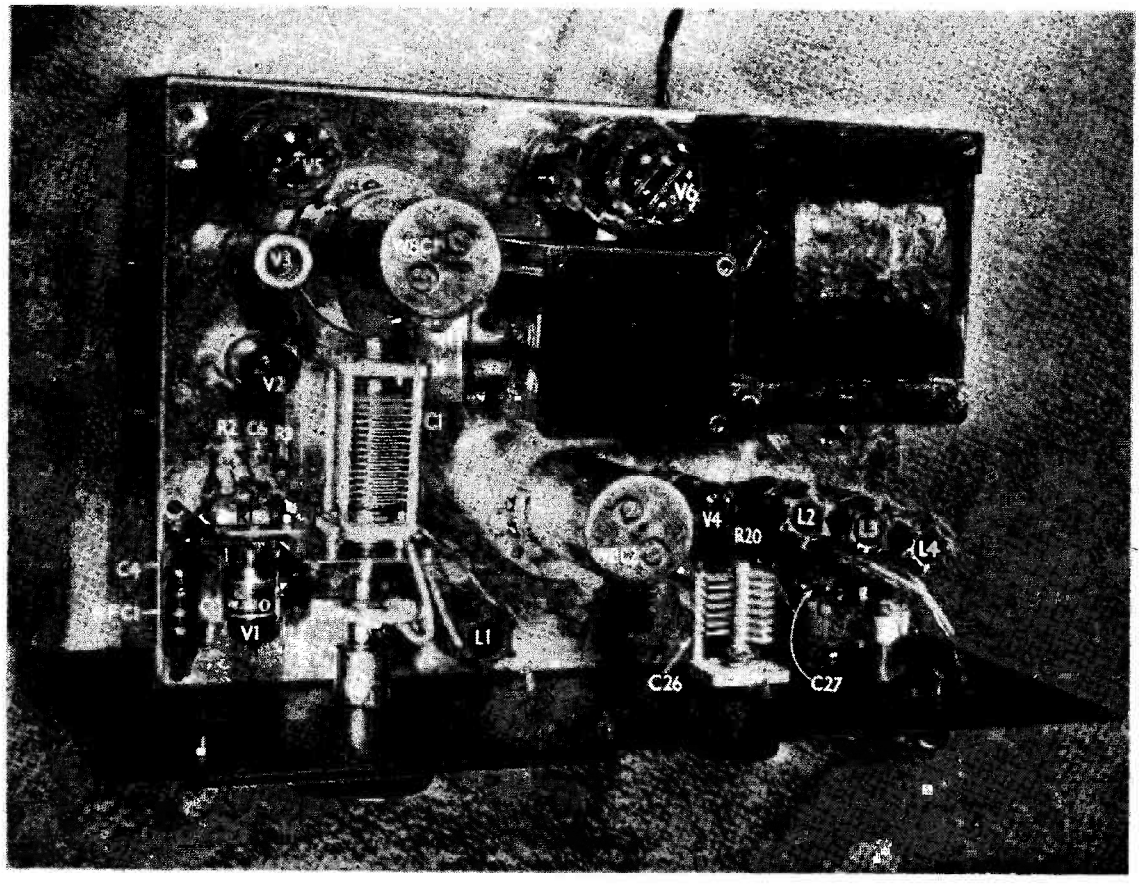
The N78 output valve is well over towards the other side of the chassis and the coils, switch and tuning condenser associated with it form a compact group, enabling the wiring to be kept reasonably short. The tuning condenser is fixed directly on the panel, but it is well to run a lead from the rotor tag to a chassis earthing point, rather than rely on a long and uncertain return path. The coaxial output socket can of course be of any type the constructor prefers. It is handy to have it on the front panel, leaving the rear clear except for the mains lead.

The stabiliser valve and resistor R9 take up little room at the rear, and it is hardly necessary to go into details of fixing and wiring the power supply components.

Coils

To give the coverage specified, the oscillator coil L1 is wound with 40 turns of 28 gauge enamelled wire on a 1" diameter former (Eddystone 646). The winding is placed at the top of the former and fixing to the bracket is by means of a 1¼" 6BA screw running through two holes drilled low down on the former.

The three coils for the final stage are also wound on Cat. No. 646 formers. L2 (28 mc) has five turns 20 gauge wire (18 gauge may be slightly better); L3 (21 mc) seven turns of the same wire; and L4 (14 mc) eleven turns.



Showing layout above chassis for the Crystal-Mixer VFO, with main parts identified. The wideband couplers WBC1, WBC2 are IF transformers from the R.1124A, SBA receiver, and involve only a very slight modification (see text) to make them suitable for this equipment.

In each case, two turns are wound on below the main winding. It is well to find out by experiment the correct spacing for the output winding as there is a position which will give peak transfer, but generally a gap of $\frac{1}{8}$" between the two windings is about right.

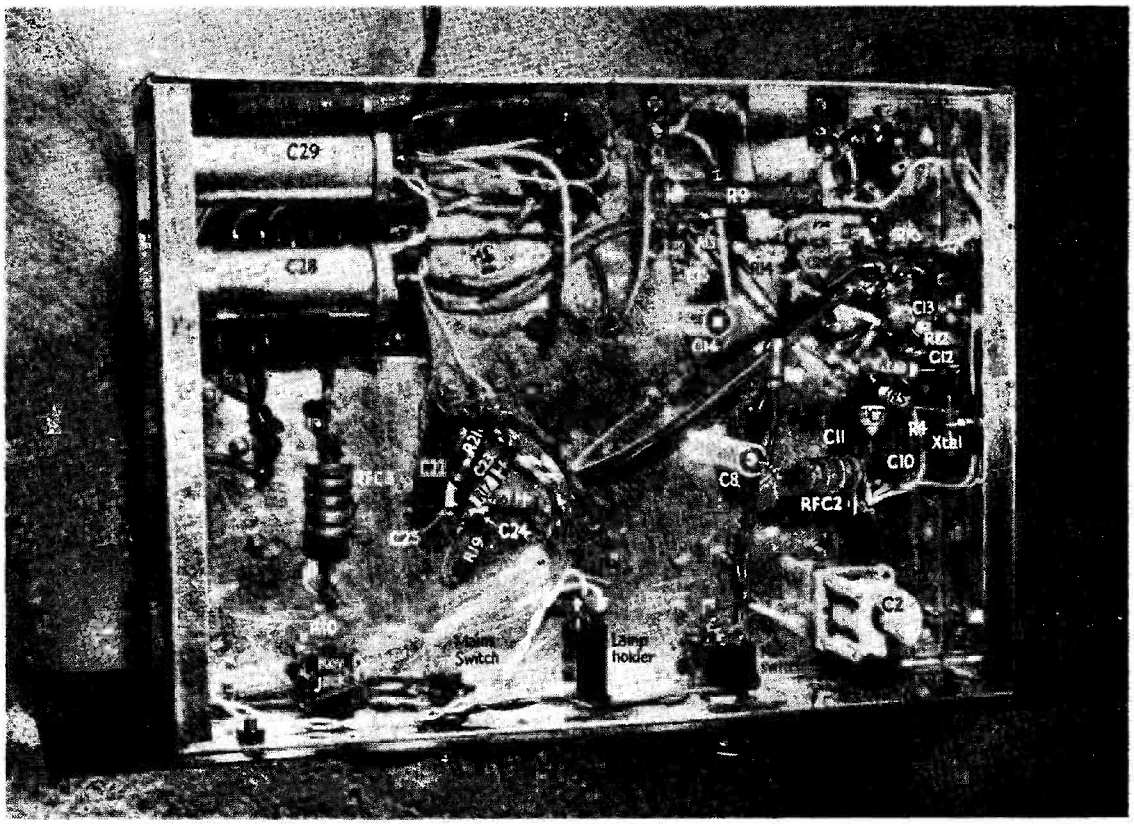
Each coil is bolted to the chassis with a 6BA screw passing through the hole provided at the closed end of the former. As before, the windings are placed at the top of the formers. Those requiring the absolute maximum efficiency may consider lifting the formers away from the chassis, as with the SEO coil, and an alternative horizontal style of mounting also suggests itself, with the minimum of metal within the fields of the coils.

Where a greater coverage is required, a few additional turns should be wound on L1, when the capacity of C3 and C4 will call for some reduction.

Wide-Band Couplers

The major problem when building an exciter of this (and other) types, is the provision of suitable wide-band couplers. Several designs have been published in SHORT WAVE MAGAZINE and the reader is referred to these articles for alternative versions. One point is emphasised —whatever type is adopted, it must be fully screened.

The couplers shown in the photograph are actually the IF transformers taken from a war-surplus aircraft SBA receiver, the R1124A (made by Standard Telephones), the intermediate frequency for which is 7 mc. Further, it seems they were originally designed to give a fairly wide bandwidth, but not quite sufficient for the present purpose. The only modification found necessary has been to remove one of the windings (the lower one for preference) and rewind it about $\frac{1}{4}$" closer to



Construction below-chassis of the Crystal-Mixer VFO. The positions of the marked components should be identified with the circuit diagram, Fig. 1.

the other winding. Stagger tuning then gives just the right order of bandwidth.

To render identification easier and for the benefit of those wishing to make up similar transformers, details are as follows. Resin-bonded paper former $\frac{3}{4}$" diameter; each winding 30 turns 28 or 30 gauge enamelled wire occupying just over $\frac{1}{2}$"; original spacing between inner ends of coils 1", reduced to $\frac{3}{4}$". Top end of upper winding (black sleeving) to grid; other end (yellow/black) to grid leak and condenser; upper end of lower winding (red/blue) to HT; lower end (blue) to anode. Screening can is $3\frac{1}{2}$" long and $1\frac{5}{8}$" diameter. In the original transformers, the trimmer condensers are twin ceramic ones bolted to the top of the former.

Setting Up

The first thing to do is to check the operation and coverage of the self-excited oscillator. To do this, V2, V3 and V4 should be removed, leaving only V1 operative in the RF chain. Oscillation can be confirmed by noting a change of anode current when a "hot" point is touched. The coverage is measured by tuning in the signal on a receiver, which may be the station receiver if it covers medium waves, or else a domestic broadcast receiver.

After ensuring the first stage is performing properly, the second valve, the ECH42, is inserted and a check made to ascertain that the crystal is oscillating. Assuming all is well, a signal—and a very steady signal—should be found near 7000 kc. With C1 at full mesh, a final adjustment is made to C2 to bring the frequency exactly on to the 7000 kc mark. A 100 kc crystal calibrator will help here, and will also enable the dial to be directly calibrated.

Next, V3 and V4 are placed in position and a voltmeter, set to read 100 volts or more, is connected across R17. With C1 at not quite full mesh, one trimmer in each coupler is adjusted for a maximum reading on the voltmeter. Then C1 is moved to near minimum capacity

and the other two trimmers adjusted. The final reading on the meter should be between 60 and 80 volts (perhaps more with a 300 volt supply) with only minor variations as C1 is swung over its full range. If the fluctuations are considerable, fresh adjustments should be tried with the small trimmer condensers.

In a non-energised condition, V4 will draw something like 30 mA and the usual dip in anode current will be found when drive is applied and the circuit tuned to resonance, the dip being greatest at 14 mc.

Operation

In actual use, the VFO is switched on, allowed to warm up for 10 or 15 minutes and thereafter it is left to run continuously during the time the station is on the air. Break-in operation is of course quite feasible as far as the VFO and the transmitter are concerned, although means should be devised for protecting the receiver whilst the transmitter is operative.

TVI Precautions

Screened wiring is used for the heater wiring, all circuits are well decoupled, the power levels are low, and the whole instrument is screened inside a metal cabinet, which should be separately and properly earthed. Hence harmonic radiation from the VFO itself is at a very low level. Where, in extreme cases, it is found necessary to take additional precautions, it is suggested that by-pass condensers be taken to chassis from the power input leads and from the jack terminals. Values of ·0005 or ·001 μF will be adequate, with suitable voltage ratings.

Keeping Back Harmonics

LOW-PASS FILTERS FOR TVI-PROOFING

A. H. WICKHAM (GM3IAZ)

This article is an important and useful contribution for the bearing it has on the subject of TVI. It shows how low-pass filters can be designed and constructed to deal with harmonic frequencies falling in the TV area, and discusses various filter arrangements in sufficient detail for the design data to be applied to almost any RF suppression problem.
—Editor.

DURING the years 1932-36 a scheme was developed in Liverpool by Captain P. P. Eckersley, first chief engineer to the B.B.C. and well-known to all old-timers, for the transmission of three different "broadcast" programmes superimposed on the electric power network. Frequencies of 22, 33 and 44 kc were used for the three channels and reception was by means of a one or two valve "selector." The "selector" was connected to the mains only and could be used anywhere on the power network.

The system was completed, perfected and demonstrated. But no commercial development was undertaken as a licence to transmit *via* this new medium was not granted "for reasons of policy."

Low-pass filters were used extensively in this project and possibly represent their earliest application to high-frequency circuits. They were used for cutting side-bands and eliminating any transmitted heterodyne at 11 kc beat frequency, and for separating HF and LF—comparable in frequency—in transmitter and "selector" circuits. Figs. 1 and 2 show the general application. Most of the side-band was removed by the output filters, but the bass

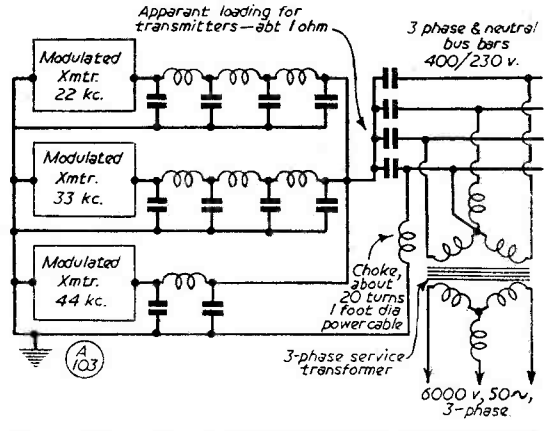


Fig. 1. Transmitter arrangement for the system of three-channel "wired wireless" developed by Eckersley in Liverpool in the 1930's. It was probably the first practical application of low-pass filters, and showed that an attenuation of 70-80 dB could be achieved between the three frequencies employed.

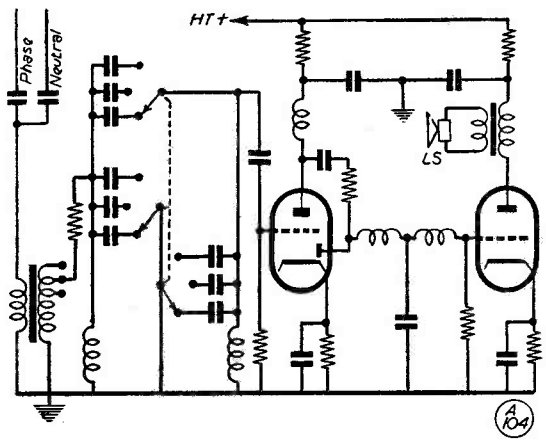


Fig. 2. The receiver, or "Selector" circuit, giving a choice of three programmes from over the power lines, without mutual interference.

response was left full to compensate for other losses. Quality of the received programme was comparable with the best reproduction and had a silent background.

The writer had the good fortune to be engaged on this project and, among other things, learned the value of the low-pass filter which could separate two fairly adjacent frequencies, cutting one to 70/80 dB without impairing the other by more than 1 dB.

The HF Aspect

Today's most pressing problem in Amateur Radio is the prevention of radiated harmonics as part of the cure of TVI. As the aerial system is the biggest harmonic outlet (assuming suitable screening and filtering of power leads) many of us look for a means of suppression which is effective, yet is efficient in conducting the operating frequency and flexible so that experiments and modifications on either aerial or output tank circuits can be carried out without jeopardizing the effectiveness of the harmonic removal.

The low-pass filter has all these qualities. But many amateurs do not attempt to use this harmonic barrier because they do not understand its application. The object of this article is to present theory in a manner which will make the working of a filter easy to follow. Only the mathematics necessary to work out component values are included.

Figs. 3 and 4 show two well-known filter circuits. They are arranged to pass low frequencies and restrict high. If an alternating voltage of variable frequency is applied at Vi and, commencing at a low value, as frequency f is increased (voltage Vi constant), the voltage at the output Vo will be observed to remain fairly steady until a critical value is reached where the impedance of capacity C, or inductance L, approaches the same ohmic value as R. At this point there is a change downwards of the output voltage Vo as the impedance of C becomes lower than R (Fig. 3), or the impedance of L becomes higher than R (Fig. 4). For all higher frequencies, Vo remains low.

If a circuit is now made up combining the two previous arrangements (Fig. 5), and if values for L and C are so chosen than they have the same ohmic value as R at any one frequency — which can be called the cut-off frequency fc—then applying a test as before, the results noted are similar to those of the previous experiment except the cut-off is *now much sharper*. Also the input impedance at Vi is now more constant as any change in impedance C is offset by a change in the reverse direction of impedance L. It should be noted that if C were placed before L (shown dotted) the effect would be similar.

If the value of R is known (*see later*), the values of C and L can be calculated from:

$$R = 2.\pi.fc.L \text{ (henry)}, \text{ or } L = \frac{R.10^6}{2.\pi.fc.} \mu H \quad . \quad . \quad . \quad (1)$$

and,

$$R = \frac{1}{2.\pi.fc.C \text{ (farads)}} \quad \text{or } C = \frac{R.10^6}{2.\pi.fc.R} \mu F \quad . \quad . \quad . (2)$$

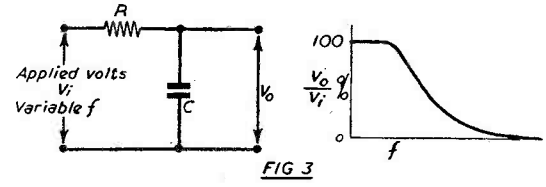


FIG 3

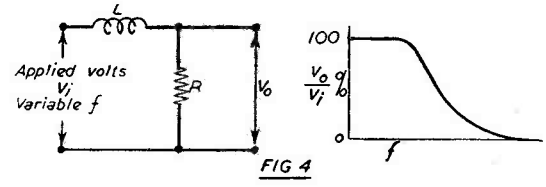


FIG 4

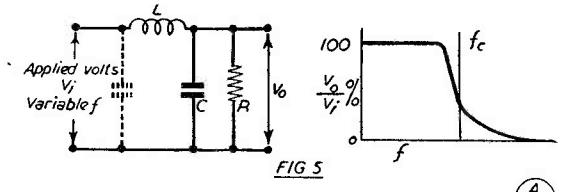
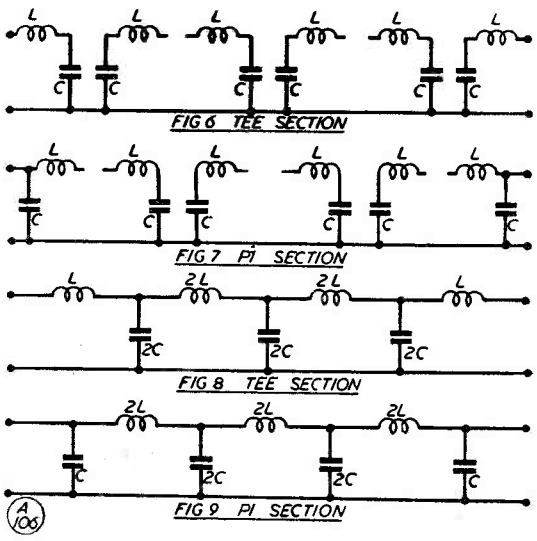


FIG 5

A 105



The arrangement shown in Fig. 5 is called a "half-section." It is a basic low-pass filter and can be used in simple circuits where a moderate suppression in the higher frequencies is sufficient. Efficiency is greatly improved if a multiple filter is made up into a network. To make a multi-section filter, any even number of half-sections is arranged as in Fig. 6, called a Tee-section, or as in Fig. 7, known as a Pi-section. These, when connected, become the network of Fig. 8 (Tee-section) or Fig. 9 (Pi-Section).

The reason for the "back-to-back" arrangement of half-sections in a composite filter is to maintain symmetry of impedance and current flow. It should be noted that it ought to be possible to operate a filter from either end.

The filters as shown would not work unless they had the component R added at the end. R is the value against which the filter discriminates and it is important that this value be determined approximately correctly. When the low-pass filter is used for suppression of harmonics in an aerial system, the actual R used is in fact the resistance load of the aerial. In most transmitters, this load is converted to a convenient figure so that a feeder of known impedance can be matched and used. The impedance figure for this feeder is also the correct R figure for a filter. Thus a filter for working in a 50-ohm line would be designed with R = 50.

Used as shown, a 3 or 4 section filter is sufficient for harmonic suppression where the transmitting and TV frequencies are not too close and the TV station near. For more extreme conditions, the filter is fitted with "m-derived" end-sections. These have the effect of increasing attenuation on reject (TV) frequency and in making cut-off even sharper.

The circuits of end-sections are as in Fig. 10, the Tee End Section, or, as in Fig. 11, the Pi End Section.

The values of L′, C′, L″ and C″ are calculated from:

$$L' = mL \qquad C' = \frac{1-m^2}{m}.\,C$$

$$L'' = \frac{1-m^2}{m}.\,L \qquad C'' = mC \quad \ldots\ldots \quad (3)$$

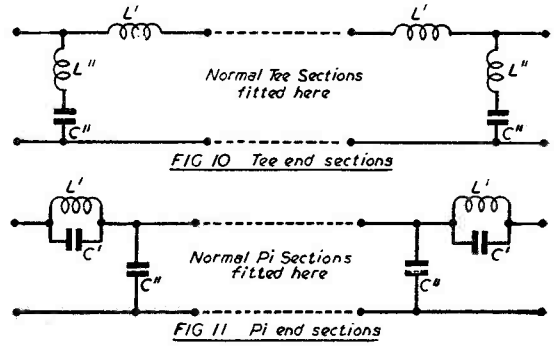
In designing a complete filter, the Tee or Pi sections are first determined for the centre portion. The end-sections are then added.

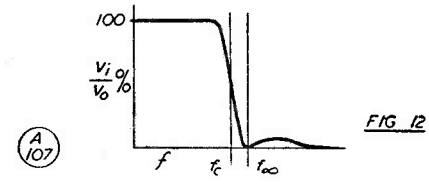
The value of *m* is determined by the ratio between the cut-off frequency fc and any one frequency f∞ where extreme attenuation is required. Thus if we make f∞ = the TV frequency then the curve would be as shown in Fig. 12, and,

$$m = \frac{\sqrt{1-(fc)^2}}{(f\infty)} \quad \ldots\ldots\ldots\ldots \quad (4)$$

It is recommended, however, to use the figure m = 0·6 and be done with it, as this gives a flat cut-off response of high attenuation and allows for more than one TV channel.

A three-section filter with end-sections will give a 75 dB cut on the TV frequency without





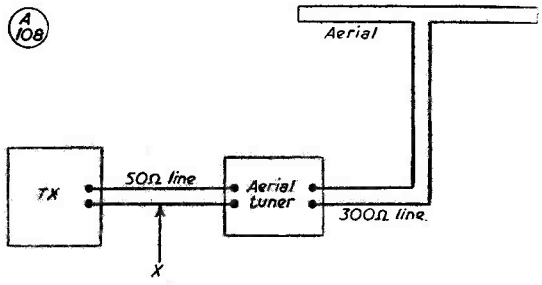


Fig. 13. Practical case in which a filter is required at point "X"

losing more than 1 dB on the transmitting frequency.

To illustrate the application of the above formulæ, here is a sample design:

An existing transmitter is arranged as shown in Fig. 13. It is decided to put a filter in at point x. This leaves the aerial tuner free of harmonics.

The transmitter must be able to work on 28 mc and all lower frequencies; the local TV frequency is 56 mc. A mid-point at 35 mc is chosen as fc.

Using formulæ 3 and 4 :

$$L = \frac{R.10^6}{2.pi.fc} = \frac{50 \times 10^6}{6.3 \times 35 \times 10^6} = 0.23\ \mu H \quad . \quad . \quad . \quad . \quad (5)$$

$$C = \frac{10^6}{2.pi.fc.R} = \frac{10^6}{6.3 \times 35 \times 50 \times 10^6} = 0.000091\ \mu F \quad . \quad . \quad . \quad (6)$$

A three-section Pi filter becomes as in Fig. 14.

For the m-derived end-sections, using m = 0·6 and formula 3 :

$$L' = m.L = 0.6 \times .23 = 0.14\ \mu H \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (7)$$

$$C' = \frac{1-m}{m}.C = \frac{1-.36}{0.6} \times .000091 = 0.000097\ \mu F \quad (8)$$

$$C'' = mC = 0.6 \times .000091 = 0.000055\ \mu F \quad . \quad . \quad . \quad (9)$$

The complete filter now becomes as in Fig. 15.

Inductances for filters are usually made from heavy wire, self-supporting and compact. For

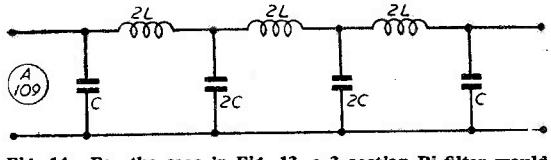


Fig. 14. For the case in Fig. 13, a 3-section Pi filter would be as shown here. Values are: 2L, 0.46 μH; 2C, .00018 μF; C, .00091 μF.

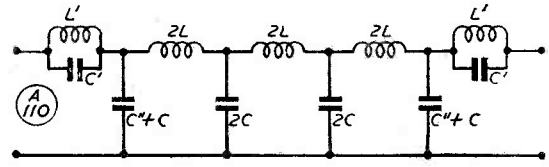


Fig. 15. Filter complete for the requirement called for at point 'X' in Fig. 13. Values are: 2L, 0.46 μH; 2C, .00018 μF; C" + C, .00014 μF; C', .000097 (.0001 μF near enough); L', 0.14 μH.

the sample design, the following could be used: 0·46 μH; 9 turns 16 SWG ½" I. Dia., spacing 8 turns to the inch. 0·14 μH; 3 turns; other details as before.

An illustration of a method of construction is shown in the photograph. An important point to note is that condensers, as usually understood, are *not* used. Normal type condensers have an appreciable amount of inductance in their connecting leads. To avoid this, a concentric type, see Fig. 16, is used for all

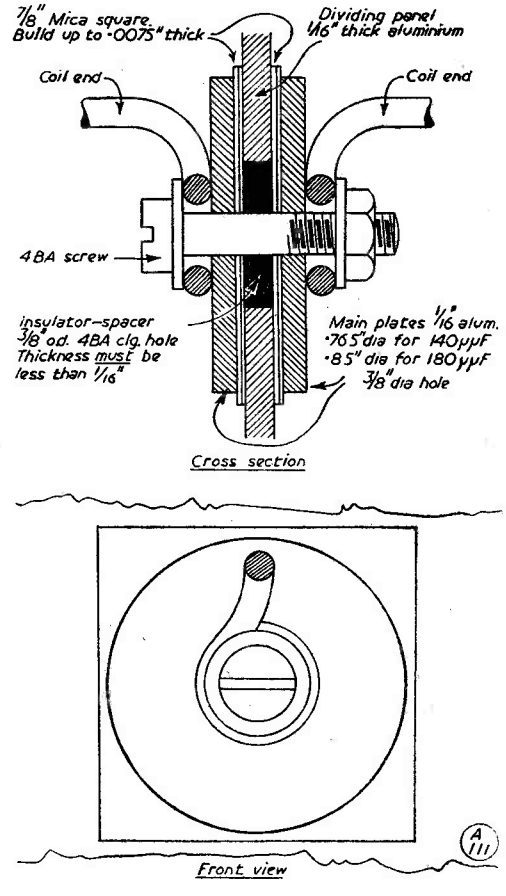


Fig. 16.

shunt condensers. Each unit of inductance is screened from its neighbour to prevent coupling and this screen also serves as mid-plate for the shunt condensers. Mica is used as a dielectric and capacity area is calculated as follows:

For the sample design, capacities required were 0·00014 and 0·00018 μF.

$$\text{Mica at 0.0075 inch thick} = \frac{0.0002\ \mu\text{F/sq. in.}}{.00014} \quad (10)$$

$$\text{Total area for capacity} = \frac{.00014}{.0002} = 0.7 \text{ sq. in.}$$

for the .00014 μF . . (11)

and,

$$\frac{.00018}{.0002} = 0.9 \text{ sq. in. for the .00018 } \mu\text{F} \quad . \quad . \quad . \quad . \quad (12)$$

If 2 circular plates are used (Fig. 17) then total area

$$A = 2 \times (\text{large area} - \text{small area})$$

$$= 2\left(\frac{\text{pi. } D^2}{4} - \frac{\text{pi. } d^2}{4}\right) \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (13)$$

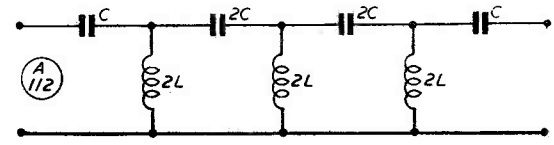


Fig. 17. A high-pass filter, in which positions of C and L are reversed. For working into 50-ohm line, and designed to give a cut-off frequency of 35 mc, values would be: 2L, 0.46 μH; 2C, .00018 μF; C, .00009 μF.

If d is made $\frac{3}{8}$" dia., then

$$A = 2\,(.7854\ D - .11) \text{ or } D = \sqrt{\frac{A + .22}{1.57}} \quad . \quad . \quad . \quad (14)$$

$$D = \sqrt{\frac{(.7 + .22)}{1.57}} = .76\text{" for dia. of .00014 } \mu\text{F} \quad . \quad . \quad (15)$$

$$D = \sqrt{\frac{(.9 + .22)}{1.57}} = .85\text{" for dia. of .00018 } \mu\text{F} \quad . \quad . \quad (16)$$

There is nothing to adjust in a low-pass filter and nothing to get out of order. It either works properly or it doesn't. It is first care-

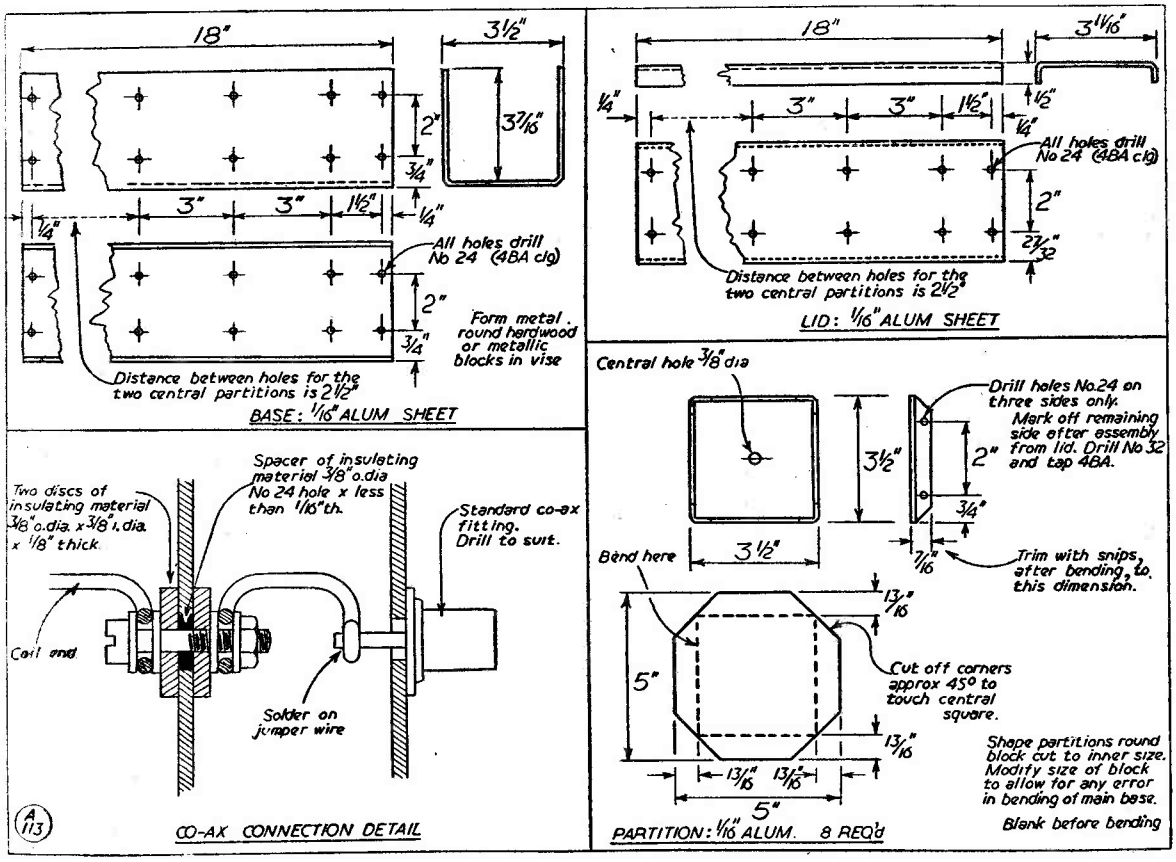
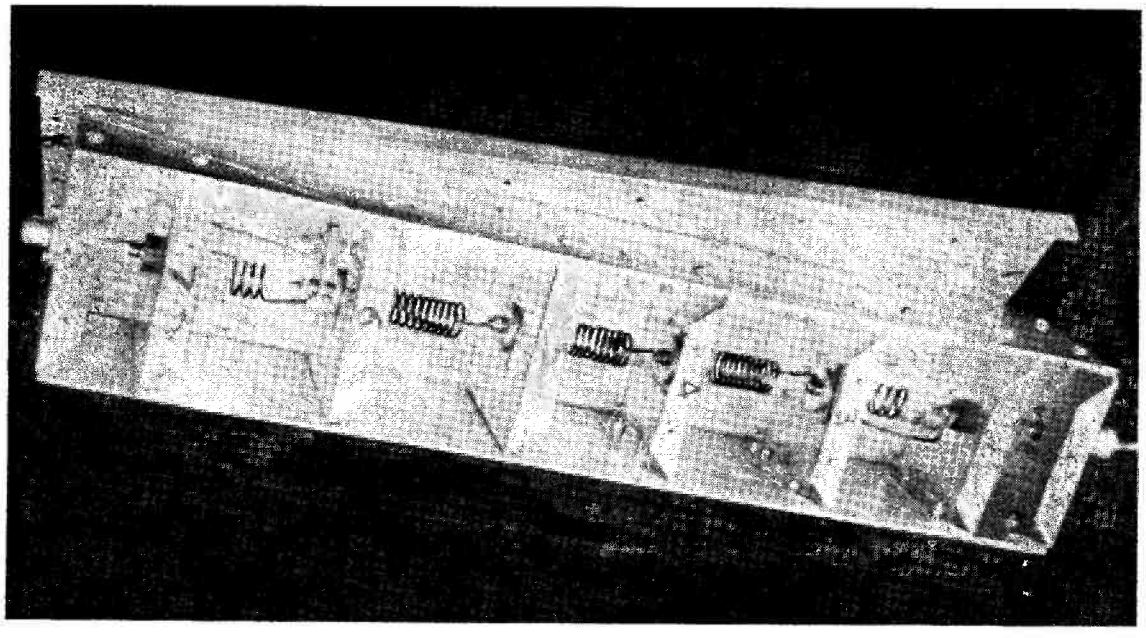


Fig. 18. Construction of the screening box for the filter shown at Fig. 15, with inter-connection details.



Method of construction of the complete filter shown at Fig. 15. Details of the coupling capacity used are given in the text, and constructional data for the screening box in Fig. 18.

fully designed and constructed, then fitted and forgotten. Values of capacity and inductance are not important to closer than 5%. Low-pass filters are not tuned and variable condensers should be avoided.

A point of interest to note is that two or more similar filters, having the same values for R and fc, may be connected in series for still greater attenuation.

High-pass filters of Tee or Pi section for connecting in the aerial leads of TV sets to reject amateur frequencies, are constructed in exactly the same manner except that the position of L and C is reversed. End-sections are not necessary. Construction may be lighter and wire-end condensers used (see Fig. 17). In this case it is the inductances L which shunt the unwanted frequency to earth.

From the writer's own experience, the road to complete TVI proofing, with happiness on both sides of the fence, depends on four main issues, *viz.*:

(1) Effective transmitter screening.
(2) Effective filtering of all power leads from the transmitter.
(3) Low-pass filter in aerial lead of transmitter.
(4) Simple high-pass filter in TV aerial feeders.

If all these points were applied, what goes on inside the transmitter becomes relatively unimportant. The high-pass filter for TV sets could be a cheap inclusion which all manufacturers should fit in their own interests.

CIRCULATION IN GERMANY

We receive frequent enquiries from Germany in particular and the Continent generally as to how *Short Wave Magazine* can be obtained by Continental readers in view of the currency controls now exercised by most European countries. One year's subscription costs Dm.19.50 for German readers, who can place their orders, with remittance in Deutsche-marks, on Wm. Dawson & Sons, GmbH. Klosterstrasse, 34-36, Dusseldorf, Germany, to whom Continental enquiries can be directed.

HONOURS AND AWARDS

In her Majesty's New Year Honours List, published on January 1st last, we were glad to note the names of: Mr. William Gordon Radley, Engineer-in-Chief, General Post Office, accorded the dignity of a knighthood; Mr. G. D. Smith, lately chairman of the Radio Industry Council, who is made C.B.E.; and P. M. Carment, better known to many readers as G5WW of High Wycombe, Bucks., who becomes M.B.E. To these gentlemen, we offer congratulations and good wishes.

Sir Noel Ashbridge Replies

When the Editorial for the last issue of SHORT WAVE MAGAZINE *was in print, advance copies were sent to BBC Publicity, to Sir Noel Ashbridge, and to other interested parties, including the General Secretary of the Radio Society of Great Britain.*

Sir Noel Ashbridge and the BBC were invited to comment for publication in this issue, and their replies appear below.

From **Sir Noel Ashbridge**

Thank you for letting me see a page-proof of your Editorial in the January issue of the Short Wave Magazine.

I am sorry that you should object to my talk in the BBC Home Service on December 18, but I cannot agree that, at any rate, all your objections are justified. In reply to your second paragraph, it is not implied, in my opinion, that the BBC "carried through *all* the experimental work . . . . " (the italic is mine). What I did imply was that the BBC was interested in the early stages and was instrumental in setting up an experimental broadcasting station to find out what equipment would be required for broadcasting to the Dominions and Colonies after it had become clear that short waves apparently provided a possible means of doing so.

With regard to the first sentence of the third paragraph of your Editorial, I really think this should be regarded as an overstatement. With regard to the last part of this paragraph, I would like to say that the last thing I wished to do was to underrate the work of Mr. Marcuse, for whom I have the greatest respect.

I think your Editorial merely emphasises once more the danger of attempting to give credit for achievements in the more or less distant past. If only a very few names are mentioned, there are those who, perhaps naturally, object. If a large number of individuals or groups are mentioned, objection is made that their respective contributions are not comparable.

Yours faithfully,

N. Ashbridge.

SIDCUP,
KENT.
9 January, 1954.

From **the Head of Publicity, BBC**

We have thought about this, but still feel that it is for Sir Noel Ashbridge to make any comments on your Editorial. It is, of course, true that BBC facilities were used for the broadcast, but the Corporation has not made any statement on this subject, and it would be quite wrong, in our opinion, for the Corporation to reply to a criticism made of Sir Noel Ashbridge's broadcast.

Yours sincerely,

Douglas Ritchie.

BRITISH BROADCASTING
CORPORATION, LONDON, W.1.
12 January, 1954.

Not much change, one may say, and it is fair to comment on these replies. The important point is that the broad facts as stated in the January Editorial are not denied, and readers will be particularly struck by the last paragraph of Sir Noel's letter. We say that, in the context of his broadcast, it would have been appropriate—and no more than just—to have mentioned the achievements of radio amateurs *as a body* and the name of Gerald Marcuse, G2NM, in particular for his totally unrewarded (and apparently now unrecognised) pioneer work in the very field over which Sir Noel Ashbridge's discussion ranged.

It will also be noted that at the end of the second paragraph of his letter Sir Noel says that the BBC set up their experimental station *after it had become clear* that short waves provided a means of broadcasting to the Empire.

This is, of course, the whole basis of our argument ! It was the amateur results that made it clear, because it was the amateurs who produced the experimental proofs that long-distance working on short waves was a practical possibility. They were the only people who could do it for the simple reason that it was only the amateurs who were using short waves —there was virtually no commercial occupancy below 200 metres until the mid-1920's, believe it or not—and as amateur stations were distributed and organised on a world-wide basis, by the accident of fate they were placed in an unique position to provide just the experimental proofs that were needed. This is the central and indisputable fact which, because it all happened " in the more or less distant past " (to quote Sir Noel) is now being brushed aside as of no particular consequence.

Had the amateurs not been driven—by the pressure on ether space above 200 metres and the fear of amateur interference with broad-

casting and the other services then being developed—on to the vast silent spaces below 200 metres, it is certain that it would have taken commercial interests many years to make a start on short wave exploration. The reason for this is that at that time, the early 1920's, there was very little commercial research effort available for such a nebulous conception as communication on short waves; there was a general feeling that wavelengths below 200 metres were more or less useless, and the radio industry as it then existed was far too busy developing and exploiting the broadcast receiver market and building up long-wave communication systems.

On the other hand, by about 1928 amateurs had achieved long-distance working on wavelengths as low as ten metres, whereas another five years were to pass before the BBC was able to commence regular short wave broadcasting to the Dominions and Colonies. On the old 45-metre amateur band world-wide communication had become possible by 1925.

The foregoing, which may in itself be news to many of our younger readers, is merely an outline of the course of events, which can be traced not only through the radio press of that time, but also by reference to published works such as Ladner & Stoner's *Short Wave Wireless Communication* and the Science Museum Handbook *History and Development of Radio Communication.* Apart from that, we are fortunate in still having with us many of the pioneering radio amateurs of those days who, like the writer of this piece, have their own records as well as their recollections.

Finally, a word about the BBC's reply to the January Editorial. As this broadcast was made by the ex-chief of the BBC's engineering department, at a peak BBC listening hour, concerning BBC technical development, by BBC authority and using BBC facilities, it seems to us very much a matter on which the BBC should be prepared to comment. As it is, the official BBC reply is a perfect example of evading the responsibility for making any statement at all.

A. J. F.

ANOTHER TRANSISTOR TRIUMPH

Among those amateurs experimenting with transistors is G3HMO (Buckingham), whose line of approach is a little different from most, in that he is *making* his own germanium triodes! Having obtained LF oscillation around audio frequencies, the next step was to try to get one of his home-made transistors oscillating in our lowest frequency amateur band. This was successfully achieved on January 3, when in the presence of G5RZ and G6FO—assisting in the experiment—oscillations were obtained on 1900 kc, but with a very rough and unstable note. By the use of an 1898 kc crystal, however, the signal was cleaned up considerably, but was still not good enough to do much with on the air. G3HMO then made yet another transistor, and using a QCC Type P5 crystal of 1858 kc, was able to radiate a perfect T9x CW signal, received at S9+10 at G6FO 1½ miles distant on January 19 for his first "cold QSO." On Sunday, January 24, extensive tests were undertaken. The transistor CC CW on 1858 kc was received at RST-569 by G5RZ, Leighton Buzzard (15 miles); at 559x by G3JNU, Bedford (22 miles); at 449 by G3ADK, Luton (25 miles); at 559 by G5WW, High Wycombe (28 miles); and at 449x by G6XH, Chorley Wood (34 miles). Input to the single stage transistor transmitter was 20 milliwatts maximum. Later, G3HMO attempted phone, which was received locally at readable strength by G6FO and G6KJ. Note that all this was with a *home-made* transistor, giving an RF output of perhaps 5 mW; taking the input power as 20 mW and G6XH as "best DX," the power-range figure is 1,700 miles per watt on this QSO. These striking results represent probably the very first use of a home-made germanium triode for actual communication purposes. It is also interesting to note that, in the course of the tests, G3HMO discovered that he could receive phone from local stations G6FO and G6KJ on the transistor transmitter, which was thus operating as a true transceiver! Experiments are proceeding, and will be fully described in SHORT WAVE MAGAZINE in due course, with the circuitry and other details.

OOJAH PANCAKES

This will bring a thrill of recollection to those readers who "go back to" the early twenties in their radio experience. Oojah coils were slab- or basket-wound affairs, and represented one of the first attempts to produce what we would now call a low-loss coil. Of proprietary manufacture, and patented, they first appeared about 1922; a set of eight, to cover 150-26,000 *metres*, cost 7s. 6d.

CORRECTION—"MORE ABOUT CLAMP CONTROL"

In the circuit on p.666 of our January issue, look at V2 and note the position of the marking "C2." The draughtsman should have shown a fixed condenser at this point, this being the .01 μF coupling capacity between the anode and the strapped diodes of the 6SQ7. It should *not* work without this condenser!

Automatic Send-Receive Switching

INGENIOUS KEY-CONTROLLED SYSTEM

D. P. TAYLOR, M.B.E., A.M.I.E.E.
(G8OD)

The circuit described by our contributor will be of great interest to all keen CW operators. It takes the change-over motion beyond even the "one-switch-and-relays" stage, bringing it on to the key itself. The notes below describe in detail how to set up and adjust the circuit.—Editor.

ONE of the essentials to snappy operating is the ability to change from "transmit" to "receive," and *vice versa,* very rapidly and with a minimum of effort. In some cases as many as five or six switching operations have to be performed at each change-over, these including Tx HT supply, aerial from Tx to Rx, phones from Rx to monitor, muting receiver, and so on. Though the operator may acquire sufficient manual dexterity to perform these functions very rapidly, how much better to have everything on one switch. A switching problem began to develop at the writer's station when activities recommenced after the war, and it was obvious that something had to be done about it. The first step was the acquisition of a multi-pole change-over relay to effect all functions (except, of course, aerial switching, where in the interests of efficiency a separate RF relay was used, although this was energised from the master relay). This relay fortunately had a high resistance coil and for convenience was connected in series with the main HT-positive supply to the receiver and operated by the receiver "stand-by" switch, which was connected also in series with this circuit. This, of course, resulted in a great improvement in operating, since one switch movement only was necessary to effect change-over.

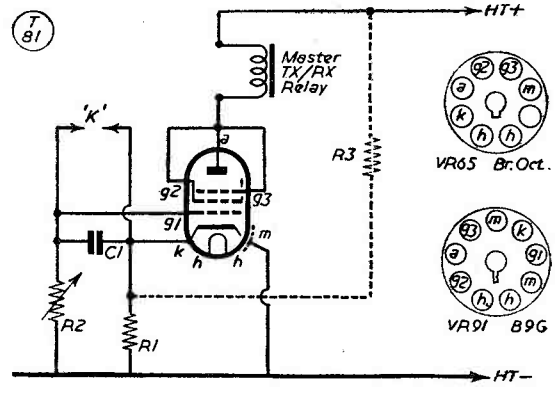
Making It Better

After working in this manner for some time it occurred to the writer that a further improvement was possible if it could be arranged that the relay would operate automatically as soon as the Morse key was depressed, and revert to the "receive" position at the conclusion of keying. Some experiments were carried out using high values of capacity in shunt with the relay coil. This did not prove entirely satisfactory, since if a fixed delay time was adopted it was either so short as to cause the relay to change over in the intervals between words at slow speeds, or so long as to miss the opening of a transmission at high speeds.

It was decided that the requirement was for an electronic device which would close the relay instantaneously when the Morse key was first operated, but release it after a certain delay at the end of keying. It was essential that the duration of this delay should be capable of being varied by a one-knob control mounted on the key, thus catering for differing operating speeds.

How It Works

The circuit finally adopted is that shown at Fig. 1. It will be seen that this consists of a triode valve (or pentode strapped as a triode), having the master relay in its anode circuit and a fixed bias resistance. The contacts "K" are carried on the keying relay and close when the key is depressed. If a keying relay is not used, then these contacts can be mounted on the Morse key arm, in addition to the normal keying contacts. The master relay is connected so that "receive" conditions



Circuit of the key-controlled change-over system devised by G8OD, and fully explained in the text.

Table of Values

The G8OD Auto-Control Circuit.

C1	= 0.5 μF	R3	= *see text*
R1	= 5,000 ohms	V1	= VR65, VR91 or similar, triode connected.
R2	= 1 megohm variable		

exist when the relay is not energised. When the contacts "K" are closed by depressing the Morse key, the grid and cathode of the valve are connected together, and resulting from the zero bias on the valve a rise of anode current occurs, thus closing the relay. The maximum value of the anode current is limited by the cathode resistance R1, which under these conditions is acting as a simple series limiting resistance. When the key is released the grid of the valve is disconnected from cathode and connected to the bottom of the bias resistance through R2, *i.e.*, negative bias is applied. The anode current does not fall immediately since the condenser C1 has to charge up to the value of the bias through the resistance R2. If correct values are chosen for C1 and R2, the relay will not fall out during the intervals between letters and words. As previously explained, to provide for different keying speeds this delay must be variable. In the unit built by the writer a condenser of 0·5 μF is used with a 1 megohm variable resistance, which allows anything between instantaneous operation and about 3 seconds delay, sufficient for normal working.

The circuit values shown in Fig. 1 are used with a relay having a resistance of 5,000 ohms and which closes at 5 milliamperes and opens at 1 milliampere. Any valve which will pass sufficient current to close the relay is satisfactory, and this provides an excellent opportunity to use up one of the types so common to surplus equipment and which clutter up most amateurs' junk-boxes, such as VR65, VR91, and so forth. The cathode resistance is chosen, as explained, such as to limit the anode current necessary to that required to ensure positive closing of the relay. It may be found that with certain combinations of relays and valves, the relay does not fall out readily after the delay time has elapsed. The reason for this is that the anode current of the valve clearly cannot fall to zero, since if it did there would be no voltage drop across the bias resistance to provide bias. In such a case a resistance R3 should be connected between HT positive and cathode as shown dotted in Fig. 1. This should have the highest value that permits satisfactory operation; it is not critical and about 200,000 ohms is usually suitable. The use of such a device will enhance the pleasure of operating, and in practice one soon learns to set the variable delay to a value most suited to the speed of transmission.

POSTAGE — PLEASE NOTE!

Due to heavy postage charges, we must ask that in future all correspondence to which a reply is expected should be accompanied by a stamped addressed envelope. This need not, of course, apply to correspondents' reports for our various activity features, to which in the ordinary way no individual reply is given.

G3JFP NOW ON PHONE

The many readers interested in the progress of G3JFP—*see* "Station G3JFP On The Air," *Short Wave Magazine*, June 1953—will be pleased to hear that he started working 80-metre phone in mid-January; look out for a QSO with him and, remembering that he is operating under more than ordinary difficulties, give him a clear channel.

CALL BOOK — WINTER EDITION

The Winter Edition of the *Radio Amateur Call Book* is now available from our Publications Dept., price 27s. post free. The G Section consists of 21 pages of 61 columns, giving the call-sign/addresses of more than 7,500 licensed amateurs in the British Isles. All new calls and changes of address as published in "New QTH's" in *Short Wave Magazine* up to and including the November 1953 listing are included in the Winter Edition of the *Radio Amateur Call Book*. The full edition also gives the call-sign/addresses of all known amateurs throughout the world (exclusive of the Iron Curtain countries) and includes a lot of useful and interesting DX information as well. The Foreign edition of the *Call Book* (which omits only the Americans) still costs 10s. and is also available in the latest printing. Order on: Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

XTAL XCHANGE

Readers interested in the *exchange* of crystals to meet particular frequency requirements are invited to make use of this space, which is free. Notices should be set out in the form shown below, and sent in on a separate slip headed "Xtal Xchange — Free Insertion." All negotiations should be conducted direct.

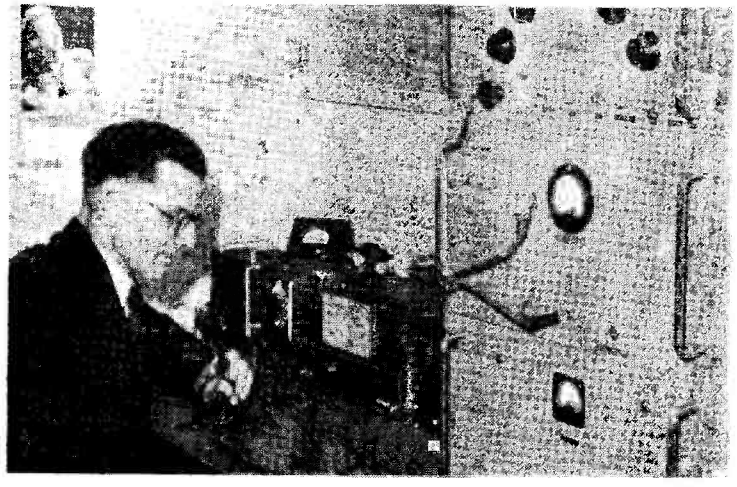
G2FCA, 26 Northolme Gardens, Edgware, Middx.
Has QCC Type P5 crystals 3564, 3602, 7185, 7278 kc, certificated. Wants Brookes or QCC rectangular type, certificated, for frequencies 7000-7010 kc or 14000-14350 kc.

G3AAJ, 385 High Street North, London, E.12.
Has 1852, 1861, 3616.5, 7075, 7200 kc crystals and 465 kc band-pass unit. Wants any crystals for 3.5 mc band, or 8-12 mc for multiplying to 144 mc band, in FT3 mountings.

G3GSS, 185 Henley Avenue, Cheam, Sutton, Surrey.
Has 6010 kc crystal, ¼-in. pins; 8029.4 and 8090.7 kc in ½-in. mounting. Wants any frequency 8047-8069 kc for multiplying into Zone J.

DX COMMENTARY

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



G3GJF

ONCE again we report a mixed bag, but not by any means an uninteresting month. Conditions have fluctuated from very bad to very good, and have favoured first one band and then another. This has meant that most of our versatile five-band types have always found something to interest them. Conversely, those who stick to one band have had a pretty boring time, unless their speciality has happened to be the Top Band.

The propagation forecasts from WWV have been varying from "U5" to "N7," but have not coincided too well with the actual level of conditions (from our point of view). The HF bands have behaved more or less as one would expect, except that 21-mc openings have been far too rare. The 14-mc band has been wide open most mornings and afternoons, and 7 mc has been its usual inscrutable self—by which we mean that even when this band *sounds* good, one often has a blank day, and then on the very next day one finds DX at the most unlikely times.

The real event of the month has been the amount of DX appearing on the Top Band; and it has so happened that the dates chosen for the Trans-Atlantic Tests have coincided with some of the worst conditions experienced on the band! But fortunately there is nothing to stop us chasing the DX at any other times, and week-day mornings have seen some very nice contacts up there. We will deal with this band first.

CALLS HEARD, WORKED AND QSL'd

Top-Band DX

Proof that real, genuine QRP will do the job is afforded by quite a few contributors. G2HKU (Sheerness) fixed a sked with W1BB (January 3) and was amazed to QSO and get a report of RST 239. 'HKU only has a 66-ft. dipole, and a 6L6 running at 5 watts off the DC mains. He wonders whether anyone else has "got across" with a 66-footer yet? GW3ZV (Rhigos) was heard working KV4BB the same morning.

GC2CNC (Jersey) made what is believed to be the first GC/W contact on Top Band when, on Christmas morning, he worked W2QHH. 'CNC was using 4.4 watts. (It is only fair to add, here, that we have been told that this was a case of each station hearing the other and not making a complete two-way of it until the QSL's confirmed the RST reports, though apparently GC2CNC did get his report direct and therefore it was a complete QSO from his point of view). But whichever way you look at it—with 4.4 watts it is nice going. And GC3EML (Jersey) worked W1BB on January 17.

G3PU (Weymouth) almost certainly scored a resounding "First" on January 2 by working VP7NM at 0720. Any claimant to a previous VP7/G contact speak up quickly, please!

Evidence of yet another new one is supplied by G3JKO (Nottingham), who logged KZ5DE calling CQ at 0545 GMT on January 10. Lots of people called him, apparently, but nobody succeeded in working him. On January 17, G3JNO (Winslow) worked ZC6BB.

G2HX (Gloucester) had worked at least ten W or VE stations prior to January 1, without ever coming on before 0700 GMT. This, in fact, seems to have been a feature of this year's Trans-Atlantic work; conditions often seem to peak around 0700 or even later. On one occasion (a week-day) we logged W1BB, W2EQS and others at 579, as late as 0745, and they have been heard, though more weakly, until 0830.

KV4AA has been heard many times, and CN2AO (our old friend EK1AO) has been busy putting Tangier back on the map.

Add to all this the frequent appearances of ZC4GF, ZC6BB, DL7AH, HA3O, the HB's and the OK's, and you begin to wonder whether we are talking about Top Band or 14 mc!

Other stations on this side who have done well are G5JU (Birmingham), G6BQ (Gravesend), G6GM (Holsworthy), GW3ZV (Rhigos) and EI9J—but it is invidious to single any out, and for the moment we will just say that many new Trans-Atlantic contacts have been made by a great variety of stations. We are *not* dealing here with the organised Sunday morning tests, which will be the subject of the usual report later in the year.

Normal Top-Band Work

First of all, an apology from GM3HLQ and his explanation of an abortive sortie. He set out for Nairn "as advertised last month," all ready to work everybody for that rare and sparsely populated county, but on an icy road in the dark slid into a ditch, and ended up with his car bogged down in soft snow; as if that were not enough, the transmitter was damaged by the shake-up. This was at 8 o'clock at night in one of the loneliest parts of Scotland, and put paid to any possibility of /P working on that trip. GM3HLQ says "I feel I've let some of the boys down, but do please emphasise that I shall go back there again." And those many 160-metre GDX operators who were on the *qui vive* for GM3HLQ will want to thank him for trying and sympathise with him in his bad luck on this occasion.

G3HYJ (Norwich) reports some good daylight work, which includes HB9T at 1132 on December 20, and GM3EHI at 1120 on January 3. He also forwards glad news about activity in Suffolk, as G3ETP (Lowestoft) came on and said that he will be active after 2230 or thereabouts, while the coastal stations are not too busy.

G3JEQ (Great Bookham) reports his score of 61 worked and 29 confirmed, in the hope of attracting a few more QSL's! GI6YW (Belfast) has now been operating for a year without a mast (the back fence seems to work almost as well), but finds the commercial QRM pretty terrifying—and he thinks a lot of it comes from Eastern Europe in the form of military stations. Quite definitely, there is a lot of stray seaweed on the band that is *not* caused by the maritime users. 'YW managed to work OK1HI with his "jury-aerial," and was one of those anxiously looking out for GM3HLQ/P.

GC3EML (Jersey) is another who enquires after Nairn, and adds "all the boys are waiting." He heard ZC4JA on January 11 at 1815, but he disappeared in the QRM.

GM3IGW (Alloa) raised HB9T at 1415 GMT on December 20, and was heard in W-land on the same day for the first time. Then on January 10 he worked CN2AO for a new country and continent. Otherwise his activity has been on phone, which has been covering the British Isles pretty well.

G3DO (Sutton Coldfield) is active on the band again, and is aiming seriously at that WABC target. G3HIW (Ilford) collected GW3CPU (Cardigan) and GM3GCH (Banff) to make his total counties 75.

G6VC (Northfleet) is still the highest-scoring G station in the WABC table, with 82 worked and confirmed; he thus disproves the theory that one has to be in a "rare" county to get to the 80 mark. On December 15 he was delighted to work ZC4GF. The difficulty now is finding new ones—either counties or countries—but 'VC says there are 9 GM's, 1 GW, 3 GI's and 2 GC's still eluding him; and he missed out on 3A2BM, which rather hurt.

G5LH (Horbury) landed CN2AO on January 3, and is now up to 80 confirmed . . . . G3ITY (Chester) is moving to a new QTH, where a 1000-ft. aerial will be a possibility . . . . GD3FBS (Douglas) uses two 99-ft. wires clipped direct to his aerial tuning coil, and his shack is six storeys up, 80-ft. above ground . . . . G6QB worked W2GGL one morning, and did not discover until afterwards that the far end of his long wire was lying on the ground. The next step will be to bury the whole thing . . . .

Stop Press. — On Saturday, January 16, G3PU scored what is believed to be another Top Band "First" by working KZ5DE. Contact was established at 0708 and continued until 0732, with KZ5DE at 569, and G3PU's signals at 559.

Eighty Metres

For the DX types, sad to say, the 80-metre band has become quite the least interesting of the lot. The HF end is the permanent haunt of phone parties—and quite rightly so—and the LF end is mostly used for short-range CW chats. The general clutter is so terrific that one must be really

FIVE BAND DX TABLE

POST WAR

Station	Points	3.5 mc	7 mc	14 mc	21 mc	28 mc	Countries	Station	Points	3.5 mc	7 mc	14 mc	21 mc	28 mc	Countries
DL7AA	639	84	146	216	89	104	221	G5FA	406	34	118	150	31	73	166
G6QB	587	52	107	220	73	135	234	G6QX	399	51	92	143	56	57	168
G5BZ	552	59	109	227	92	65	233	G2YS	369	48	62	142	73	44	158
G2VD	493	47	89	178	70	109	187	G2BW	350	24	57	144	82	43	155
G2WW	474	23	70	189	85	107	196	G3GUM	328	31	38	168	90	1	177
G2BJY	459	48	77	141	77	116	179	GM2DBX*	319	21	31	154	32	81	163
G3FXB	439	60	109	172	59	39	174	G8VG	278	35	76	123	18	26	140
G3DO	439	24	46	195	67	107	221	G2DHV	174	20	21	107	11	15	111
G4ZU	426	11	15	195	85	120	203	4S7XG	135	1	21	98	11	4	98

* (Phone)

hard-boiled even to think of DX in terms of this band.

Despite all this, one or two interesting stations have shown up, notably AP2K, who was worked by G5LH at 0300 on January 3. He made skeds with several DL's on that band, and seems to be planning quite a lot of operation up there.

New ones for G2YS (Chester) were ZC4RX, IS1AHK and UA3AF, who seems to be one of the few privileged UA's. OX3EL was also heard on the band. G5BZ (Croydon) was another to work UA3AF.

Forty-Metre News

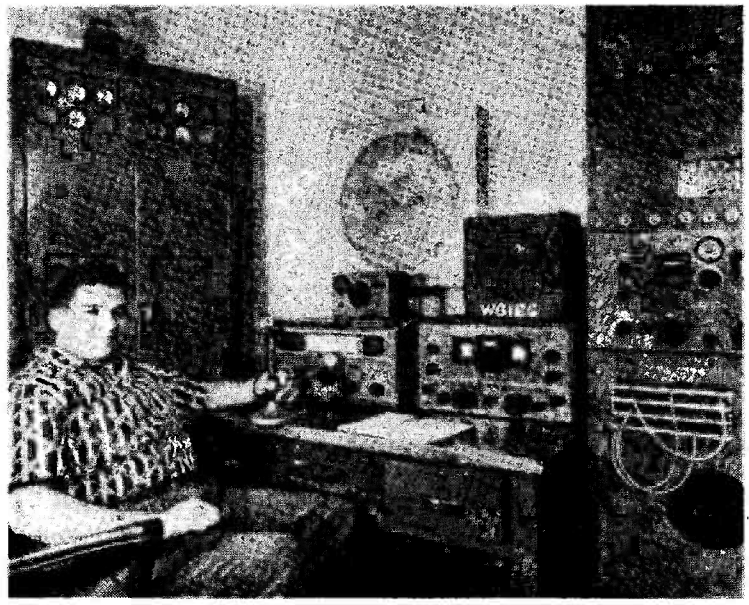
Although we know that Forty has had several nice DX spasms. very few write to tell us about them. On several occasions the W6's have been breaking through in mid-afternoon ("long way round"), and they have also been heard in the mornings, as late as 0900 GMT. Early evenings have seen Asia and South Africa cutting through the QRM, and W's and South Americans have been good later on.

EASTER ISLAND AGAIN

We are informed by CE3AG, for the Radio Club of Chile, that a Chilean naval transport has gone to Easter Island with equipment for CEØAC (Dr. Dario Verdugo), who will remain there for about a year, operating a 40-watt phone station on 14100 kc.

Another station is also being installed, for the Chilean Air Force, running a BC-610 to be used for meteorological work. But in between times the operators will also be on the amateur bands, signing CEØAD, and using CW and phone. For a short while, about now as you read this, both stations will be signing CEØAA, as they will be operated by CE3DG, who is doing the installation for CEØAC and CEØAD.

All QSL's in respect of contacts with these Easter Island stations must be sent to: QSL Bureau, Radio Club of Chile, Box 761, Santiago de Chile.



A Californian Kilowatter is W6IEG, Arcadia, Calif., who runs 1000 watts in a PA consisting of a pair of 304TL's in push-pull, with push-pull 810's modulating. Receivers are an HQ129X and a Super-Pro, and the aerial for 20 metres is a three-element wide-spaced beam.

G5BZ has been keeping a daily sked with VQ4AQ, whose signals have been so terrific that he has deluded many G's into thinking him a pirate. The "gimmick" has been a little matter of a rhombic, 18 wavelengths long, with a BC-610 at the input end! VP2GRO (G2RO in Grenada) was a nice new one for 'BZ as the result of a sked made on 14 mc.

G2WW (Penzance) joined an interesting little *phone* party at 2000 GMT one evening, with VQ4AQ and OQ5RU. G5FA (London, N.11) is an old stalwart on the band, and has returned there to winkle out MP4BBD, KV4BB, EA6AU, ZC4IP and others. He also heard CR5AC, HH2LD, MP4BAF, ZD4AB and some W6's.

G3HYJ raised ZD4AB, who told him that the former ZD4BN had left the colony for G-land. (The latter operator was also ZD2JDH, and is now resident in Norwich).

Some nice DX heard of, or heard, but not worked, includes LB8YB (Jan Mayen), VK9GM (Norfolk Island), SVØWG (Rhodes), FR7ZA, ZS7D and OQØDZ (Ruanda). So don't neglect Forty.

The DX on Twenty

Those who don't exactly rave over this band are the multitude who cannot get on the air until 1900 GMT or after; although even they are a little better served now than last month, because the path to South America is frequently open quite late. The best time of day, undoubtedly, is the early afternoon, when signals from all parts of U.S.A. seem to roar in, even when conditions are thoroughly bad. One or two outstanding W's are a reliable S9 around 1400 GMT, day after day. Occasionally the Far East is there too; sometimes the short-skippers swamp the band. But there is never any lack of activity.

G5BZ collected VQ6UU and VP2GRO (Grenada) for new ones. not only for Twenty but for any band. G3GUM (Formby) worked a couple of EL's, VK, ZL, W7 and the like; KA7AR got away. But he finds the band full of "spitch," commercials, jingle-bells and all the other stuff, and we agree that the spitch-menace is spreading. Certain Europeans now think nothing of using it right down to the LF edge. 'GUM also heard VQ6UU on the band, but plastered with W's. (We have

plenty to say about this one, later on.)

G6QB struck a morning when the JA's were pounding in like W2's. It was January 2, and after working a ZL at 0840 he was called, in succession, by JA1AQ, 2DN, 2AB and 2WB, all coming in at about 569 and receiving him the same way. None of them have ever been heard since!

GD3FBS collected ZD4, ET, ST, FQ8, ZD2, CO and VP2GRO, but missed on such nice ones as FB8, FI8, HS, YK and OD. Now that the I.o.M. "booster station" is in operation, his TVI troubles are over, and the days of continuous operation are back after two years. 'FBS uses a Collins TCS-12, slightly modified, on all bands and makes an occasional appearance on phone—but having been a brass-pounder since 1918, the old habits mostly prevail.

G3CMH (Yeovil) comments on the fine conditions of December 26, when VE5 and 7, W6, 7 and Ø were good between 1700 and 1900, with no short-skip troubles. January 10 was logged as "another good day." TA3MP was worked on phone, but HI6EC and TI2RC (both phone) got away.

G5FA raised OD5XX, EA8AP, CT2BO, 3V8AB and "the usual stuff." G3GWT (Hessle) put up a ground-plane in October last, and has joined the DX ranks since then. Before that, working even a W was quite an event! EA9DD and FI8AR have been among the recent offerings, although a card to the latter has been returned *inconnu*. Other new ones were FQ8, OQ, VP6, LB8, PJ, CR6 and so on. XZ2OM was worked at 1500 on January 13, after he had been heard calling CQ G. (He will be on every day, 1130-1230 GMT.)

G2WW has been wielding his 14-mc phone to some effect, and the best contacts have included VK2, 3, 5, 6 and 7, ZS7D, HP1EV, YV5BQ and some South and East Africans. The AAA Certificate has arrived, and the WAI has been claimed, although this one seems to be somewhat sticky.

The 21 mc Band

Perseverance on this band has been well rewarded, although there have been many blank patches. It is behaving very much as "Ten" used to, before it had descended quite so far into the depths as it is at present. G3GUM had a very pleasant surprise in the shape of FK8AB—a new one for any band. He was coming in at the same time as the VK's, on January 3, and there seems no reason to suppose him other than genuine. 'GUM also reports the W's coming through most afternoons, and says that the open paths now appear to be mostly NW and NE, with hardly any of the usual North-South stuff audible at all.

G3CMH, on phone, worked KP4WI, SVØWO, VQ2DT and 4AQ, ZC4RX, ZS1BV and sundry Europeans. Gotaways were FF8AK and ZS9G. G5FA sums up many people's feelings with a terse report of "band dead at times when I've been available."

G2WW, who must be one of the most consistent users of Fourteen, worked five new ones—HC1FS, ZS7C, HK4FV, CX3BH and ZS9G. January 3 was so good that all continents except Asia were worked, and at least three Asians were heard. In the afternoon sporadic-E contacts were made with G6BS, GM4PW and GD6IA. Other nice DX on phone has included CR6, ET, FB8BC and 8BJ, FF, KP4, KZ5, VP6 and 9, VS1, VU and ZS3. 'WW passes on VQ4RF's score for the band, which is 103 (102 on phone) and adds that Frank has now given up being a DX hound. (How *does* one give that up? We would like to know the formula).

G3HCU (Chiddingfold) found the band pretty poor, but raised CR6, OD, SV, VK, VQ3/4, W, ZD4, ZS and ZS9 on phone in the course of the month. EI6D was also worked for a new one, bringing his phone score up to 72 on this band.

Off the Air!

Well, referring back to a previous paragraph, here's something. Jim of ST2UU was operating from VQ6UU and calling "CQ G." Despite his repeated attempts to get calls on 14080 kc, all and sundry came back on his own frequency, and from everywhere except G-land. W's were included, but the main offenders were DL's. Jim explained that he was there for 15 days and that there was no need for a pile-up, but the deluge continued.

From now on we quote his letter: "There and then I decided that if I could not control them, and they could not control themselves, the best thing I could do was finally and for all time to quit ham radio. If I had been at home and found a deserving ham,

21 mc MARATHON

(Starting July 1, 1952)

STATION	COUNTRIES
VQ4RF	103
G5BZ	92
G3GUM	91
DL7AA	89
G2WW	85
G4ZU	85
G2BW	82
G2BJY	77
DL2RO	75
G2YS	73
G6QB	73
G3HCU (Phone)	72
G2VD	70
G3DO	67
ZS2AT	65
G3CMH	61
G3TR (Phone)	57
G3FXB	57
G6QX	56
G8OJ	53
ZE3JO	52
G8KP	50
VK2AWU	47
GM2DBX (Phone)	32
G2DPY	32
G5FA	31
G3WP	26
GW3CKB	19
G8VG	18
G2DHV	11
4S7XG	11

The boys at KA7RC, Iwakumi, Japan, run the full kilowatt on 14 mc, into stacked rhombics 700 feet long; the receiver is a modified AR88. The U.S. Army, Navy and Air Force are represented in the operation of this station.

he could have had all the gear on the spot. This evening a dusky gentleman thought I was mad when I made him a present of my new NC-45 receiver and the T2FD antenna — the transmitter was scrapped and the pieces dumped . . . . no more 'UU' from now on."

Jim is in deadly earnest (or was when he wrote!) we can assure you; so, with regret, we say good-bye to all the "UU" call-signs that have helped to make the bands interesting. Or will the bug bite again — perhaps?

News from Overseas

VQ4AA (Nakuru) confirms that VQ4RF has made his DXCC on 21-mc phone. He himself will be in G for four months' holiday, and would like to meet as many old friends as possible. He can be reached *via* G3HXQ of Dursley, Glos., in whose shack he hopes to spend a lot of time. Later, he hopes to become VQ3AA again. He adds that AC mains are now being installed in Zanzibar, and that a permanent VQ1 station may appear.

I5BC (Italian Somaliland) runs 25 watts phone on 14 and 21 mc and is very active on both bands. QTH: Box 347, Mogadishu.

The Selangor Amateur Radio Society ran its annual radio and electronics exhibition in December, and VS2DT was on the air during the period. DX worked included VK, CR7, ZS, KG6, 4S, VQ3, VU and XZ—all on Twenty, although conditions were not favourable. The transmitter was lent by VS2DG, and the operators were VS2AO, 2AZ, 2CB and 2DB.

Bob Kenny, ex-G3AAU, is now installed as second operator at VE3BWY in Toronto, and has been savouring Canadian hospitality ever since the ship arrived in Halifax. He has also visited several W's, including W2ICE, who has a memorable collection of "ham gear thru the years" including a complete station of the late 'twenties. Bob also has a recording, which he has offered to send across, of the Trans-Atlantic Tests on the morning of December 20. He suggests that it might be loaned out to interested Clubs.

4X4CZ (ZC6AB) has been off the air since August and expects shortly to be "just another G." ZS6ACD, lately of Johannesburg, is now ZS1ACD of Cape Town, and will be on again soon with a new CW/Phone transmitter, with which he looks forward to renewing G contacts; he also hopes to receive some overdue QSL's—particularly from VK1, VP4 and VP6 —earned as ZS6ACD.

General Notes and News

More strange behaviour on the bands—a CQ was heard from FA9VN, and, on his frequency, a station immediately, and at great length, began sending "FA9VN No QSL no QSL." FA9VN, after a while, came back with "Finish the story and give QTH," to which the mystery man replied, "What's the good if you won't QSL?" and disappeared. Maybe this makes sense, but we can't discern it.

G3ABG informs us that the Tops CW Club are now awarding a Tops Century Certificate, available to any amateur who works 100 different members. Full details and a list of members are available from the secretary, GW8WJ.

G3HJL (Boreham Wood) is so

TOP BAND COUNTIES LADDER

(Starting Jan. 1, 1952)

Station	Confirmed	Worked
GM3IGW	85	85
GM3EFS	82	83
G6VC	82	82
GM3JDR	82	82
GI6YW	81	81
G5LH	80	80
GI3HFT	80	80
GM3OM	80	80
G3ELZ	77	78
G2NJ	76	76
G3HIS	74	77
G3ESY	69	69
G3HIW	68	75
G2YS	66	74
G3IVH/A	66	66
GC3EML	65	69
G3GZJ	65	67
G3HTI	63	66
G3BRL	62	62
G5JM	61	77
G3AKY	61	64
G8TS	60	67
G2AYG	60	64
G3LP	60	60
G3ITY	44	54
G5FA	37	52
G8VG	36	49
G3DO	35	43
G3HYJ	34	53
G2HKU	33	38
G3JEQ	29	61
G3CFG	29	51
G3FZS	23	39

Short Wave Magazine

DX CERTIFICATES

The following have been awarded since the publication of the last list, in the November, 1953, issue:

WNACA

No. 62 LA6O (Oslo)
63 G3AIM (Liverpool)
64 DL1IB (Eutin-Zarnekau)

WABC

No. 45 G3AKY (Sheffield)
46 G2YS (Chester)
47 G4LA (Hexham)
48 GC3EML (Jersey)
49 G8TS (Farnham)
50 G2AYG (Bury)
51 G3LP (Cheltenham)
52 G5JM (Buckhurst Hill)

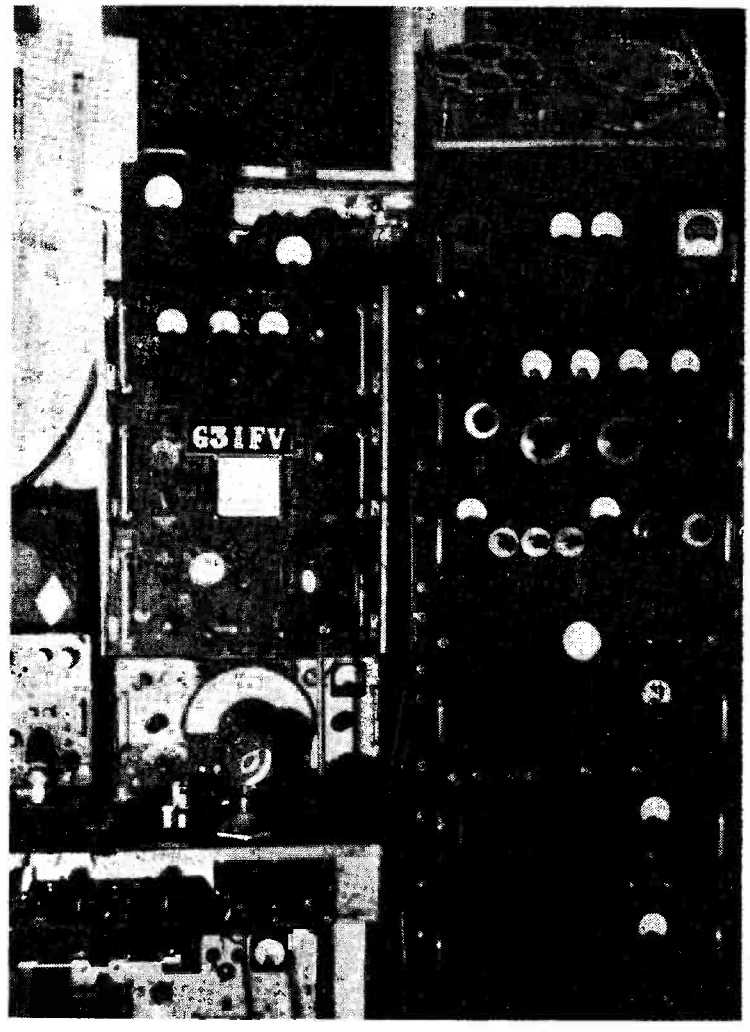
FBA

No. 23 OZ2PA (Copenhagen)
24 DL6BZ (Forchheim)
25 DL3BJ (Paderborn)
26 KP4CC (Santurce)
27 DL1IB (Eutin-Zarnekau)
28 DL1FE (Erlangen)
29 OZ7KV (Odense)

General conditions for claiming MAGAZINE DX AWARDS and CERTIFICATES appeared on p. 419 of the September, 1953, issue.

firmly wedded to QRP that he has made over 500 contacts with 2 watts or less—and he has only recently "discovered" the Top Band. Most of these QSO's were on Eighty. Best DX on the Top Band is Invergordon (over 500 miles) with one-third of a watt.

ZL2QI and a few others are interested in a scheme for letting the ZL's know just how their signals are received over here, and the information is to be published in their magazine, *Break-In*. The collector at this end is P. M. Crawford, 9 Hewitson Road, Darlington, and he would much appreciate any lists of ZL's heard or worked, with date, time, frequency and RST.



Some of the gear at G3IFV, Northville, Bristol, shortly to be featured in our "Other Man's Station" series.

TOP BAND TRANS-ATLANTIC TESTS 1953-54 SEASON

Dates:

February 14 and 28
March 14

Times:

0500-0800 GMT
DX stations call at 0500, 0510, 0520 and so on. Home stations call at 0505, 0515, 0525 and so on. Clocks should be synchronized by WWV on 2500 kc.

Frequencies:

U.K. Stations: 1830-1870 kc.
W/VE Stations: 1800-1825, 1875-1900, 1900-1925 and 1975-2000 kc, according to location.

No New Ladders

Last month G3GUM offered a suggestion for a new ladder, based on the number of times anyone makes a WAC in one day, and irrespective of band. We were open-minded on the subject, and passed it over to readers. Opinion, it seems, is overwhelmingly against it. The most frequent remark is that any ladder that puts a premium on operating time is meaningless. One comment is that anyone with time on his hands (especially on week-days) can do it time after time, day after day, and where does it get them? Conversely, people pressed for time or with fixed operating hours, would not be likely to find it possible, or wouldn't want to devote their time to it, anyway. It was a surprisingly strong reaction to a suggestion; many suggestions simply don't produce any reaction at all.

DX Strays

G2RO's Caribbean expedition will be over by the time you read

this; his appearances as VP1RO and VP2GRO stirred things up, and at the time of writing he is in VP3. Next epic, in the spring and summer, takes in Brunei, North Borneo and Sarawak.

TI9UXX made a very brief appearance from Cocos Island towards the end of last year; he made only 29 contacts and the only European among them was G2PL.

Look out for VQ7NZK and VQ9NZK some time during February. One or both places will be covered, and a stay of around two weeks is planned.

If you hear TI9AA, reflect that DI9AA (the *Xarifa* Expedition) has been given permission to land on Cocos. This one may not come off, but there seems a possibility.

VK1's have all changed around again; the only one on Macquarie this year is VK1CI (VK3ACI), while on Heard Is. will be VK1DY (VK3ADZ) and VK1PG (VK2PG). There is also a rumour that VK1EG will be on from MacRobertson Land, Antarctica.

Late News

VQ6UU, despite the statement from him already quoted, appeared again on January 20! He said that he would be active for about the first ten days in February as FL8UU, and thereafter from Yemen as 4W1UU. It seems, therefore, that he has relented after all—but we wonder what the "dusky gentleman" did about the gear. Asked a high price for it, no doubt!

G5FA kindly passes to us the following list of Calls Heard by TF5TP during the Top Band Contest on January 16-17: G2BQC, 2CVV, 2FTA, 3ANL, 3BUE, 3CYS, 3ERN, 3FVW, 3FZC, 3GGN, 3HVX, 3IEW, 3JNL, 3US, 4NS, 4QD, 5JO, 5JU, 5LH, 5LR, 5PU, 5TO, 6BQ, 6PD, 6TD, 6UJ, 6UT, 6VC, GI5UR, GM3IGW, 6IZ, 8MJ, GW3HJR, 3ZV, CN2AO and OK1HI. Nice to know we're being heard up there, and what a pity we can't QSO!

That's the lot for this month, and next month's dead line is **first post on Friday, February 12.** Address everything to "DX Commentary," *Short Wave Magazine*, 55 Victoria Street,, London, S.W.1. 73 and BCNU.

"Waves Against Waves"

ON January 19, in the Home Service, the BBC broadcast a feature programme, entitled "The Friend We Dare Not Trust," on the Dutch flood disaster early last year. This programme was well presented, and gave due credit to the outstanding service rendered by Dutch radio amateurs, as reported in the press at the time.

It happened that on the day of this broadcast we had received a copy of a remarkable booklet entitled *Waves Against Waves*, published by N. V. Philips Telecommunicatie Industrie, Hilversum, Holland, and dealing with the essential part played by telecommunications, and the communication services in general, in coping with the Dutch Floods. In *Waves Against Waves*, a very full—and probably the first authentic—account is given of the remarkable exploits of our Dutch colleagues in bringing their specialised knowledge and experience to the aid of their country.

There is space here to mention only a few of the highlights. The very first alarm was given by an unlicensed amateur operating from a yacht in Hellevoetsluis harbour, and signing PAØXX on 137 metres. He raised Scheveningen Radio in the early hours of February 1st, 1953, and on the authority of the Mayor of Hellevoetsluis, passed the first emergency messages.

By the time the landline communications had become engulfed, an Amateur Radio network had been established, with PAØYG at The Hague as control, and some 30 other PAØ's in various parts of the affected areas as out-stations. A very large volume of essential traffic was passed over this network, which remained in continuous operation throughout the period it was needed.

Of particular interest is the story of a young radio serviceman at Zierikzee, a town almost under water and completely isolated. Though not an amateur operator himself, he knew enough about it to put together, in a few hours on that awful night, a lash-up 80-metre phone transmitter that did work, using odd pieces of gear; the tank coil was wound on a bottle and the RF indicator for aerial tuning was a flash-lamp bulb. He went on the air and raised another amateur in Middelburg to bring help to his town.

The Philips concern itself played a vital part in the organising of emergency communications. They loaned mobile radio transceivers to the authorities, provided large quantities of batteries (mains power was off early in most places) and sent battery receivers into the casualty areas.

Though the rescue effort was a national one and the whole Dutch nation rallied to the aid of the country, the account in *Waves Against Waves* makes it clear that communication was the important factor. And until emergency working had been officially organised, it was the amateurs—and the amateurs alone—who were in a position to provide communication during the early hours of the disaster.

A Three-Valve Station

SIMPLIFIED TRANSMITTER/RECEIVER DESIGN FOR QRP

C. W. FINCH (G3AHO)

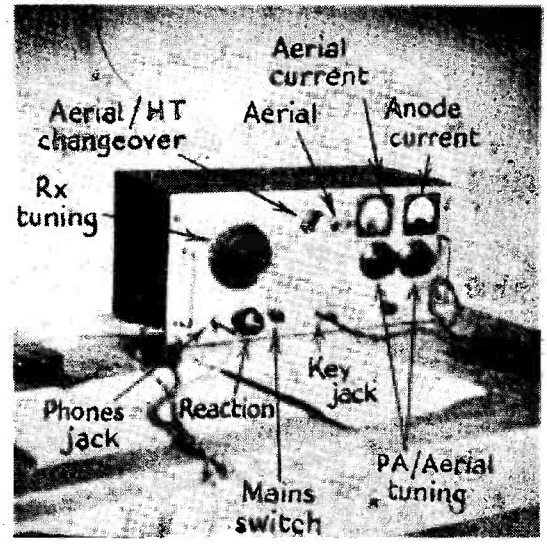
FOLLOWING a period of enforced inactivity the writer recently decided that something must be done about getting on the air again.

A little time spent in thought, and the following conclusions were reached :

(1) The gear must be cheap to build.
(2) It must take a minimum amount of time to construct.
(3) Owing to lack of space it must be compact, and transportable.

This seemed to be rather a formidable list of requirements, but the transmitter/receiver described here does conform pretty well to this specification.

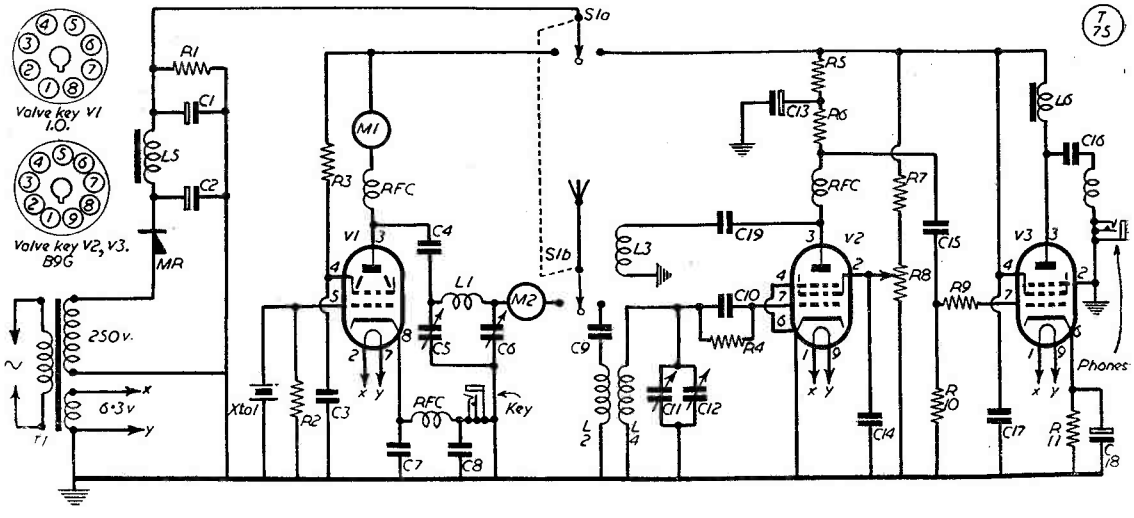
First, the junk box was sorted and all the likely components were dug out, dusted, and repaired where necessary. Then a conventional circuit was sketched out around the components available, and the rig built up, using a front panel and chassis of suitable dimensions for fitting into a disused TU unit case.



The transmitter/receiver complete, as designed and constructed by G3AHO. It is a single-valve CC oscillator, with a straight two-valve receiver, and would be particularly effective for local working on the LF bands.

The complete transmitter/receiver, aerial coupler and power pack was assembled on to this chassis—and in fact could easily have been accommodated on one much smaller.

A brief look at the circuit will show that there is nothing new in it, and no originality is claimed for it. The transmitter consists of a 6L6 crystal oscillator coupled into the aerial by means of a pi-section coupler. With the



Circuit of the transmitter/receiver as used by G3AHO for CW operation on the 40-metre band. It is essentially a low-power CC transmitter (V1), with an O-V-1 receiver (V2, V3). Particularly interesting results should be possible on the LF bands, where the receiver would be more effective.

Table of Values

Circuit of the Tx/Rx Assembly used by G3AHO.

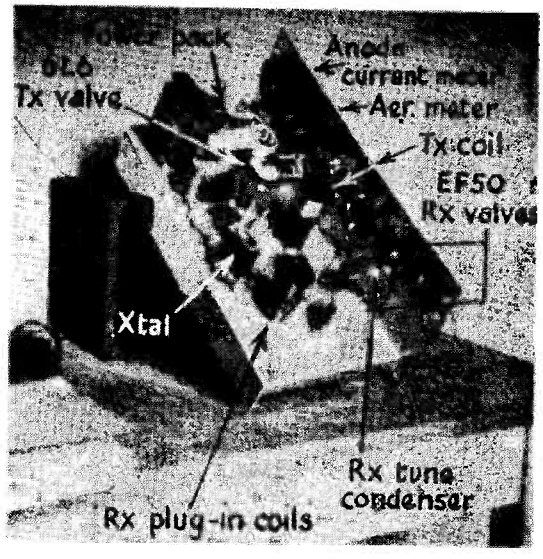
C1	= 16 μF, elect.	R6	= 100,000 ohms, ½ watt.
C2	= 8 μF, elect.	R7	= 22,000 ohms, ½ watt.
C3, C4	= 0.01 μF.	R8	= 50,000 ohms.
C5, C6	= 350 μμF, variable.	R9	= 4,700 ohms.
C7, C9, C10, C19	= 100 μμF.	R10	= 470,000 ohms.
C8	= 0.5 μF.	R11	= 300 ohms, 1 watt.
C11	= 160 μμF, variable.	V1	= 6L6.
C12	= 20 μμF, variable.	V2	= EF50.
C13	= 4 μF, electr.	V3	= EF50.
C14, C15	= 0.1 μF.	L1, L2, L3, L4	= For band(s) required.
C16, C17	= 0.25 μF.	L5	= Smoothing choke.
C18	= 25 μF, elect.	L6	= AF Choke.
R1	= 50,000 ohms, 1 watt.	S1	= Change-over switch.
R2	= 22,000 ohms.	M1	= 0-50 mA.
R3	= 15,000 ohms, 1 watt.	M2	= 0-0.5 amp RF.
R4	= 2 megohms.	MR	= Metal rectifier.
R5	= 47,000 ohms, ½ watt.		

power pack used the input is in the region of 12 watts.

Reception

An EF50 regenerative detector, RC coupled to another EF50 as an audio amplifier, covers the receiving side. The power pack is a simple half-wave arrangement.

It is not claimed that this rig will dig out the DX, but anyone with strictly limited means or space can quickly and cheaply build up this complete QRP CW station and be sure of some interesting QSO's. The usual rules applying to QRP working must, of course, be obeyed. The writer has not been able to try the transmitter out with anything like an aerial owing to the "regulations" in force at his QTH regarding outside sky-wires, but even so an



Inside the G3AHO QRP station, which is self-contained for power. He needs only an AC point, a key and whatever sort of aerial can be erected, to go on the air.

HB9 was raised recently during the heat of a Sunday battle on Forty.

All that is needed to get the station on the air is a piece of wire for the aerial, a power point and a pair of phones and a key, plugged into their respective jacks.

The station has been worked consistently in the same room with the XYL watching the TV programme without the slightest trace of TVI. *Vive le QRP.*

AN EMERGENCY SIGNAL SOURCE

The writer recently had to realign the 28 mc range on his receiver. No signal generator being to hand, an attempt was made to use a harmonic from the station wavemeter, which operates on a 1.8 mc fundamental, but the receiver was so far out of alignment that the weak closely-spaced 28 mc beats could not be identified. The urgency of the problem led to the household BC set being pressed into service as an emergency "signal generator"! The BC set was tuned to 14 mc, so that the local oscillator second harmonic of approximately 28.93 mc provided a strong, easily identified signal which was used to line up the receiver. (G3ETH).

BROADCAST RECEIVING LICENCES

13,216,644 broadcast receiving licences, including 2,846,227 for television and 202,676 for sets fitted in cars, were current in Great Britain and Northern Ireland at the end of November, 1953.

During the month the number of television licences increased by 119,157.

DAWE INSTRUMENTS

We are informed that the well-known manufacturers of electronic measuring instruments, Dawe Instruments, Ltd., are moving to extensive new premises at 99 Uxbridge Road, Ealing, London, W.5.

CARDS IN THE BOX

Operators listed below, for whom we have no forwarding address, are asked to let us have a large stamped, self-addressed envelope, sent to BCM/QSL, London, W.C.1, for the delivery of cards held for them in our Bureau. If publication of the call-sign/address in "New QTH's" and in the *Radio Amateur Call Book* is also required, that should be mentioned when sending in the SAE.

G3BDP, 3EAE, 3JBT, 3JGH, 3JGV, 3JHA, 3JHP, 3JJI, 3JJZ, 3JKL, 3JLR, 3JUG, 3JWT, 3PG, GW3CX.

Behaviour of the Bug

HINTS ON HOW TO TAME IT

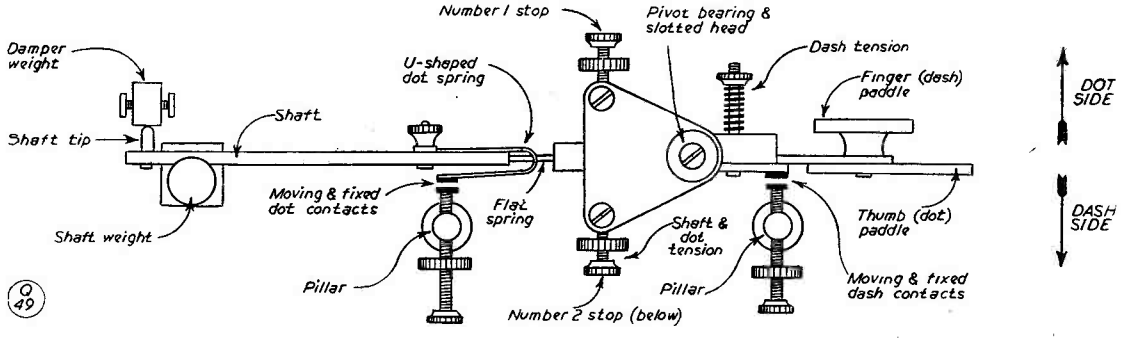
N. P. SPOONER (G2NS)

IN the dim and dusty past, deafened by the chattering of tape perforators and buried in mountains of cypher, code and plain-language traffic, the writer chose to earn his living as a cable telegraphist and any 8-hour day or night shift might have found him at the receiving end of a hectic high pressure 200-word-per-minute automatic Wheatstone local landline, or at the leisurely 10 w.p.m. hand-sending end of an ocean-bed cable, thousands of miles in length. He might even have been watching for days the blank tape of a syphon recorder for a distant cable-ship to signal that it had grappled successfully in the slimy depths for two rock-sheared cable ends and had at last got them safely aboard for splicing. Whatever the job, it all added up to the same thing—that the purpose of telegraphic communication was to convey intelligence, and errors and erasures therefore had no meaning. A City merchant who asks his agent to send along 20 sample bags of new-season Patna rice cannot be blamed for harbouring hard thoughts about telecommunications in general if 200 bags are suddenly dumped on his office doorstep because somewhere an erratic operator has carelessly added just one teeny-weeny little nought.

To a lesser degree in this process of conveying intelligence—even if only as a hobby and in the absence of any official knuckle-rapping for mistakes—Amateur Radio has little excuse for punctuating its messages with wild erasures caused only too often by uncalled-for speed.

The bread-and-butter compulsion already touched upon by the writer trained him to hand-send with a current-reversing key consisting of two side-by-side pivoted brass levers fitted with the usual contacts, but with flat ebonite discs instead of knobs. In action the dot lever on the left was depressed with the first finger-tip and by slightly swinging the wrist over to the right the dash lever could then be depressed with the tips of the second and third fingers together. The necessary pauses were observed between letters and words, but as a dot and dash each had its own separate lever both symbols were of the same duration and unless compensated for would have appeared exactly the same when received as inked signals on syphon recorder tape. To differentiate between them a straight line inked itself continuously down the centre of the moving tape to indicate key-up pauses and letter and word spacing. Upon closing the dot contacts at the sending end the centre line was suddenly made to deviate upwards and hump itself like an inverted " vee " in order to represent a dot. Opening the contacts returned it once more to the straight central path, but when the dash contacts were closed the current was reversed and the deviation then became a downwards one to represent a dash, in the shape of an open " vee."

While therefore no claim can be made to continuous handling of single-current or radio keys or even to an equal familiarity with reception by ear instead of by sight, some intensive listening has nevertheless been carried out as an amateur during the past 21 years



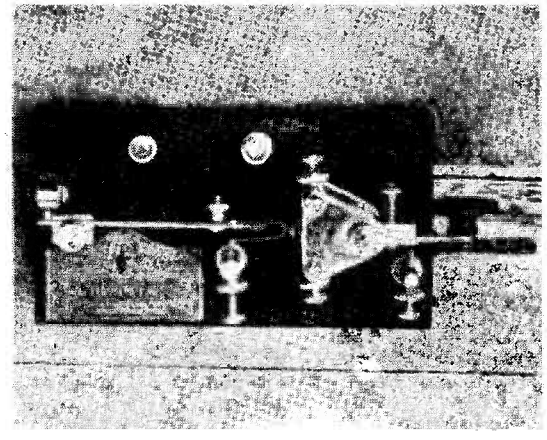
Detail sketch of a well known commercial type of semi-automatic (" bug ") key, showing adjustments. The correct way of setting up this, and any other similar type of key, is discussed in the article.

and, as is well known, the onlooker often sees most of the game. In consequence, it is yet to be discovered why on earth a clever mechanical device like a semi-automatic key should have come to be used so often for incoherent fast-sending frenzies when it was invented to give *comfort by saving unnecessary wrist-action.* The very nimbleness of the automatic dots it can produce makes continuous monitoring imperative and when this is done a bug can to the receiving end be absolutely indistinguishable from any straight key. The causes of code-mutilation must therefore be sought elsewhere—in incorrect handling and adjustment.

A Speed Suggestion

An examination of the handling question can be commenced by honestly admitting that a bug can actually be used as intended by its makers for *slow,* comfortable sending with the weight permanently set far forward towards the tip of the shaft. How then within reason can speed be increased when necessary? The writer is here going to suggest a novel (although entirely unofficial) suggestion that may help to abate the public nuisance of dot-spewing. To expect the distant station to interpret flights of stuttering dots that are too fast for manual dashes to accompany them in correct proportion makes CW listening a penance instead of a pleasure. That a " dit " is sent with a straight key by closing the contacts for a fraction of time will be disputed by few and as a " dah " is three times the length of a " dit," it will be agreed that the key should be kept closed that much longer.

What many do not realise, however, is that irrespective of the speed, the *length* of the dits and dahs should remain fixed. In other words, there are no long, medium and short dits and dahs to suit varying temperaments or speeds. The fixed standard length of any dit is the fraction of time taken to close the contacts of a key and open them again; the fixed length of a dah can consequently be arrived at by first sending three dits, memorising the time taken to do so and adopting that as the standard length of all future dahs. Put another way, speed should never be altered by altering the length of the dits and the dahs. It may not be realised that an average bug key can be driven faster than 25 w.p.m. even with the weight set far forward towards the tip of the shaft. So why not for once resist the temptation to shift the position of the weight in the hope of squeezing out more words per minute,



The type of Morse key discussed by G2NS, and shown in detail in the sketch. Good sending is only possible by proper adjustment of the " dot " side in relation to " dash " length at normal operating speed. A good deal of practice, with an audio oscillator on a closed circuit, is usually necessary before going on the air with a key of this kind.

and try instead of the writer's suggestion that speed can be altered by altering the *word spacing.* To send faster without any extra effort whatever, simply cut down the length of the spacing between words; to send slower, simply increase the word spacing. Provided this temporary new shortened or lengthened word-spacing is kept as nearly the same length as possible between each word, the transmission will still retain whatever excellence it was originally endowed with; moreover, without the risk of dot-spewing through unnecessary weight-shifting, the distance operator's request to QRQ or QRS will have been complied with to his complete satisfaction. To sum up: Keep the official lengths for all dits and dahs and letter spacing but unofficially determine the speed of a transmission by the word spacing and *not* by the position of the weight on the shaft.

McElroy's Advice

An extract from one of McElroy's old articles in *Radio* may bring out some further points about bug-handling. He says, " Take your present automatic and slide a book under it. Get those paddles about $2\frac{1}{2}$" to 3" above the table where they belong. Take a look at your wrist. You'll see it runs smoothly straight. There is only one correct method of sending on an automatic. You've got to slap the paddle with your thumb, actuated by your whole arm, to make dots. And you've got to slap it over to the dash side with your

whole arm, with the wrist straight up and down and the index finger and large finger hitting the paddle with a full arm movement. Try it ! Put that automatic on the desk in front of you where it belongs, about where a letter would be if you were gonna sign it. It'll be somewhere around 12" in on the desk directly in front of you. Your arm diagonally across the desk with the fingers resting on the paddle and the elbow just off the desk. And the hand up and down. Keep your wrist off the table. You send with your whole arm. Do what I'm telling you. Just try it. It won't cost anything. If you could only realise how easy it is to be really good at this code racket, you'd go wild over it." Well, that's how Ted McElroy, world champion telegraphist, puts it !

Easy Adjustment Drill

Although the photograph accompanying this article shows a genuine old Vibroplex, semi-automatic Morse key, the same general layout will be found in most other bugs to which the following suggested sequence of adjustment will apply: Loosen the lock-nuts and fully unscrew the fixed dot contact, the number 1 and 2 stops and the fixed dash contact. Gently lift the tip of the shaft for vertical play. If any, take it up by loosening the lock-nut of the pivot bearing, turning the slotted head slightly and re-locking. When looked at from the side or immediately above, the shaft should appear straight and its tip should be resting lightly against the damper weight. If the shaft does not lie in this position, increasing the tension of the dot spring will force the shaft over against the damper weight. When in action it is this spring that is responsible for returning the shaft smartly to its resting position against the damper weight after the thumb paddle has been released. Proceed next to adjust the number 1 stop by screwing it inwards until it pushes the shaft over towards the dot side and the tip of the shaft parts from the damper weight. (This is only being done to make the actual adjustment that follows more clearly visible.) The process is then reversed by unscrewing the stop until the tip of the shaft returns and just lightly rests once more against the damper weight. To check the correctness of this adjustment, the thumb paddle should be slowly pressed over towards the dot side without allowing the shaft to vibrate and as the movement is commenced it should be seen that the flat spring joining the front portion of the shaft (holding the weight and the U-shaped moving dot contact spring) to the rear portion of the shaft (holding pivot, moving dash contact and paddles) does not bend before the shaft tip parts from the damper weight. If it does bend, the stop should be re-adjusted until this disappears and the two portions of the shaft both move as if made of one solid bar when the thumb paddle is pressed as directed. To determine the total swing of the shaft over to the dot side the number 2 stop (visible in the drawing immediately below the dot tension spring screw) should be adjusted. To do this the thumb paddle is pressed slowly over towards the dot side without the shaft vibrating and the position is held when a gap of about one eighth of an inch appears between the shaft tip and the damper weight. Still holding this position, the stop is screwed in until it meets the shaft. If an eighth of an inch is found to be too wide for individual preference it can be reduced slightly before re-locking.

To adjust the dot contacts the thumb paddle is pressed slowly over towards the dot side without the shaft vibrating, and when it meets the stop (number 2) it is there held stationary while the fixed dot contact is screwed inwards until its face just meets that of the moving dot contact, which at the moment is of course stationary. A piece of paper placed on the key base immediately below these contacts will clearly show up their faces, which should be clean and meeting squarely. If out of alignment the faces can be altered by either turning the fixed dot contact pillar slightly or by altering the horizontal backwards-and-forwards positioning of the moving contact by loosening the screw that holds the U-shaped spring to which the moving dot contact is fixed. It will be found that the pivot bearing adjustment affects the vertical positioning of the moving dot contact when necessary. When adjusting the dot contacts by making their faces meet this is done lightly without forcing or bending the moving dot contact U-spring. A final touch of the fixed dot contact should, when monitored, give complete firmness of dots devoid of scratchiness in sound and good following of even an ordinary telephone type of surplus relay if one is used for keying.

The dash contacts are next adjusted and should have the same gap as the dot contacts. This is done by pressing the finger paddle over towards the dash side while screwing the fixed dash contact inwards. The gaps will be equal if the finger paddle travels as far over to the dash side as the thumb paddle travels over to the dot side. The two dash contacts should have clean faces that meet squarely, the fixed contact pillar being turned slightly to effect this.

or the moving dash contact being moved horti-zontally or vertically as required. The tension of the dash spring should suit individual requirements and is usually the same as that of the dot spring. While the longest string of dots to be required will be eight for an "Erasure," operating will in general be found more comfortable if the weight is set well forward towards the shaft tip to produce the greatest possible number of automatic dots before coming to rest after the thumb paddle has been smartly struck and held. Finally, the key base should be held down by screws or extra weighting if there is any tendency for it to slide about when in action. This helps during the process of proving to the world that "as a good tree is known by its fruit, so is an Op known by his favourable fist."

NEW MULLARD VHF VALVE TYPES

Mullard, Ltd., announce two new valves which have been specially designed for use in domestic radio and television receivers at frequencies up to 220 mc. These valves will enable sets to be designed for reception of transmissions in the VHF Broadcast Band (Band Two) and on the "competitive TV" frequencies (Band Three).

The new valves are a double triode, type PCC84, and a triode pentode, type PCF80, both on the noval base. The PCC84 is specially designed for use as a "cascode" low noise RF amplifier, and the PCF80 is intended for use as a frequency changer following an RF stage employing the PCC84. Both valves have 0.3-amp. heaters, and are suitable for use in AC/DC sets where the heaters are connected in series and the HT is as low as 180 volts.

PCC84 Double Triode UHF Amplifier

The double triode PCC84 has several novel features. It has been specifically designed for operation as a series connected cascode amplifier with an HT supply of 180v. In the cascode circuit, the first triode operates as a neutralised grounded-cathode amplifier, and the second as a grounded-grid amplifier. This arrangement results in a considerable improvement in noise factor over pentodes at frequencies of the order of hundreds of megacycles. The series-connected cascode amplifier, in which the anode of the neutralised stage is coupled directly to the cathode of the grounded-grid stage, leads to a simpler circuit than when the two triodes are connected in parallel across the HT line. This is particularly attractive at ultra-high frequencies, since it is not necessary to change the anode circuit of the input triode when switching from one frequency to another. A simple "series peaking" coil (of the type familiar in video stages), inserted between the anode of the neutralised stage and the cathode of the grounded-grid stage, acts in conjunction with the valve output and input capacitances to maintain the response over the whole band.

Series connection results, however, in two disadvantages: A high voltage is placed across the heater-cathode insulation of the grounded-grid stage, and the amount of HT available for either triode is only half the total HT, which can result in a low amplification factor and poor mutual conductance. The PCC84 has been carefully designed to avoid these disadvantages. The heater-cathode voltage rating is −250v. and +90 v. peak, the maximum DC component being 180v. Each triode can therefore be operated with a maximum HT of 180v. (total HT=360 volts). With an HT line of 180v., the valve is therefore operating well within its maximum ratings. The amplification factor (*mu*) is 24 and the mutual conductance (*gm*) is 6mA/V with an HT of 90v. per valve. In a practical circuit this results in a gain of 12dB from the grid of the first triode to the grid of the mixer at 200 mc, using an HT line of 180v.

A new type of cathode construction has been evolved in order to achieve the necessary high slope at low supply voltages without resorting to unduly small clearances, which might have been expensive to maintain in mass production with the required degree of accuracy. In the PCC84 the cathode surface is given the same degree of curvature as the grid wires. The grid is therefore equidistant from the cathode over the entire emitting area. This enables a high slope to be achieved with a reasonably large grid-cathode clearance.

Yet another interesting design feature of the PCC84 is the careful internal screening between the two triodes. This is connected inside the valve to the grid of the grounded-grid section. The resulting performance at 200 mc is considerably better than would have been obtained with the screening connected to the cathode.

PCF80 Triode Pentode Frequency Changer

The PCF80 triode pentode has been specially developed to meet the need for a simple high-performance frequency changer capable of operating with conventional television circuitry at 200 mc. At this frequency the conversion gain is 20dB in a typical circuit with an IF of 35 mc.

In order to minimise inter-electrode capacitances and lead inductances, the triode and pentode sections of the PCF80 are positioned side by side instead of one above the other, as in earlier Mullard triode-pentodes. A screen is placed between the two sections.

An experimental tuner for 200 mc with an IF of 35 mc had the following performance figures:

Total gain from aerial to grid of first IF stage	39dB
Image rejection	35dB
Noise Factor	8

VHF BANDS

A. J. DEVON

Conditions Poor, Activity Low—

Thoughts Regarding Receivers—

Facts About VHF Propagation—

Cheltenham Meeting on March 13—

Station Reports and News—

WITH conditions generally poor to very bad, and with little or no GDX coming through, there has been a marked recession in activity—in other words, not much doing on the VHF bands since last we wrote. Some of the regular long-haul schedules have become tough going, and there are even cases of recourse having to be made to CW telegraphy to get a few squeaks across!

All this is reflected in the volume of mail for this month and the very few claims for the Tables—so few, in fact, that most of the tabular matter is being held over. All claims have, however, been noted and will be written into the Tables for their next appearance.

In spite of the foregoing, the two-metre band still remains lively for local working and many 50-100 mile contacts continue to be made without difficulty. In particular, it is noteworthy that the period 1830-2000 is becoming more popular in the South of England, and stations can be heard in QSO any evening during this time. There is also, as we know, much experimental and constructional work going on, and the fact that there are not so many signals to be heard on the air is no proof at all that VHF interest is languishing in any way.

Reflections on Receivers

Rather, it is a time for improving equipment—particularly the receiver. Many operators are still using converters which, while capable of producing loud signals from locals, fail to find the more distant stuff unless conditions are really good.

These are those converters that suffer from a high inherent noise level (due very often to too much injection); lack of gain, or even negative gain, at the front end (an RF stage which is merely a passenger separating the mixer from the aerial, owing to slug-tuned coils not resonating anywhere near the band); poor oscillator stability (difficult to deal with when the aim is to receive weak T9 signals as T9); and bad matching of the IF output into the main receiver. Then there are the problems of breakthrough and self-generated beats in the IF tuning range, with perhaps the main receiver itself out of alignment and noisy on the band on which the IF falls.

A formidable list of faults, some or all of which can be found in many converters. Yet these same receivers *will* produce EDX or GDX when the band is well open and conditions are really good. So when conditions go dull again, the proud owner, so long as he can hear a local at S9+, decides that it cannot be his converter that is at fault, and that the reason he does not receive the 100-mile stations is because either (*a*) His location is against him, or (*b*) People don't come on much in the winter.

In fact, the excuses under (*a*) above seldom apply, and under (*b*) practically never, in the sense that at the sort of times when amateurs are normally able to get on the air, there is always somebody on somewhere.

There is a great deal yet to be learnt by the average amateur on the design and construction of good two-metre converters. Even the excellent standard designs—such as those propounded at various times by G2IQ, G2UJ, G6UH, G6VX and ON4BZ—can give very indifferent results in the G9BF version of the designer's original intentions. In other words, because your first attempt at a two-metre converter is a G2IQ (which you succeed in getting to work), and you then build yourself a Cascode-or-whatever and straightway get better results, it does not necessarily mean that the G2IQ is inferior as a design—it much more probably means that on your second attempt you unconsciously built in a lot of the practical experience gained in your first.

This, of course, is progress, and as it should be. But it does *not* justify condemnation of an early design with which you happened to be unable to get really good results.

CC or SEO?

It is not intended here to work up a controversy on the pros and cons of SEO *v.* CC, but there are certain broad facts worth bearing in mind in regard to both. Rock-stability and an absolutely T9 beat are very difficult to achieve in the SEO design, but if tolerable stability and a good note (only to be judged by the constructor in his own honest opinion) are acceptable, then SEO's do confer other advantages: A wide choice of IF, freedom from beats in the IF tuning range (where the oscillator is used fixed-frequency with tunable IF) and ease of calibration of the oscillator tuning dial, or the IF tuning range; for instance, using a fixed-frequency oscillator at 60 mc (with means to make a small change *plus* or *minus*), this being doubled to 120 mc to give a 24-26 mc IF tuning range, means that on any good main receiver in use as IF/AF amplifier, frequencies can be read off the IF tuning dial to a very good degree of accuracy, *e.g.*, 24.75 on the IF dial is 144.75 mc, and 25.35 is 145.35 mc. Moreover, by reference to one's own transmitter crystal frequency, or some other

VHF DINNER MEETING
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(6.30 p.m. for 7.30)

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R. JOSS, G2AJ, DENEWOOD, POST OFFICE LANE, CLEEVE HILL, CHELTENHAM

or

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Joint Honorary Secretaries

known beat that can be made to fall in the 24-26 mc band, it is easy after warm-up to correct the SEO to bring the reference beat dead-on; for this, the fixed frequency oscillator should be fitted with some sort of a slow-motion control so that close adjustment is possible.

But the trick still is to get good inherent oscillator stability and a T9 beat; in a 60-120 mc osc-dblr, using a 6J6 or a 12AT7, a 5-turn coil ¼in. in diameter with the turns well spaced needs a lot of swamp capacity to obtain resonance at 60 mc; this is worth remembering in aiming for good oscillator stability.

The advantage of the CC oscillator is that the beat is nearly always T9x without any special precautions having to be taken, and crystal stability is automatically assured. Beats in the IF tuning range can be almost eliminated by careful choice of crystal frequency and the IF to be used—this needs a lot of paper work beforehand, and even then there can be surprises! It is worth mentioning here that a useful practical article on the subject of crystal frequencies appeared in *Short Wave Magazine* for October 1950 ("Choice of Crystal Frequency in VHF Converters").

With a CC oscillator, a calibration can be put on the IF tuning dial that will stay-put, even if it does bear no arithmetical relation to the actual dial markings. Where IF tuning is employed, as a general principle a high IF is desirable, so that the gain of the main receiver is constant over the 2 mc tuned, *i.e.*, the higher the IF, the smaller the percentage change of

SEVENTY-CENTIMETRE STATIONS — Tenth List

CALL	LOCATION	FREQ. (mc)	EQUIPMENT
DL3FM	Mulheim-Ruhr	434.2	Tripler, 32-ele stack, SEO Rx
EI2W	Dublin	432.54	Tripler, 16-ele stack, (? Rx)
G2BFT	Solihull	433.17	Tripler, 16-ele stack, (? Rx)
G2BVW	Leicester	432.60	Straight PA, 5-ele Yagi, Special Rx
G2CNT	Cambridge Airport	435.2	Tripler, CC Rx, 12-ele stack
G2DCI	Sutton Coldfield	433.05	832 Tripler, G2DD C'vrtr, 20-ele stack
G2DDD	Littlehampton	435.6	Tripler, 16-ele stack, CC Rx
G2DHV	Lewisham	434.97	Tripler, CC Rx, 16-ele stack
G2DVD	Slinfold, Sussex	434.58	Tripler, G2DD C'vrtr., 16-ele stack
G2FCL	Shipley, Yorks.	433.134	Tripler 15E, G2DD C'vrtr., 6-ele Yagi
G2FKZ	London	435.95	*no details*
G2FNW	Melton Mowbray	?	Tripler, 5-ele Yagi (? Rx)
G2HCG	Northampton	434.00	*no details*
G2HDZ	Pinner, Middx.	435.17	Straight PA, SEO Rx, 20-ele stack
G2MV	Kenley, Surrey	435.22	*no details*
G2RD	Wallington, Surrey	435.57	*no details*
G2WJ	Great Canfield, Essex	436.00	Straight PA, CC Rx, 16-ele stack
G2XV	Cambridge	435.10	Tripler, CC Rx, 12-ele stack
G3ABA	Coventry	?	Tripler, 16-ele stack (? Rx)
G3AOO	Denton, M'cr.	433.13	Tripler, 4/4/4, CC Rx
G3AYT	Hyde, Ches.	433.13	Tripler, City Slicker, CC Rx
G3BKQ	Blaby, Leics.	434.05	Tripler, 48-ele stack, CC Rx
G3CGQ	Luton, Beds.	434.10	*no details*
G3DA	Liverpool	432.6	Tripler, 6-ele Yagi, CC Rx
G3EOH	Enfield, Middx.	436.03	Tripler, G2DD C'vtr., 12-ele stack
G3EUP	Swindon, Wilts.	433.9	Tripler, 3 stk'd dipoles, CC Rx
G3FAN	Isle of Wight	435.80	*no details*
G3FFC	Leicester	?	Tripler, 16-ele stack (? Rx)
G3FIJ	Colchester	435.18	Tripler, SEO Rx, 5-ele Yagi
G3FP	Sidcup, Kent	436.04	*no details*
G3FZL	Dulwich, S.E.22	435.24	Doubler, CC Rx, 12-ele stack
G3GDR	Watford, Herts.	435.39	*no details*
G3GOP	Southampton	435.00	*no details*
G3GZM	Tenbury Wells, Worcs.	?	Tripler, 16-ele stack (? Rx)
G3HAZ	Northfield, Birmingham	433.59	Tripler, CC Rx, 4/4 Yagi
G3HBW	Wembley, Middx.	434.61	Tripler, 12-ele stack, CC Rx
G3HHY	Solihull, Warks.	433.93	Straight PA, 21-valve Rx, 4-ele Yagi
G3HTY	Kidderminster, Worcs.	?	Tripler (? beam array and Rx)
G3IAI	Northampton	433.80	*no details*
G3ILI	London, S.E.22	434.97	Tripler, 6-turn Helix, R.1294 mod.
G3IOO	Oswestry, Salop.	432.54	Tripler, 16-ele stack, SEO Rx
G3IOR	Hellesdon, Norwich	?	Tripler, SEO Rx, 4-ele Yagi
G3IRA	Swindon, Wilts.	436.05	Tripler, SEO Rx, 8 d'ples stk'd
G3IRW	Hoddesdon, Herts.	434.3	Tripler, SEO Rx, 16-ele stack
G3IUD	Wilmslow, Ches.	432.41	Tripler, CC C'vrtr., 6-ele Yagi
G3IVF	Kirk Langley, Derbys.	433.78	Tripler, Rx various, 16-ele stack
G3JGY	Malvern, Worcs.	436.00	Tripler, SEO Rx, 12-ele stack
G3MI	Chesham, Bucks.	434.13	832 Tripler, CC Rx, 10-ele stack
G4AP	Swindon, Wilts.	436.50	Tripler, CC Rx, 3 stk'd D'ples
G4CG	Wimbledon, London.	435.07	CV53 PA, CC Rx, 9-ele Yagi
G4OT	Maldon, Essex	435.240	Tripler, G2DD C'vrtr., 4/4 Yagi
G4OU	Sheerness, Kent	432.414	Tripler, Superhet, 3-ele Yagi
G4RO	St. Albans, Herts.	434.16	Tripler, 16-ele stack, CC Rx
G5CD	Hendon	435.66	*no details*
G5DS	Surbiton, Surrey	435.61	Tripler, G2DD C'vrtr., 16-ele stack
G5DT	Purley, Surrey	436.02	*no details*
G5YV	Leeds	432.85	QQVO3-20 Tripler, G2FKZ C'vrtr., 48-ele Stack.
G6CW	Nottingham	?	*no details*
G6NF	Shirley, Surrey	435.47	Straight PA, 5-ele Yagi, SEO Rx, ASB8 cavities
G6[illegible]	Bexley, Kent	434.7	Tripler, 16-ele stack, ASB8 C'vtr.
G6Y[illegible]	London, S.E.5	435.75	*no details*
G6YU	Coventry	434.10	Tripler CC Rx, 16-ele stack
G6ZP	Malvern, Worcs.	435.78	Tripler, SEO Rx, Corner reflector
G8QY	Birmingham	?	Tripler, 24-ele stack (? Rx)
G8SK	Enfield, Middx.	433.15	Tripler, G2DD C'vtr., 8 ¼-waves stk'd
G8VR	London, S.E.22	435.0	Tripler, SEO Rx, 12-ele stack
GM6WL	Glasgow, W.1.	?	P/P CV53 PA, CC Rx, 20-ele stack
GW2ADZ	Llanymynech, Mont.	432.84	Doubler SEO Rx, 32-ele stack
GW5MQ	Mold, Flints.	432.58	Tripler, 3-ele Yagi (? Rx)
ON4UV	Fayt-lez-Mange, Nr. Charleroi	434.7	Straight PA, CC Rx, 32-ele beam

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

TWO METRES

COUNTIES WORKED SINCE SEPTEMBER 1, 1953

Starting Figure, 14

Worked	Station
46	G5YV
43	G3GHO, G4SA
42	G6XX
40	G3IOO
39	G3WW
34	G2DVD, G5MA
32	G2AHP, G5BM, G5DS
30	G2FJR, G5ML
29	G3DO, G3EPW
27	G2DDD
26	G2FCL, G3CUZ, G3IRA
23	G2HDZ
22	G3FYY
21	G3JFR, G3WS, G4RO
20	G2CZS, G8VN
19	G3FUW, G6TA
18	G5MR
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.

frequency involved. To take extreme cases: It is obviously better to tune 30-32 mc on the IF side rather than, say, 4-6 mc, because in the latter case the fixed IF coupling into the main receiver could not possibly give a flat response over such a large percentage change of IF tuning. With a 30-32 mc IF, however, the frequency change is only about 7% and a flat response is assured with a slug-tuned IF coil in the converter.

But the snag can be that the higher the IF with the CC job, the more difficult it can become to eliminate spurious beats. These can be generated in all sorts of ways when there are so many harmonics flying about from a relatively low-frequency crystal.

The foregoing remarks are *not* offered as "expert opinion," nor do they even cover all the ground. They are put forward merely to give point to the earlier statement that "The average amateur has a good deal to learn about VHF converter design." And so has your A.J.D., for that matter!

Trend of Events

Elsewhere in this issue appears a piece which will be of interest to all who have a concern for the history, tradition and achievements of amateurs in the field of radio.

The point to be made here (mainly for the benefit of posterity) is that in much the same way as the amateurs of 30 years ago charted the short waves, so the VHF operators of today are slowly but surely providing the experimental proofs on the propagation of VHF waves.

This they can do, *and they alone can do,* because amateur VHF stations are now widely enough distributed geographically, and are well enough organised, to produce results no commercial or Service organisation can attempt, simply because it is only the amateurs who are constantly trying to *communicate* with one another on VHF, over "impossible" distances. Communication is the amateur objective, and the reason why so many amateurs are on VHF and are studying the propagational factors involved.

As to the results so far achieved, G3EGB has prepared for this issue a Summary which all readers of "VHF Bands" will find well worth close attention. It is a noteworthy contribution, and an extraordinarily interesting piece of work. Based entirely on actual results obtained by British amateur VHF operators—in fact, based on the long series of reports in "VHF Bands"—in collated form it provides for the first time the experimental proofs in regard to the possibility, on an annual basis, of point-to-point VHF working over distances up to 600 miles.

This survey shows that for a significant part of the year there is certain to be good VHF propagation over much of Northern Europe. It means serious difficulties for the frequency planners now busy arranging matters in Band II (87.5-100 mc) for VHF Broadcasting, and in Band III (174-216 mc) for TV development. That is to say, it will *not* do to rely upon line-of-sight propagation and local area coverage on these bands, since the amateur results obtained (with much lower power), as shown in "VHF Weather and DX Results" in this issue, prove that if stations are operated on the same frequency, even if well spaced geographically, there will on many occasions be serious mutual interference.

This is worth emphasising here, because in a recent broadcast (the BBC again!) Mr. H. Bishop, the Corporation's Director of Technical Services, stated that VHF broadcasting would not be subject to Continental interference. Well, we shall see!

Cheltenham VHF Meeting

The details have now been finalised, and all the immediate information you want about what promises to be a very interesting occasion appears in the panel herewith.

Please note three important points: Bookings must be accompanied by a remittance for 11s. 6d. (which will be returned on application in the case of those unable to attend at the last moment), and

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.

secondly, that the organisers must know by Monday, February 22, pretty well what the numbers are going to be—this because of the catering arrangements. Thirdly, all communications respecting the Cheltenham VHF Meeting should be sent direct to one of the two joint honorary secretaries (*see* panel) and *not*, repeat not, to A.J.D. or the Magazine offices.

Many interesting personalities have said that they hope to make it, and we can look forward to as good a turn-out as ever we have had for these events. Somebody has suggested that, "to pay off old scores," everybody should bring a supply of QSL cards! What *can* he mean! There will probably be some equipment displayed, possibly a discussion on some point of interest to the majority, but in general the evening will be given over to a personal get-together and a good VHF rag-chew.

For those coming from long distances, there is plenty of good overnight accommodation available in Cheltenham—see the AA or RAC *Handbooks*—and if transport is a problem, or a long motor journey is not relished at this time of year, then all that need be said is that Cheltenham is a stopping station on main-line routes from all parts.

Write that card now, and send it, with your 11s. 6d., either to G2AJ or G3FRY.

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Some Station Reports

G3GHU reports for G3DBP of the Nottingham University Radio Society, operating from Beeston; the transmitter is a BC-640 running 100 watts to a pair of HK24G's on 144.51 mc, and the receiver a CC Cascode into a BC-454, with a 3-element wide-spaced Yagi at 35 feet as the present aerial; a stack is in course of construction. Operators on G3DBP are G3GHU, G3JIJ and G3JKO, and some dozen stations have been worked on Two, with as many heard; a regular schedule, each Thursday at 1930, is kept with G3GFW. They would welcome some lunch-time arrangements, and week-end schedules.

G3DLU (Compton Bassett) is still in his rebuild, and is also contemplating a 12-element stack. G3HHY (Solihull) was active on Two Metres and Seventycems throughout his Christmas vacation, and was agreeably surprised at the activity encountered and the results obtained on both bands. During the period March 21 to April 21, G3HHY hopes to be operating a "formidable array," using German RD12TG triodes, at full power on both bands.

G8VN (Rugby) comes in with a calls h/w list showing some 26 different stations worked on Two in the month to January 15, and G2AIW, G2MQ, G2YB and G3WW heard, among others. He found two "bright spots" in conditions, on December 20 and December 28-29, and has now worked a total of 93 different stations on the indoor beam.

Harold of G5YV (Leeds) has been checking over his Continentals-worked log, and makes it 108 different European stations worked two-way on Two Metres, distributed as follows: 32 DL's; 21 F's; one HB; 15 ON's; 7 OZ's; 24 PAØ's; and 8 SM's. This is a remarkable total and puts him just in the lead over G6NB in this particular marathon! The ON4BZ-G5YV schedule is off while Guy builds a new beam, and G5YV is occupying himself by improving the 70 cm gear—he has a 48-element stack ready for that band and a new converter; incidentally, the two-metre and 70-centimetre beams will be on the same mounting and fed by the same 300-ohm line, change over from one to the other being effected by a relay "up at the top" which Harold has made specially for the purpose.

In the fortnight or so to January 2, G3WW (Wimblington, Cambs.) worked 25 different stations and heard 7 more at up to 100-mile distances; a new station on, reported by G3WW, is G2DJM, Mundford, nr. Thetford for Norfolk, on 144.78 mc. G3IRA (Swindon) says "Nothing much to report, but still active," and ON4BZ (Brussels) writes to correct us on the LX/ON "First" mentioned last month; Guy says that LX1MS was first worked by ON4TR for Belgium. The scores at G3DO (Sutton Coldfield) remain static, as he has not been on Two recently—his total of stations worked on the band since April 1952 is now 185.

G5BD (Mablethorpe) has built himself a new TVI-proofed transmitter, the multiplier sequence being 24-72-144 mc to side-track Holme Moss; the valves used are 12AT7-5763-QVO4/7-829B, giving 75 watts on CW and 50w. on phone, the whole thing being in a cabinet 10 ins. by 10 ins. by 9 ins. "and room for more." G5BD remarks that overtone crystals are tricky, but go off all right when the correct coil-tap is found; he is working GM3EGW at 241 miles three nights out of six.

G3MI (Chesham, Bucks.) is on 434.13 with a CC receiver and a 10-element stack, the transmitter being an 832 tripling.

With GC2CNC (Jersey, C.I.), G5TZ/A remains his most consistent signal; F9OK has been heard several times again (calling G5TZ/A on December 29) and on January 2 GC2CNC was receiving G3WW and G8OU, both working G5TZ/A.

EI2W (Dublin) has decided on a 32-element beam fixed to fire in the direction of Scandinavia, to be carried between two 41-foot masts, well in the clear and 760 ft. a.s.l. Henry is quite determined to work LA, OZ and SM, and everybody will hope that his enterprise will be rewarded. The EI2W transmitter has been rebuilt with a

QQVO6/40 PA, and for general working the beam is a motorised 5-over-5. He hopes to be on 430 mc before the end of April, and in the meantime will be running that big beam on 144.1 mc from 2100 until midnight most evenings, looking for the Scandinavians.

VHFCC Elections

New members of the VHF Century Club are: DL6EP, Linz, No. 160; G3DO, Sutton Coldfield, No. 161; and HB9IV, Emmen, Lucerne, No. 162.

As always, the breakdown of the European members' card is very interesting. DL6EP showed two F's, 35 G's, 13 ON's, one OZ and 11 PAØ's, the remainder being DL's. HB9IV's list includes no less than 36 Swiss stations, which is surprising for the level of HB activity it shows; he has 32 DL's, 17 G's, 5 ON's, 5 F's, and one each Austria (OE7AT) and Italy (I1FA).

Claims for the VHFCC Certificate are accepted from any VHF operator who can show cards for 100 or more different stations worked two-way on the amateur VHF bands from 50 mc up. Cards should be sent by registered post, *with a check list*, and addressed to A. J. Devon at the Magazine offices. No claims made in any other way can be entertained.

That brings us to the end of it for this month—we look forward to an improvement in conditions and to plenty of mail for the next issue, even if it is only to tell us what you are doing about improving the gear. Incidentally, this is also the time to get claims checked over and places in the Tables up-to-date.

The Dead-Line

This must be **Monday, February 15,** certain, for the March issue, with everything addressed A. J. Devon, "VHF Bands," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. With you again on March 5—and don't forget to put your name in for the Cheltenham Meeting before February 22.

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).

VHF WEATHER AND DX RESULTS

SURVEY FOR 1953 — NOTES ON PERIOD DECEMBER 15 TO JANUARY 10

A. H. HOOPER (G3EGB)

WITH winter at last upon us, the opportunity is taken of presenting the month's VHF weather in condensed form and then reviewing the results of 1953.

The usual study has been made so as to ascertain the possibilities for EDX. Likely dates were December 17, 20, 21, 23 and briefly on January 5. For GDX our best chances occurred from December 19 to 22, and on January 6. Mention should be made of December 16, when conditions were good and yielded the opportunity of GM/PA and GM/OZ working.

The November openings were in excellent agreement with the assessment, as brought out by Fig. 2 on p.693 last month, showing the best day of the reflecting layer together with the best results. The suggested "dead" area in the Midlands is curious. The atmospheric structure has been carefully examined without finding an explanation of any kind. It is good to note that the southern path over France was utilised during the month. The conditions which developed have occurred *many times* since the last opening (to Bordeaux two years ago). We are missing opportunities!

Survey for Year 1953

Turning now to the experiences of the whole of 1953, the writer has analysed results in order to see what conclusions can be made from our joint efforts. For soundly-based conclusions we really need many years of information. In this instance we have less than one. However, while accumulating those necessary years of results, it is thought that such tentative conclusions as can be drawn will be of value and interest. In certain respects it may even be felt that already the evidence is strong.

There were ten EDX spells during the year, totalling 34 days, according to A.J.D.'s monthly appraisal, starting on March 1 and ending on December 1. This is almost 10% of the year, and, when taken in conjunction with an appreciable quantity of snap spells and less outstanding anomalies, is encouraging.

An important question is whether or not it is possible, with simple equipment, to *predict* the onset of anomalous propagation, and the writer has made no secret of his opinion that it is not. Our interest is in propagation in three dimensions. The process is complex and imperfectly understood—it is hardly feasible that the general level of spot observations can be very successful. However, our results have been examined with this object in mind, and it is hoped that the figures will be of interest. The limitation of only one year's results is again stressed.

The easiest observation available to the amateur is that of barometric pressure, and DX spells are commonly associated with high pressure. Taking values in mid-Bedfordshire, as given in the monthly report, the greatest value that could be taken for all

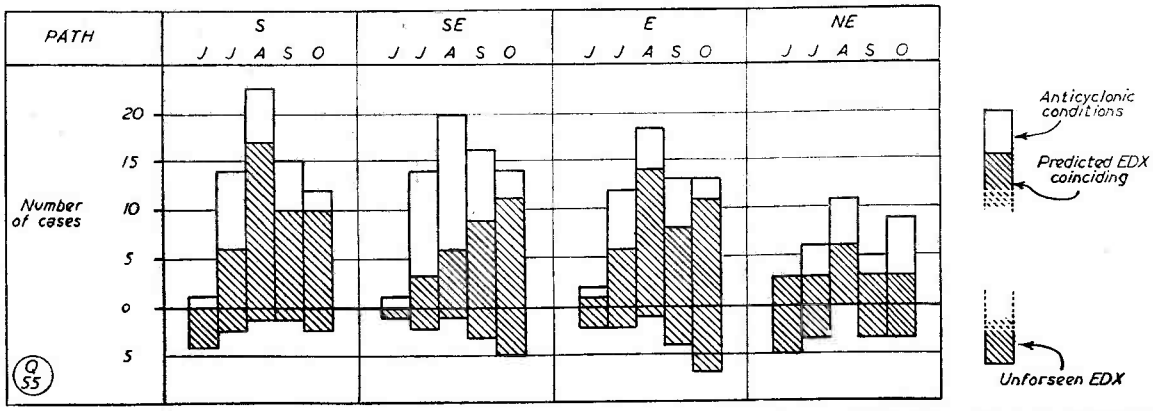


Fig. 1. This diagram gives an idea of the degree of success achieved during 1953 in the prediction of EDX/GDX possibilities by a study of surface weather charts. The shaded columns are estimated results and are drawn over clear columns showing weather chart predictions. The residual clear portions represent prediction failures, while shaded areas below the zero-line are missed openings. The limitation of surface weather chart prediction is well brought out.

spells to occur at a greater pressure still was 1019 millibars. Three of the ten spells occurred with only slightly greater pressures than this, and so this value was a firm limit. During the 289 days from March 1 to December 14 this pressure was exceeded on 158 days, of which only 34 were EDX days. If we push our "initial" pressure up, accepting the inevitable loss of good spells, we still achieve little, for although with a value of 1040 millibars we could have achieved 100% success—on March 1—the loss of the remaining 33 days would not have been acceptable! Thus barometric pressure alone was *not* a good guide to conditions.

Now a given barometric pressure can occur with pressure either falling or rising. Could we go a step further, therefore, and take into account the rise and fall? This property was examined for the *beginning* of each spell. On 5 occasions the barometer was rising, on 4 it was falling, while in the remaining case it was steady. Nothing much to go on, here. When taking *all* of the 34 days, the corresponding figures were 12, 18 and 4, and now there is a slight preponderance of falling pressure, just over half of all cases. Unhappily, it is the *onset* of each spell that we are looking for. Making the best of a bad job, however, and combining pressures greater than 1019 with a falling barometer, we should have selected 66 days out of 289, of which 18 would have been EDX days. The combination of criteria would have found 18 of the 34 EDX days, would have missed the first day of each of 6 out of the 10 DX spells, and would have wrongly given 48 days. Again a poor performance.

Knowing that anticyclones are often associated with EDX, the enthusiast could listen to the weather forecasts and could look at the various weather charts that are published. Often associated? The table sets out anti-cyclonic and EDX spells for the same period.

Discarding all 1-day spells and bracketed spells (when pressure was less than 1019), there remain 16 anticyclonic spells (77 days), of which only 8 spells (27 days) would have yielded EDX. Of the other two DX spells, one would have been missed completely (this was the occasion when LA was worked for the first time!) and the other probably missed (7 days in all). Ignoring 1-day "spells," it is seen that only 8 out of 21 "A" spells developed a reflecting layer, so we are far from justifying a belief in a 100% association of this phenomenon.

Let us now examine the weather map along each route, rather than over a portion of the U.K. alone. This is necessarily based upon each month's assessment in Table I, and so is subject to the writer's errors of prediction. An idea of the magnitude of the error is given later, and it is small enough to be worth proceeding. In Fig. 1 is shown for each month, by the height of a clear vertical column, the number of occasions when anticyclonic conditions lay along each path. The shaded columns, which are superimposed, represent the predicted occasions of EDX. Those portions above the zero line indicate that the EDX coincided with "A" conditions, while those portions below the line occurred with other pressure patterns. Thus, when predicting for each path by the presence of anticyclonic conditions, the residual portions of the clear blocks represent failures, while the shaded blocks below the line represent missed opportunities. It is interesting to note, for example, that, for all paths, missed opportunities would have been a minimum in August, which was also the month of most "A" conditions. Also, the proportion of failures for the SE path would have dropped progressively from month to month.

The 1019 millibar criterion was applied to see what improvement, if any, resulted. There was no improvement except for a slight one for the SE path.

As far as they go, these results, the writer feels.

Duration of Spells in Days	1	2	3	4	5	6	7	8	9	10	
No. of anticyclones	6+(2)	2+(1)	3+(2)	4	1+(2)	3	1	1	–	1	=103 days
No. of EDX	–	4	(1)	2+(1)	1	1	–	–	–	–	= 34 days

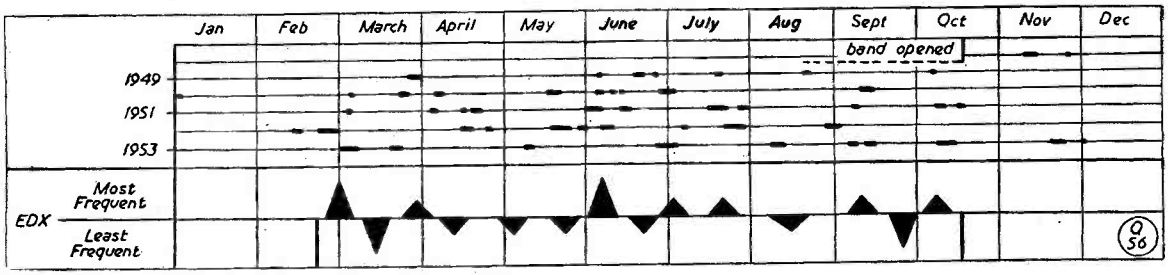


Fig. 2. Showing EDX openings actually encountered during the last five years. Upright triangles represent the periods of the year that have most frequently brought openings. Triangles pointing downwards show the periods during which EDX occurred the least. From this, it would seem that VHF operators should take their holidays in April, May or August!

support his view of the difficulties of an isolated observer. Seamen and country-dwellers acquire a knowledge of the weather that results in very good localised forecasts. Can such a person—living, for example, in Bedfordshire—say what the weather is at Hanover, let alone what it is going to be there? Our problem involves just this, together with the weather between! Undoubtedly one can develop a VHF-weather eye, and the writer made some suggestions on this topic in *Short Wave Magazine* for February, 1953. As we have just seen, it will not, however, be more than a very rough guide, and then only to local conditions.

In a most interesting paper referred to on a previous occasion, it is concluded that there is no simple classification of the weather situation which by itself would give a reliable indication of the possibilities of non-standard propagation of metre-wavelength radio waves. The above results appear to be in complete agreement.

The DL Path

How much better if any is a *three*-dimensional analysis of the atmosphere, such as the writer has been carrying out since June? The eastern path to DL is far enough away to require anomalous propagation and is a direction in which there is sufficient activity for any correlation to have propagational significance. The monthly tabulations for this path have been compared with the results reported by A.J.D. For the period June 1-December 1 there were given 10 DX periods of two days or more, of which only one (of two days) was wrong. No periods were missed. This is a considerable and satisfying improvement which, in the writer's opinion, justifies his method. Had G3EGB been operating on Two in search of DL, there would have been no lost opportunities and very little wasted effort.

The beneficial effect of an MRI discontinuity aloft is but one of the known tropospheric factors influencing VHF propagation. These results suggest that it is the dominating effect. In other words, that refraction and turbulence scattering are of secondary importance at the greater ranges.

In recent years VHF propagation has been the subject of much research in many countries, but, so far as is known, no attempt has ever been made to predict conditions at VHF from day to day. To get the most from the data it is necessary to analyse the failures as well as the successes, and for this purpose the single-day occurrences have been brought in. There were 10 failures over the period, of which 7 involved weak, high level or very localised discontinuities aloft. Had it been the writer's practice to discard such occasions, then the score for spells of 2 days or more would have been 9 out of 9! Future work should be helped by taking this knowledge into account.

A DX Climate?

Most people will have heard of Buchan's Cold Spells. These are periods of the year when cold weather for SE Scotland was considered to be likely. They were propounded by Buchan about seventy years ago after a study of ten years' observations. His work was extended at a later date, but the method proved to be less satisfactory than other forecasting techniques.

The writer thought it would be amusing to see whether VHF DX was especially likely on a particular day of the year—G3EGB's DX Spells, in fact!—periods, that is, when rebuilding and holidays should be avoided. With only five years to date on Two, the result can only be tentative. Fig. 2 shows all the spells reported in "VHF Bands" since Two Metres first opened. Overall, certain periods of the year have in the past brought more EDX than others. There were two periods which brought EDX for four years, and several for three years, of the last five. Calling these Grade I and II respectively and labelled "For amusement only," we have:

DX SPELLS

Grade I	March 2
	June 6
Grade II	March 29
	July 1, 19
	September 10
	October 9

All dates ± 5 days

From the same figure one can pick out, also, periods when at no time during the last five years has a DX spell developed. Ignoring the winter

months, these periods, in a similar way, are:

Grade I	March 13
	September 24
Grade II	April 12
	May 3, 21
	June 20
	August 5-23
	October 24

All dates ± 5 days

It is interesting to note that we had a good spell in our first November on the band, that there has been at least one brief spell in mid-winter, and that there is usually a prolonged *poor* spell in August, convenient for holiday-making! In connection with holidays, a case was made out in *Short Wave Magazine* last July for portable operation from the Azores.

Finally, let us examine the chances of a DX spell persisting. Taking the last two years together, a spell that had lasted for two days continued longer in 13 cases out of 17, a probability of $\frac{3}{4}$. Having lasted three days, the probability of a continuation was $\frac{1}{2}$ — an even chance. This figure showed consistency in that it applied for both years taken separately.

Progress

It is interesting to see how we have progressed on Two Metres. The total duration each year of EDX spells of 2 days or more, starting with 1949, is 7, 17, 23, 38 and 34. The detailed analysis suggests an increase both in the number of spells of a given duration and in the lengths of spells. Presumably our improving equipment enables us to come in on enhanced conditions sooner and to fade away later. A compensating factor would be an increasing discrimination as to what exactly is an EDX spell. One wonders whether receiver performance is now being affected by the law of diminishing returns and that the last two figures represent a flattening off of the yearly improvement to an average level of 36 days per year, about which only small fluctuations will occur from year to year in the future—it is not possible to say.

For the writer and, it is hoped, all VHF enthusiasts, 1953 has been a most interesting year. We have looked at the EDX possibilities for most directions from the U.K., have sympathised with the bad luck of a near-miss for the trans-Atlantic tests, have worked LA for the first time, and have acquired an idea of the magnitudes involved in the bending of a VHF beam.

There is always a difference between explaining away results and in predicting events! What began as a tentative prediction appended to an appraisal of the year's first opening in early March, 1953—*see* p.170, *Short Wave Magazine*, May, 1953 — has developed into a daily assessment in which a measure of confidence can be justified. It is your results that have made this possible. Official studies are usually restricted to observations over a limited number of paths. It is the amateur VHF network that is showing how vast are the areas involved in propagation anomalies. There is room for improvement, of course, as regards activity. More stations to the SE as far as OE, for example, and repeats of those very rare QSO's with La Rochelle and Bordeaux. The opportunities exist!

In the meantime, it is not long now to our first "DX Spell" in early March.

The permission of the Director, Meteorological Office, London, to quote information derived from official publications is gratefully acknowledged.

NEW APPOINTMENT — T.E.M.A.

The Council of the Telecommunication Engineering and Manufacturing Association announce the appointment, as from January 5, 1954, of Mr. H. Faulkner, C.M.G., B.Sc., M.I.E.E., F.I.R.E., to the office of Director of the Association.

Mr. Faulkner has had a lifelong connection with telecommunications, having been for 40 years with the General Post Office, from which he retired at the New Year after holding the rank of Deputy Engineer-in-Chief.

Mr. Faulkner was born in Nottingham and studied at the University College there; he entered the Post Office through the Assistant Engineers' open competition. After service with R.E. Signals during the 1918 war, he was actively engaged in the establishment of the Rugby Radio Station.

MOBILE RADIO

This is beginning to become more important in commercial circles, and the range of application is widening rapidly. Apart from police radio and taxi-calling, in many areas the ambulance service is radio-controlled, while private firms running delivery vehicles and industrial concerns operating large plants are turning to mobile radio for economical traffic control; there is also a demand among doctors and other professional men for a personal radio-calling system in order to save time and unnecessary travelling. To safeguard and further the interests of all those concerned with mobile radio—users as well as manufacturers of the necessary equipment—the Mobile Radio Users Association has been formed. The president is Sir Robert Renwick, Bt., K.B.E., well known in the electronics industry, the secretary is Mr. Ronald Simms, and the address of the M.R.U.A. is Buckingham Court, Buckingham Gate, London, S.W.1.

NEW QTH's

Readers are reminded that under this heading each month we publish addresses of newly-licensed operators, and changes of address of amateurs already on the air. Any licensed amateur is entitled to appearance in "New QTH's," and it should be noted that callsign/addresses sent to us are also printed in both sections of the *Radio Amateur Call Book*, the American publication which for nearly 30 years has been the only directory to the amateur stations of the whole world, and for which we are sole agents for Europe and the United Kingdom.

Mounting a Ground Plane

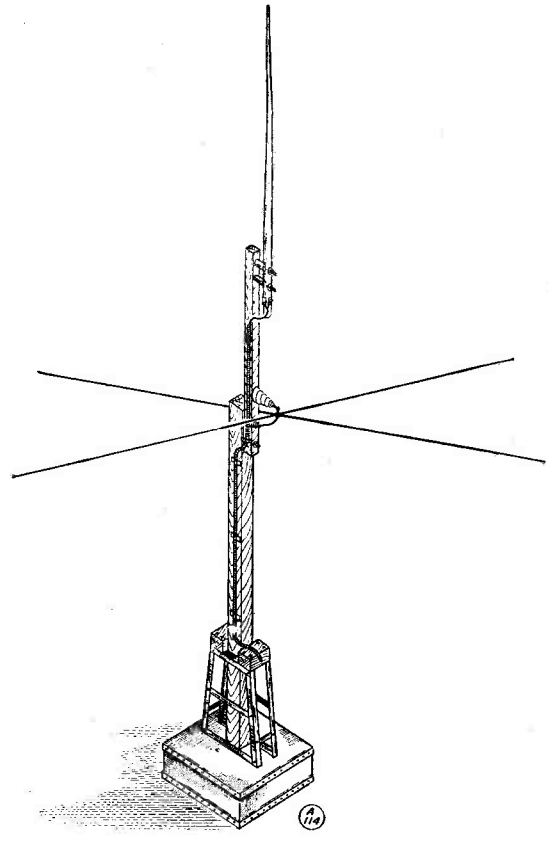
SIMPLICITY AND PORTABILITY

V. H. CURLING (G6VC)

THE design and construction of the mounting illustrated here is so simple that the sketch is almost self-explanatory. The result is a good strong job, conferring also the advantage of a reasonable degree of portability—you can move the thing about, or mount it on the roof of an outbuilding.

The materials required are: One disused galvanized water tank, to act as base; one piece of 4-by-4 timber, 12 foot long; one piece of two-by-two, ten feet long; two 8 in. by $\frac{3}{8}$ bolts, with nuts; two 4 in. by $\frac{3}{8}$ bolts and nuts; 20 bolts $1\frac{1}{2}$ ins. by $\frac{1}{2}$ in., with nuts; about 16 feet of 1 in. to $1\frac{1}{2}$ in. angle-iron; and dural tubing for elements.

These quantities can be varied to suit individual requirements, making the main support either taller or shorter; in the writer's case, the angle-iron came from an old bed frame.



The constructional detail sketch for G6VC's Ground Plane mounting.

Construction

Water tanks of the type suggested normally have a hole in the centre, but if not, one can be cut out to 6 ins. diameter. The 4 in. square timber is the main post; it is let into the tank to rest on the bottom. The angle iron is cut and fitted to form the vertical support, using wood blocks as shown. The lower edges of the angle-iron are bolted to the tank.

The two-by-two timber is fitted as shown, to carry the vertical radiator, with connections and insulators arranged in the usual way for ground plane systems; the illustration shows merely one method of assembly. For 21 and 28 mc, the mat section can consist of two lengths of dural rod, each cut to twice the calculated length for the band required; if properly mounted at the centre, they should not require any further support. On the 14 mc band, however, where the "over-hang" would be about sixteen feet, support would be necessary unless large diameter tubing is used. On these lower frequencies, it would be better to use wires, terminated with insulators and secured to suitable anchoring points.

After all constructional work has been completed the tank can be filled with ballast, and the main support will be found stable enough for it to be climbed. The mat or ground section of the system can be got well up into the air—at G6VC it is at about 12 feet—and the whole structure can be moved about as required.

"INTRODUCTION TO VALVES"

By R. W. Hallows, M.A.(Cantab.), M.I.E.E., and H. K. Milward, B.Sc., A.M.I.E.E. Published by Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Price 8s. 6d. (postage 6d.). Size, D8vo, 8¾" x 5½". 152 pages. 107 line illustrations and a frontispiece.

This book describes the principles of operation of the radio valve and its uses in circuits of various types. Following an explanation of the fundamental thermionic valve, the book deals with diodes, as rectifiers and detectors; triodes and their various applications; tetrodes and pentodes; multiple-grid valves for frequency-changing; power-output valves; and valves for VHF and UHF operation. Other chapters discuss special-purpose types and the construction of modern miniature and sub-miniature valves.

The system of letter symbols for valves introduced by the British Standards Institution in 1947 is used throughout, and a full explanation of this valuable system is given. The text is supplemented by over 100 diagrams and graphs, including many typical circuits. While this book does not attempt to provide more than a general introduction to this large and complex subject, the reader is given an excellent grounding in a clear and concise form, and the technical level is sufficiently advanced to make the work useful to the more knowledgeable radio student as well as to the novice.

MEASURING LOW FREQUENCY QUARTZ CRYSTAL ACTIVITY

A new low frequency quartz crystal activity test set is now being produced by Salford Electrical Instruments, Ltd. Covering a frequency range from 50 to 2,000 kc and known as the QC-166 Test Set, it is complementary to the older QC-57 equipment which covers frequencies from 1 to 20 mc. Need for a test set of this kind has arisen because of the many recent additions to the low frequency range of quartz crystals. Its use is specified in Quartz Crystal Specification R.C.S.271, and the ranges covered embrace all Service requirements. The new QC-166 set (which is available in a commercial as well as a Service form) was developed in the Research Laboratories of The General Electric Co., Ltd.

Operating Principle

The new set, although it necessarily incorporates a modified circuit, operates on the same principle as the older high frequency QC-57 in that it measures the apparent resistance, or the equivalent parallel resistance, of the crystal. The operator can, by measuring this property, determine the quality of a crystal, because the amplitude of oscillation in most crystal oscillator circuits is determined by the apparent resistance of the crystal shunted by the circuit input capacity, the behaviour of crystal and oscillator being similar to a parallel tuned circuit.

In the QC-166 the equivalent parallel resistance range for the 50-2,000 kc frequency range is from 30,000 to 600,000 ohms, and the measurements are made on four frequency ranges: 50-130 kc; 130-330 kc; 330-800 kc; and 800-2,000 kc, approximately. In the first three the range of equivalent parallel resistance measured is 50,000 to 600,000 ohms, while on the fourth the range of measurement is 30,000 to 350,000 ohms. This embraces all the limits specified in Quartz Crystal Specification R.C.S.271. Measurements are made direct, input capacities of 30, 50 and 100 $\mu\mu$F being selected as required.

The equipment is designed for operation from a 50 c/s supply, but other supplies can be catered for if necessary. The input voltage can be changed from 200 to 250 volts in 10-volt steps, and the power requirement is about 50 watts.

TWO-WATT MOULDED TRACK POTENTIOMETERS

These potentiometers have been developed by The Plessey Co., Ltd., Ilford, Essex, as the result of the evolution of an entirely new moulding technique. They are suitable for tropical service under normal conditions, and the specification of the Radio Components Standard Committee RCS/122 for rotary variable composition carbon resistors has been adopted as the quality standard in their development.

The track is produced as an integral moulding in a groove in the body of the insulated casing. The units are therefore intrinsically stable, both mechanically and electrically, due to the avoidance of unstable backing materials and the elimination of moisture traps and other disadvantages associated with conventional construction. Continuity of the track material ensures low track noise, and a double carbon brush arrangement eliminates track wear and the increase of track noise due to age.

Track resistance value is determined by the proportions of carbon and chemically inert moulding material, and a very wide range of resistance values is obtainable. Units rated at 100 ohms may as easily be produced as those of more usual values. The method of manufacture provides for variation in resistance law by variation of the proportions of binder and conductive materials throughout the moulding process. The use of deleterious chemicals, abrasives, and discontinuous methods of production are thus obviated.

Low and consistent values of "stop-and-start" resistance are readily obtainable, and a maximum production limit of 50 ohms, or 5%, whichever is the smaller, is specified. Special values of hop-on and hop-off resistance can be provided.

"THE OTHER MAN'S STATION"

This has been a popular and interesting feature in *Short Wave Magazine* for many years now, and we are always interested in seeing more of them. So long as you can let us have a good photograph, with full descriptive notes, you can be sure of a showing as "The Other Man's Station." The story you see each month under this heading is written from the notes—therefore, what we like is not only a description of the gear, but also of the results achieved, main interests in Amateur Radio, and such personal details as you care to give for publication. Payment is made for material used as it is published.

NEW QTH's

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

DL2TH, Sgt. J. B. Smith c/o Sgts.' Mess, R.A.F. Station, Bruggen, B.A.O.R. 34.

DL2YL, Mrs. J. M. Smith, c/o Sgt. J. B. Smith, Sgts.' Mess, R.A.F. Station, Bruggen, B.A.O.R. 34.

G2JB/A, J. H. Payton, Waltham Tea Gardens, Skinners Lane, Waltham, nr. Grimsby, Lincs. *(Tel: Waltham 2271).*

G3CRC, Clacton Radio Club, c/o 39 Victory Road, Clacton-on-Sea, Essex.

G3GWR, A. G. Stormont, 55 Townhead Road, Dore, Sheffield.

G3IDF, A. R. Dyer, 36 Keble Street, Summerstown, London, S.W.17.

GW3IDF/A, A. R. Dyer, Llys-Awel, Brynteg, Anglesey.

G3IPY, C. W. Hope, 48 Oak Crescent, Malvern, Worcs.

G3JAO, G. E. Simonite *(ex-MD1C),* 289 Gristhorpe Road, Selly Oak, Birmingham, 29.

G3JBV, D. Smith, 46 Willamce Grove, Richmond, Yorkshire.

G3JBV/A, D. Smith, 3 Squadron, 3 Training Regt., Royal Signals, Gallowgate Camp, Richmond, Yorkshire.

G3JFO, R. W. Flintham, 77 Spalding Avenue, York, Yorkshire.

G3JGT, C. V. Taylor *(ex-D2IV),* 6 The Moat, Weston Coyney, Stoke-on-Trent, Staffs.

GI3JGZ, E. Wright, jun., 3 Queen Street, Portadown, Co. Armagh.

G3JIA, D. Harrington, 40 Wellington Avenue, Chingford, London, E.4.

G3JJU, R. B. Hurst, 26 Somerville Road, Sutton Coldfield, Birmingham.

G3JJY, J. Joynson, 184 Outer Forum, Liverpool, 11.

GW3JKE, G. W. Thomas, 2 Lewis Street, Trehafod, Pontypridd, Glam.

G3JKK, R. M. Allen, 20 Clifton Road, Henlow, Beds.

G3JKO, M. Dransfield, B.Sc., 49 Musters Road, West Bridgford, Nottingham.

G3JLJ, F. Guthberlet, 1 John Cobb Road, Weybridge, Surrey.

G3JLN, F. G. Blain, 67 Long Lane, Hillingdon, Middlesex.

G3JMJ, D. E. Nunn, 7 Bigwood Avenue, Hove, 4, Sussex.

G3JMK, D. L. Hurrell, 53 Yorke Way, Hamble, Southampton, Hants. *(Tel.: Hamble 3125).*

G3JML, J. H. Fish, 9 Cliffe End Road, Longwood, Huddersfield, Yorkshire.

GM3JMM, J. M. Murdoch, 9 Meadowbank Street, Dumbarton.

G3JMP, S. T. Crowther, 91 Passage Road, Westbury-on-Trym, Bristol. *(Tel.: Bristol 65848).*

G3JMQ, C. S. Cotter, 19 Homer Street, Dingle, Liverpool, 8.

G3JNF, J. S. MacAulay, Bourlon Amateur Radio Club, 3 Training Regt., Royal Signals, Bourlon Lines, Catterick Camp, Yorkshire.

GM3JOB, G. Bryce, 17 Churchill Crescent, Ayr, Ayrshire.

G3JOC, O. S. Chilvers, 206 Felixstowe Road, Ipswich, Suffolk.

G3JRF, R. G. Fox, 69 Burney Avenue, Surbiton, Surrey.

G3JVA, L. H. E. Buhr, 9 Cedar Avenue, Sidcup, Kent.

CHANGE OF ADDRESS

G2DFG, N. D. Mattock, Flat 1, 70 Bouverie Road West, Folkestone, Kent.

G2DPA/A, R. C. Parnaby, c/o 116 Halse Road, Brackley, Northants.

G3AFX, E. Barnes, A.I.P.R.E., 6 Silverhill Road, Bradford Moor, Bradford, Yorkshire.

G3AQX, S. Roberts, 43 Brenden Avenue, Somercotes, Derbyshire.

G3BOT, A. B. Reeder, The Limes, Church Street, Little Shelford, Cambs.

G3BPQ, E. Smith, 114 Margaret Street, Ashton-under-Lyne, Lancs.

G3CIO, J. S. MacAulay, Catterick Amateur Radio Club, Loos Lines, Catterick Camp, Yorkshire.

G3CWZ, D. R. Layzell, Sunningdale, Cann, Shaftesbury, Dorset.

G3DLQ, J. S. MacAulay, 33 Quentin Road, Catterick Camp, Yorkshire.

G3DVH, J. R. Mason *(ex-YI2JR/VU2DJ),* 35 Benning Avenue, Dunstable, Beds.

G3EGE, D. C. G. Johnson, 19 Gamble Street, Nottingham, Notts.

G3EHZ, A. H. Wreford, 207 Durham Road, Stockton-on-Tees, Co. Durham.

G3EJH, W. R. Peatman, 146 Long Lane, Attenborough, Beeston, Notts.

G3EKW, Nottingham and District Short Wave Club, Woodthorpe House, Mansfield Road, Nottingham, Notts.

G3FAS, A. B. Dixon, 51 Tyzack Road, Totteridge, High Wycombe, Bucks.

G3GVT, K. Drabble, 189 Woolley Road, Garden Village, Stocksbridge, nr. Sheffield, Yorkshire.

G3HMH, J. Shilling, 33 Dovenby Road, Clifton Estate, Nottingham, Notts.

GI3IGD, D. S. K. Coulter, 30 Oakland Avenue, Belfast.

G3ITY, E. Yates, 210 Stamford Road, Blacon, nr. Chester, Cheshire.

G3IXA, D. Livingstone, Seal Point, Radford Semele, Leamington Spa, Warks.

G3IXE, R. J. West, 11 Durrisdeer House, Lyndale, London, N.W.2.

G6TJ, A. Cooper, c/o Cross Roads Photographic Supplies, Southbourne, Bournemouth, Hants.

Random Jottings by the Old Timer

SO the future of broadcasting on VHF is assured — a news item which must have made many an amateur sit up and take notice. Although we still talk in terms of converters for existing sets, it is obvious that medium-wave broadcasts will *eventually* cease, even if it does take many years, and that VHF FM will be the chosen vehicle for Housewives' Choice, Music-While-You-Work and the whole gamut of education and entertainment which we call broadcasting. This leads one to the comical speculation—will the amateurs eventually be put out to graze on the otherwise useless medium and long waves? What a glorious opportunity for some of the real Old Timers (much older than this one) to revive their specialised knowledge of 1000-metre technique! But it won't be so good, with copper the price it is to-day. A 300-turn tank coil, six inches in diameter, would cost real money now; and some of these fellows restricted to 33-ft. dipoles might find difficulty in working their VK's . . . .

THE OLD-TIMER PLAN

We have really got down to this and evolved a much better plan. It is devastatingly simple. Just prohibit all *broadcasting* on the HF bands, and hand the said bands over to the amateurs, together with the full responsibility of handling all international propaganda. Give the broadcasters their territory on long, medium and ultra-short waves, and let the amateurs occupy the 49-, 31-, 25-, 19-, 16-, 13- and 11-metre bands. Difficult? *Tch*—it could be arranged overnight. As for the organisation of the propaganda . . . simply make it clear that it was not only the right but the duty of every amateur to tell all his contacts what he did for a living, what kind of place he lived in, how many hours he worked (and for what) and all the domestic details that he wouldn't rather keep to himself. Then you could close down the Foreign Office, the Politbureau, the FCC, Senator MacCarthy and all, and devote the savings occasioned thereby to financing bigger and better transmitters for the amateurs—the heroes of the hour.

QRP—THE GOOD SIDE

So long as one does not make too much of a virtue out of using low power, it is a very good thing and a very interesting one. More than this, it removes so many complications. We were recently talking to a W station who ran nicely at 750 watts on CW, but when he got his phone going, a 6000-volt condenser blew up and had to be replaced by one rated at 30,000 volts! And here were we, without anything rated over 1000 volts in the place. And there, too, were the QRP fellows, without anything rated above 200 volts. Provided one does not expect to duplicate QRO results when using QRP, one can have a fine time. Working DX gives greater satisfaction; one doesn't cause as much QRM to others; and local BCI and TVI troubles are almost non-existent. The gear is easy on the pocket, simple to construct, takes up little room, affords great pride of possession when it achieves startling results, and so on. In fact, the joys of QRO operation seem to be outweighed on all counts by those of QRP.

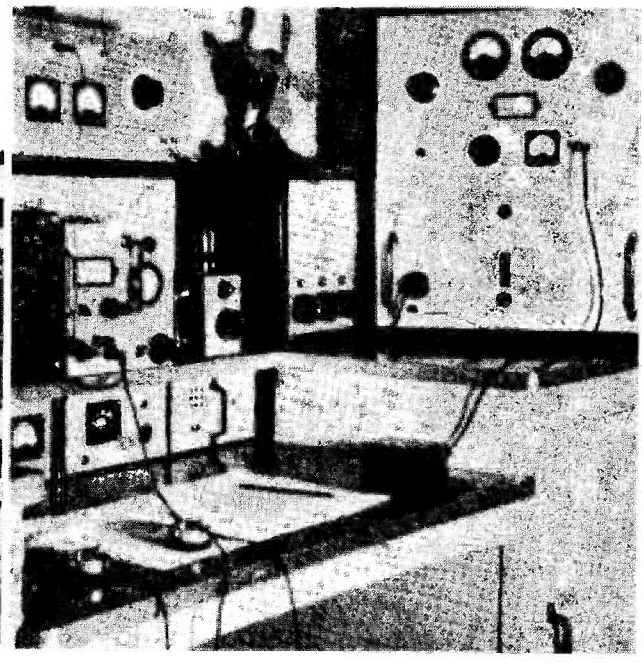
QRP—THE BAD SIDE

What a pity it is, then, that a few users of QRP practically ignore the fundamentals of radio in some of the nonsense that they talk! One hears the law being laid down about the need for squeezing the last drop of efficiency out of a PA; for instance, when, whatever the power, the difference in the signal would be quite imperceptible, whether the PA efficiency were 50 per cent. or 75 per cent. (Work it out in decibels for yourself, then). We have even heard the opinion freely expressed over the air that an *efficient* 2 watts will beat an inefficient 25 watts any day. Well, from where we are sitting an efficient 2 watts looks like about 1¾ watts output, and an incredibly inefficient 25 watts looks like at least 10 watts output. So where do we go from there? Shift the subject of conversation to *aerials*, and we will listen with far more interest. Two watts to a really efficient aerial will be better than 25 to a useless one—there we fully agree. But you can't discuss aerials in terms of "QRP."

CAUGHT IN THE NET

Once more we are bound to return to this phone-net business, and the shockingly inefficient way in which most of them are operated. Instead of saving time and space, they become wasters of both. It is a pleasure to hear a proper net, slickly operated, with all users dead on the same frequency—a real joy to listen to. Most of the nets we find (apart from the Americans and Canadians, which are exemplary) are composed of people who waffle about the order, haven't a clue whose turn it is, come on two at a time, drift off frequency, and defeat the whole object of the thing by laborious repetitions of call-signs, complete with unnecessary phonetics . . . in fact, the whole procedure seems to us rather nauseating at times, at least on the HF bands. A large prize should be offered to the first group of British amateurs who get together a *real* net, slickly operated, under control all the time, and sounding as if all its members know what they are doing. On the other hand, there are some quite good Top Band nets.

The Other Man's Station—G3IHT



THIS very neatly fitted installation is that of G3IHT, owned and operated by H. M. Thompson, 99 Woodfield Drive, Gidea Park, Essex—whose experience of what was then called wireless goes back to 1917, when he operated a fearsome piece of machinery known as a "power buzzer"; this radiated a signal by means of a system of earth mats, and was much used in the forward areas during the latter part of the 1918 War.

After six years in India with the Royal Signals, operating spark and ICW transmitters (and the first Army telephony transmitter, powered by a hand generator), H.M.T. transferred to the Indian Government Wireless Branch and served at various of their radio stations. In 1930, he came home to England and, in the service of the G.P.O., took many an amateur in the Romford area for his Morse Test! From all this, it is clear that though the station of G3IHT only came into existence comparatively recently, its owner has had a wide and varied experience as a radio man.

G3IHT is a 25-watt station, operated mainly on CW and in the 7 and 14 mc bands only. Nor is DX of particular interest—anybody workable is a QSO for G3IHT. On the extreme right, we see the transmitter and power pack, with the aerial tuner to the left, and above. The station receiver is an R.1155, with modifications, and to the right of the wavemeter are the power distribution panel and the control switchboard.

The operating table, bench and fittings have been carpentered by G3IHT himself; the finish is grey and dark blue, with an aluminium banding strip. As readers will agree, the whole effect is clean and neat, and no doubt his layout will give a few ideas to those who are contemplating a rebuild.

Aerial at present in use at G3IHT is a 66-foot Zepp, with rather a long and awkward feeder run—from the radio room at the front of the house, up through the roof space, and out under the eaves at the back. In fact, at one point the feeder is several feet higher than the aerial!

THE RADAR ASSOCIATION

The Radar Association was originally formed as a club for ex-members of the Royal Air Force who had been engaged on radar duties. The increasing demand to expand the technical side has resulted in a re-organisation of the Association, with a technical division open to anyone interested in radar (from industry or the Forces) and an operational division for those concerned with the applications of radar. This has strengthened the Association and considerably widens the field for membership. Interesting lectures and activities are planned for the coming months, and prospective members should write to the Secretary, Radar Association, 83 Portland Place, London, W.1.

QSL BUREAU FOR DL2

The QSL Bureau for the DL2's is now being operated by G. Verrill, G3IEC, at 75 South Street, Gosport, Hants. Cards for DL2 should be despatched at fairly frequent intervals, as the addressees are often on the move and are not always easy to trace.

The Month With the Clubs

Another "MCC" event has come and gone, and those Clubs who entered seem to have been greatly pleased thereby. We suggest that an entry of 50 or even 60 Clubs should not be too much to expect for this event, which, next winter, will be repeated on the same lines—two week-ends of afternoon operation only.

Now is the time for Clubs to start giving it thought. If the Club station is not suitable for contest work, surely a member would be glad to take the duty over and allow some of his fellow-members to join him in operating his home station?

We suggest that Club discussions and committee meetings should not be devoted too much to this summer's portable operation, but should include some thought and constructive suggestions for next winter as well.

This month, in addition to the usual reports, we acknowledge receipt of the Monthly "Newsletter" (CLIFTON) *and two copies of "South Coast QRM," the Bulletin of the* SOUTH COAST RADIO CLUB, *South Africa. One gem noted in the latter publication is worth repeating: "A Club becomes a Society when its constitution becomes so lengthy and so full of legal jargon as not to be understood by anyone." Untrue, but worth repetition.*

We have 32 reports from Clubs this month, some of which were received for the January issue, in which the space was devoted to the MCC Report.

Next month's deadline is **first post on February 12.** *Address reports to "Club Secretary,"* SHORT WAVE MAGAZINE, *55 Victoria Street, London, S.W.1.*

Birmingham & District Short Wave Society

At the AGM the retirement of the Society's President was announced, and Mr. Burton, G2BON, has been elected to the position for the coming year. Other officers will be Mr. Frearson (Vice-Chairman). Mr. Shirley (Treasurer) and Mr. Yates (Hon. Secretary).

Chester & District Amateur Radio Society

The New Year has opened with increased activities on the air, both on Top Band and 80 metres, with the Club Tx, G3GIZ, operating from the Tarran Hut, YMCA, Chester. Meetings are held every Tuesday at the same address. R.A.E. lectures are held on the first and third Tuesdays, the remainder of the programme being made up with Morse practice and general-interest lectures.

Clacton Radio Club

Four members have recently passed the G.P.O. Morse test, and two are already licensed as G3JGC and G3JKT. Meetings continue at the Laxfield Guest House, Beach Road, and intending members are asked to contact the Secretary (QTH in panel) for details. Considerable interest is being shown in R.A.E.N.

Lancaster & District Amateur Radio Society

An informal Christmas Dinner turned out to be a very pleasant event, and the Chairman expressed the hope that this would become a regular feature of the society's programme. After the dinner, Mr. O. Ellefsen, A.M.I.E.E., related his memories of the early days of radio, before the thermionic valve was invented. Spark transmitters and coherer receivers were described. On January 6, Mr. D. Baxter gave a talk on the servicing of broadcast receivers by the amateur.

Leicester Radio Society

The A.G.M. was held in December and the officers for the coming season elected. Three entries from listener members were submitted for the "Thomas Trophy," and a committee is examining them. Society finances were described as sound, and after the official business a talk was given on the Radio Amateur Emergency Network.

Medway Amateur Receiving and Transmitting Society

Both meeting place and times of meetings have been changed. The Club now gathers at the Troy Town School for Boys, King Street, Rochester, on alternate Mondays, the next dates being February 15 and March 1. Business is conducted at every third meeting, the others being occupied with talks, film shows and the other Club activities.

QRP Research Society

The Kaleveld Cup Contest for 1953 was won by GC2CNC, who, among other excellent contacts, worked W5BNO, VK4SD and VK4FJ with his 2-watt transmitter—a single-valve CO working on 14 mc. Anyone interested in any aspect of QRP work is invited to contact the Hon. Sec.—QTH in panel. A recent development is the "Student Adoption Scheme," catering for the novice.

SHEFFIELD UNIVERSITY RADIO SOCIETY

Any student interested in reforming the University Radio Society is requested to contact the provisional secretary, Mr. B. Jenkinson, G3JHC, *via* **pigeon hole "J" in the Union.**

Southend & District Radio Society

Recent lectures have covered such diverse subjects as Klystrons and Magnetrons (Mr. K. F. Crispin), Transmission Lines and

The winning team for Neath and Port Talbot Radio Club, signing GW3EOP in the Eighth MCC. Left to right: GW3INO, GW3FSP, GW2DTQ. Bracketed first with Chester in the 1952 Contest, they managed to lead the northern Club by two points in the 1953 event.

Aerials (Mr. W. A. Smith, B.Sc.) and Undistorted Output (Mr. J. Wallace). First of a new series was a talk on Radar by Mr. T. Gray, of Marconi's. Forthcoming: February 5, Transistors; February 19, Time Standard.

Spen Valley & District Radio & Television Society

Forthcoming events are as follows: February 10, Principles of Radar (G3GFD); February 24, Annual General Meeting; March 10, not yet arranged; March 24, Crystal Microphones and Pick-Ups (Rothermel).

Stoke-on-Trent Amateur Radio Society

Meetings are held every Thursday night at the rear of the Cottage Inn, Oakhill, Stoke-on-Trent. Lectures on Tape Recorders, Modulators, Transistors and TVI Suppression will be given this year. The workshop is almost fully equipped, and members are invited to undertake practical work. Refreshment facilities have been acquired, and prospective members are invited to attend any Thursday night.

Torbay Amateur Radio Society

Recent events have been a talk on Meters, by Mr. Mackenzie, and a series of ten-minute talks by members on their aerial system and the reason for the choice of that particular type. So much interest was shown in the latter that it was carried over to the following meeting. Future meetings will be on the third Saturday, as usual; 7.30 p.m. at the YMCA. Torquay.

West Lancashire Radio Society

Meetings are held every Tuesday evening in the room over Gordon's Sweet Shop, St. John's Road, Waterloo, Liverpool, 22. The present session continues with film strips, films, junk sales, Morse classes and lectures. A constructional contest will also be held early this year. New members and visitors will be welcome.

Wolverhampton Amateur Radio Society

This Club has now moved to new Headquarters at Stockwell End, Tettenhall, Wolverhampton, and work is proceeding with the equipping and installation of the Club Tx, G8TA, which should be operating shortly. Morse classes are also being held, and are proving very popular. Meetings are held on alternate Mondays, with Morse classes on non-meeting nights.

Woolwich & District Radio Society

Meetings are held on alternate

Wednesdays at the Bull Tavern, Vincent Road, Woolwich, S.E.18. Next dates are February 10 and 24. *See* panel for Secretary's QTH.

Worthing & District Radio Club

Meetings continue at the Adult Education Centre, Worthing. In December the annual Junk Sale was held. The usual programme of talks and discussions is now under way.

Bournemouth Radio & Television Society

At the recent A.G.M. the new officers were elected (*see* panel for QTH of secretary) and a full programme for the coming season was announced. On February 13, at 7 p.m., there is a Hamfest at the Four Seasons Restaurant, Iford Bridge; thereafter, on the first Friday of each month, regular meetings will be held at the Cricketers' Arms, Windham Road. G3FVU, the Club Tx, is active on 40 and 80 metres and will shortly be on "Two" as well.

Brentwood & District Amateur Radio Society

This Club has now amalgamated with the Brentwood Model Engineers, and the joint Clubroom is the Model Engineers' Hall, Primrose Hill, Brentwood. A programme is being arranged, and there will be a change of meeting night. Further details will be announced later.

Brighton & District Radio Club

Mr. R. T. Parsons has resigned from the post of Hon. Secretary after three years, and the work has been taken over by Mr. Jim Huggett (*see* panel for full QTH).

Cannock Chase Amateur Radio Society

Recent visitors were G3CRH and G3JGM, the latter giving an interesting demonstration of his "Spy transmitter." The Club, which is not charged for the use of the meeting-room, was entertained by "Mine Host" and provided with free refreshments at the January meeting. On February 4, G2AMG gives his second talk on Aerials, and on February 6 twelve members will be visiting Sutton Coldfield.

Cheltenham Amateur Radio Society

At the recent A.G.M. G3LP was elected chairman and Mr. W. Briers secretary (*see* panel for address). The subscription was reduced to 6s. per annum. Meetings are now held on Wednesdays at 8 p.m. in the Radio Hut, St. Mark's Community Centre, Brooklyn Road. Visitors are always welcome.

Clifton Amateur Radio Society

A Christmas Day net was organised by G3DIC, and most members had their sets tuned to 1925 kc that morning. At a

Chester and District Amateur Radio Society receive the congratulations of G2AMV (left), chairman of the Association of North-Western Radio Societies; he is shaking hands with G3EXT, chairman of Chester, who was supported by, left to right: GW3HEU, G3ATZ and G2YS (extreme right) who, with the assistance of GM3JFJ, were the operators running Chester into second place in the Eighth MCC.

recent meeting Mr. D. Reed gave a talk on his record player and home-built amplifier. January 1 attracted a large gathering for a Junk Sale. Meetings continue every Friday at the HQ, 225 New Cross Road, London, S.E.14.

Radio Society of Harrow

Forthcoming events are as follows: February 5, Practical Night; February 12, Demonstration of Test Gear (Avo); February 19, Practical Night; February 26, Junk Sale. All meetings are held in the Science Lab., Roxeth Manor Secondary School, South Harrow.

South Manchester Radio Club

On February 12 G3DQU will talk on Frequency Measurement, and on February 26 G3JRK will cover the Construction of a Grid-Dip Oscillator and its Uses. For the coming season, various D-F tests are being arranged for members who are keen on this side of radio; it is also hoped to get G3FVA on the air with the new Club Tx.

Surrey Radio Contact Club (Croydon)

The Junk Sale arranged for March has been brought forward to the meeting on February 9, so that G2FKZ can give a talk on VHF at the March meeting. All meetings are on the second Tuesday, at the Blacksmiths' Arms, South End, Croydon.

Yeovil Amateur Radio Club

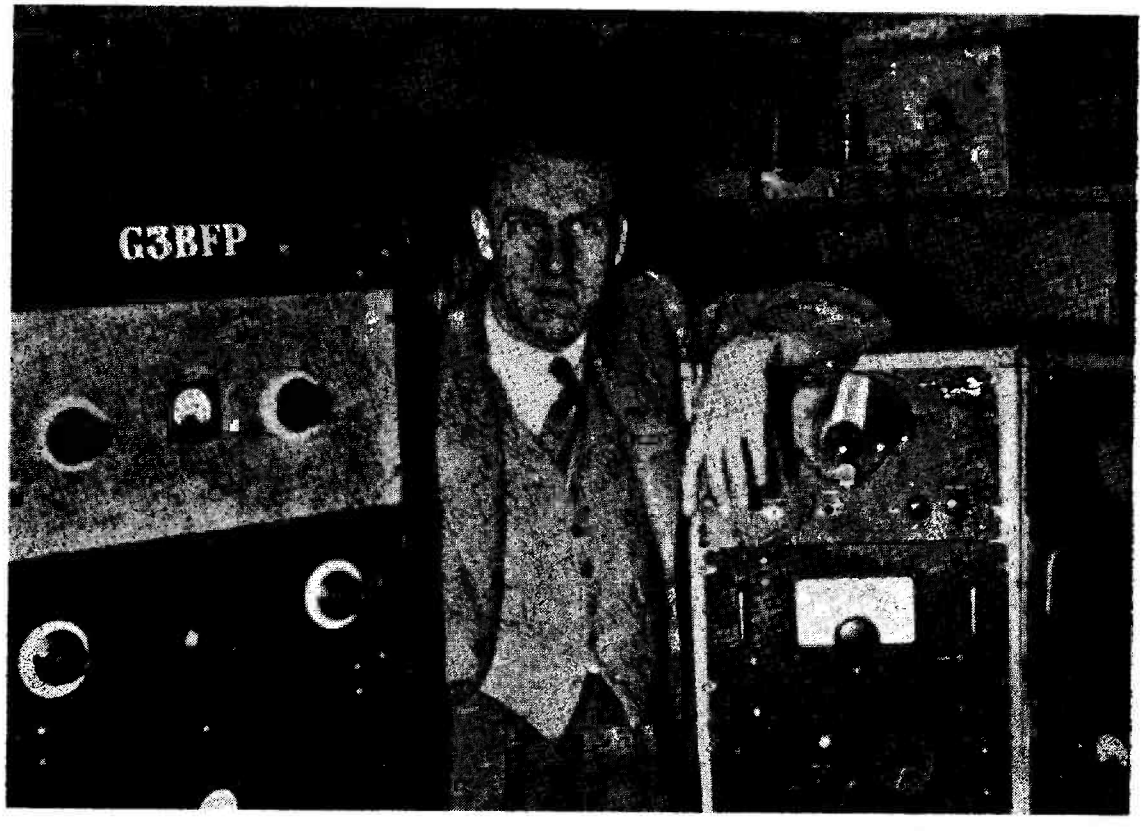
Entry in MCC was not possible this year, as all operators were working on Saturday afternoons. Weekly meetings have continued, with informal discussions, and constructional work has included the modification of a BC-453 as a Q5'er for the Club station. DL2TA was a recent visitor, who gave some interesting details about present conditions in Germany.

Coventry Amateur Radio Society

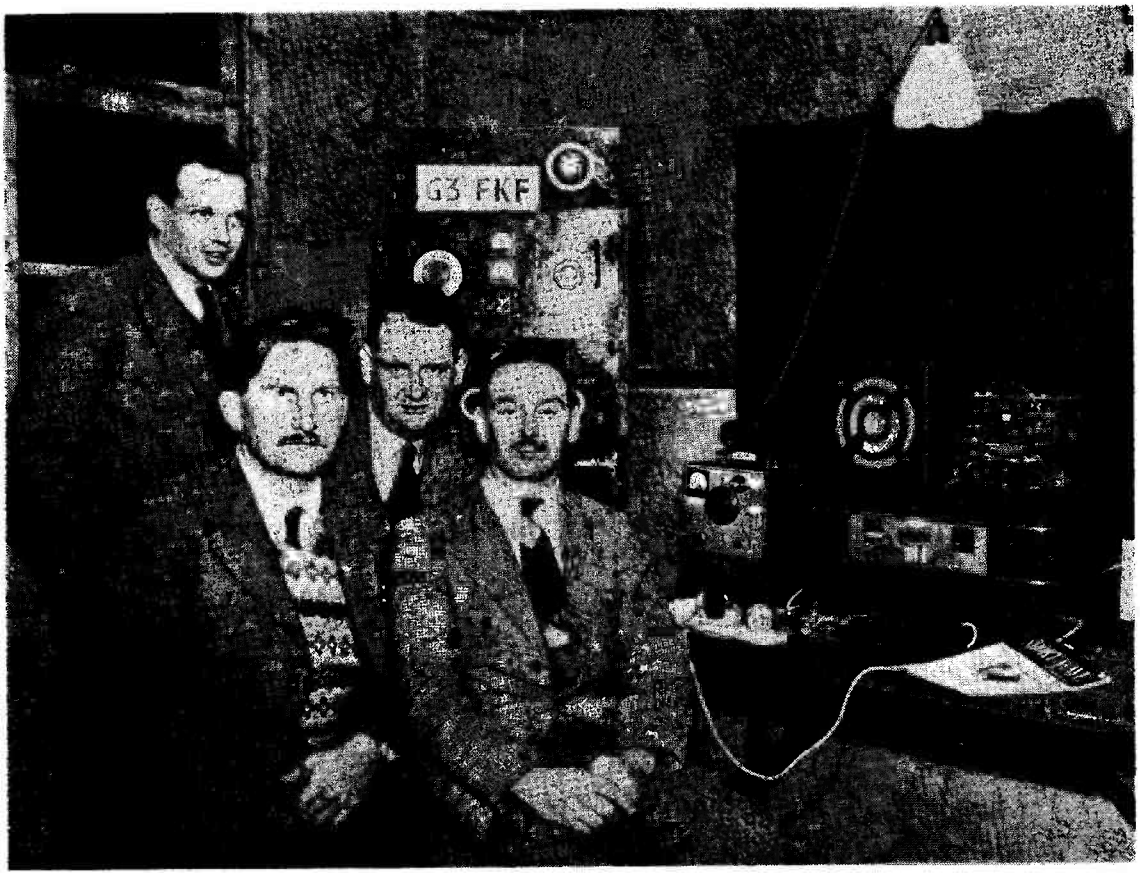
Meetings continue on alternate Mondays, 7.30 p.m. Forthcoming events include a Junk Sale on February 15, and recent meetings have taken the form of Film Shows, a talk on Aerials by G6WH and a talk on Mathematics by Mr. T. R. Theakston, B.Sc. The Annual Children's Party in January was voted a great success.

Grafton Radio Society

After the Christmas break, Grafton resumed full activity with talks on January 15 and 22, and "Any Questions" on the 29th.



Surrey Radio Contact Club came equal third with Salisbury in this season's MCC. Their nominated station and operator was G3BFP, who carried through almost single-handed, with logging assistance from SWL Morrison and G3IRP. A score of 370 points and a high place in such a hot contest reflects the greatest credit on G3BFP as an operator.



The team on G3FKF, Salisbury and District Short Wave Club, who finished equal third with Surrey in the Eighth MCC. It is Salisbury's first appearance among the leaders, and they express themselves as well pleased with the result. Left to right: G3IVP, G3CMJ, SWL Ledsham and G2FIX. Gear used was as on the table to the right of the picture, and consisted of an AR77 receiver and a neat little 10-watt VFO-PA transmitter built into a Jefferson-Travis UF-1 Transceiver cabinet.

February dates cover "Miniature and Unusual Components" (G6MB) on the 5th; Club Members' Stations on the 12th; "Simple Modulation" (G6OT) and a Junk Sale. R.A.E. classes are well supported on Monday evenings.

Neath, Port Talbot & District Radio Club

There will be a meeting on February 10, 7.30 p.m., at Royal Dock Hotel, Briton Ferry. The subject will be VHF, and the speaker G4CG.

Norwich & District Radio Club

The secretary has now been granted his licence, G3JIE, and has been active on most bands from 1.8 mc to 70 cm. The Club itself holds the call G3JGI, the full address being c/o Comrades Club, 1 St. Faith's Lane, Prince of Wales Road, Norwich. A successful Christmas Party and the AGM have been held recently. Early in April this Club, with the Norwich Model Aero Club, plans to hold an exhibition.

Nottingham University Radio Society

Constructional work is in progress, including a 2-metre stacked array to be mounted on the shack roof. A modulator for the LF bands is also being tested. Visits arranged for the spring term include Parmeko Transformers, Leicester, and the Eddystone Works, Birmingham. The Club acts as host to the still active Nottingham BSWL group.

Stockport Radio Society

The next meetings after publi-

cation are on February 17 and March 3. During February there will be a Hot Pot Supper, and a social evening at the Edgeley Institute is planned for March 6. R.A.E. Classes are held every Thursday at the A.T.C. Headquarters in St. Petersgate, Stockport.

Salisbury & District Short Wave Club

Their annual general meeting was held on January 12, when officers were elected. The Earl of Pembroke and Montgomery is President of the Club, and G3IVP —the retiring secretary, who has held this onerous position for five years and now become treasurer— reviewed the events of the year; one of the highlights was Salisbury's success in the last MCC. An interesting summer programme has been arranged for the meetings at 8 p.m. every Tuesday —visitors are always welcome and should contact the secretary for a map of "how to get there."

NAMES AND ADDRESSES OF SECRETARIES REPORTING IN THIS ISSUE

BIRMINGHAM : F. C. Cook, 67 Regent Road, Handsworth, Birmingham 21.
BOURNEMOUTH : F. G. Hamshere, 55 Maclean Road, West Howe, Bournemouth.
BRENTWOOD : J. S. Thornton, G3FQQ, 18 Western Road, Billericay.
BRIGHTON : J. Huggett, 15 Waverley Crescent, Brighton 6.
CANNOCK CHASE : C. J. Morris, G3ABG, 58 Union Street, Bridgtown, Cannock.
CHELTENHAM : W. Briers, 42 Roman Road, St. Mark's, Cheltenham.
CHESTER : N. Richardson, 23 St. Mary's Road, Dodleston, Chester.
CLACTON : R. J. Appleby, G3INU, 95 Oxford Road, Clacton.
CLIFTON : C. H. Bullivant, G3DIC, 25 St. Fillans Road, London, S.E.6.
COVENTRY : K. Lines, G3FOH, 142 Shorncliffe Road, Coventry.
GRAFTON : A. W. H. Wennell, G2CJN, 145 Uxendon Hill, Wembley Park, Middx.
GRAVESEND : R. Appleton, 23 Laurel Avenue, Gravesend.
HARROW : S. C. J. Phillips, 131 Belmont Road, Harrow Weald.
LANCASTER : A. O. Ellefsen, 10 Seymour Avenue, Heysham.
LEICESTER : W. N. Wibberley, 21 Pauline Avenue, Belgrave, Leicester.
MEDWAY : D. H. Brett, 14 Connaught Road, Luton, Chatham.
NEATH and PORT TALBOT : H. G. Hughes, GW4CG/A, 3 Hill Top, Styclewen Villas, Baglan Road, Port Talbot.
NORWICH : D. Youngs, 53 Salisbury Road, Norwich.
NOTTINGHAM UNIVERSITY : J. Cragg, Radio Society, Union Room, The University, Nottingham.
QRP RESEARCH SOCIETY : J. Whitehead, 92 Rydens Avenue, Walton-on-Thames.
SALISBURY : H. G. Futcher, 171 Castle Road, Salisbury, Wilts. (*Salisbury* 3697).
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, nr. Leeds.
STOCKPORT : G. R. Phillips, G3FYE, 7 Germans Buildings, Buxton Road, Stockport.
STOKE-ON-TRENT : K. H. Parkes, G3EHM, 159 Belgrave Road, Longton, Staffs.
SURREY (Croydon) : S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon.
TORBAY : L. D. Webber, G3GDW, 43 Lime Tree Walk, Newton Abbot.
WEST LANCS. : D. Vaughan, 32 White Meadow Drive, Thornton, Liverpool 23.
WOLVERHAMPTON : H. Porter, G2YM, 221 Park Lane, Wolverhampton.
WOOLWICH : S. Hollingshurst, 30 Conway Road, London, S.E.18.
YEOVIL : D. L. McLean, 9 Cedar Grove, Yeovil.

BRITISH RADAR EQUIPMENT FOR FRENCH AIR FORCE

The French Embassy in London have placed an order worth more than £100,000 with E.M.I. Factories, Ltd.

This order is on behalf of the French Air Ministry, shortly to take delivery of 100 airborne navigational aid equipments, including spares and test gear. These are the Rebecca Mark IV medium-range homing device which, used in conjunction with ground beacons, enable aircraft to be directed accurately to particular sites.

Rebecca Mark IV was developed by E.M.I. in conjunction with the British Ministry of Supply and is produced by E.M.I. Factories. Ltd., Hayes. Middlesex, England.

". . . K Somebody Please . . ."

SMALL ADVERTISEMENTS

9d. per word, minimum charge 12/-. No series discount ; all charges payable with order. Insertions of radio interest only accepted. Add 25% for Bold Face (Heavy Type). No responsibility accepted for errors. Replies to Box Numbers should be addressed to The Short Wave Magazine, 55 Victoria Street, S.W.1.

OFFICIAL APPOINTMENTS

TECHNICIANS, GRADE I (RADIO), required by East African Posts and Telecoms Administration on probation for pensionable employment. Salary, etc., in scale £742, rising to £1,134 a year. Outfit allowance £30. Free passages. Liberal leave on full salary. Normal tour 4 years. Candidates should possess a thorough practical knowledge of the working and maintenance of radio transmitting and receiving equipment. G.P.O. staff should apply through departmental channels.—Write to the Crown Agents, 4 Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience, and quote M2C/32424/SQ.

TECHNICAL ASSISTANTS required by the NIGERIA GOVERNMENT BROADCASTING DEPARTMENT for one tour of 12/15 months, with option of appointment (*a*) On agreement with prospect of permanency, with salary, etc., according to experience in scale £750 rising to £1,035 a year ; or (*b*) On agreement on temporary terms, with salary, etc., in scale £807, rising to £1,115 a year, plus gratuity of up to £150 a year. Outfit allowance £60. Free passages for officer and wife. Assistance towards cost of children's passages or grant of up to £150 annually for maintenance in U.K. Liberal leave on full salary. Candidates should have not less than 10 years' experience in the engineering division of the B.B.C. Those selected will be required to undertake operational duties relating to the control and maintenance of radio equipment at Radio Distribution Studios and to assist in general technical duties.—Write to the Crown Agents, 4 Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience, and quote M2C/30188/SQ.

TRADE

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

QUANTITY 832 Type Valves wanted urgently.—Write PYPE HAYES RADIO, 606 KINGSBURY ROAD, BIRMINGHAM 24. (ERD. 4942).

TABLE-TOP 12w. Tx, 160, 80 and 40 metres, self-contained with p/pack and modulator ; VFO-controlled, fully metered ; £25 each. Miniature Tx, 12w., 160 and 80 metres ; VFO controlled ; complete with modulator, less p/pack ; measuring 7½" x 6" x 5", fully metered ; £17 10s. 0d.—Cotswold Electronic Service, 6 Coronation Road, Tetbury, Glos.

45/- PAID for new boxed 813's. Other surplus valves purchased.—Send details to Box 1362, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

ALTHAM RADIO Co. pay highest prices in the trade for all American equipment, including test sets, transmitters, receivers, etc.—Jersey House, Jersey Street, Manchester 4. (*Tel.: Central 7834-5-6*).

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

SMALL ADVERTISEMENTS, TRADE—*continued*

WANTED: RCA Speech Amplifiers, Type MI-11220 J or K, and Aerial Tuning Units BC-939a.—Offers, stating quantity and price, to P.C.A. Radio, Beavor Lane, Hammersmith, W.6. (*RIV. 8006*).

WANTED: BC-610 Hallicrafters, RCA-4336 Transmitters, SX28, AR88, S27, HRO Receivers and spare parts for above; best prices.—P.C.A. Radio, Beavor Lane, Hammersmith, W.6. (*RIV. 8006*).

R.A.F. and Ex-R.A.F. HAMS.—Join the R.A.F. Amateur Radio Society and keep in touch with old friends.—For membership details, apply Hon. Secretary, R.A.F. Amateur Radio Society, Locking, Somerset.

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: Guaranteed Valves at 5/-; EL42, L77, EL91, (6AM5), ECC91 (6J6), EF91 (6AM6), EB91 (6AL5), EF92 (W77).—Box 1355, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

EDDYSTONE S640, handbook; mint condition; little used; £20 o.n.o.—J. M. Murdoch, GM3JMM, 9 Meadowbank Street, Dumbarton, Scotland.

WANTED: Collins 75A Receiver and 32V Transmitter.—E. Parvin, 19 Fellbrook Avenue, Acomb, York. (*Tel.: 78283*).

WANTED: AR88 Receiver, any condition, reasonable price. Will collect. FOR SALE: HRO, bandspread coils; Twenty-seven pounds ten shillings. Also Meissner Signal Shifter, 1953 model, perfect; Twenty-five pounds.—Box 1354, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

REAL BARGAIN: One-valve Battery SW Rx, covers 1-30 mc; band set and spread, etc.; perfect; in case; offers over 32/6. Need any components, made-up amplifiers, tuners, etc., really cheap, in excellent condition? Must sell, so send SAE for list.—Box 1358, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

H.R.O. RACK SET, with p/pack, speaker and coil cabinet, 10, 15, 20, 40, 80 BS; two GC; £35. G5RV 75w. exciter, £10; ditto, 813 PA, £8; 75w. modulator, p/pull, 807's, £10; Woden 1250/1000v., two 625/375v. power/packs, grey enamel enclosed rack on castors, chokes, 813, 866, 6V6M.—List: Yates, 63 Birley Road, Whetstone, N.20. (*Hillside 6994*).

FOR SALE: B21B Rx, 2 RF-31F, 1-20 mc, coil turret with pwr. supplies. Wavemeter W1191 with LT supply. BC454. Everything in good condition. Offers?—Box 1356, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Any *QST's* before 1924; most *CQ*, 1945/6; *Radio*, November 1940 and before 1936; most *R/9*. Detailed lists on request. Postage refunded.—G3IDG, 95 Ramsden Road, London, S.W.12.

SMALL ADVERTISEMENTS, READERS—*continued*

SALE: BC348, 230v. AC, perfect working order. £14.—Box 1359, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

R208 RECEIVER, complete with phones, etc. Offers or exchange photographic equipment.—Griffiths, 207 Inverness Place, Roath Park, Cardiff.

HALLICRAFTER SX28 for sale, £40.—Saracen's Head Hotel, Daventry. (*Phone: 351*).

SALE: R107, excellent condition; S-meter, noise limiter, manual. Offers?—Pounder, G3DVQ, 44 Hartley Hill, Purley, Surrey. (*UPL: 9471*).

AMATEUR requires American HF Receiver and Signal Generator; also 150-watt Phone Transmitter; also unmodified 348 with spare generator. AR88D for disposal (any swaps?)—Box 1361, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Wilcox-Gay VFO, in good condition, at reasonable price.—Box 1360, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

S. 640, perfect condition, £15; 150-watt phone Tx, 14, 21, 28 mc, 813 PA, TZ40's modulator, in 6ft. rack. A gift, £20.—G2HAC, 54 Lodge Street, Accrington, Lancs.

BC221-D, modulated, with internal P/Pack, £25 o.n.o. Eddystone 640, condition as new, £20. TU units 5, 6, 7, 8, 9 & 10 in cases, as new, £1 each. Valves: 813, 805, 807 & 866.—Box 1357, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

EXCHANGE: Voightlander Bessa 66, F3.5 lens 2¼ x 2¼"; new condition; post-war model; for Tape Deck.—G3FYV, 16 Salisbury Street, Loughborough, Leics.

EDDYSTONE 750 in excellent condition; looks brand-new; £39. All letters answered.—Smart, 11 Shaftsbury Crescent, Newarthill, Motherwell, Lanarkshire.

URGENTLY WANTED: MANUALS OR INSTRUCTION BOOKS, DATA, ETC., ON AMERICAN OR BRITISH ARMY, NAVY OR AIR FORCE RADIO AND ELECTRICAL EQUIPMENT.—HARRIS, 93 WARDOUR STREET, W.1. (*TEL.: GERRARD* 2504).

HALLICRAFTERS Skyrider, 5-10, 25-66 mc, £10; Lane Mark I Tape Deck, £7. — Martin, 13 Broom Water, Teddington, Middlesex.

SALE: CR100 coil pack, 4-gang, 5 IF units, BFO, circuit, 55/-; 2.5 kV. AC, pack and VCR517A, FB for TV, 'scope, 60/-; Premier 45 mc strip, 8 valves, 45/-. Sound strip, 4 valves, 30/-. All items good working order.—80 Byworth Estate, Farnham, Surrey.

FOR SALE: BC221T Frequency Meter, gen. book, VR150 tapped input power unit. Tuning units TU5B, 8B, 9B, 10B, good condition.—Apply 5 Wood End Way, Greenford, Middlesex.

HRO Tuning Condenser, complete with gear box, as new, 25/-; also 12v. vibrator pack for 1-10, 7/6. WANTED: Handbook for Type 62 Tx/Rx and fitments; also vibrators supplies for Type 22 Tx/Rx and AR88. Offers?—L. Grout, 68 The Drive, Worthing.

HRO, perfect condition, appearance new; 5 coils, 400 kc to 30 mc, power/pack; £28. Any lower offer considered. Bargain. Delivered.—Box 1365, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS, READERS—*continued*

SALE: Professional 150-watt Phone/CW Transmitter, VFO 10, 20, 40, 80m; complete; best offer, £35.—G3ATL, The Limes, Hugglescote, Leicester.

POWERFUL 24-volt Motor for beam rotation: reversing split field series type with magnetic brake, 5-stage gearing; brand-new; 35/-, plus carriage.—J. B. Armstrong, 40 The Oval, Mirehouse, Whitehaven.

SALE: BC-221, metal case, first-class condition, complete with internal stabilised power/pack, haversack; £22.—Webber, Westgarth, Cainscross Road, Stroud, Glos.

FOR SALE: Labgear Wideband Couplers, 7, 14, 21, 28 mc, 35/- lot; 6V6M's, 6/-; 12A6's, 4/-; 813 with base, 42/6; PT15's, 5/-.—Box 1363, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

144 mc CONVERTER (G2IQ), professionally constructed and finished; black crackle cabinet, chrome handles, National silver "velvet vernier" dial, IF output, 8-9.5 mc; in perfect order, complete with external p/pack; £15. BC625A Transmitter, brand new and mint, complete, £6. Both items plus carriage.—Box 1364, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: AR88, perfect, late model, £45 for quick sale. Buyer collects.—Bartlett, 4 Folly Square, Bridport, Dorset.

ENCLOSED RACK containing modern band-switched 150-watt Tx, complete with separate VFO and push-button relay control unit; buyer collects; £35. Precision 18-valve triple-conversion receiver; all refinements; unsurpassed performance; genuine sacrifice; £30. 100 kc crystal calibrator with 10 kc multivibrator, 0.005%; four-valve AC mains operated; £8. 420 mc Rx/Tx RT-7/APN-1, less relay, £6.—E. Parvin, 19 Fellbrook Avenue, Acomb, York. (*Tel.: 78283*).

VHF REC., with 6 EF50, 2 EF39, 30/-. Xtal unused, 5257 kc, 12/6.—G2ATD, 5 Sussex Road, North Heath, Erith, Kent.

WANTED: BC453, less valves and otherwise incomplete, but with IFT's intact.—D. Noonan, EI2H, St. Patrick's College, Thurles, Tipperary, Eire.

BARGAIN: Really stable and FB Receiver, American BC1147A; 1.5 to 30 mc in four bands; 11 valves plus VR, noise limiter and rectifier; comparable AR88; S-Meter; Internal speaker—230v. AC. Buyer collects. £27 10s. 0d.—22 Heywood Street, Bury, Lancs. (*Phone: Bury 2385*).

SALE: Crystals 1803, 1000 kc, BC453, RF Units, 80/40 VFO, Top Band transmitter, power/packs, meters and miscellaneous gear.—Enquiries: Crabtree, 180 Halifax Road, Nelson, Lancs.

BOXED 805's (2), 40/- each; boxed 811's, 30/- each. Also handbooks for AR88D; ET4332-B; BC221-T; T1154 (all models), T1131, A and B (no covers on last two books). Offers, please.—G3GUP, 12 Saffron Way, Walderslade, Chatham.

WANTED: Two Marconi MCR1 Midget Receivers in good order, with all coils and one power/pack. State condition and price.—Longacres, Hordle, Lymington.

HAMMARLUND "Super Pro" in good order, with P/Pack.—Offers to: Belsey, 20 Battleswick, Fryern's Estate, Basildon, Essex.

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