

The
SHORT WAVE
Magazine

2/-

VOL. XII

OCTOBER, 1954

NUMBER 8



WORLD WIDE COMMUNICATION

H. WHITAKER G3SJ

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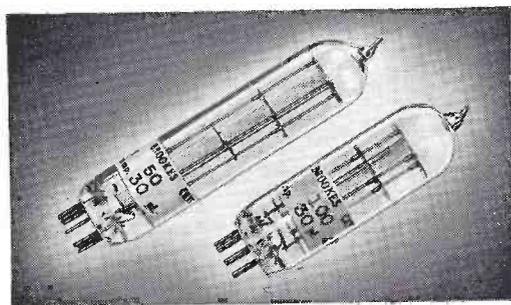
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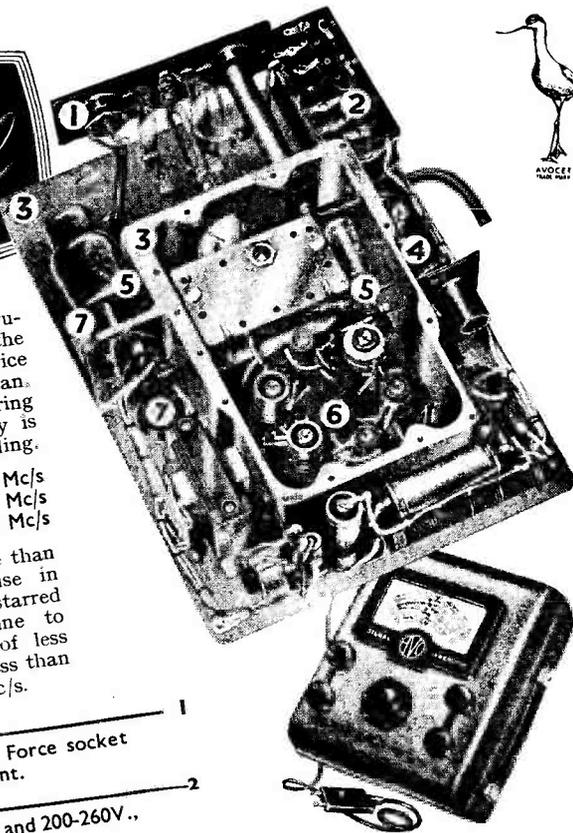




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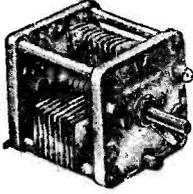
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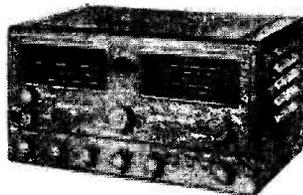
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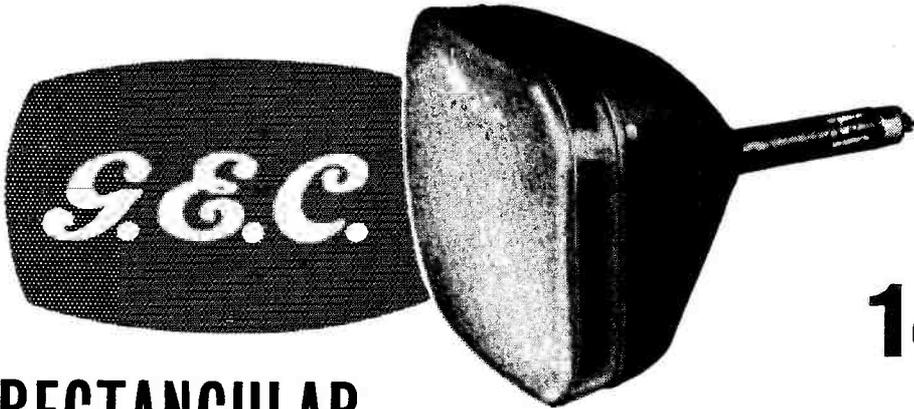
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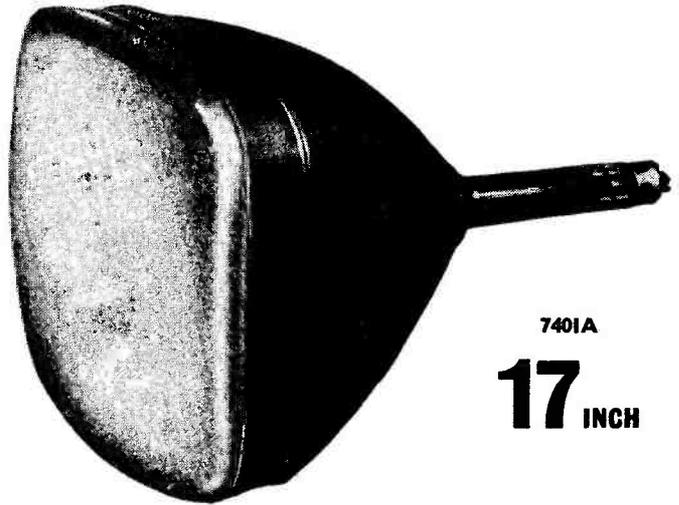
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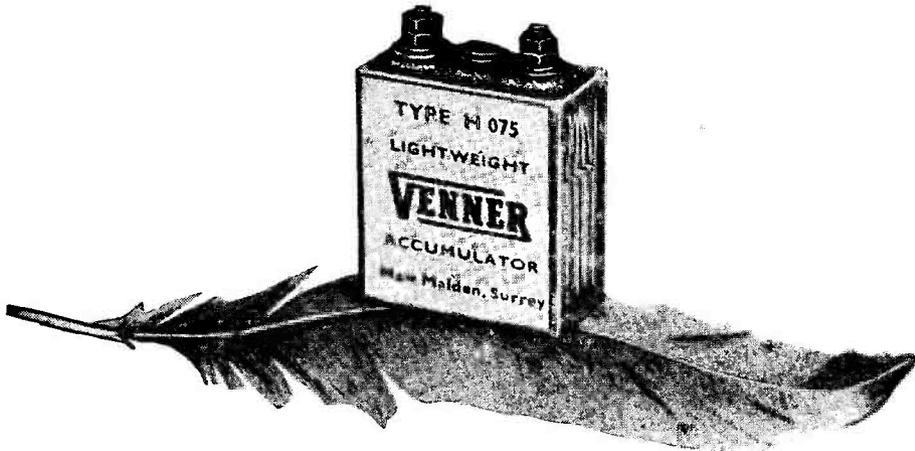
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CENTRAL 1635

The SHORT WAVE Magazine

E D I T O R I A L

Reversion

It is an interesting fact that though our licences are now issued as for communication purposes — rather than experimental, as they used to be — there is more purely experimental work going on in Amateur Radio circles than ever before. This is not only because we now have a far greater number of licensed stations, but also because of the widening scope for amateur experiment in the radio field.

Much of this “amateur effort” is, of course, not amateur at all in the strict sense, but semi-professional. It is true to say that some very large proportion — probably not less than one third — of licensed amateurs are dependent upon the radio industry for a living. Many are in positions of great responsibility as radio engineers or executives, and thereby are fortunate in having at their disposal resources (in terms of equipment, or design and constructional facilities) far beyond those of the average “non-professional amateur.” There is nothing whatever to be said against this; indeed, it is a very good thing, if only for the reason that it helps to keep up standards and also contributes materially to progress.

Then there are also those amateurs who, not professionally engaged in radio at all, are leaders in other fields of industry and commerce. Theirs, too, is very often purely an experimental interest.

These remarks are inspired by the (somewhat surprising) results of a survey of the professional interests of a group of 24 readers of SHORT WAVE MAGAZINE, selected at random: Eight were in senior positions in the radio industry, either in research organisations or as directors or managers of nationally-known concerns; one was a director of a firm of knit-wear specialists doing a world-wide business; another was sales director of an equally famous perfumery establishment; two others, both personalities well in the public eye, were professional entertainers, one on stage and screen, and the other on the speedway; three were radio dealers; and the remaining nine were the sort of people one would expect to find at any radio club meeting.

It does not necessarily follow that a random selection made in this way is truly representative of all. But the interesting thing is that not one of these 24 licensed amateurs is either a double-813 tycoon or in the category of well-known DX operator. However, they all have one pursuit in common — in every case they said their main interest in radio is experimental.

*Austin Fobler
Gt Fo.*

Safe Top Bander

CW/PHONE TRANSMITTER
PROOFED AGAINST BCI
AND TVI

N. P. SPOONER (G2NS)

As many operators will know, even relatively low-powered equipment on the 1.8 m.c. band can cause TVI. Apart from this is the fact that on the 160-metre band there is often BCI trouble in a district where there may be broadcast receivers of the simpler designs having no RF stage, but only the frequency changer as the first stage. The transmitter described and illustrated here has been found to give trouble-free operation on the Top Band; it incorporates a simple NBFM unit for phone working.—
Editor.

THE fact that the 1.8 mc band is not far removed from medium-wave broadcasting often serves as a warning and prepares one for possible BCI complaints. At the same time the separation can also foster a sense of false security; the band is so far removed from vision and sound frequencies that surely TVI cannot arise. In order to prove that, contrary to popular opinion and in the absence of certain precautions, a 1.8 mc transmitter will cause as much trouble in a fringe-area as any other unsuppressed gear, a local Top Band enthusiast was recently tempted by the writer to come on the air during TV hours.

His equipment was an excellent example of really first-class pre-war workmanship and technique, but as business and domestic ties had always confined its operation to Sunday mornings this Peter Pan of rigs never knew the necessity of growing up with the times. Its one brief command performance during TV hours, however, produced an immediate and startling effect not only upon its owner's peace of mind but also upon the screen of the nearest viewer, some 150 feet distant, who almost became airborne in his armchair as the modulated carrier suddenly crashed through the intervening bricks and mortar. The devastation left no one in doubt that future construction would have to be along modern harmonic-free lines, and that even if some of the cost and labour went into "refinements" too much attenuation would be better than too little. A description of the prototype tentatively produced as the writer's contribution towards the problem

is the subject of the present article, and while a 6L6-807 combination for Buffer and PA is the worst possible choice it was incorporated to satisfy popular clamour and easy junk-box replacement.

Switching

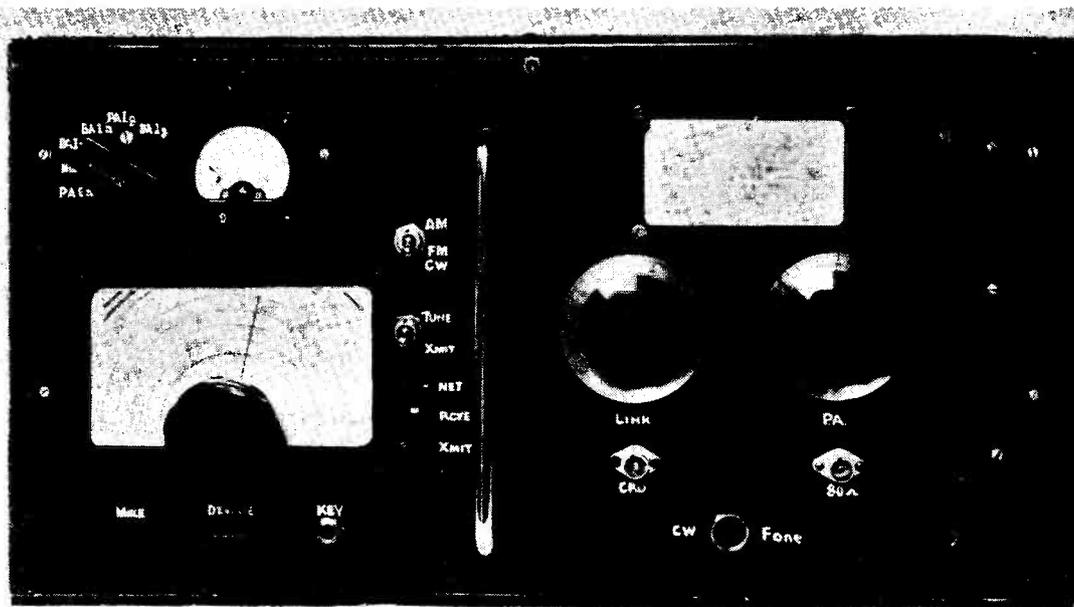
Any type of favoured VFO may, of course, be wired into circuit, that actually in use being a Top Band version made by "Panda" of their remarkably stable EF50 Clapp oscillator, test-reported in the July, 1953, issue of *Short Wave Magazine*. Whatever the choice, the send-receive switch in the "Net" position should allow HT to be applied to the oscillator quite independently of any other stages. After a signal has been tuned in on the receiver the VFO alone may thus be switched on and its tuning dial rotated until the oscillator is heard a few kc away from the received signal. The VFO is then switched off by returning to the "Rcve" position; when the distant station signs over the other stages of the transmitter are ready to follow the oscillator in calling up if the switch is moved to "Xmit" and the toggle seen immediately above it in the front-panel photograph is also resting in the "Xmit" position.

In the alternative "Tune" position the VFO and Buffer are both on, the PA is driven, but

COAST STATION FREQUENCIES 1800-2000 Kc

1827	Folkestone GUR, Wick GKR
1834	Niton GNI
1841	Cullercoats GCC, Lands End GLD
1848	North Foreland GNF, Oban GNE
1855	Burnham GRL, Newhaven GUV, Stonehaven GND
1869	Humber GKZ
1883	Portpatrick GPK
1911	Lands End GLD, Niton GNI, Seaforth GLV
1925	Lands End GLD, Niton GNI, Seaforth GLV
1953	British Ships
1960	French Ships
1974	Dutch Ships
1981	British Ships
1988	Danish Ships
1995	Dutch Ships

Note: Certain foreign Coast Stations work on spot frequencies between 1800 and 1827 kc, and there are coastal shipping frequencies above 2000 kc.



Panel appearance of the 160-metre CW/Phone transmitter described by G2NS. The VFO is on the left, and the dials on the right are for C14, C15 in the circuit, Fig. 1. Phone working can be either by plate-screen modulating the 807 PA, or by NBFM on the grid of the VFO.

it has no HT on its anode. This permits stage-by-stage testing when desired and also the setting up of the NBFM system, which only requires the VFO to be running for the modulated effect to be monitored in the station on a superhet receiver.

Readers will notice a slight difference between the theoretical circuit and the front-panel markings in regard to the old Igranic BC switch used for Send-Receive which in the central "Rcve" position has all its prong contacts open. When pressed down to "Xmit" the upper contacts close the transmitter pack centre-tap (and that of the modulator pack when in use) to supply HT to the VFO, Buffer and PA stages (and modulator). When pressed up to "Net" the lower contacts close the centre-tap and supply HT to the VFO alone, while simultaneously removing HT from the Buffer and PA and opening the modulator pack centre-tap. The uppermost toggle in the photograph, marked "AM-FM, CW" diverts HT to the 807 plate and screen *via* the secondary winding of the amplitude modulation transformer, or alternatively it switches for NBFM or CW. While it was found that a 20,000 ohms PA screen voltage-dropping resistor and a .001 μ F condenser secured plate-and-screen modulation depth reports of 90% they also allowed an additional, and unwanted, rise on

the screen of 160 volts with the CW key up. When these rises were limited to a comfortable 60 volts by the use of a screen voltage-dropping network consisting of a 6,800 and a 25,000 ohms resistor much of the audio then naturally escaped to ground and reports became "now only about forty per cent. modulation." So to satisfy both modes another toggle switch marked "CW, FONE" was placed centrally below the two coax sockets of the front-panel to take HT to the 807 plate and screen either *via* the network for CW, or *via* the dropper and condenser for amplitude modulation. For NBFM, of course, everything is switched as for CW. For AM any desired type of modulator may be used, the circuit of that actually described being shown in Fig. 3.

Modulating

In the writer's opinion, little is ever gained by controversial comparisons between AM and FM—one might as well list the failings of AM when compared to single side-band suppressed carrier working. Both AM and FM play their own definite roles in varying circumstances, and although FM lacks ability to cut through heavy interference, quickly loses its intelligibility during selective fading, causes trouble if the deviation is excessive, and is always very weak in side-band power, it can nevertheless provide

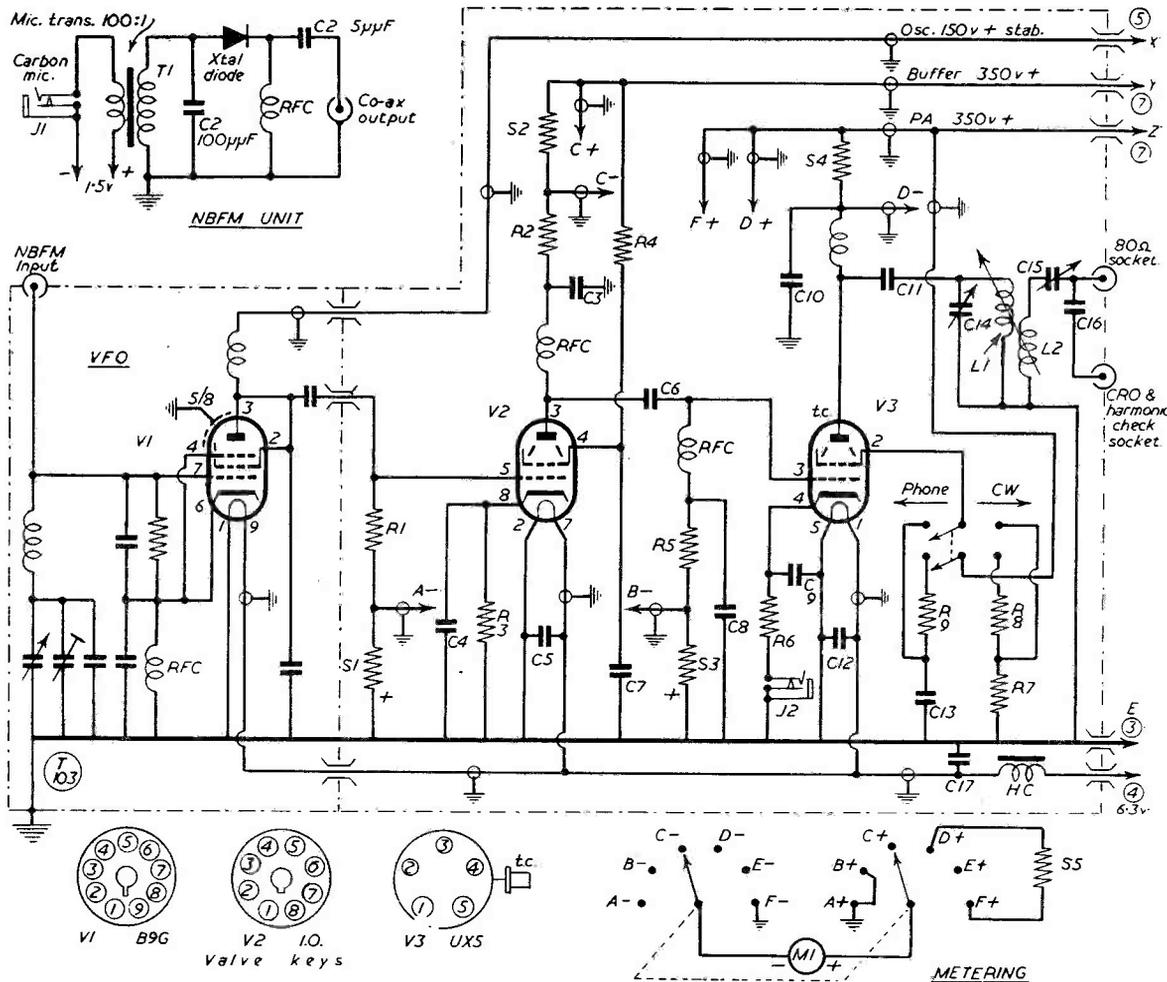


Fig. 1. Circuit of the VFO-NBFM-RF section of the BCI/TVI-proofed 160-metre transmitter designed and described by G2NS in this article. The VFO (round V1) is in this case a commercial unit, but any other type of home-constructed drive oscillator could be used; it should be in a screening box of its own. NBFM is applied to the grid of this stage, by the unit shown inset top left. The buffer-PA is 6L6-807, the popular combination, and HC is a heater choke. See table of values for full circuit details.

considerable relief, if not always a cure, in many cases of BCI. During TV hours it often allows the unrestricted use of telephony if a very slight amount of interference to vision still persists after normal harmonic suppression to the transmitter has been carried out. When vision is clear but interference to the sound channel is still evident, FM will often put this right also. In other words, although under normal conditions AM is superior to FM, the latter has distinct advantages during TV hours, in cases of BCI, and for any confirmed brass-pounder who, when badgered by local cross-town rag-chewers to "be a sport and join the net," actually accepts the invitation. To these half-hearted participators who want no expense

and the minimum of extra gear the valve-less and pack-less NBFM unit now introduced here should appeal greatly as being the most amazingly simple collection of humble components it is possible to conceive for such a job. Excellent results with this system have been consistently obtained over a number of years and on all amateur bands, especially with miniaturised 2-metre gear, by its originator, G8DL of Bournemouth. Any ordinary amateur communications receiver detuned slightly to one side or the other of exact resonance will resolve the NBFM speech. No shielding of the unit is required beyond the short length of coax that connects its output to the grid end of the VFO coil. Plugging this in for

Table of Values

Fig. 1. Circuit complete of the Top Bander.

NBFM Unit	R9 = 20,000 ohms, 1-w.
C1 = 100 $\mu\mu\text{F}$	V1 = EF50
C2 = 5 $\mu\mu\text{F}$	V2 = 6L6m, 6V6m
J1 = Carbon mic. jack	V3 = 807
T1 = Mic. xformer, 100:1	J2 = Keying jack
	SW1 = DPDT, toggle
Transmitter	HC = Heater choke; 18g. enam. close-wound over 2 ins., on $\frac{3}{8}$ -in. dia. rod.
C3, C4, C5, C7, C8, C9, C10, C12 = .01 μF	M1 = 0-5 mA meter, m/c.
C6 = 100 $\mu\mu\text{F}$	S1-S5 = Meter shunts, to read as required; switch contacts arranged to select metering points
C11, C13, C17 = .001 μF	L1 = 45 turns 18g. enam. close wound on $1\frac{1}{2}$ -in. diam. paxolin tube
C14 = 500 $\mu\mu\text{F}$ (BC type var.)	L2 = For 300-ohm reactance at 1.9 mc is 40 turns 18g. enam. close-wound on $1\frac{1}{2}$ -in. diam. paxolin tube
C15 = 300 $\mu\mu\text{F}$ (BC type var.)	
C16 = 5 $\mu\mu\text{F}$	
R1 = 10,000 ohms, 1-w.	
R2 = 5,000 ohms, 3-w.	
R3 = 470 ohms, 1-w.	
R4 = 50,000 ohms, 1-w.	
R5 = 56,000 ohms, 1-w.	
R6 = 250 ohms, 5-w.	
R7 = 25,000 ohms, 1-w.	
R8 = 6,800 ohms, 1-w.	

Metering

Cost is avoided by switching a single 0-5 mA meter *via* the appropriate shunts to those parts of the circuit where readings of the Buffer and PA grid current, the Buffer and PA anode current and the PA anode voltage may be obtained. Current can be read directly from any milliammeter dial providing, of course, that it does not exceed full-scale deflection. To extend for higher readings a by-pass resistor or "shunt" to carry the excess current must be placed in parallel across the meter terminals. If the internal resistance in ohms is not marked on the meter face this must be ascertained with the help of another meter. The resistance of

Table of Values

Fig. 2. Power Packs and Switching for the Top Bander.

C19, C20, C25, C26 = .005 μF , safe rated	S4 = Igranic BC type, 4 p., 3 pos.
C21, C22, C27, C28 = 8 μF , elect.	S5 = DPDT
C23, C24 = .01 μF , 500v.	S8 = SPDT
R10 = 5,000 ohms, 3-w.	Jones Plug and Socket Connections 1-8 — to suit
V4, V6 = 5Z4	T2, T3 = Woden 350-0-350, 150 mA
V5 = VR150/30 Stab.	T5 = Woden UM1
S2, S3, S5, S6, S7 = On-off toggle	LFC = Woden 20 H., 150 mA

NBFM or removing it for CW produces only a small variation in the VFO dial calibration—in the writer's case, one degree at 2,000 kc and $1\frac{1}{2}$ degrees at 1,800 kc.

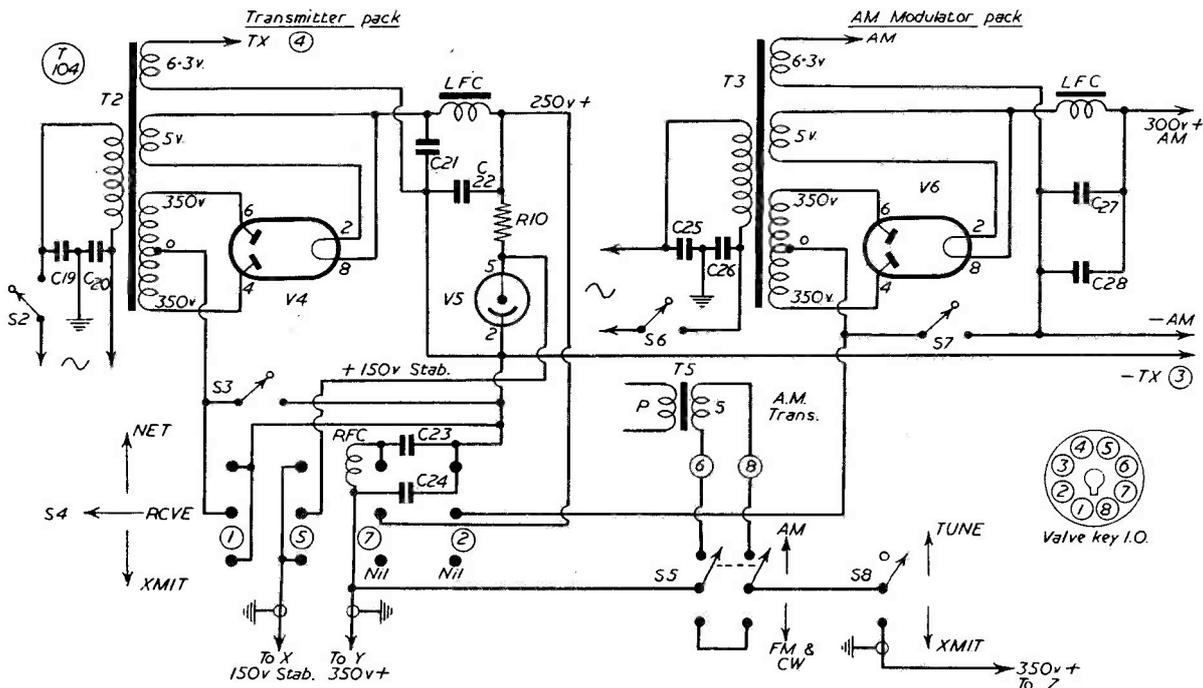


Fig. 2. Suitable power packs, which are separate units, for the Safe Top Bander. The control switching is also shown. If NBFM only were to be used — quite permissible and entirely satisfactory in this application — the amplitude modulator section would not be required, dispensing with the circuitry and switching round rectifier V6.

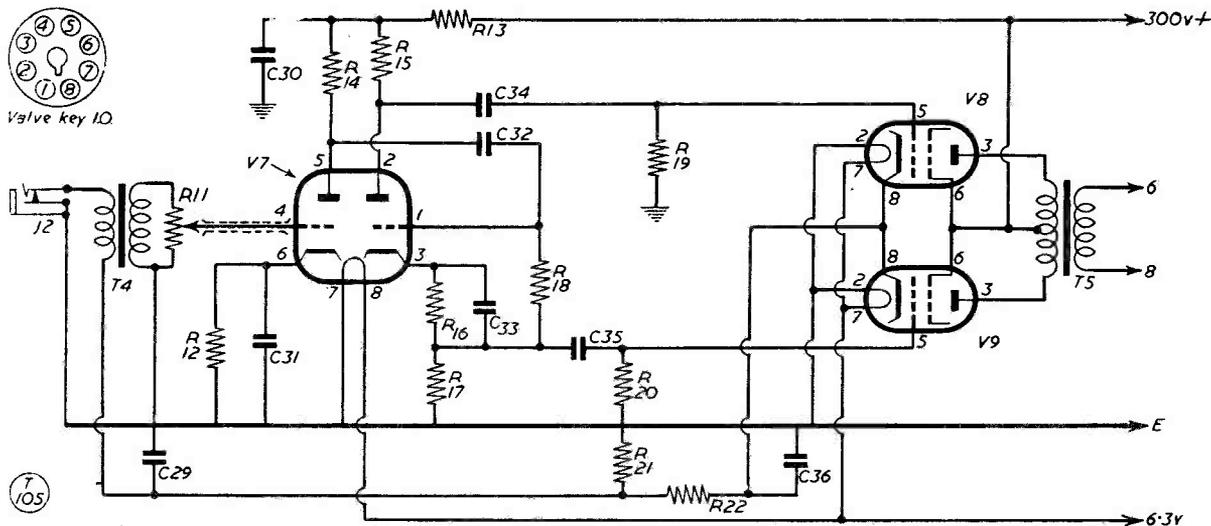


Fig. 3. A simple amplitude modulator for the 160-metre transmitter described in the article. This gives plate-and-screen control of the 807 PA. V7 is a 6SN7 and V8, V9, are 6V6; note how the energising current for the carbon microphone at J2, T4, is supplied by tapping off the cathodes of the 6V6's.

Table of Values

Fig. 3. Amplitude Modulator for the Top Bander.

C29, C31,	R18 = 500 000 ohms, 1/2-w.
C33 = 25 μF	R19, R20 = 250,000 ohms, 1/2-w.
C30 = 8 μF	R21 = 50 ohms, 1-w.
C32, C34,	R22 = 250 ohms, 3-w.
C35 = 0.1 μF	V7 = 6SN7
C36 = 50 μF	V8, V9 = 6V6
R11 = 250,000 ohms, pot	T4 = Carbon mic. x-
R12, R16 = 2,200 ohms, 1-w.	J2 = Mic. jack
R13 = 39,000 ohms, 1-w.	T5 = Woden UM1
R14 = 100,000 ohms, 1-w.	
R15, R17 = 20,000 ohms, 1-w.	

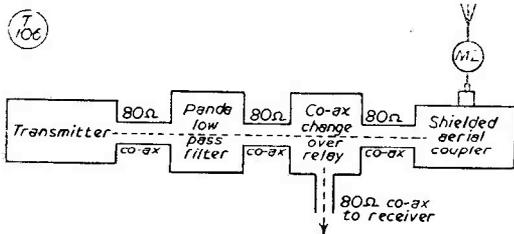


Fig. 4. Block schematic of the layout complete on the output side of the 160-metre transmitter—an arrangement contributing very largely to the elimination of BCI and TVI.

the required shunt can then be found from the following:

$$R_s = \frac{R_m}{n-1}$$

where R_s is the shunt resistance to be ascertained, R_m is the internal resistance of the meter and n is the scale multiplication factor.

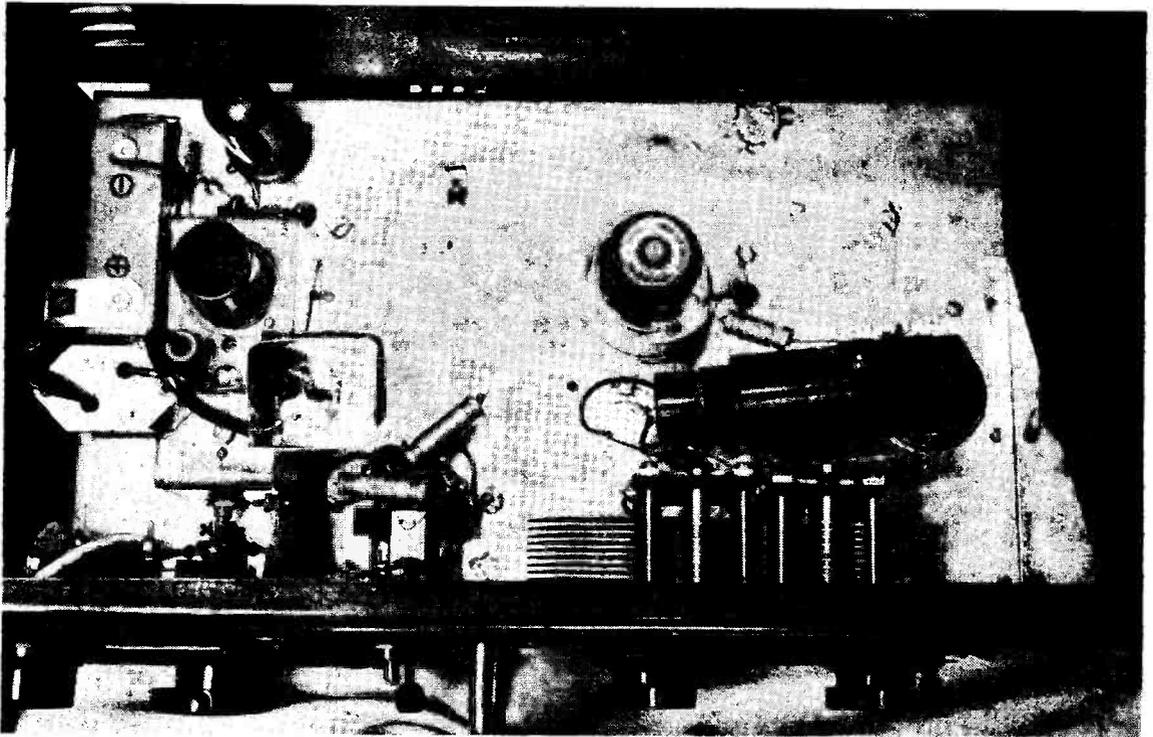
Eureka wire wound on a former so that the turns will not short and with each end anchored to a length of heavier gauge tinned copper wire and a soldering tag will make a robust job. After computing the shunt resistance required, Eureka wire gauge tables should be consulted and the smallest gauge that will reduce the shunt to a reasonable length chosen therefrom. Appropriate lengths of wire to provide the shunts are cut and sufficient current to produce a full-scale reading is put through the meter without any shunt connected. Each shunt is

then connected in turn and its length trimmed if necessary until the correct reading is secured on the proposed new full-scale range.

Shielding, Filtering and Harmonic Reduction

A metal cabinet encloses the transmitter, the two packs and the modulator (AM) being separate units with all inter-connecting leads in shielded cable. The entire wiring of the transmitter itself is in shielded cable, with the exception of the leads from the VFO anode to the Buffer grid and the Buffer anode to the PA grid, each run being bonded at both ends to chassis. A removable shielding-box (not shown in the photograph) connected to chassis by a flexible lead encloses the Send-Receive switch and the PA stage to reduce harmonic radiation. Heater leads are screened, choked and decoupled.

To lessen harmonic production a low drive to the PA is always advisable; the original 27,000 ohms grid leak allowed too high a grid



Interior view of the Safe Top Bander, with the PA section on the right. The coils L, L2, can be seen below the main tuning condensers C14, C15; this part of the circuit is normally enclosed in a shielding box. The VFO is on the left, with the buffer-stage valve immediately behind it. The frequency modulator section is mounted on the VFO, and connected to it by coax — see Fig. 1.

current (of 3 mA) and was changed to one of 56,000 ohms to cut the drive down to a sufficient 1½ mA. Loading of the PA is adjusted by varying the physical distance between the PA tank coil and the tuned-link coil that slides into it from the cold end.

The link condenser tunes out the inductive reactance of the link circuit and allows the low-pass filter to operate into a resistive load impedance of the correct nominal value. Quite an appreciable increase in output will be noticed as the link coil is resonated. Coax is used between the transmitter and the shielded aerial coupler in

Table of Values

Fig. 4A. Detail for Aerial Coupler.

C18 = 500 μμF. BC type var.	L4 = 60 turns 20g. enam., close-wound on 2-in. former, tapped every 6 turns. Aerial tap for max. reading in M2
M2 = 0.500 mA RF thermo, or similar	
L3 = 3-turn link on centre L4	

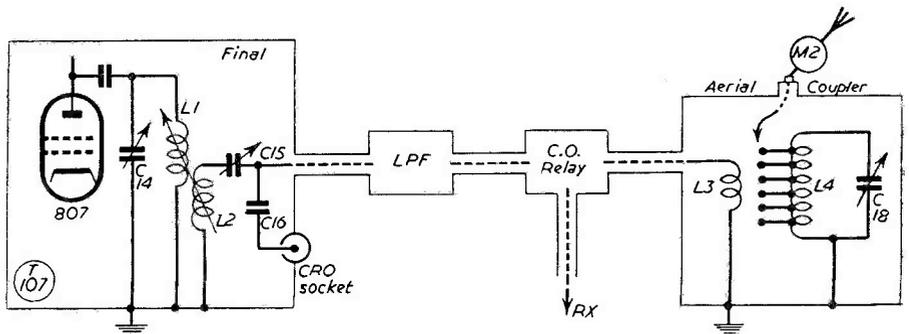


Fig. 4A. RF output feeder and aerial coupler, the latter enabling any normal length of end-on aerial to be energised. The adjustment is to get maximum reading in M2 at the correct PA input; this will involve finding the correct tap on L4 and resonating C18 at each adjustment. The coupling L1, L2, and the setting of C15 may also be affected as these changes are made. The general tune-up procedure is all-through adjustment from C14 to C18 for the best reading on M2.

order to allow the insertion of the low-pass filter and a change-over relay (Air Ministry surplus, Switch Type 78 A). This latter gives a coax connection to the receiver so that the same aerial may be used for transmitting and receiving. The nominal impedance of the coax used has a distinct bearing upon the reactance of the link coil and of the condenser setting that resonates it. This should be 3 or 4 times the impedance of the coax so that the link coupling circuit has an operating Q of 3 or 4. When this obtains, the coupling circuit will tune across the entire band without a change of coupling between the PA tank coil and the link coil that slides into it from the cold end.

As additional aids to the avoidance of interference a harmonic indicator may be plugged into the CRO socket and the panel above the two tuning dials serves as a reminder of the shipping frequencies best avoided by coastal-area amateurs. Fuller details are given in Table A.

One favourable effect of all this shielding and filtering was noticed immediately the transmitter was first tested. The XYL's Harmonica (so christened because harmonics of its local oscillator persist in beating with the OM's signal) has been burdened by its manufacturers with a frame aerial that forms the RF

tuned circuit and thus achieves very poor selectivity. Funny noises emanating from G2NS could be heard at unwanted times and places on the Harmonica's dial. It was therefore a pleasant surprise to find no trace of this, using phone or CW, on the Home or Light programme with the new Top Bander (although of course the G2NS signal could still be tuned-in at various points on the BC receiver dial).

Keying and Aerial Coupling

No spacer was reported when the buffer was keyed so the cathode of the PA was opened and a keying-jack inserted there instead. The Panda oscillator invariably collects an "x" with its tone reports. The first aerial tried out was an 80-metre version of the T2FD which radiates on Top Band and with coax feed avoids the necessity of an aerial coupler. As, however, the average station uses some odd length of wire for 1.8 mc, with end-fed working, this has been catered for by the tapped coil in the coupler. The aerial is clipped in turn to various taps until the highest thermo-couple (aerial RF ammeter) reading is reached. This is purely for comparative purposes and means nothing unless the impedance at the point of measurement is known; the heart need not break if old so-and-so down the road is getting more aerial current with the same input!

The Folded Ground Plane

GIVES INCREASED FEED
IMPEDANCE AND BROADER
BANDWIDTH

J. C. BELCHER (G3FCS)

This article suggests an interesting application of the well-known folded dipole principle to the design of the Ground Plane, with the advantages enumerated in the text.—Editor.

THE ground-plane system, in its original form, suffers from the usual disadvantages of a high-Q aerial; these can be enumerated as follows:

- (1) The input impedance is low, of the order of 35 to 40 ohms. Hence some form of matching device becomes necessary where a 100-ohm coaxial or a 300-ohm ribbon

feeder is required. This complicates the electrical and mechanical construction, and it must be admitted that the appearance of a quarter-wave transformer at the foot of the radiator leaves much to be desired.

- (2) As a result of the high Q-factor, the bandwidth of the system is restricted, limiting efficient operation to one part of the band only. This effect may be emphasised when a resonant matching device is employed.

In the case of the centre-fed, half-wave radiator, these disadvantages have been overcome by putting additional elements in parallel with the main radiating element. In other words, by using a *folded dipole*. The result of this modification is that the terminal impedance increases as the square of the total number of elements.

$$\text{i.e. } R_f = N^2 R_d$$

where R_1 = terminal impedance of folded dipole.

N = total number of elements.

R_d = terminal impedance of a half-wave dipole.

Assuming R_d to be 75 ohms, the use of one additional element increases the terminal impedance to $(2^2 \cdot 75)$ or 300 ohms, while two additional elements increase it to $(3^2 \cdot 75)$ or 675 ohms. This, of course, will be modified if the relative diameters of the elements differ.

This artifice can also be used where a vertical quarter-wave radiator in general, and a ground-plane aerial in particular, is concerned. The equivalent radiating system of a ground-plane system is shown in Fig. 1, where the effect of the "ground image" is taken into consideration. The nett result is equivalent to a centrefed, half-wave dipole, which has a mean height above ground level of zero.

In Fig. 2(a) we see the effect of adding one additional element in parallel with this hypothetical radiator. This time the result is a

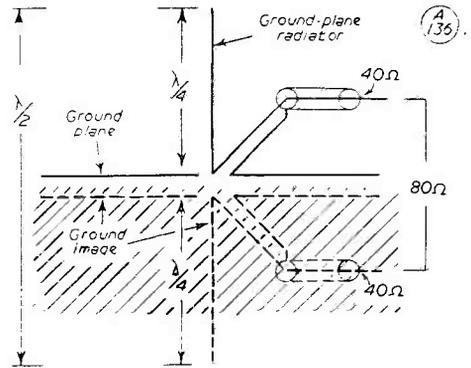


Fig. 1. The equivalent radiating system for the usual type of ground-plane aerial, which demands a low-impedance feed, sometimes awkward to achieve.

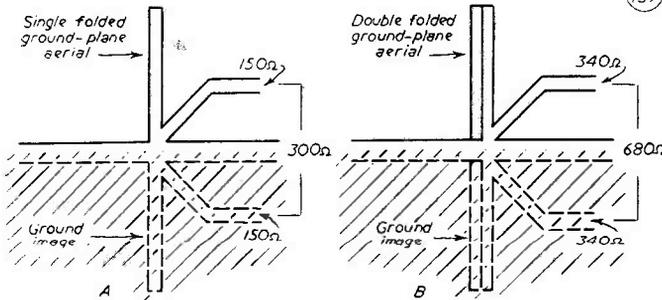


Fig. 2. Showing the equivalent radiating system for single and double-folded ground plane systems, with feed impedances.

folded dipole in which one half of each of the primary and secondary radiators is provided by the ground image. Logical development leads to Fig. 2(b) and so on *ad infinitum*.

It seems reasonable to assume that, as the impedance of the original ground-plane aerial is half that of an ordinary dipole aerial, *i.e.*, 35 ohms, then the impedance of the radiator in Fig. 2(a) will be 150 ohms, while that in Fig. 2(b) will be of the order of 340 ohms.

That this assumption is valid can be shown as follows:

Consider that a current I flows in a ground plane aerial of terminal impedance R_{gp} . What will be the terminal impedance R_{fgp} if a total of N radiating elements are folded in parallel?

- The field due to the ground plane aerial itself = kI
- The input power to the ground plane aerial itself = $I^2 R_{gp}$
- The field due to an N -element folded ground plane = NkI

The input power to an N -element folded ground plane = $I^2 R_{fgp}$

If, however, the field strength has increased N times, the power must have been increased N^2 times.

$$\text{Hence, } I^2 R_{fgp} = N^2 I^2 R_{gp}$$

$$\text{Therefore, } R_{fgp} = N^2 R_{gp}$$

This formula is the same as that given for the folded dipole and hence our assumption is valid.

The electrical details having been straightened out, we can now turn our

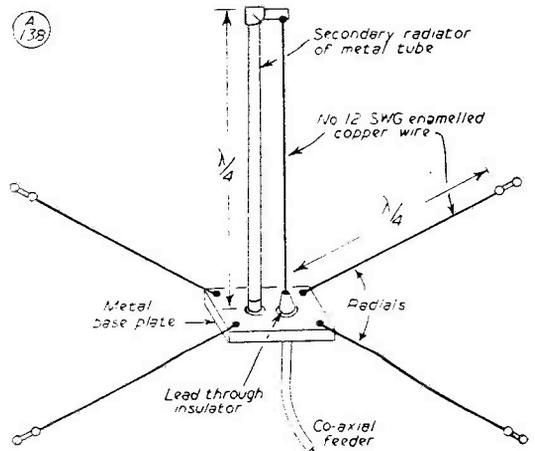


Fig. 3. A folded ground-plane, built on the same principle as a folded dipole. In the case illustrated, it calls for a feed line of 150 ohms surge impedance and gives a broad-band characteristic, which is an added advantage.

attention to the mechanical construction which should present little difficulty. In effect, the primary radiator is a length of wire which is supported at the top by the element or elements in parallel with it. The general view of the arrangement is given in Fig. 3. However, it is suggested that where a folded ground-plane is used under mobile VHF conditions, such as on the roof of a car, that in the interests of stability the primary radiator should be more substantial.

Upon reflection, there seems to be quite a number of applications for which this form of aerial would be suitable, least of which consists in loading up an earthed rainwater-pipe of convenient length! There is even the possibility of short-circuiting the elements at a point one-eighth of a wavelength from ground level, and using it on its "second harmonic" for two-band operation. But perhaps that is trying to make too much of a good thing!

Automatic Change-Over System

IMPROVED
VALVE-OPERATED CIRCUIT

P. J. POWELL (G3EFI)

This article describes a send-receive circuit operated by the CW key, suitable delays being applied to prevent unintentional breaks in transmission. The ingenuity of such circuits apart, it is of interest to the keen CW operator to be able to effect rapid change-over, with the added facility of listening-through that such a system usually provides.—Editor.

MUCH has been written, during the last few years, on the desirability of employing a change-over system which requires a single switch movement. The ability to perform this operation rapidly is essential to the snappy operating called for on the amateur bands today. Full break-in facilities are not, however, such an essential but BK is, nevertheless, extremely useful—though it may be somewhat depressing to be able to pause briefly during transmission to listen to the indescribable racket usually cluttering up one's frequency. The ultimate, as far as rapid send-receive is concerned, is of course the key-operated system, whereby the first touch of the key will switch on the Tx, and it will remain in this condition until a predetermined period of time after the conclusion of keying, when the whole system will revert to the "receive" condition. The delay is usually variable between $\frac{1}{2}$ and 2 seconds.

Circuit Details

A type 6SN7 valve is used in the control unit. One triode portion is connected as a diode, whilst the second triode portion actuates

the change-over relay which is connected in its anode circuit. Alternatively, the functions can be separated and a simple diode can be used with a type 6J5 to operate the relay. The circuit used is shown in Fig. 1 and is very simple in operation. When the key is open a bias of about 30 volts is placed upon the grid of the triode, cutting it off completely, and the relay remains in the "receive" position. Upon closing the key the grid is made positive through R4 and the diode portion, whereupon the triode will draw anode current and operate the relay. At the same time C1 will be charged up through the diode to the full supply voltage. When the key is released, C1 will discharge slowly through R5, causing the triode to conduct sufficiently to keep the relay closed until C1 has almost completely discharged. If the key is also connected, via the usual filter, to the grids of the keyed valve(s) in the Tx the action of closing the key will remove the blocking bias simultaneously with operating the control relay; but it will be found that owing to the lag of the key filter the control relay will go over a fraction of a second before the removal of the blocking bias becomes completely effective. This is extremely useful since it means that any operation performed by this relay will have been completed before the actual keying of the transmitter takes place.

The length of the time delay before the relay returns to the "receive" position after the completion of keying will depend not only upon the time constant of R5, C1, but also upon the gm of the triode, the sensitivity of the relay and the fact that C1 will also discharge through R1, R6, R7 and the triode so long as grid current is being drawn. In addition, the delay will be increased by any capacity in the keyed circuit. For these reasons C1 is made semi-variable so that the delay can be varied to suit individual conditions and keying speeds. In position 1 and with a keying speed of about 18 words per minute it will be found that the

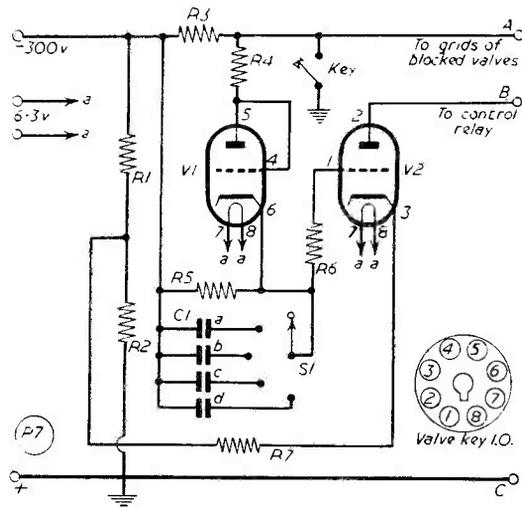


Fig. 1. Circuit of the control section in the change-over system discussed by G3EFI. V1, V2, can be a single 6SN7, one half V1 connected as a diode, or a separate triode and diode can be used. The unit requires a negative supply of about 300 volts.

relay will open up between words if the capacity used in the key filter is not too large. With the circuit constants shown the delay can be increased to a maximum of about 2 seconds on position 5.

R4 reduces the spark at the key resulting from the initial charging of C1 after a pause. R7 limits the anode current through the triode: its value should be chosen to give an anode current of about 10 mA, but will depend upon the relay used. At the writer's station the control relay has a resistance of 1000 ohms, closes with 7 mA and opens when the current falls to 2 mA, but any high-resistance high-speed relay will suffice provided that the value of R7 is suitably adjusted. R3 replaces the usual current limiting resistor found in all blocked-grid keying systems.

The Relay Unit

The change-over system, which is shown in Fig. 2, is very smooth in operation. It is adapted from a circuit devised some years ago by W1PMT and originally appeared in *QST* dated March, 1948. An SPDT relay is used to short the receiver input, reduce the receiver gain and operate any secondary relays necessary to bring the transmitter into action. If you are fortunate enough to possess a separate receiving aerial and a transmitter which, with all supplies switched on, is absolutely quiet

Table of Values

Fig. 1. The Control Unit.

R1 = 2,200 ohms, 2 watt	C1a = 0.01 μ , 600 volt paper
R2 = 25,000 ohms, 10 watt	C1b = 0.05 μ F. " "
R3, R5, R7 = 20,000 ohms, 5 watt	C1c = 0.1 μ F. " "
R4 = 500 ohms, 1 watt	C1d = 0.5 μ F. " "
R6 = 1 Megohm	S1 = 5-way Yaxley " "
V1 = 6SN7 or D1	V2 = 6SN7 or 6J5

under no-drive conditions (which, so we are told, should be the case) then only the VFO need be switched on by the relay. If, however, you are not so blessed then you will find that the transmitter high voltage supply and the aerial change-over relays can also be operated from the control relay with only a slight amount of clipping of the first transmitted character. Receiver muting is by the now-popular method of auxiliary cathode biasing of the RF stages. This additional bias is shorted out in the "receive" position. An auxiliary gain control is useful here since the receiver gain can then be adjusted under key-down conditions. This is a very simple modification and in most receivers a suitable panel hole is already provided if the now-redundant "send/receive" switch is removed.

Finally, it might also be mentioned that the negative supply required for this unit can also be used to provide protective bias for any stage in the transmitter or modulator.

The writer does not claim originality for this system of automatic change-over—it has merely been adapted from an idea which was first suggested as far back as 1932.

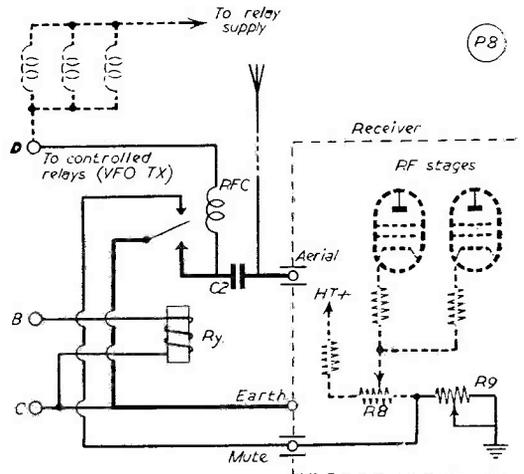


Fig. 2. Circuit of the relay unit, giving muting of the receiver (aerial shorted to earth on "mark," with aerial relay open) and in-step control of the transmitter relays. On "space," the aerial relay (not shown) closes, and the receiver is at a sensitivity determined by R8, R9. The leads to aerial and earth terminals on the receiver itself must be kept as short as possible to minimise direct pick-up of the radiated signal.

Table of Values

Fig. 2. The Relay Unit.

R8 = Receiver RF gain control	C2 = 0.001 μ F Mica
R9 = 10,000-25,000 ohms pot	RFC = 2.5 mH. RF Choke
	Ry = SPDT relay (see text)

DX COMMENTARY

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

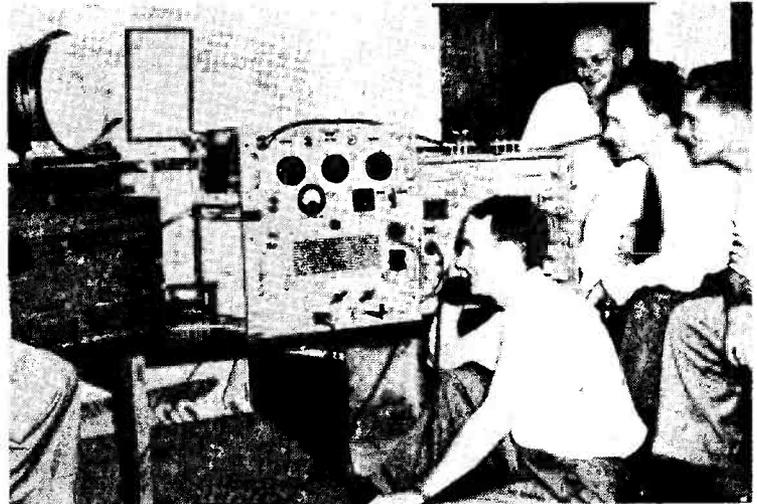
ON the whole, we have a much better month to report. Although the general level of conditions is still well down, there have been patches of improvement; days when the bands could be described as "spotty" rather than really bad; and one or two real awakenings.

The fact is that one can now work DX on most days—if one is prepared to get up early or stay up late. Those who like it the easy way are still apt to be disappointed with daytime conditions. The main reason is, of course, that the true "daylight bands"—21 and 28 mc—are still out of commission. The 14 mc band is excellent for daylight work when conditions will stand it, but nowadays it is likely to be full of short-skippers and all the miscellaneous QRM that seems to grow like fungus whenever conditions are below par.

Most of this stuff is absent in the early mornings and late evenings, and the 6 o'clock riser will often find a band that is quite reminiscent of the Good Old Days, with W6 and 7, KH6 and KL7 in evidence. Furthermore, there is not much competition, and a stray call will nearly always attract plenty of attention from these customers.

It is still the Top Band, though, that occupies most of the space in our post-bag, and the infectious but innocent habit of chasing the British counties around the map continues unabated. (Someone described it to us as "DX-substitute . . . guaranteed non-intoxicating.")

So, after this slightly more



ZS6DRS

CALLS HEARD, WORKED and QSL'd

cheerful preamble, To The Bands

.....

The DX on Twenty

Our mainstay, the 14-mc band! It is still "open" practically all round the clock, but wider at some times than others. There have even been some new ones to be found (but only by those prepared to *search!*) G3IAD (Wakefield) scooped a good one by digging out VK1EG for his first G contact—nice work. This VK is a rarity, he being located on MacRobertson Land, Antarctica. There were some notes about the station and its unique location on pp.30-31 of our March issue. After G3IAD's contact, G2LU (Coventry) also worked him. These were the first and second QSO's between G and MacRobertson Land, and the time of the first was 1715 BST on September 14.

Other good contacts by G3IAD were AP2K, CE0AD, HB1MX/HE, MP4QAJ, ZC7BB and ZS9I.

He runs 100 watts to a 132-ft. end-on wire.

G3FPQ (Bordon) returns to the air after a year's absence, now wielding 80 watts instead of the previous 25. *Twenty* CW brought in CR6AI, CX4CZ, EA9DF, FM7WP, KH6WU, LU8ZS (South Shetlands), MP4QAJ, SV0WK/9 (Crete), VS4HK and many other interesting ones. Somewhat unexpected was VK4YP, who came back to a CQ at 2230 on a band full of PY's and W's. Phone operation brought in HB1MX/HE, ST2DB, VP1GG, T12TG, ZD3BFC and ZD4BL.

G2WW (Penzance) worked ZD3BFC and CX2CO for new ones on phone; OZ7HM (Bornholm) gave him a new district for WAE II; HB1DU (Appenzell) was a new Canton towards H. 22; and PY8AT was his first PY8. Other events were personal contacts with Tony, Roger and Ian of ZB2A (on the spot) and with EA7DJ in Malaga. G2WW is

now one of the few G's with genuine sunburn!

G2VD (Watford) keeps his Five-Band score up to date with a few additions, and says that the high-spot of the month was a spell of exceptionally fine conditions on September 6.

G3IOR (Norwich) has been getting W6's and 7's most mornings around 0700, and, a little later, VE6, VE7 and KH6 have also been VE7.

G4ZU (Croydon) made three new ones with ZD3BFC, ZD6BX and LU6ZE. He also worked SVØWK/9, but had Crete already. Visitors to the 'ZU shack included MP4QAH, VS1ES, 4S7EP, SU5EB and two ops. from YI2AM. 'ZU received his DUF Silver Medal a few weeks ago, and thinks it was well worth the work involved.

G6VC (Northfleet) has been raising "the usual stuff," which is his description of KH6, JA, FC and the like. G3ITY (Chester) is now on phone with a new rig, and has been working Europeans (R5 and S8/9 stations only!) and generally feeling his way around, being new to the 14 mc band.

G3FXB (Southwick) had a burst of real activity which has brought him in some quite good stuff. CW was responsible for F18AP, FR7ZA, HV1AA (!), I5PP, JA6AK, VP4LZ, ZD6BX, VQ8CB, ZS9I and lesser lights such as ET, CR7, MP4, ST, VP6, VS1, 2 and 6, VU and ZE. Phone operation raised F8FW/FC, HZ1AB, MP4KK, SVØWK/9, VQ5BVF, ZD3BFC and HB1MX/HE. 'FXB tells us that ZD3BFC uses a 725-ft. long-wire on the U.K., and a "better" aerial is under way! Look for him on 14105 and 14295 kc. VQ8CB is apparently CC on 14045, but also runs a sked with FR7ZA on 7058 kc (Sundays at 0315 GMT!)

DL2RO (Hamburg) reports "dismal patches" but also very good ones, especially to the East in the afternoons. Some of these have brought good QSO's with VU, VS1, VS6, JA, CR9, KR6 and KG6. Late evenings have opened up for South America, with many LU's in Antarctica putting in good signals. 'RO thought the "plum" on this band

was SVØWK/9, calmly and efficiently giving contacts to all comers, despite heavy bombardment by long-range howitzers from the U.S.A. As the resident comedian he nominates ZC7BB, "with a note that can hardly be described in 'Ham' terms."

Forty Metres

And so to the next band—Forty—where things are by no means so beautiful and so good as on Twenty. In fact, only those with almost superhuman patience manage to stay the course, but they are rewarded for their efforts.

G3IAD raised HC2OT, HH2LD, HK1TH, VP8AP and sundry PY, YV, VE and W stations. He would like the QTH of 4UAI, worked on the band last year—no QSL as yet.

G3FXB raised F8FW/FC, HB1MX/HE and T12PZ, as well as numerous East Coast W's. Phone skeds were also run with ZB1TD. G3IOR says "with a little more activity this could be a FB band—all 10 kc of it!" He has a session there every morning and has worked many W's, PY's, LU's and ZL's.

G3IGW (Halifax) has been listening a good deal on the band, and has logged CO8RM, KZ5IL, KV4AA, VP9AN and 9BF, and VQ8BA. Due to an unsuitable aerial, he has only raised VO3X, YI2AM, W and LU. He adds that ZA1KAD is on, apparently

AMBIGUOUS!

The World Wide DX Contest has been given two separate notices by ourselves, and in each case we have stated that the Phone Section is on October 23-25, and the CW Section October 30-November 1.

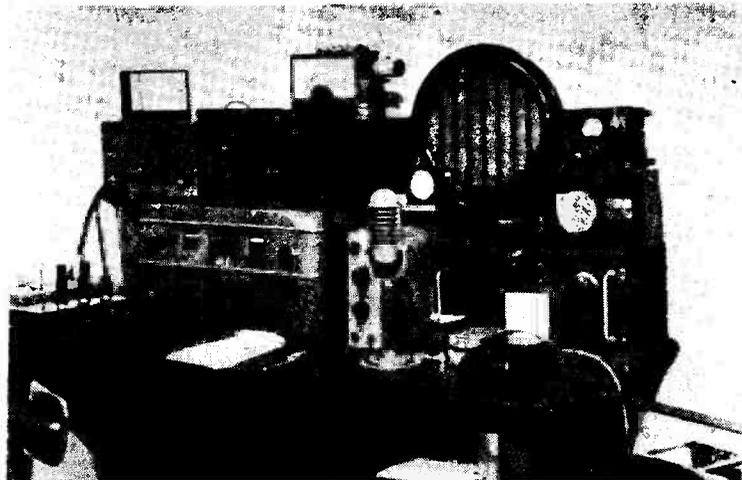
In the September issue of *CC*, however, contradictory statements are made! Rule 1 confirms our statement, as above; but the schedule showing the starting times says "First weekend CW, second weekend Phone." And the specimen Contest Log reverts to the original, showing a CW entry dated October 30.

We imagine that the intention is for the Phone Section to come first, but it might be as well for entrants on both sides to make a check on the first weekend and see what is happening. We don't know for certain!

genuine, and not "WSEM" only.

G3JKO (Nottingham) hasn't had much luck on Forty with his QRP, but tells us that stations called were CR6AI, VP2SH and 9GX, KP4DA, UD6KAB, PY's, LU's and W's.

DL2RO says "As ever, this band on first check appears to be full of intruders and queer noises that one hesitates to blame mankind for. But with determination, courage and plenty of digging, there is usually some small consolation prize to win." In his case, the prizes have been PY's, LU's (including LU4ZB and 7ZO—both "down under") and an odd CE and CX. Best contact really was with HB1MX/HE. Forty also has a "resident comedian," signing IEA43 and giving his QTH as Parma, North Italy. Genuine Il's



G3EJO of Erdington, Birmingham, has an AR77E as main receiver, and is active on Top Band and VHF, with crystal-controlled converters.

in Parma know nothing about him; he has a beautiful T5 note.

G3IOZ (Rugby) also queries this IEA43 business; perhaps he will note the foregoing paragraph—all the information we have about this one.

21-mc Interlude

It's no good pretending that the 21-mc band has really been wide open at any time this year. Various odd signals filter through from time to time, and medium-DX is possible on many occasions; but, on the whole, the band is regarded as a pretty good waste of time by most of those who give it a trial. DL2RO thinks it is a pity that it is so neglected—to such an extent that to the casual listener it is always “dead.” But he remarks on the regularity of the American/MM's operating down the West and South-West coasts of Africa, and also quotes stations like CR6BH and FY7YC. A sked with MP4BBL gave him a new country; before and after this contact there was not another signal audible on the whole band. From 1700 onwards on September 5, PY and LU stations were heard working W6 and 7 as hard as they could go, but without the slightest trace of the North Americans here in Europe.

New ones for G4ZU were TF5TP, F8FW/FC and GW3AHN. His phone score now stands at 99! G6VC also had a look at the band and added SM and ON to his score; OQ5 and CR7 were heard, but not worked.

G2WW has not noted any sign of improvement, but says that VQ4RF has come to life again, and EL10A was a nice new one. ZS, CR6, OQ5 and the like were also heard, and a few South American contacts made.

G3FPQ, on phone, managed CR6BH and 6BX, HC1FB and 1LW, HP3FL, KP4UD, VQ4, 4X and EA6. CW was responsible for OQ5ZZ and CN8MI. G3FXB's only new one was FY7YC.

Top Band Topics

The possibility of DX is beginning to interest the Top-Band devotees once more, and possibly by now the first Trans-Atlantic contacts of the season have been made. G3EIZ (Liverpool) found August an excellent month for American DX at the HF end of the medium-wave broadcast band, where he logged four 250-watt stations between 1230 and 1400 kc. Three were in Florida and one in New Jersey. All were heard in the hour or so immediately before sunrise. EIZ adds that the WWV forecast for nights has usually been N6 or N7.

This is a definite indication that Top-Band G/W-VE contacts should be feasible by now, as they were last year. We are not beginning the organised Trans-Atlantic Tests until December, but we can be quite sure that the keen types will be on the look-out, particularly on Sunday mornings.

On the 160-metre DX theme, a very interesting letter from VP4LZ, who is with Pan-American World

Airways, and writes from Caracas in YV. He has a “professional interest” in the Top Band, in that the Loran chain is used as a navigational aid. VP4LZ reports that on their South American runs Loran has been much more useful and effective at long ranges this summer than last, and that this seems to presage good conditions for winter DX working. When at home as VP4LZ he is on 1833 kc CC, looking for G's in the early mornings. His first test was on Wednesday, September 22, but as his letter only reached us the day before, there was no time to pass on the schedule. However, you may take it that he is there whenever possible.

Far East and Top Band Tests

The VS6 group in Hong-Kong have laid on some 160-metre tests which, they hope, will give them a chance with W/VE and ZL. Naturally, the most suitable times in that part of the world are not good for us, but we give the schedule hereunder for the information of all who may be interested:

Sundays, October 17, onwards:
0945-1015 GMT, Far East stations using 1805 or 1824 kc, ZL stations on 1895 kc.

Saturdays, October 30, onwards:
2215-2245 GMT, Far East stations on 1870 kc, Europe and U.S.A. to be listened for over 1890-1900 kc.

ZL1AH will open on 14020 kc CW at 1030 GMT on *Sundays* to report results. DX stations participating are expected to be: HS1D, VS1FK, VS2EB, VS6CQ, VS6CW, VS6CZ, W8GDQ, ZC5VS and ZL1AH—and as interesting a group as any DX operator could wish for on any band, let alone One-Sixty!

By the same airmail as this information was received from VS6CQ, we had a letter from VR2AS (Suva) reporting that the claims, made in good faith, by certain W's to have worked “VR2BJ” do not hold water; the genuine VR2BJ, a neighbour of VR2AS, uses 14 mc CW only, and he is very annoyed about the cards reaching him for the alleged 160-metre QSO's—so it looks as if another of these wretched



“. . . Hr QSL direct . . .”

"hoaxers" has been operating over States-side.

During the next series of Top Band DX Tests, we shall have to be very careful to authenticate all contacts with exotic DX calls—which is a great pity, as well as being a great nuisance.

WABC-chasing continues unabated, with some very high scores appearing at the top of the ladder. The goal to aim at now seems to be 90 counties, rather than the former 80.

Several stations report contacts with OK's, and some HB's have been heard on the band. QSO's between Scotland and the southern parts of England have been quite commonplace.

G3JHH (Hounslow) notes that the QRN is abating, and reports several good long hauls. G3IGK (Wolverhampton) worked mobile from Llandudno during his holiday, using a kite aerial which became a little embarrassing in heavy static conditions!

G6VC put his score up by one (Londonderry), but missed the GM counties made available by expeditions last month.

G2CZU (Bath) was one of the unfortunates who had a big score of counties by the end of 1951, but had to start reckoning again when we fixed the WABC deadline as January 1952! However, he now climbs on to the ladder with 41 worked, although he has 60 on an "all-time" basis.

G3GYR (Stoke-on-Trent) claims

his WABC with a QSL-ratio of 100 per cent. It includes 17 GM counties, and 'GYR says the GM's are the quickest at QSL-ing. Best DX is HB, and life's ambition is a contact with W-land on One-Sixty.

G2CZH (Morden) is another WABC holder, and he wants to hand a bouquet to the "expeditionists" — G5PP, 5R1, 3IWF, 3IGW and GM3HLQ. He thinks it was a great privilege to work them and adds that their lot could not have been too happy in the weather we have "enjoyed" this summer.

G3HIS (Ashbourne) is very near the top with 89 worked and 87 QSL's, also mainly due to the efforts of the gentlemen mentioned above. He was awaiting G3IGW's GI trip with interest.

GM3JNW (Alloa) reports for the first time; he has kept Clackmannanshire on the air since GM3IGW's departure, and appeals for some QSL's, of which he is 13 short. He made a few contacts from Peeblesshire, at a camp, before his aerial blew down! He has his eye on Kinross and East Lothian, and says he is not very well situated for Top Band owing to aerial limitations, but he will remain plugging away to keep "Clacks" on the map.

G3BRL (London, W.5) raised G13IGB (Londonderry) and GM6JH (West Lothian) for new ones; G2NJ (Peterborough) remarks on GW3GIZ/A (Merioneth) as a good *daylight* signal, also

21 mc MARATHON

(Starting July 1, 1952)

STATION	COUNTRIES
VQ4RF	108
G4ZU	105
GW3AHN	104
G5BZ	103
G4ZU (Phone)	99
G2WW	98
DL2RO	93
G2BW	92
G3HCU (Phone)	88
G2BJY	81
GW3AHN (Phone)	77
G6QB	75
G2YS	74
G3DO	72
ZS2AT	67
G3FXB	65
G3CMH	64
ZB1KQ	64
ZB1KQ (Phone)	63
G3CMH (Phone)	62
5A2CA (Phone)	60
GM2DBX (Phone)	42

G13CVH (Londonderry) with 4 watts. Three OK's were heard on the band.

G3IGW worked GC2CNC when the latter was using a TTX, and was actually peaking at S8 on CW and S6 phone. This was believed, at the time, to be the longest TTX hop yet recorded*. 'IGW was off to Ireland at the time of writing; we hope to have several accounts of increased scores, due to his efforts, next month. Incidentally, we hope also to be able to issue a WABC to G3IGW/P one day; this month we had the pleasure of sending the first "Portable WABC" to G5PP/P. Congratulations!

* (GC2CNC claims other long-range contacts since.—See "Transistor Topics."—ED.)

List of Counties ?

G3JEL (London, N.7) wants us to publish a complete list of

FIVE BAND DX TABLES
(POST WAR)

Station	Points	Countries					Station	Points	Countries						
		3.5	7	14	21	28			3.5	7	14	21	28		
		m	c	m	c	m			m	c	m	c	m		
DL7AA	649	85	154	216	90	104	221	G6QX	407	51	96	146	57	57	170
G6QB	589	52	107	220	75	135	234	G5FA	406	34	118	150	31	73	166
G5BZ	562	60	111	223	103	65	229	G2YS	384	53	68	143	74	46	158
G2VD	499	47	91	180	72	109	189	G2BW	357	24	57	144	89	43	161
G4ZU	490	12	45	208	105	120	210	GM2DBX*	337	27	31	156	42	81	167
G2WW	488	23	70	190	98	107	198	ZB1KQ	284	6	34	118	64	62	139
G3FXB	471	64	117	179	65	46	184	G8VG	280	36	76	124	18	26	141
G2BJY	464	48	78	141	81	116	181	G3IAD	196	26	81	84	4	1	117
G3DO	445	24	46	196	72	107	221	G2DHV	177	20	23	108	11	15	112

* (Phone)



W2SGX of Caledonia, N.Y., runs push-pull 250TH's at 900 watts input, modulated by a pair of 810's. Receivers are an HQ120X and HRO-7, with DB-20 preselector, and a VHF152A for two metres.

British Counties for the benefit of the 'chasers. But the draft list he submits does not conform to the standards we have already laid down, as he lists all the Western Isles and most of the Orkneys and Shetlands separately.

Our plan is quite straightforward and has never varied. The counties are the *geographical* counties, as shown in almost any atlas; *not* the administrative counties, which include the three Ridings, East and West Suffolk, East and West Sussex, the Soke of Peterborough, and so forth. *Just the geographical counties.* To these add the Isle of Man, the four Channel Islands: Jersey, Guernsey, Alderney and Sark (counting as *four*), Orkney, Shetland but *not* the Isle of Wight, which counts as Hampshire. The position of the Scillies has not yet come into question, no activity on this band having yet shown up; but we are inclined to add them to the list as a separate scorer, London (Postal Districts) also counts as a separate county. The total appears to be 98. (See note p.392, September issue).

G3IOR has been on holiday on the Norfolk coast, and wonders how it is that there is *any* amateur coastal activity on Top Band. Due to ship-shore traffic, he says the only workable slice is 1910-1930 kc, and Loran jams that out in the evenings!

G3JJZ pushed his score up nicely with some of the portables, and also worked OK1KTI. G3IWF/P at Weymouth was worked while visiting G3BF at Worthing. G3CO (London, S.E.14) didn't manage his portable expedition to the Channel Is., but went to France and Spain instead. His GC trip is therefore put off until next Spring at the earliest.

G3JKO is running only 2 watts these days, and finds his reports just about one S-point down. He is well into the sixties and still climbing. Recent ones were GW3GIZ/P, GM5R1/P and GW3IGK/M. GW3HCP/P in Carnarvonshire was heard just as his kite aerials (and signals!) were falling down.

G3ITY has been mostly on phone, and has been getting 8's and 9's from Hants., Kent, Aber-

deen and Co. Down, to quote a few.

The Overseas Mail

4S7HK (Negombo) says something has shaken up *Twenty*, and in Ceylon they now enjoy a lively hour at night when almost anything might be heard or worked. There is a definite peak period between 1530 and 1630 GMT. A DL has been heard on 80 metres, but Pakistan Radio makes the 40-metre band more or less useless, together with Japanese broadcast stations. If anyone still wants a card from ZE3JZ (his previous call), 4S7HK will see to them when he returns to the U.K. in October. He has no G call yet, but the QTH will be 248 Ryefield Avenue, Hillingdon, Uxbridge. 4S7WA and his XYL 4S7YL are both to be heard now on SSB.

W2NZZ (Belleville, N.J.) describes himself as "an ex-Geordie migrant of 1928 vintage," but has never yet made a G contact! He operates only 10- and 40-metre phone at present. 'NZZ is very interested in Civil Defense, now known as Disaster Control (DC), and he says the swing to

two metres for this work is almost complete. He adds that mobile operation adds greatly to the scope and effectiveness of DC work.

VS2DQ (Kuala Ketil) sends a newsy letter and raises the following points: VS4HK in Sarawak is using about 20 watts phone and 40 watts CW, both on 14 mc only. He is fed-up with the wolf pack and just goes off the air when operating gets bad. He will be in Sarawak for at least eight months.

VK1HM/ZC2 will be leaving Cocos in about two months, leaving ZC2AC behind, but not very active . . . VS6's have been in trouble with a bad typhoon, with aerials down all over the place . . . an HL1 station on phone appears to be genuine (no call given) . . .

VS2CP is now in a fine QTH in Johore, with a colossal four-element beam. VS2DS, 2DH and 2EB also have good beams. VS2DV is returning to England. VS2DW has a BC-610 modified for 150 watts, but says this is only to be the "stand-by" Tx (!).

General note—all VS1 and VS2 stations report that conditions towards the U.K. are greatly improving at last. VS2DQ, to whom thanks for all the above gen., sends photos of his own beam, which looks like no mean affair!

VQ5EK (Box 1803, Kampala) is VQ5 QSL Manager and tells us that the following are active: VQ5AU, 5BVF, 5CB, 5CY, 5DZ, 5EB, 5EK and 5EP. Conditions have been very poor for six months and very few G contacts have been made. Outstanding G signals have been G3MK, 2PU, 3TR and 8KW. 21 mc opens occasionally, but 28 mc is quite blank still.

G3ATH/V57PH/XZ2HP/ZB2A is now about to become a DL2! QTH Gutersloh, but no call-sign as yet.

David Mitchell or ZL1MP (ex-GW6AA) is now *en route* for the Bahamas, where his call will be VP7NI. He has what he describes as a "perfect QTH on Eleuthera Island," where he can run his aerials over salt water. David looks forward to operation, phone and CW, on 3.5, 7, 14 and 21 mc. Address: Barclay's Bank, Nassau.

ZS6ACD is now settled in as ZS1ACD (Box 1167, Cape Town) and would like to receive some of the many overdue QSL cards from various parts. He needs them for his DXCC as ZS6ACD.

4S7SS (Colombo) is licensed for only 5 watts of CW, but finds that his call has been pirated on 14 mc phone. He asks us to pass on the word that until he is licensed for normal power and phone, any phone signal with that call must be regarded as a pirate.

Strays

GM2DBX (Methilhill) has just received his certificates for last year's World Wide DX Contest. He was the 2nd GM in the multi-operator class (all band CW) and also 2nd GM in the single-operator class (all band Phone). His phone score, beaten only by GM3DHD, took second place in the U.K. Jimmy is now all keyed up for this year's event. Let us remind you:

Phone : October 23, 0200
 GMT to
 October 25, 0200
 GMT.
 CW : October 30, 0200
 GMT to
 November 1, 0200
 GMT.

For fuller details, see p.382 in last month's issue.

Another case of suspected piracy is reported by G3DNT (Matlock), who has been receiving cards for contacts that never took place. Actually, his station has not been on the air since the licence was issued.

DX Notes

HV1AA was most certainly a phoney, but DL4OR is trying to get the O.K. for HV work. . . . VQ8CB is on 14045 kc . . . VS4HK (Sarawak) on 14095 . . . YK1DF has been heard on phone . . . ZB1CA (14100 phone) is on Gozo—useful for WAE . . . CR5SP still on from Sao Thome on phone. (Thanks for all the above to G3FXB).

KC4AB *did* materialise, and made 600 contacts in the first 24 hours! VR2BZ/ZM7 also appeared for a few days, on Tokelau Island. VQ9NZK, Seychelles, may turn up some time in December,

and hopes to be on the air for some months, also making trips to Aldabra Island. VQ7.

Deadline for the November issue is **first post on Friday, October 15**, and please address all your notes, news and scores to "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. And would overseas readers please note *November 12* as deadline for the December issue. Until then, BCNU and 73.

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

Station	Confirmed	Worked
GM3OM	90	92
G5JM	89	89
G16YW	88	89
G3HIS	87	89
G5LH	86	87
GM3EFS	85	86
G2NJ	84	89
G6VC	84	85
G3JEL	81	85
G3HDQ	81	82
G3IVH	78	80
G3CO	78	80
G3HIW	73	79
G3EUK	72	79
G3BRL	71	74
G2AYG	69	70
G3JEQ	68	79
G3HTI	66	70
G3FTV	65	75
G3GYR	64	64
G3IOX	63	74
G3JKO	63	69
G3IGW	62	76
G3JHH	62	63
G3DO	60	64
G2CZH	60	62
G3ITY	54	70
G8VG	50	60
G2HKU	48	50
GM3JNW	43	56
G3HZM	42	52
G3JJZ	39	45
G3JBU	39	43
G2CZU	39	41
G3JZQ	29	39
G3JBK	20	25
G3JKM	17	37
G3HMF	17	20

TRANSISTOR TOPICS

Transmission by Sun-Power Achieved

G3HMO World's First Daylight-Operated Station !

In "Transistor Topics" in the September issue, it was suggested that a local-coverage 160-metre transmitter, using a good transistor in a CO circuit, should be possible with ordinary daylight as the sole source of power. Within a few days of the appearance of the September SHORT WAVE MAGAZINE, that result—as reported in the daily press—had been obtained. (It might be mentioned, in passing, that this press publicity was not sought; it was the result of an "unauthorised leakage," but we are grateful to the Daily Telegraph for the unexceptionable way in which the story was handled). However, the results are what matter, and in the notes following we describe the equipment used by G3HMO in these

Further Notes on Transistor Applications

Recent GDJ Results, and TTX News

historic tests. Moreover, on September 19 he was able to complete the round by obtaining good local-station reception on a sun-powered transistor receiver; and on that day he also worked a partial two-way QSO with another TTX station 8 miles distant, using only the selenium light-power battery, as described here, for both transmitter (TTX) and receiver (TRX). These remarkable results, achieved with apparatus home-constructed throughout, open an entirely new chapter in low-power communication possibilities. They fully justify the forecasts that have from time to time been made in SHORT WAVE MAGAZINE as to the future of transistors in the field of Amateur Radio.—Editor.

SUN-POWERED transmitter working over distances of thirty miles has been achieved. What was put forward in last month's "Transistor Topics" as a reasonable possibility has now become an established fact. Briefly, the equipment consisted of a 160-metre transmitter using a home-made transistor and a battery of sixteen selenium photo-cells to supply the power.

The Results. The first call put out on this equipment raised G3IYX (New Bradwell, Bucks.) at a distance of 8 miles. A solid twenty-minute QSO followed, in which the G3HMO transmitter was powered entirely by sunlight. During the course of the morning (Sunday, September 5), with G6FO as linking station, the following reports were obtained: G3ITW (Northampton, 20 miles) reported 569; G5LP (Wellingborough, 30 miles) reported 539; G5RZ (Leighton Buzzard, 15 miles) reported 569; and G5WW (High Wycombe, 32 miles) reported 339. G3ITW later confirmed his earlier report while working a normal QSO, which lasted about ten minutes, with G3HMO on the SPTTX.

It is difficult to evaluate these QRPP results in terms of miles-per-milliwatt, but it happened that the sun was shining brightly that morning! The average output from the photo-cells was probably between 10 and 20 mW. In dull, cloudy weather or within an hour of sunset, the output would be down to 3 or 4 mW. The electrical efficiency seems to be good, as the measured results on G6FO's S-meter, about a mile away, show a drop of only 20 dB on the SPTTX compared with the 1-watt valve transmitter.

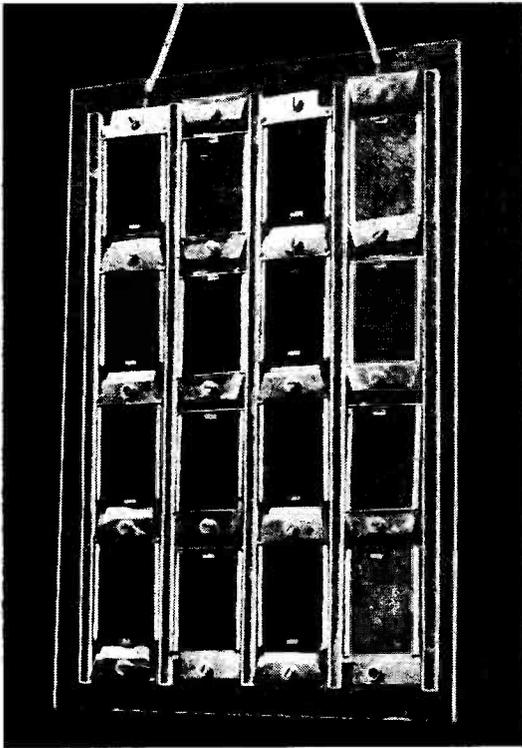
To achieve these results the obvious lines to follow, after what was said on the subject last month, were (a) To obtain a transistor with good low-voltage characteristics and a good performance at 2 mc; and (b) To determine exactly what performance could be expected from a selenium cell in terms of volts, milliamps and milliwatts, with a view to making up a battery of such cells in series or series parallel.

By good fortune a transistor of the required quality appeared in the course of some experiments on etching germanium. (This transistor and its characteristics will be examined in detail next month). It looked sufficiently hopeful for a series of local QRP tests to be initiated. In previous tests it had been found that, with a particular transistor, on reducing the power from 100 mW to 6 mW, the radiated signal had fallen from S9+10 dB to S3. In other words, when the transistor was just oscillating the RF efficiency fell to a very low value. With this new home-made transistor, however, similar tests showed drops of only one or two S points. QSO's with G3IYX (8 miles) were maintained at RST-559, using an input of 2.7 mW! This was done by drawing 0.6 mA from a 4½-volt dry battery.

Thus, the time was ripe for a closer investigation of the power output from the selenium cell.

The Photo-Electric Power Supply

The audio oscillator described last month will function on less than 100 microamps at 0.3 volts. The 0.03 mW is easily provided by the selenium cell, even in quite poor artificial light. The question of



Front view of the selenium photo-cell assembly actually used for the sun-power transistor transmitter tests on Sunday, September 5. The cells are each about 1½-in. wide by 2-in. long and are individually mounted on a sheet of perspex, and series connected. The DC output in bright sunlight is 4-5 volts at about 3 mA, sufficient to run a good point-contact transistor at 12 mW input.

made up of one sheet of perspex, a few 6 BA screws and some thin, springy brass.

Construction of the Photo-Cell Battery. Using a carpenter's tenon saw, five perspex strips 10½ in. x 3 1/16 in. and one sheet 11½ in. x 8 in. were cut. The strips were fixed to the sheet to make four channels 1½ in. wide. With the strip held lightly in position, a little chloroform is brushed along the junction. The chloroform, which is a good solvent, creeps between the two surfaces, and after half-an-hour it has hardened and they become as one. 6 BA clearance holes are drilled and countersunk at 2½ in. intervals down the centre of each channel. Sixteen brass triangles are cut from the thin, springy brass sheet, each being 2 ins. high and just under 1½ ins. across the base. 6 BA clearance holes are drilled in each of these, near the centre of the base. In the extreme corners of the base an excrescence is made by using a centre punch on the reverse side. Next, a double bend is put in the triangle just above the hole, so that the top forms a clip which will eventually hold the cell in place.

The photo-cells have on the front two lines of aluminium paint (clearly visible in the photograph), to which one connection is made. This is done by resting the cell on the base of a brass triangle so that each line rests on a punch mark. So that it shall make contact, the cell is supported at the other end by a small piece of perspex 1/16 in. thick (also visible in the print), thus supporting it in three places, and three places only. It is kept in this position by

the maximum output from the cell in sunlight had to be settled. It was known that the cells had a high internal resistance, 50 to 500 ohms depending on the illumination, and that careful matching might be necessary to get the best results. A number of measurements showed that under conditions similar to sunlight one might expect to draw 0.75 mA at 1½ volts from a bank of four cells connected in series.

Having checked these results, a further dozen cells were obtained and a battery of sixteen cells was constructed. It was assumed that the power should be at least sufficient to energise the QRPP equipment with a comfortable margin in hand. The construction is shown in the photographs. The whole was

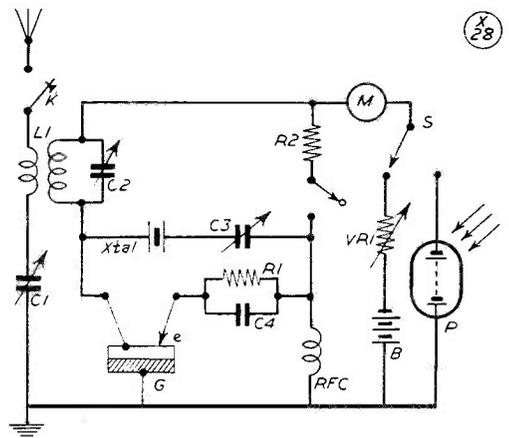


Fig. 1. Circuit of the ultra-low power Transistor Transmitter used by G3HMO in the sun-power experiments. The success of the tests was largely due to the production of a particularly good specimen of a home-made transistor, with α 5.25. First tests were with the battery B, the voltage of which was reduced to give an input of only three milliwatts to the TTX, with the transistor CO still oscillating and radiating a strong signal locally. The photo-cell battery P (see photographs) gave an input of about 12 mW and the results mentioned in the text were obtained over a period of two hours on September 5, using the p-e cell battery P as the sole source of power. It was found that keying directly in the aerial, at K, gave a clean T9x signal, the 1820 kc crystal thus being maintained in continuous oscillation during transmission. At G6FO, just over a mile from G3HMO, the SPTTX gave S9 + 20 dB, compared with S9 - 30 dB from the G5RZ 10-watt Top Band transmitter at 15 miles, taken on the same receiver.

Table of Values

Fig. 1. Circuit of the P-E Cell Transmitter.

- C1 = 200 μ F, tuning.
- C2 = 50 μ F trimmer.
- C3 = .002 μ F.
- R1 = 2,000 ohms.
- R2 = 10,000 ohms
- VR1 = 25,000-ohm pot'meter.
- K = Key directly in aerial lead.
- L1 = Top Band coil assembly.
- RFC = 2.5 mH RF choke.
- M = 0-5 mA meter.
- B = 4½-volt dry battery.
- P = Photo-electric cell battery (see text).
- G = Home-made point contact transistor.

pressure on the back by the apex of the next triangle. This automatically connects the face of one cell to the back of the next, thus putting them in series with no other connections. The end of each row needs a piece of brass which, in effect, is the base only of a triangle, but this is evident from the photographs. The end of each row is linked to the beginning of the next, so that the sixteen cells are in series.

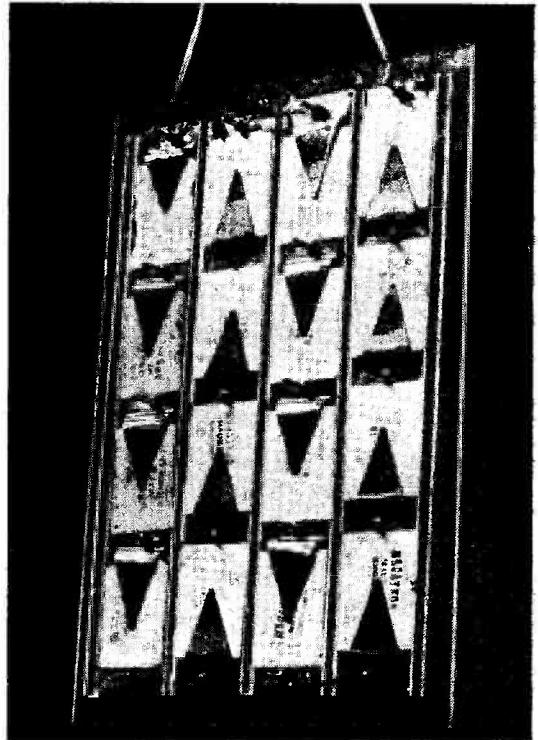
The cells are the Megatron 37 mm. x 50 mm. Type B selenium; using this system of mounting, they give a total light-sensitive area of 40 square inches. The conversion efficiency of light into electrical energy is poor—only about 1% using selenium cells, but this is the best that can be done commercially at present. The Bell Telephone Company's new cell has a very much higher efficiency and is reported to be about 6%. This cell is basically a silicon *p-n* junction (not, as was wrongly stated last month, germanium), and can give in sunlight up to 10 mA per square inch at 0.3 volts. The Megatron cells are probably the best selenium available, and the sixteen in the (English) sun can give 3.5 mA at 6 volts, which is 0.5 mW per square inch. Incidentally, the new twelve, which are darker in the photograph, are rather better than the old ones. Being blacker, they presumably absorb more light!

Photo-Electricity. Although not strictly within the scope of transistory, it is worth noting that there are three types of photo-electricity—photo-conduction, photo-emission and the photo-voltaic effect. The latter is the one that interests us, because only in such cells do we get electrical energy in return for light energy. In the others, we get an electric current proportional to the light energy falling on the cell, but this requires an external source to supply the current. The photo-sensitive devices used in television are all of the photo-emissive type, and obviously do not themselves generate power.

The QRP Transmitter

The circuit used is shown in Fig. 1. Basically, it is the same as the original TTX of Fig. 5(b) on p.15 of the March issue of *Short Wave Magazine* and is described fully in that issue. There are, however, three changes in detail:

- (a) The aerial is coupled inductively to the tank and is series tuned. This is not an improvement, but happens to be more convenient for coupling to the aerial at present in use at G3HMO.
- (b) A resistance R1 and condenser C4 in parallel in the emitter circuit provide self-bias to produce Class-C working. This has the effect of reducing the collector current by about 20% and, at the same time, getting a 2 dB increase in RF output. The values differ from valve practice, but the principle is the same.
- (c) The oscillator is, unfortunately, not always self-starting at low powers, and may have to be started by temporarily connecting a 10,000 ohm resistance from HT minus to the emitter. On removing



Rear view of the photo-cell battery constructed by G3HMO, shown as P in the circuit at Fig. 1. The triangular pieces are cut from springy brass sheet, set to give good contact with the back of each cell. The perspex sheet is about 8 ins. wide by 10 ins. deep, approximately the size of an ordinary window pane.

it, the circuit bursts into oscillation. It seems that any "electric shock" will start it off, because even breaking the earth lead has the same effect. (It is hoped that circuit changes will make the oscillator self-starting and avoid this untidy detail).

In the meantime, however, to keep the oscillator going has necessitated keying the aerial. Experience shows that this frequently gives the best results for QRP working (even on valve rigs of 1 watt or so input). Certainly, in the case of a transistor transmitter it ensures a clean T9x signal. In the case of battery-operated equipment, of course, it would be a pity to lose the beauty of keying the power lead.

In addition to the photo-electric supply, a battery in series with a 25,000 ohm variable resistance is shown in Fig. 1. This alternative supply is useful in setting up in conditions of poor light and generally establishing optimum QRP settings on the TTX. No resistance is needed in series with the photo-cell supply, as the high internal resistance of the cells limits the current to a safe value. The short circuit current is only about twice the normal current on load.

Future of Sun-Powered Equipment

Although transmitting with sun power sounds good, the reader may well ask, "What is the practical use?" After all, nothing has been done that could not have been achieved just as well with a 7½-v. dry battery, and much better with the mains. If the sun goes behind a cloud (unpredictable) or it sets (predictable, but inevitable), what then? In any case, the sun is notoriously a poor performer in this country—we are told that it is only in California that the sun *shines* with certainty every day!

The complete answer to what may be done with sun-power lies in the future. However, we may consider the facts and make some deductions. Sun-power transistor transmitters can transmit over ranges of 3 miles with certainty and 59+ signals, up to 30 miles under favourable conditions—and probably even more under exceptional conditions—using power supplies of only 20 mW. Such powers can be provided by intercepting and converting to electricity some 40 square inches of sunlight. Rather less power is available per square inch during the hours of daylight if averaged over the whole day. If the power could be stored and drawn when wanted, then we have at our disposal a source of power which will give, at a very conservative estimate, 120 mW hrs. per day.

This is not very much, but it would go a long way with transistorised equipment, especially if it was only used intermittently—and it would be as *free* and as *easily obtainable* as the air we breathe. Further increase in power only requires more square inches of sunlight, *i.e.* capital outlay, not running costs. An increase of six to ten times on these figures is possible as soon as the silicon *p-n* junction cell is available. Nor is one confined to lower-power transmitting equipment. Without stretching the imagination very far, one can visualise many circumstances when such a supply may be very useful.

Transistor Activity

G3CCA and G3IZS, of the Leicester Transistor Group, are busy with sun-powered transistor equipment; their line at present is to use the *p-e* cells to energise an LF oscillator, the output of which is rectified and used as DC power for TTX and TRX applications. This method produces higher voltages, even if at lower power (due to conversion losses), than can conveniently be obtained from a *p-e* battery direct; the point being that something around 22 volts is needed for best results with most commercial point-contact transistors.

LATE FLASH

First Sun-Powered All-Transistor Station

On Sunday, September 19—a day on which there happened to be bright sunshine in the Buckingham area—G3HMO succeeded in using the output of the photo-electric cell battery described in this issue to energise a transistor receiver using a GET-2 as detector, with a junction transistor as LF amplifier. On this, he was receiving locals G6FO and G6KJ at comfortable speaker strength, and some more distant stations on their 160-metre net could be identified. Later, in a transistor QSO with G3IYX (Bradwell, 8 miles)—also a TTX station—G3HMO was receiving CW signals from G3IYX at RST-329 on the SPTRX. Experimental work with the sun-powered transistor receiver is proceeding. In the meantime, this result may be claimed as the first occasion in history that radio communication, amateur or professional, has been achieved using daylight as the sole source of power for both receiver and transmitter at the one station.—*Editor.*

G3CCA and G3IZS have had short-range results on these lines, and they are also developing local calling circuits, on the principles suggested in



Junction transistors in a two-stage audio amplifier, used with a noise-cancelling microphone in an ordinary handset. This enables a telephone system to be operated in exceptionally noisy locations—such as workshops, engine testing sheds and in aircraft intercom. systems—without interference or the necessity to shout down local noise. This (experimental) unit was demonstrated by Mullard, Ltd. at the S.B.A.C. Show at Farnborough. OC71 junction transistors are used, with an additional OC71 amplifier to boost the output in the receiver at the distant end. In its finalised form, such an amplifier could be built into the handset itself.

"Transistor Topics" in the September issue. These calling circuits may well develop into one of the most useful amateur applications of transistors.

Success in Birkenhead

A most interesting report comes from G3CSZ, who is producing very good home-made transistors. Within two months of receiving his supply of phosphor bronze wire, he has made himself three working transistors with *alphas* of $2\frac{1}{2}$, 3 and $1\frac{1}{2}$ —measured on the Combined Tester and Processor, which he has also built as described in the April issue. The best of the G3CSZ transistors will oscillate in the TTX circuit as given in March *Short Wave Magazine*, with a 7 mc crystal and gives harmonics up to 28 mc! Out of the 11 diodes tried at G3CSZ, the G.E.C. red-spot is recommended, as it is rated at 100 microamps at -10 volts. G3CSZ favours the 9-10 volts positive processing as opposed to the 140 volts negative alternative. He has obtained his results entirely by following the details given in the April 1954 issue of *Short Wave Magazine*, and is the first reader to report success on the home-constructor front. We are looking forward to hearing from others who have also succeeded.

Transistor Communication

GC2CNC (Jersey, C.I.) has written in to say that he has now worked G, GC, GM, GW and HB on TTX! He is thus one of our most successful DX stations, and is to be congratulated on these outstanding results. Best distances claimed by him to date are: G31GW (Nr. Halifax, 310 miles).

G3FTV/A (Wakefield, 342 miles), GM6JH (Linlithgow, 472 miles), and HB9T (Zurich, 500 miles). The HB contact was made in the early evening of September 19, and the QSO with GM6JH took place on September 16.

G2AUA and G2VU, both of Wellingborough, Northants., are busy on home-made transistors. G2AUA has also built a TTX using a GET-2 in the base-tuned circuit, on which he has worked locals only so far. It is interesting to note that G2AUA is using a 3.5 mc crystal which frequency-halves into the Top Band—see Fig. 3, p.166, May issue, *Short Wave Magazine*.

Also working locals on TTX is G3HGY (Coventry); he usually gets RST-549 on his weekly schedule with G5QI (nr. Birmingham). G31YX remains active, and gets contacts by calling "CQ TTX" on 1820 kc; he and G3HMO maintain a regular schedule, with strong signals both ways.

TTX in ZL. ZL4GP (Dunedin), of *Break-In*, has started the TTX ball rolling in New Zealand by working ZL3FM of Christchurch, at 200 miles, with an RST-339 report; this signal was identified at 600 miles! ZL4GP is using a Mullard OC50 as a self-excited oscillator on 1.8 mc with 125 mW input. These are very interesting results, and we hope to hear more of VK/ZL doings in Transistory.

Dead-line for the next issue is October 14, by which date all news of activity, equipment and results should reach us, addressed "Transistor Topics," c/o The Editor, *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

Beam Design for VHF

SURE-FIRE ARRAYS FOR TWO METRES AND SEVENTY CENTIMETRES

By G4MW

This article will meet the needs of those who require authoritative data on the design and matching of VHF beam systems. The author discusses in detail types for both VHF bands.

—Editor.

THE importance of matching a transmitting aerial to its feeder does not need to be emphasised, and a variety of systems for achieving this has been described from time to time in the *Magazine* and in the various handbooks. For receiving aerials, where the aerial is the "generator" rather than the "load,"

this is of less importance—most commercial T/V aerials seem to work.

This article describes a different approach to the matching problem, whereby the aerial array itself is designed to present the correct load to the feeder so that it may be directly connected without the need for any intermediate matching devices.

The importance of dimensional accuracy in the arrays to be described should be emphasised right away as no provision has been made for any subsequent adjustments. This, in fact, is the main feature of these arrays; no adjustments of any kind are necessary.

The aerials are all of the "Kooman's" stacked-array type which has proved very successful on VHF and UHF, and the method employed is to choose the dimensions of the elements so that when the required number of them are connected in phase, in parallel, a feed impedance results which is suitable for the chosen feeder. In the configurations to be described a feeder of 75 ohm impedance is assumed, but the method can, of course, be

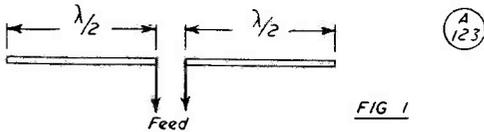


FIG 1

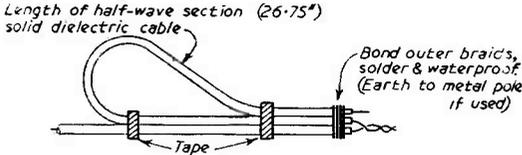


FIG 2 Balun impedance transformer for 145 mc

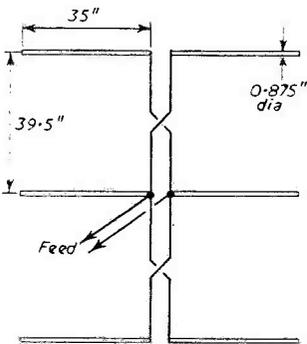


FIG 3

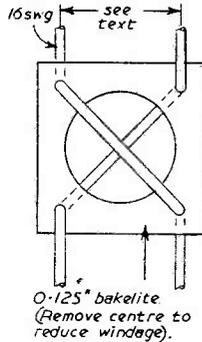


FIG 4
Transposition piece

Figs. 1 to 4 above are explained in detail in the text.

adapted to suit cables of other impedances.

Reflectors are not shown; in any particular array the advisability of fitting reflectors should always be considered, weighing the small additional gain (3 dB) against the increased mechanical complexity, weight and windage of the array. Without reflectors, 90° of rotation will cover all directions. If a set of reflectors or a deflecting screen, is fitted to any of the arrays to be described, a mismatch will result, of greater or less importance depending upon the spacing of the reflectors from the elements; at quarter-wave spacing little disturbance of the characteristics should occur.

The feed impedance and resonant length of an aerial of the type shown in Fig. 1 ("centre fed full-wave" or "two half-waves in phase") is very dependent upon the average characteristic impedance of the elements; this should not be confused with the "radiation resistance" of the aerial. Data have been published¹¹ which show the feed-point reactance and resistance of various element lengths (in terms of λ) having different values of characteristic impedance, and it is from these data that the configurations which follow have been designed.

Since aerials of this type are of "high" feed impedance, and balanced, it was decided that the arrays should be designed for a feed impedance of 300 ohms in most cases, so that the well-known coaxial balance-to-unbalance impedance transformer could be directly employed. Direct feed with 300 ohm line is, of course, equally suitable electrically, although most amateurs will now agree that the other shortcomings of this type of feeder almost preclude its use, in a permanent installation. The dimensions of a balun for 145 mc made of solid-dielectric coaxial cable are shown in Fig. 2.

All the arrays are fed at or near the centre. This is to assist equal current distribution, and more important still, to ensure that any phase-error which might be present due to inaccuracies in the length of the inter-connecting sections, or in the stacking interval, is not cumulative. The effect of such a cumulative phase error would be to tilt the beam upwards or downwards, with resulting loss of range. (This effect, no doubt, accounts for many of the arguments one hears on the air about the relative effectiveness of Yagis and stacked arrays, of identical gain, for working DX).

Two Metre Arrays

The smallest practical array for two metres, using this system, is one of six elements. This is shown in Fig. 3. A gain of over 7 dB, or 10 dB with reflectors, can be expected from this, with a good low-angle pattern. Elements of $\frac{7}{8}$ " dia. give a characteristic impedance of nearly 500 ohms and a feed impedance of 870 ohms at resonance. Three sets of elements in phase, in parallel, therefore give a feed impedance of 290 ohms presenting an excellent match

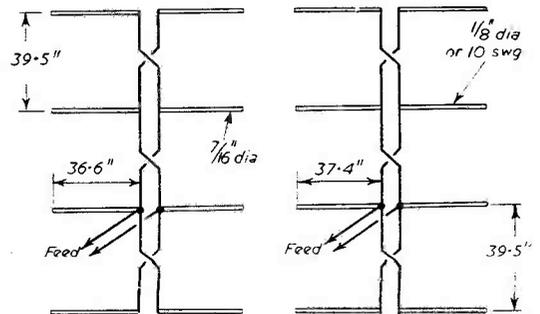


FIG 5

FIG 6

A 124

Figs. 5 and 6 can be followed by reference to the text.

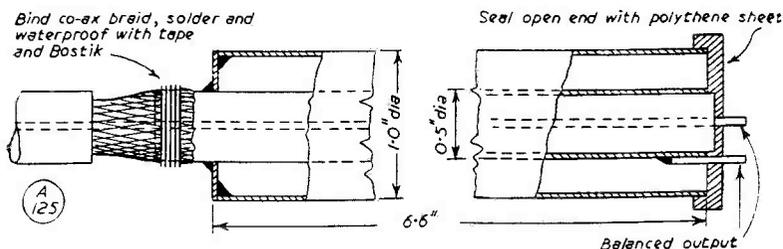


Fig. 7. Balun for 430 mc. The inner tube should be chosen to give a wall thickness making a tight fit over the polythene insulation of the cable used.

to the 300-ohm balun. It will be noted that the resonant length is much shorter than for the more usual smaller-diameter elements; the stacking interval is, of course, almost exactly an electrical half-wave.

The inter-connecting lines may be of any gauge and spacing since they are half-wave transformers terminated at each end in equal impedances. They must, of course, be transposed in order to keep the elements of the array in phase. A suitable transposition method is shown in Fig. 4; high grade insulation is not required here as the transposition is at a lower impedance point midway between the elements, and bakelite will serve.

The space between the ends of the pairs at the feed points is not critical, but the calculations do not allow for any additional capacity at this point. A spacing of about 2" for the 2-metre aerials is suggested, and any supporting insulators, unless of low capacity, are better mounted a foot or so away from this end.

In all cases the balun is clamped to the supporting mast and the ends soldered directly to the pair of elements marked "Feed" in the diagrams. Waterproofing of the open ends of the coax balun is most important; a small bottle of "Aquatect," obtainable from most garages, will prove a good investment for this purpose. Alternatively, a few lavish applications of polystyrene coil dope, covered when dry with "Bostik," will be effective.

If aluminium or dural tubing is used for the elements, connections may be made by plugging the ends of the tube, then drilling and tapping 4BA, so that solder tags may be connected to the feed wires. These joints should also have several coats of "Aquatect"; coil dope is less satisfactory on metal and tends to peel off in time.

An 8-element Array

The addition of another two elements to the six-element array will bring the gain up to

at least 9 dB. The elements must now be reduced in diameter as a feed impedance of 1200 ohms is required per pair, as against 900 ohms before. Because the elements are thinner, the resonant length will also be different. The dimensions are shown in Fig. 5.

10-element Array

The addition of a further pair of elements to make a 10-element aerial gives a symmetrical array of excellent characteristics and a power gain of over ten times (Fig. 6). The height of this array is just over 13ft., i.e., this length at least would project above the uppermost mast support. This is probably as much as one would want to have unsupported unless a fairly heavy mast is used. Here again the elements must be thinner to give the required feed impedance of 1500 ohms per pair, and a different form of construction may be required, for example, a wooden frame, since they must be of 10 S.W.G. (1/8" dia.) conductors.

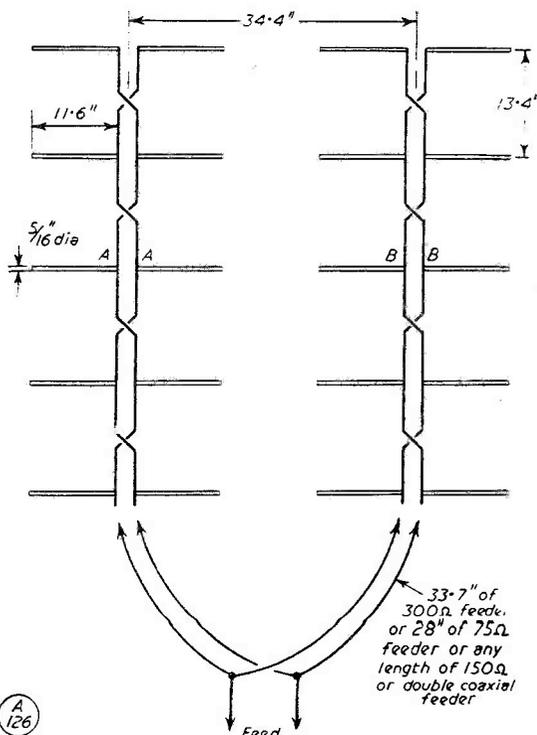


Fig. 8. A 20-element beam layout for the 430 mc band. It should be particularly noted that the correct feed points are at "A-A" and "B-B" and not at the bottom of the stacks.

Aerials for 70 Centimetres

On 70 cm higher gain aerials are required to offset the "wavelength factor" when the aerials are used for receiving. This means in effect that a larger number of elements is necessary on 70 cm to extract the same amount of energy from a radiated signal than would be required on 145 mc for a signal of equal power. Because of the reduced physical size of the elements a directly-fed multi-element array of compact dimensions is possible.

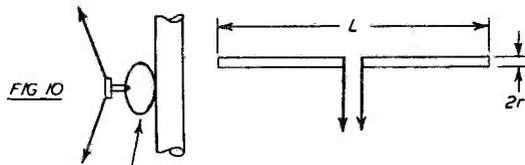
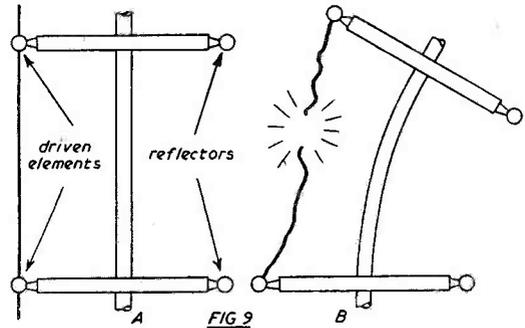
Bearing in mind the danger of a cumulative phase-error it is not desirable to go on stacking elements away from a single feed-point. Therefore, when a large number of driven elements are to be employed it is preferable to feed the array in sections. This is not difficult to arrange, and one such array for 70 cm will be described.

In order that self-supporting, and therefore low characteristic-impedance elements of standard diameter may be employed at this higher frequency, it was found preferable to design the array for 75-ohm feed, rather than 300 ohms. A different type of balun is then necessary, and a suitable one is shown in Fig. 7 made from copper or brass tubing. (The various dimensions are somewhat inter-dependent and those shown only apply when all are adhered to.)

20-element array for 430 mc

This array consists of two 10-element stacks spaced horizontally at 5 quarter-waves between centres. The stacks are fed in parallel with equal in-phase voltages and therefore require to have a feed impedance of 150 ohms each. If two lengths of 150 ohms balanced feeder are available the leads from the feed-points to the balun may be any length, but equal. Otherwise two equal lengths of any balanced feeder may be interposed, each being a whole number of electrical half-waves long, due allowance being made for the velocity-factor of the cable used. (For 300-ohm ribbon this factor is 0.82 and for 75 ohm twin 0.68). A further possibility is to use two lengths of the smaller diameter 75-ohm coaxial cable to feed each stack, the outers being connected together at each end. These double-coaxial feeders to each stack may again be any length, but equal, as in the case of the 150-ohm lines. For clarity the diagram (Fig. 8) shows the stacks as if fed at the bottom but centre feeding is preferable.

The feeders should be kept well away from the elements and the lengths shown will allow for this. Care is necessary to ensure that the correct phasing is obtained between the stacks



Phosphor bronze tensioning strip

FIG 11

(A 127)

In Fig. 11 K_a can be found from the expression

$$K_a = 276 \log_{10} \frac{L}{r} - 120 \text{ ohms}$$

where L = total length of element, and r = radius of the element.

as it is easy to get the twin-lead crossed over, A check with an ohm-meter between a pair of corresponding elements in each stack will reveal any error.

The spacing between the ends of a pair of elements should be an inch or less on this frequency. A transposition piece similar to that of Fig. 4, but of reduced dimensions to suit the spacing of the interconnecting wires, may be used.

No suggestions are made regarding the mechanical mounting of the arrays described. This will depend on the type of mast to be used and on the other materials available. One piece of advice, however, is offered: Mount the driven elements close to the mast, otherwise excessive strain will be put on the interconnecting wires and on the element insulators as the mast sways in the wind. This is shown in an exaggerated fashion in Fig. 9. In one case, when the elements were only about 2" forward of a 1 1/2" dia. steel mast, it was found necessary to allow for stretching of the interconnecting wires, and spring loading was introduced as shown in Fig. 10. When this is done, the phasing wires are made equal to the stacking interval shown in the diagrams. Spiral springs are less satisfactory for tensioning (unless of phosphor bronze) as they trap moisture in the coils and quickly rust.

Other Arrays

Other arrays can be designed easily on these principles, or those described can be re-designed to suit feeders of other impedances.

The procedure is as follows :

Suppose the feeder has a characteristic impedance of Z ohms and a stacked array of n pairs of $\lambda/2$ elements is required.

Using the $\lambda/2$ balun, the feed impedance required for the array is $4Z$, so that the required feed impedance of each pair is $4nZ$ ohms. From the curves published in Ref.1 it will be seen whether this feed impedance can be obtained with a "possible" value of characteristic impedance, *i.e.*, one lying between, say, 400 and 1200 ohms, the upper and lower limits being set by the practicable element dimensions at these frequencies.

If $4nZ$ is a possible value, then the characteristic impedance of the elements (K_a) corresponding to this required feed impedance can be read off the curves, and also the half-wave resonant length ($L/2$ in Fig. 11).

It is only necessary then to substitute the data in the formula for characteristic impedance:

$$K_a = 276 \log_{10} \left(\frac{L}{r} \right) - 120 \text{ ohms (see Fig. 11).}$$

and solve for r hoping that it will come very close to that of a standard diameter tube or rod. If unlucky the first time another arrangement of elements, or a direct feed at Z ohms rather than $4Z$ can be tried.

But before abandoning a non-standard, calculated diameter, assume that the elements are, in fact, the nearest standard size of tubing, and by re-substituting in the formula, work backwards to derive the new value of K_a produced by these elements, and the new feed impedance per pair. It will then be readily seen whether the mismatch produced is of serious consequences or not in terms of SWR.

- Ref. 1. *Radio Engineers' Handbook* — Terman.
 Ref. 2. *Antenna Theory and Design* — Williams, Vol. II.

THOUGHTS FOR THE MORROW

Transistory is like VHF. It is not until you try it that you realise how interesting it is.

You Want a Quiet Band for the Local Net?

Why not try Ten Metres—ideal for local working.

You are Tired of the QRM on the DX Bands?

Why not give Fourteen Metres a trial? You may find it a bit barren at first, but several operators have worked more than 100 countries on 21 mc.

You are Looking for a New Angle on Amateur Radio?

Why not build a transistor transmitter and receiver? Almost anything you can work over 50 miles will be creditable DX.

The VHF Bands are Boring You?

With a local, why not start experimenting on the 1215 mc (25-centimetre) band? Valves like the 8012 and 15E, in coaxial line circuits, look as if they should work (at reduced ratings) in this band, and the receiver can be a super-regenerative job.

MOBILE RADIO USERS' ASSOCIATION

In its first six months the Association has succeeded in obtaining official recognition as the negotiating body on behalf of mobile radio users. It has been invited by the P.M.G. to nominate two members to serve on an informal committee set up to advise on matters connected with Mobile Radio. The M.R.U.A. is endeavouring to ensure that the frequencies allotted to member-users shall not be interfered with by other operators in Band III. Those

in any way interested in Mobile Radio—either as users, traders or manufacturers—are invited to join the Association and make use of the services offered. The minimum subscription is only one guinea per annum. For all details, write: R. E. Simms, Secretary, Mobile Radio Users' Association, Buckingham Court, Buckingham Gate, London, S.W.1.

"LETTERS TO THE EDITOR"

Heavy pressure on space this month has necessitated "Letters to the Editor" being held over until the next opportunity. The same applies to "Random Jottings" and "The Other Man's Station." They will be in next month.

CARDS IN THE BOX

If your call-sign appears below, send a large stamped addressed envelope to: BCM/QSL, London, W.C.1, and the card(s) held for you will be forwarded on the next fortnightly G clearance. If you would like your call-sign/address published in our "New QTH" feature and in the *Radio Amateur Call Book*, for which we are agents, please mention that at the same time.

G3BWZ, 3EQL, 3GMB, 3IXV, 3IYA,
 3JKU, 3IQM, 3JRW, 3JVI/A, 3JVL,
 3JVR, 3JXZ, 3JZZ, 3KFT, 3RL, 6HH/A,
 GD3IDS, GM3PV.

RATHER more heartening is the fact that this month we can kick off with a report of real C5 conditions, at least in the southerly part of the U.K. During the period August 26-31, with the peak around the 30th/31st, Europeans were coming in strongly as far as East Anglia, the Midlands, the West of England, and South Wales.

This was an unexpected break—so much so, that there were not nearly enough stations on during the evening of August 30-31 to reap the full benefit of it. By those who were there, the late hours of Monday, August 30, have been likened to "March 1953" conditions—at any rate, G8VN (Rugby) was able to raise F8MX (Paris), getting an RS-59 signal from him on the indoor beam; other Midlanders worked by F8MX were G2ATK, G2CVD and G3HHY, also G3IOO and G5CP from even further north. At about the same time, G3GHO and GC3EBK had a comfortable S9-both-ways contact.

Results generally are clearly reflected in the unusually extensive Activity Report herewith; this tells much of the story. It will be seen, for instance, that during the opening G6RH (Bexley, Kent) was very successful with the EDX, and that GW8SU, away down in Porthcawl, South Wales, also made some most excellent European contacts.

The met. appreciation — see "VHF Weather Report"—ties up well with these results; the chart at Fig. 1, p.457, prepared, of course, without any foreknowledge of the results obtained, shows clearly what was happening aloft; it also shows that this was a classic instance of the occurrence of EDX conditions.

It is conceivable that we may experience something similar again before the winter is upon us, and even "out of season" the band can open for good GDX, with the nearer Europeans workable from the South of England. Indeed, to stations like G3JHM (Worthing), G5MR (Hythe) and G5TZ (Isle of Wight), working F's across the Channel is nothing unusual; the number of contacts

VHF BANDS

A. J. DEVON

Continental Opening,
August 30-31—

Spell of Good Conditions—

G5YV Heads Annual Counties—

Station Reports and News—

they can make is limited only by the French activity.

Annual Counties, 1953-'54

You see the final placings here, with a summary of the results over the five years since this Table was instituted, with some notes arising from the analysis.

In connection with this Table—and our congratulations to Harold of G5YV on turning in another fine performance—it is interesting to see what a large turn-over there is of stations entered from year to year in Annual Counties. This is no bad thing, as it keeps the interest going in County working, which, in turn, helps to maintain activity. Once again, however, we would say that there are far more stations who could appear than have actually entered, and we hope that for this year's Table many more will come forward as they work their "14C since Sept. 1st."

For the new Annual Counties, we have already had eight claims, ranging from 14C (G3BJQ) to 25C (G3GHO). Due to the amount of tabular matter we are carrying this month, first appear-

ance of Annual Counties 1954-'55 is being deferred till next issue. In the meantime, let us have your claims. Similarly, All-Time Counties is being held over till November "VHF Bands."

There have been several requests for the re-appearance of the 70-Cm Station List, which was last printed on p.170 of the May issue. This also is in hand, though actually that List can be taken as being pretty well up-to-date, as few amendments have been notified since.

News from Belgium

Guy of ON4BZ (Brussels) reports that he is busy on a *two-metre* version of the G3BKQ 70-cm Converter, with which he is very pleased—however, he feels that results would be even better if he could get hold of a CV-364 diode, a type which is not obtainable in Belgium. He wonders if any reader of these notes could help him—we are sure that somebody will. Guy has a selection of crystal diodes used for test purposes, and the best of them, of "unknown surplus" brand, gives an NF of about 7 dB; all his others are very much worse than this.

ON4AC (Nieuwport) was on for the EDX opening at the end of August, and had a number of good contacts, representing in all five European countries. He runs 35w. to a QQE06/40 (shortly to be pushed up to 75w.), the beam is a 4-ele flat-top, and the receiver a 3-stage SEO into a BC-342N at 7 mc. Nearby ON's active are ON4GG (Coryde) and ON4IE (La Panne); ON4AC himself, right on the coast, is on every Sunday 1100-1400 clock time, and most evenings after 2200, on 144.12 or 144.45 mc.

Station Reports—Midlands and North

G3CCH (Scunthorpe) is a very consistent operator, adding steadily to his scores; his latest GDX is G3UB, and GM3DIQ is a regular sparring partner.

From Clarke of GM3DIQ (Stenston, Ayr) we hear that the GM's got a break around August 25-26, but evidently it did not

extend them very far South, and they were right out of it during August 30-31. For GM3DIQ, GW8SB/A giving Anglesey was a very helpful new one, and on the 26th G2CBR (Ormskirk, Lancs.) was a strong signal; at the time, EI2W was "such a terrific S9+" that the GM3DIQ beam would not reject him at all, at any setting.

G2DCI (Sutton Coldfield) gets all his results, like G8VN, on a 4-ele Yagi in the roof space, with 30w. into an 832; he has succeeded in working 155S in 36C All-Time, and stands at 28C in Annual Counties—which shows what can be done, if one is not too impatient and can keep steadily at it.

G6PJ (Sheffield) moves in the Tables, and G8NM (Lincoln) likewise brings himself up-to-date. G3EPW (Bury) stands well at 45C in the Annual, with G5MA/P and GW5BM/P as useful GDY worked recently. G3DO (Sutton Coldfield) scored with G2BAT/P for Cornwall as a nice addition, and GW3GWA (Wrexham) reports that his additional counties have been gained under /P conditions, and so cannot be claimed for the Tables; on August 15, GW3GWA/P had a good day out, when 46S were worked, including 26 fixed stations and three VHF mobiles!

Which brings us to G3ABA (Coventry), who has been accompanying G2ATK/M on some of the latter's recent trips; on the evening of September 1st they were near Abergavenny, but in Breconshire, and worked G3FAN as best DX; activity was disappointing, though several semi-locals were worked; G6NB was heard but could not be raised. The next evening, the stopping place was the top of Fish Hill, overlooking Broadway, Worcestershire, a site (and a sight) which must be well-known to many; from here, some of the Londoners were workable.

G8VN (Rugby) is naturally pleased with his DX results on the indoor beam, and remarks that, being in the Midlands, he often hears both sides of a N-S or E-W contact. So it may interest "those concerned" to know that on Sep-

TWO-METRE ACTIVITY REPORT

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

GW8SB/A, Llanfaethlu, Anglesey.
WORKED: EI2W, 5Y, G2AK, 2BCR, 2FZU, 2OI, 3BW, 3CCH, 3CUZ, 3EHY, 3EPW, 3GPT, 3HHY, 3IUD, 3IWJ, 4SA, 5AU, 5BM, 5JU, 5YV, 6FK, 6NB, G13FZQ, 3GQB, GM3DIQ.
HEARD: G2BVW, 2FJR, 3GHA, 3GMJ, 3IPH/A, 5TZ. (August 21-27).

GW8SB/A, Llanfaethlu, Anglesey.
WORKED: G3CCH, 3CUZ, 3EPW, 3IUD, 3IWJ, 3PY, 5YV.
HEARD: G2FJR, 3GB, 4SA. (September 11-12).

G4SA, Drayton, Berks.
WORKED: G2AOK, 2ATK/M, 2AVQ, 2CVD, 2CZS, 2DCI, 2FTL, 2FWW, 2HCG, 2HDZ, 2HIF, 2YB, 3ABA/P, 3AEX, 3A00, 3APY, 3ASC, 3CRH, 3DJX, 3DO, 3DQO, 3DVQ, 3EGG, 3EJA, 3ENY, 3EPW, 3ERD/P, 3FAN, 3FKO/P, 3GBJ, 3GHO, 3GPT, 3GWB/P, 3GZM/P, 3HHY, 3IER, 3IEY, 3ISA, 3ITF/P, 3IWJ, 3XC/P, 4IJ, 4PR, 5AU, 5BM, 5DF, 5DS, 5HK, 5KW/M, 5MA/P, 5ML/P, 5RZ, 5YK, 5YV, 6AG, 6FK, 6JK, 6NB, 6OU, 6XM/P, 6YU/M, 6ZH, G15AJ, GW5BM/P.

G3JGJ, Plympton, S. Devon.
WORKED: F3ER, 8ME, G2BAT, 3FIH, 3GPH, 3H2H.
HEARD: F8MB, 8UK, 9IY, G2BMZ, 3AET, 3AGA, 3AUS, 3AVF, 3CQC, 3GVC, 5TZ, 6AG, 6NB, 8DA, GC2FZC, GW2ACW, 8SU, 8UH. (August 22 to September 18).

G6RH, Bexley, Kent.
WORKED: DJ1DC, 1VK, DL3NQ, 6OR, F3JN, 3LP, 3LQ, 8GH, 8MX, 8NH, 8UK, 9CQ/P, 9JY, 9NW, G2BAT, 2FCH/M, 3AGA, 3CCH, 3DQO, 3DV, 3ENS, 3ENY, 3YH, 3YZ/P, 5CP, 5KW/M, 5YV, 6FK, 6LI, 6UJ, 6XX, 8BP, 8NM, 8VN, GC3EBK, GW8KW/P, 8UH, ON4AC, 4HC, 4HN, 4PA, 4TW, 4UD, 4ZK, PA0FC, 0NO, 0HAK.
HEARD: DL3VJ, EI2W, F8AA, 8OB, 9EA/P, PA0FB, 0WO, PE1PL. (DX and /M only; August 4 to September 15).

G3IUD, Wilmslow, Ches.
WORKED: EI5Y, G2A1W, G2BMZ, G3EGW/P (Westmorland), G3IOE, G4LX/P, GD3UB, G13GQB, 5AJ, GM3BDA, 3DIQ, 3EGW, 3JDD/P, 6KH, 6LW/P, GW2ADZ, 2XV/P, 3EGW/P (Radnor), 3GOP/P, 3GWA/P, 5BM/P, 8SB/A.

G2FJR, Sutton Bridge, Lincs.
WORKED: EI2W, G2A1W, 2BMZ, 2CZS, 2DJM, 2DVQ, 2FQP, 2XV, 2YB, 3AGS, 3CKQ, 3CRH, 3DLU, 3DO, 3DOV, 3DVQ, 3ENS, 3FAN,

3FIH, 3FUM, 3FXR, 3FYY, 3GGJ, 3GHO, 3GPO, 3GWB/P, 3HCJ/P, 3HWF, 3IER, 3IEX, 3INU, 3IOO, 3WW, 4KO, 4LO, 5DS, 5GX, 5TZ, 5YV, 6UJ, 6XX, 6YU, 8BP, 8SC, 8VZ, GM6WL, GW3EGW/P (Merioneth), 3EGW/P (Radnor), ON4HN, PA0NO, PE1PL. (August 15 to September 16).

G3ITP/P, Nr. Farnham, Surrey
WORKED: F9CQ, G2AHP, 2ATT, 2BMI, 2DD, 2DSP, 2DTO, 2DVD, 2HIF/P, 2IT, 2MV, 2RD, 2TP, 2UJ/P, 2WS/P, 2XV/P, 2YB, 3AEX, 3BNC, 3DFF/P, 3DIV/P, 3DVQ/P, 3EJA, 3EYB, 3FD/P, 3FOS/P, 3FYY, 3GOP/P, 3GXG, 3HCU, 3HST, 3HXS, 3HZJ, 3ION/P, 3IPN, 3JHM, 3JQN/P, 3YZ/P, 4AU, 4KD, 4SA, 5DS, 5NF, 5TZ, 6GR, 6JK, 6LX, 6NB, 6NF, 8UO/P, 8VZ.
HEARD: G3ARL/P, 3AVF/P, 6TA/P, 8OU. (September 15, 1100-2000 BST).

G2XV/P, Nr. Cromer, Norfolk.
WORKED: G4KO, 4MW, 5BD, 5GX, 6AG, 6LI, PE1PL.
HEARD: DJ1DC, G2A1W, 2DRA, 2FJR, 2PU, 3CCH, 3DJX, 3ENS, 3FAN, 3GGJ, 3GPO, 3IOO, 3WW, 4AU, 5TZ, 5YV, 6NB, 6RH, 6UJ, 6XX, ON4UD, PA0FC. (August 29 to September 4).

E15Y, Dublin, Eire.
WORKED: EI2W, 3S, G2BCR, 3BW, 3EPW, 3GPT, 3ITY, 3IUD, G13GQB, GW8SB/A. (August 31 only).

GW8SU, Porthcawl, Glam.
WORKED: DL3NQ, F3JN, 8GH, 8OB, 9JY.
HEARD: F8MX, GC2CNC, ON4EO, PA0UL. (August 29 to 31 only).

G3WS, Chelmsford, Essex.
WORKED: DJ1DC, F3LQ, 8AA, 8GH, G2XV, 3BSU, 3IOO, 5GX, 5SK, 6UJ, 6XX, 8VN, GC3EBK, ON4AC, 4IE, 4PA. (August 20 to 31).

EI2W, Dublin, Eire.
WORKED: EI3S, 5Y, 9N, G2ATK, 2FJR, 2HGR, 3DQO, 3EPW, 3GPT, 3HHY, 3IPH/A, 3IWJ, 4SA, 5AU, 5BD, 5BM, 5JU, 5TZ, 5VN/A, 5YV, 6FK, 6NB, G13CXY, 3FZO, 3GQB, 3IJM, 5AJ, GM2BUD, 3BDA, 3DDE, 3DIO, 3EGW, 3FOW, 6WL, 6WL/P, GW8SB/A.
HEARD: G2DCI, 3EHY, 6MI, G13AXD. (August 19 to September 14).

G2CZS, Chelmsford, Essex.
WORKED: F8GH, 8JR, G2ATK/M, 2FJR, 2FTS, 2HDZ, 2XV, 2XV/P, 3ANB, 3BSU, 3CGO, 3CRH, 3CVO, 3DIV/P, 3ENS, 3FD/P, 3FEF, 3FNL, 3FSD/P, 3GGJ, 3GHO, 3GJZ, 3HHY, 3IIT, 3IWJ, 3ION/P, 3ISA/P,

3JMA, 3WW, 4SA, 5DS, 5KW/M, 5TZ, 6LL, 6NF, 6NU, 6XX, 8SK.
HEARD: F8MX, 9CQ/P, G2ATK, 2HCG, 3DO, 3ERD/P, 3FAN, 3FYY, 6TA/P, 8NM. (August 12 to September 17).

G3CUZ, Leek, Staffs
WORKED: EI2W, G2AK, 2ATK, 2CVD, 2HGR, 2JZ, 3CRH, 3DIQ, 3DQO, 3EPW, 3FKY, 3GHO, 3GPT, 3GXR, 3INL, 3IUD, 3IWJ, 6FK, 6SN, 8SB, GW3EGW/P, 8SB/A.
HEARD: G2DVD, 3COB, 3DO, 5AU, 5BM, 5VN/A. (August 17 to September 16).

G3DLU, Compton Bassett, Wilts.
WORKED: EI2W, G2AOK, 2FJR, 2FTL, 2PU, 3ARX, 3BJQ, 3BRX, 3CCH, 3DQO, 3EGG, 3FD, 3GHO, 3GKZ, 3GPT, 3HHY, 3IUK, 3IVF, 3LP, 5YV, 6SN, 8DA, 8VN, GD3UB.
HEARD: G2AK, 2ATK, 2BMZ, 2BVW, 2COP, 2DVD, 3BW, 3CRH, 3DJX, 3DO, 3EHY, 3EPW, 3FAN, 3FIH, 3FMO, 3GNJ, 3HAZ, 3HXS, 3HZH, 3IOO, 3IUD, 3IWJ, 3YH, 4SA, 5BD, 5SK, 5TZ, 6AG, 6NB, 6RH, 6UJ, 6XX, 8BP, 8NM, 8SB, GW3GWA, 8SU, 8UH. (August 16 to September 10).

G3JHM, Worthing, Sussex.
WORKED: F3JN, 3LP, 8GH, 8ME, 9CQ/P, G2BAT, 2DSP, 2DVD, 2HDZ, 2UN, 3AGA, 3CGE, 3FAN, 3FEF, 3FGC, 3GDR, 3GVF, 3HEW, 3HXS, 3JEP, 5DS, 6NB, 8KW, 8OS/M, GC3EBK.
HEARD: F3YE, 8AA, 8MX, 8OB, 9EA/P, 9JY, 9NW, G2AHP, 2A1W, 2BMZ, 2DDE, 2DTO, 2FJR, 2HCG, 2MC, 2PU, 2TP, 3ARL/P, 3AUS, 3BII, 3BNC, 3DF, 3DIV/P, 3GHO, 3GOP, 3GOP/P, 3GVC, 3HCU, 3HWJ, 3IAM, 3JFR, 3XC/P, 3WW, 4MW, 4SA, 5KW/M, 5LK, 5MR, 5NF, 5TZ, 6AG, 6RH, 8OU, PE1PL.

G5MR, Hythe, Kent.
WORKED: F3CA, 3JN, 3LP, 3ND, 3WH, 8GH, 8LO, 8MX, 9BB, 9CQ/P, 9DI, 9EA/P, 9NB, 9NW, GCZCS, 2HCG/M, 3BSU, 3DIV/P, 3DVQ/P, 3FIH, 3IEX, 3ION/P, 3ISA/P, 3JMA, 5KW/M, 5KW/P, 5NF, 5RO, 5SK, 6AG/P, 6LL, 6NB, 6RH, 6YP, GC3EBK.
HEARD: DL9SH, F3FA, 3LQ, 3YE, 8AA, 8NH, 8UK, 9EA, G2AHP, 2A1W, 2BAT, 2BMZ, 2FTS, 2HDZ, 2UJ, 3AGA, 3AUS, 3BII, 3CGO, 3EMU, 3ENS, 3ERD/P, 3GHO, 3GWB/P, 3HBW, 3JFR, 3WS, 3WW, 4AU, 5DS, 5TZ, 6AG, 6CH, 8KW, 8OU, ON4PA, PE1PL. (August 3 to September 18).

G3FYY, London, N.W.2.
 WORKED : G2ABD, 2ANT,
 2ATK/M, 2DVD, 2FJR,
 2FSY, 2RD, 2TP, 3BJQ, 3DF,
 3DO, 3DVD, 3DVQ, 3EYV,
 3FD/P, 3FOS, 3FSG/M,
 3GHO, 3GSM, 3GWB/P,
 3HWF, 3HYF, 3IAM, 3IOO,
 3ISA, 3ISA/P, 3ITF/P, 3IUK,
 3JMA, 3WW, 4AJ, 4GT,
 5KW/A, 5KW/M, 6NF,
 6TA/P, 6XH, 8GD, 8KW,
 8UQ/P. (August 14 to Septem-
 ber 15).

GM3DIQ, Stevenston, Ayr.
 WORKED : EI2W, G2CBB,

G13XD, 3GOB, 5AJ,
 GM2BUD, 3BDA, 3DDE,
 3EGW, 3FOW, 3FYB, 3IBV,
 3INK, 4PW, 6KH, 6SR,
 6WL, 6ZV, 8AH, GW8SB/A.

HEARD : EI5Y, G3BW,
 3CCH, 3IUD, 5VM/A,
 5YV, GM3DYC. (August 4
 to September 4; 94 hours
 operating).

G4AJ, London, W.1.

WORKED : DJIVK, F3LQ,
 9NW, ON4HC, 4HN. (August
 31 to September 2).

G8VN, Rugby, Works.

WORKED : F8MX, G2ATK,
 2FTL, 3BA, 3BJQ, 3CKQ,
 3CGQ, 3DLU, 3DVQ, 3GHO,
 3HHY, 3HXS, 3IUK, 3IVF,
 3WS, 4SA, 5JU, 5ML, 5SK,
 6RH, 6SN, 6YU.

HEARD : G2ABD, 2AIW,
 2CZS, 2DVD, 2FZU, 3BW,
 3CCH, 3EYH, 3FIH,
 3FYY, 3GNJ, 3IRA, 3IWJ,
 3JQN/A, 4GR, 5BD, 5CP,
 5DS, 5YV, ON4BZ. (August
 15 to September 15).

tember 2, G3CCH in Scunthorpe was calling GW8UH in Cardiff, while at the same time G4GR near Cardiff was calling G3CCH! As late as September 15, G8VN was receiving ON4BZ.

G3IOE (Newcastle) reports that he is still active, and very pleased to work G3WW "at long last"; G2XV was heard and called immediately after this QSO. Other new counties for G3IOE—who is now running 120w. — have been GM3DDE (Edinburgh), GM3BDA (East Lothian) and G3IUD (Cheshire).

G3BJQ reports from Rugby, with latest claims, and says he has since worked G3GHO, "whom nobody loves any more"; (see p.403, September). G3BJQ has been in a spot of trouble with the gear, and remarks, *inter alia*, that early-evening activity seems to be lower than it used to be in 1952.

Having lost his 12-element stack in a gale, G3CUZ (Leek, Staffs.) is trying a pair of skeleton slots, which seem to perform very well, but, he thinks, are not quite up to the stack (this was the beam described in our November 1952 issue). G3CUZ's converter is a CC version of the G2IQ, "and is easily the best of the five types so far tried"; from which G3CUZ infers that it has taken him till 1954 to get the results G2IQ achieved in 1948!

Bernard at G3GHO (Roade) is once again a happy chap, not only because "they've begun to work him again," but also because his GDX log looks like this: August 26, G3BW for Cumberland, C4LX for Northumberland; August 30, F8MX; August 31, GC3EBK and GD3UB.

Portable Doing

G8SB (Prestwich, M/cr) writes

to report his Anglesey trips, as GW8SB/A, over August 21-27 and September 11-12, from a place called Llanfaethlu, overlooking Holyhead; stations heard and worked appear in the Activity Report. G8SB was running but 8w. to a portable outfit, the aerial was a 4-ele flat-top with an effective height of 18-ft. only, and he remarks that his "receiver noise-level left a lot to be desired." However, 19C were covered, and in most cases the stations-heard were excellent signals, repeatedly called without avail; in particular, this applied to G2FJR, "called a dozen times" during both trips. G8SB says he hopes to go to the same place again next summer, when he plans to have more power with a better aerial.

G3IUD (Wilmslow) is another who keeps regularly active, and is giving Cheshire to a large number of stations; in the All-Time, he stands at 54C with 201 stations worked, in a relatively short period.

London and Home Counties

G3FYY (London, N.W.2) feels pleased with his final placing in Annual Counties, as his is very much a bricks-and-mortar location; weak carriers, which would be readable on CW, are occasionally heard from the northerly directions, and on September 15 GW8UH, never previously heard, was called by G3FYY. G5DS (Surbiton) shows the fine total of 561 different stations now worked on Two Metres, and G2HDZ (about to move to a new QTH in Pinner) sends his latest scores; he hopes to find the new location more favourable for VHF, and in the meantime is temporarily QRT.

G6RH (Bexley, Kent) wants to apologise to the GDX stations that

have been calling him with no joy, and explains that a lot of his difficulty is due to the fact that he is between two main roads only 100 yards apart! Rochester Way, to the immediate north, is one of those routes on which the traffic density reaches 1,000 cars an hour, so that the roar of ignition noise has to be heard to be believed, says G6RH—and we can well believe it, when one realises that a converter of only ordinary sensitivity will easily pick up car rattle over distances of a quarter-mile. In spite of these handicaps, G6RH has been able to work quite a lot of GDX to the north-west, and hopes that he will continue to be called whenever heard.

G5MA and Mrs. Bob have had a holiday touring in Eire, without the /P tackle, and gratefully acknowledge the hospitality shown them by EI2G and EI2W. G4AJ, who operates from a block of flats in Park Lane, with a high local noise-level, nevertheless gets out when conditions allow; he was there for the August opening, and worked three new countries straight off, with DJIVK as best EDX.

From Slinfold, G2DVD writes that he is almost afraid to look at "VHF Bands" these days in case he is reported as having been called "from across the Atlantic, without replying." He would like to know what RF power there is

SEVENTY CENTIMETRES

ALL-TIME COUNTIES WORKED

Starting Figure, 4

Worked	Station
23	G3BKQ
15	G2XV, G4RO
13	G3IOO, G6NF
11	G2HDZ, G5YV
7	G2HDY
6	G3FAN, G3JMA
5	G3FUL, G3IRW
4	G2DDD, G3JGY

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

in the beams of those GDX stations known to have been trying to raise him, and adds "the one-way traffic is getting rather monotonous." However, G2DVD got the EDX when the going was good, and feels he has made a reasonably good start for the current year.

TWO METRES

ANNUAL COUNTIES
1953-54

FINAL PLACINGS

Worked	Station
60	G5YV
54	G3GHO, G4SA
52	G3IUD
48	G2FJR, G3IOO
47	G3WW
45	G3EPW, G6XX
43	G3CCH, G3FAN
41	G5MA
40	G2XV, G5BM
39	G2DVD, G3DO
38	G5DS
36	G3WS
32	G2AHP, G2HDZ, G3CUZ
30	G2CZS, G3FYY, G5ML
29	G3FIH, G3GVF, G3IRA
28	G2DCI, G2DDD
26	G2FCL, G3BW, GM3EGW, G5MR
25	G3IER, G6TA
24	G8VN
23	G3BJQ, G3JMA
22	GM3DIQ
21	G3JFR, G4RO
19	G3FUW
18	G4AJ
17	G3JHM, GW3GWA
15	G2AOL, G8NM
14	G3FIJ

This Table is a record of Counties Worked during the 12 months September 1953 to August 1954. The total of stations placed is 48. The Table re-opened again w.e.f. September 1st, 1954. Claims are invited from operators who have worked 14 or more Counties since that date; with the first claim a list should be sent showing the station worked for each county claimed. Thereafter, counties can be added as they accrue.

ANNUAL COUNTIES ANALYSIS

SEPTEMBER -AUGUST TWELVEMONTH	TOTAL STATIONS LISTED	MAX COUNTIES WORKED	FIRST TWO PLACES	COMPARATIVE CONDITIONS
1949-'50	55	43	(1) G3BLP, G6NB (2) G2OI	<i>Good</i>
1950-'51	56	45	(1) G2AJ (2) G2OI, G3EHY, G6XM	<i>Fair</i>
1951-'52	47	56	(1) G3BW (2) G3EHY, G5YV	<i>Fair</i>
1952-'53	53	59	(1) G6NB (2) G5YV	<i>Very Good</i>
1953-'54	48	60	(1) G5YV (2) G3GHO, G4SA	<i>Poor</i>

NOTES: Only five operators — G2HDZ, G3FIJ, G3WW, G5DS and G5MR — who were in the first Annual Counties List four years ago appear in this year's listing. Of the 48 stations in the List for this year, only 16 hold pre-war radiating licences. On the placings for the five years, G5YV is shown as the most consistent and successful GDX operator. The increase in the total of counties worked since the first year is a measure of the increase in general activity.

G3DVQ (Purley, Surrey) a keen /P operator, decided to try his luck from the home QTH for a change, using the portable gear—the result was 17C in about three weeks, nearly every QSO on phone.

Eastern Counties

G2XV was /P near Cromer in Norfolk for the week August 29 to September 4, running but 6w. with a 4-ele Yagi—see Activity Report. On August 17, G3WW (Wimblington) worked GD3UB for a first QSO, and has also been having car-ignition interference; all local main road traffic was diverted immediately past his QTH all day on August 29. On August 30 F8MX was worked, and G3WW found conditions good again on August 31, when DL3VJ was raised at 2105, several ON and PA stations being heard; on September 8, GW2HQ/P in Merioneth was worked in the late evening.

During September 1-6, G2FJR (Sutton Bridge) had 18 contacts in 14 different counties and three countries; he badly wants GC and GD, and is on most evenings from 6.30 p.m. clock time. A "near-miss" was GM3DIQ, lost in local QRM.

In the Chelmsford area we now have G2CZS, G3CVO (recently

reactivated after marriage and a move) and G3WS. G2CZS raised a number of stations during August 29-30 and September 1-2, with new counties worked for the All-Time, and also found conditions good again on September 15, when Midlands and South-Westerly stations were coming in strongly. G3CVO, at Great Baddow, has put up a 4-over-4 for Two Metres and a 16-element stack for 70 centimetres; a new converter and QRO transmitter are on the way, and in the meantime G3CVO, on the original gear, is heading the beam on London most evenings around 1900 clock-time, frequency 145.16 mc.

G3WS (Chelmsford) goes up one in Counties Worked, having raised GC3EBK, and G5AM (Ipswich) writes to say that he has got going again on Two after an interval of nearly a year; so far, not much worked or heard, but G3FAN (Ryde, I.o.W.) has been logged; G5AM feels that he is "in a direction in which few ever put their beams," and asks to be remembered, as he is on most evenings before and after TV.

South and West

GW8SU (Porthcawl, Glam.), whose EDX has already been mentioned, is on every evening, and is plagued by the "weak,

modulated carriers" we all hear but cannot resolve, but which would be readable, if not workable, signals if CW were occasionally to be used. This is a point that should be remembered by all regular phone operators; if *everybody* using phone would sometimes put out a call, or identity, on CW, things would be much more interesting all round.

G3FAN brings himself up-to-date in the Tables, and we note with interest that he has worked 6 counties on 70 centimetres; another striking point from his report is that he has worked G5MA in no less than eight different counties! The only G/GW counties now wanted at G3FAN for the All-Time are Anglesey, Denbigh, Northumberland and Westmorland — which, from about as far south in the U.K. as one can get, is not bad going.

On August 15, a party consisting of G3ITF, G3JFR, G4PS, G5NF and G6OU put G3ITF/P on the air near Farnham, Surrey, using the well-tried portable equipment loaned by G3GVF—their results appear in the Activity Report. G3ITF himself is active on Two from Basingstoke, but his mains connection being DC and himself being stationed at Worksop, Notts., he is somewhat handicapped.

G3JHM (Worthing) finishes the year with 20C worked, the best of the recent additions being G3AGA for Cornwall; during August 28-31 he was hearing and working many F's, as far west as F8ME of St. Brieuc in Brittany. GD_X was also audible in Worthing, while on 70 centimetres G3JHM has worked G3GDR (Watford) and G3HBW (Wembley) for two most excellent contacts on that band; for those who may be interested, F8GH is now on 435 mc every Saturday and Sunday, calling "CQ G" 1400-1415 GMT and listening 1415-1430 for replies. Stations heard by G3JHM on the 430 mc band are G2DD and G3FRG.

Vernon at G5MR (Hythe, Kent) got his share of GD_X during The Opening, and on August 30 conditions to the West were particularly good for him; G2BAT, G2BMZ, G3AGA and G3AUS



G2ATK (Shirley, Birmingham) is a well-known /PM operator on the two-metre band. For static working, the beam is a 3-c/c knock-down Yagi; for operation on the move, a quarter-wave vertical, seen on the rear side of the car, is used. G2ATK at the microphone, photograph taken by G3ABA. Nice site, too, by the look of it!

were coming in at excellent strength, and all were busy with the Continentals, which shows the area over which this opening extended. Portable-mobiles recently worked by G5MR include G2HCG/M, G3ION/P and G5KW/M.

Round to Plympton in S. Devon, G3JGJ reports with a calls h/w list, and from Jersey GC2CNC claims G2BAT and G3AGA as new ones for Cornwall. G3DLU (Compton Bassett), anticipating a move to the home QTH at Weston-s-Mare, is building a new beam consisting of 4 c/f dipoles backed by reflectors spaced $\frac{1}{4}$ -wave, stacked at $\frac{1}{2}$ -wave intervals and inter-connected by wave-lengths of 300-ohm line—this being a lighter and more compact assembly than the 16-element stack. G4SA (Drayton, Berks.) says that conditions are often quite good during the early part of the evening, but not enough

stations come on then to try for GD_X.

G3FIH (Combe Down, Nr. Bath) has been short of time for it during the last few months, but was there on August 30 and worked GC3EBK again. He remarks on having worked five portable-mobile stations during September, including G3EGW/P on Porlock Hill. As '3EGW is also well known as GM3EGW, and has been reported from various /P locations, he is evidently getting about on these portable jaunts almost as keenly as Bob of G5MA.

Notes from Eire

EI2W (Dublin) and GM6WL/P from Drummore have been carrying out a carefully-planned series of tests on the 70-centimetre band, which so far have resulted in EI2W being identified by GM6WL; unfortunately, the violence of the weather ruined



The 4-over-4 used by HB1PQ for the abortive DX-pedition during August week, on the St. Gotthard at 7,900 feet a.s.l. They could hardly have had a better site!

their most recent attempt, the schedule on September 16 being held under gale conditions at both ends.

The evening of August 25 was particularly good for EI-GM and EI-GI working on Two Metres, when the GM's were bending the S-meter at EI2W. On August 31 EI5Y (Dublin) got across the Irish Sea, and on September 13 EI4N-EI9N were in two-metre QSO for the first time. EI4E (Killarney), on 145.1 mc. is looking for G's every evening 2200-2300 clock time, and should be a chance for our more westerly stations.

TWO METRES

COUNTRIES WORKED

Starting Figure, 8

- 15 G4MW (DL, EI, F, G, GC, GD, GI, GM, GW, HB, LA, ON, OZ, PA, SM)
- G6NB (DL, EI, F, G, GC, GD, GI, GM, GW, HB, LA, ON, OZ, PA, SM)
- 14 G3GHO, G5YV, G8OU, ON4BZ
- 13 G3BLP, G3CCH, G5BD, G6XX
- 12 G2HDZ, G2HIF, G2XV, G3WW, G6LI, G6RH.
- 11 G2AJ, G3ABA, G3IOO, G4RO, G4SA, G5UD.
- 10 EI2W, G2FJR, G2FOP, G3BK, G3EHY, G3FAN, G3GHI, G3HAZ, G5DS, G5MA, G8IC, GW5MO.
- 9 G2AHP, G3BNC, G3FIJ, G3WS, G6XM, PA0FB.
- 8 G2XC, G3GBO, G3GSE, G3HCU, G3VM, G5BM, G5BY, G5ML, G5MR, G8SB, GM3EGW

The European VHF Contest

Regarding the European Contest, scheduled for August 28-29, which EI2W is almost the only correspondent even to mention, Henry points out various weaknesses in the conduct, organisation and publicity handling of this contest, with which we are in full agreement. Last year, U.S.K.A. (the HB amateur society responsible) failed to produce any European VHF Contest at all; this year, they succeeded in keeping it almost a secret by failing to circulate details in time—which was a great pity, because it happened that one of the few DX openings we have had this year occurred over the period of the contest.

For the European VHF Contest to be a success, it must be well publicised; this is only possible if the rules are circulated to all authorities able to give publicity at least *three months* before the date of the event. Moreover, the rules should be drawn up in such a way as to ensure the minimum of complication and log-keeping procedure—the old number-exchanging business is *out*; it never did check anybody or anything, and it is obvious that if a sufficient number of entry-logs are received, they cross-check one another without any other aid being needed.

After last year's failure, one would have thought that steps had

been taken to ensure that what should be the most important event in the VHF year had been put on a proper footing.

Some of the Sayings

"I was told that I was quite definitely causing TVI because someone had seen my 'number' on their screen!" (G5AM) . . . "In my view, the use of VFO's on VHF is neither desirable nor necessary. Would it be possible for you to invite opinions on this important matter?" (G2HDZ) . . . "I called two GDX stations trying to raise one another, in hopes of being able to put them in touch, but they were off my frequency. How I wished I had a VFO!" (G8VN) . . . "I have raised my beam to 45 feet, much to the XYL's disgust" (G3GHO) . . . "G4SA was a very consistent signal, but dozens of calls failed to raise him" (G3IOE) . . . "I was operating /P at the Lord Mayor's Garden Party on Sept. 11 and we had been placed at the end of the clay-pigeon range; anyone hearing G3ABA/P on that occasion may have wondered what the shooting was about" (G3ABA) . . . "ON4BZ is not dead on Two Metres" (ON4BZ).

VHFCC Elections

We are glad to notify the election of the following to the VHF Century Club, their claims being in accordance with the rules: G3IEX, Bexhill, Certificate No. 171; G2DCI, Sutton Coldfield, No. 172; G3DVQ, Purley, No. 173.

The general conditions for the issue of the VHFCC parchment appeared in this space last month.

Finally—

Your A.J.D. would like to thank nearly 50 correspondents this month for their useful, interesting and instructive reports, between them accounting for some 60 claims for the Tables—totals as large as those recorded in the best of times. We hope that everyone finds himself in the right place, and that everything of importance has been covered.

So, till November 5, 73 and *thank* you again. Deadline for the next issue is **Monday, October 18**, addressed A. J. Devon, "VHF Bands," Short Wave Magazine, 55 Victoria Street, London, S.W.1.

VHF WEATHER REPORT

PERIOD AUGUST 14 TO
SEPTEMBER 17

A. H. HOOPER (G3EGB)

A BRIEF but limited opening at the end of August to report.

The first hopeful event was the arrival of an anticyclone over Scotland on August 15, but its beneficial effect extended no further south than the Midlands and Eire, and by August 17 conditions had reverted to this year's normal. After a week of varied conditions, a high pressure system arrived over England and the neighbouring continent, with limited VHF extension for August 25, 26. Two days later this had intensified, producing warm weather and a three-day spell—still of limited extent—for the southern counties. Then followed more than two weeks of unsettled cyclonic weather taking us into mid-September.

On clear, calm evenings cooling over land in the surface layers of the atmosphere leads to conditions which enhance the refraction of VHF waves. Such occasions are listed in the first line of Table 1, which gives the time when the effect had developed to a maximum. On the evening August 31, for example, refraction continued to develop through the night until 0500 next morning and was quite marked. For the following evening, midnight proved to be the time limit. The values given are for the South Midlands.

For long distance and overseas extensions we generally need the aid of reflecting layers aloft. The results of radio-soundings reported in *The Daily Aerological Record* of the Meteorological Office, London, have been studied. Occasions when radio refractive index discontinuities are thought to have caused extended propagation in certain directions from South-East England are set out in Table 1. Using country prefixes and the simple code, we can see that extensions to Lancashire on August 29 and further to GI and GM on August 31 were likely. Little is shown for the eastern path and nothing towards Norway and Sweden. To fill in some of the Table gaps, the GI/GM path appeared favourable on August 15, 16, 29, 31, September 4, 12 and 17, while for Shetland to GM, August 15, 16, 18, September 2 and 12 were possible dates.

The charts of Fig. 1 are for the first two nights of the spell which occurred at the end of August. The limits of the favoured area extended south-eastwards during the 24 hours between the first and second charts as the associated anticyclone began to drift away. By the following night, August 31/September 1, the layer was no longer well defined, and confirmation of the validity of the resulting entries in the Table must await operating results. The HB contest organised for August 28-29 appears just to have missed this chance of an HB/G QSO.

The MSL barometric pressure graph is continued in Fig. 2 and, unlike the last two months, the main body of entries in Table 1 are seen to occur for pressures greater than the supposedly critical value of 1018 millibars.

Second Thoughts

From last month's results, August 4 is of interest. It was an occasion with a weak high-pressure belt over the North Sea and a broad band of vaguely defined RRI discontinuities extending from Southern England north-eastwards to Denmark. Judging from the several reports of this occasion, the favoured zone must have extended northwards over our eastern coastline and the North Sea. A check has revealed no evidence overland of this and, of course, no information from over the sea, and we can only leave this occasion open.

Extreme QSB was reported by GM3DIQ on signals from G3CCH (Scunthorpe) during the late evening of July 25. Having been S4 for well over an hour, the signal built up over a five-minute period from 2225 GMT to S9+. Signals from Cheshire also

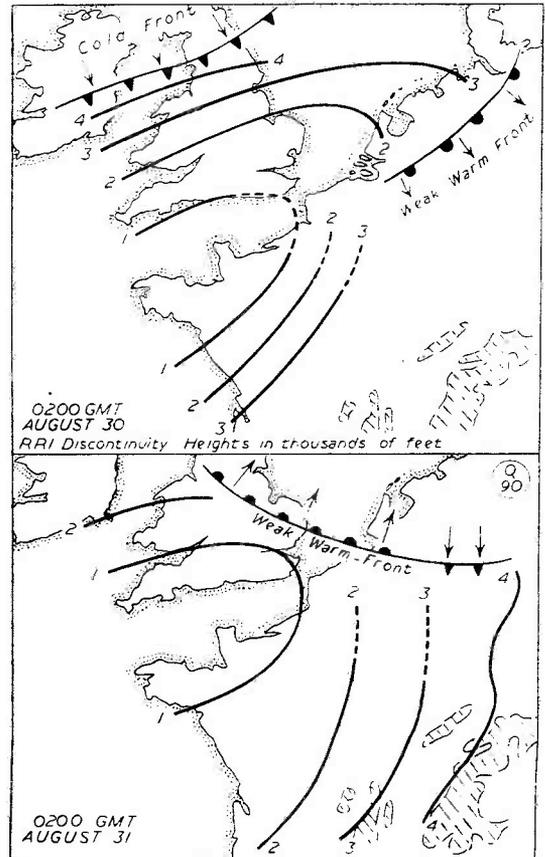


Fig. 1. Showing part of the limited opening which developed at the end of August. The opportunities were to the South and South-East.

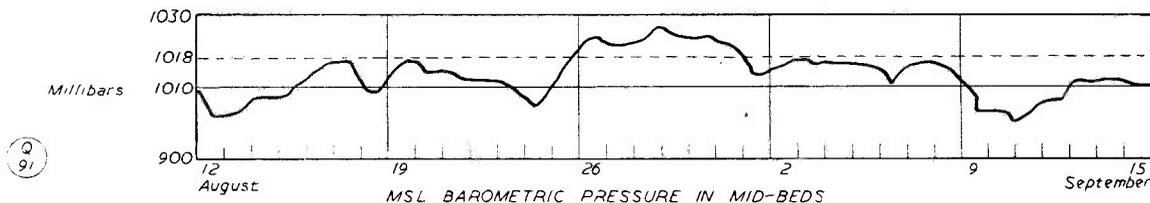


Fig. 2. The pressure graph this month is in general agreement with the assessment of Table I. Pressure was 1018 millibars or more on those occasions when VHF DX was expected.

capable of damping down the otherwise daily showers. From the information available, it appeared likely that this air originated more than 1800 miles away in the Australian desert. Similar dry air from the north-east (Asia) sometimes arrived.

As we have seen from experiences in the Middle East (*Short Wave Magazine*, August, p.346) dry desert air flowing out over a hot sea can establish excellent conditions for anomalous propagation. It is a question of magnitudes, and one can only

wonder whether for a week or so each year conditions are set up for extended working from Malaya. Let us hope that sporadic-E will augment these limited prospects and that the "activity" problem—so much greater than ours—will be solved by the appearance of more stations for 'DQ and 'DV to work. Their results will be interesting.

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

UNEXPECTED DISCOVERY

When G3IGK, of 4 McBean Road, Wolverhampton, was operating as GW3IGK/M from a site on the Prescelly Mountains during the latter part of August, he chanced to find a battered tuning knob and dial lying in the heather. Enquiries have established that these items are not the property of G5MA—who has been using a site in the neighbourhood on his VHF expeditions. One wonders, therefore, whose they can have been.

ANOTHER R.A.E. COURSE

We are informed by G3ABG that, under the Staffordshire Education Committee, he is conducting a course for the Radio Amateurs' Examination (to be held in May next year), and the G.P.O. Morse Test, at the Walsall Road C.P. School, Walhouse Street, Cannock, from 7.15 to 9.15 p.m. on Tuesday and Thursday evenings. Application to join the classes should be made direct to C. J. Morris, G3ABG, at the address given.

250 WATTS ON 500 mc—MULLARD DEMONSTRATION AT S.B.A.C. SHOW

Among the exhibits on the Mullard stand at the S.B.A.C. Show at Farnborough was a demonstration 500 mc transmitter. This had been constructed to prove the effectiveness of the latest types of Mullard VHF and UHF valves. It showed, on the one hand, 15w., 50w. and 250w. RF output stages for 500 mc. and on the other, suitable multiplier and driver sequences necessary to achieve these outputs, using a crystal multiplication factor of 81. The demonstration transmitter consisted of three units: A driver-multiplier to give the 500 mc drive, a unit consisting of two successive power-buffer stages, and the final RF power amplifier giving 250 watts on 500 mc. into a dummy load. The valve sequence was ECC81-ECC81, QQV03-5, QQV03-10, QQV03-20A,

QQV03-20A, QQV06-40A, into a pair of UHF disc-seal tetrodes, QV1-150A, connected in push-pull and giving 250 watts RF out.

The QQV03-5 and QQV03-10 are new miniature double-tetrode RF types, dissipating respectively $2\frac{1}{2}$ and 5 watts per anode. The QQV03-20A is a double-tetrode frequency multiplier, with internal neutralisation and the "butterfly" arrangement of electrodes to minimise stray lead inductance; its very low output capacities enable most of the tuned circuit to be kept outside the valve, even at the highest frequencies. In the transmitter demonstrated, it gives 15 watts RF out at 500 mc. The QQV06-40A, also a double tetrode connected push-pull, gives about 50 watts at this frequency. The only essential difference between the '20A and the '40A is that the latter has twice the anode dissipation.

In the final amplifier, the QV1-150A is forced-air cooled, has an external anode, and is rated to dissipate 150 watts.

CORRECTION

In the Advertisers' Index in p.365 of our September issue, the name of Harris & Gillow should have appeared as H. Harris, who trades from Organford in Dorset. The error is regretted, as the two firms concerned have no connection with one another.

AMATEUR HOME-PARTNERSHIP

In our Small Advertisement columns this month appears an offer from a reader who wishes an active amateur (with or without family) to join forces with him in a house to be specially built for their joint, but domestically separate, occupation, i.e. a detached house constructed as two semi-detached residences. The site selected, in the South Birmingham area, is good for radio, and the idea is that the house itself should be designed to be convenient for full Amateur Radio activity.

NEW QTH's

This space is available for the publication of the addresses of all holders of new U.K. call signs, 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.

- 5A4TT**, Sgt. H. I. Martin (*ex-G3IBD*), R.A.F. Station, Idris, Libya, M.E.A.F.1.
- EI7V**, J. Cahill, 6 Soho Terrace, Sunday's Well, Cork.
- GM3AEY**, H. G. Henderson, B.Sc., 20 Hendry Crescent, Kirkcaldy, Fife.
- GM3AEY/A**, H. G. Henderson, Viewforth Secondary School, Loughborough Road, Kirkcaldy, Fife.
- G3ANN**, W. E. Williams, 19 Shalnecote Grove, Kings Heath, Birmingham, 14.
- G3BXY**, T. Murname, 19 Western End, Newbury, Berks.
- G3IMT**, D. M. Timmins, 2 Windmill Drive, Burgess Hill, Sussex.
- G3JDS**, H. Staniforth, 18 Birch Lane, Dukinfield, Cheshire. (*Tel.: Ashton-u-Lyne 3436*).
- GM3JKG**, J. Richardson, 4 Octavia Cottages, Greenock, Renfrewshire.
- G3JKS**, F. Smith, Jr., 98 Fryston Road, Airedale, Castleford, Yorkshire.
- G3JNZ**, V. D. Knibbs, 39 Mixbury, Brackley, Northants.
- G3JPV**, Hatfield County Secondary School Radio Club, Ash Hill, Hatfield, nr. Doncaster, Yorkshire.
- G3JQR**, J. M. Cox, 102 Sydney Road, Muswell Hill, London, N.10.
- G3JSR**, P. L. Chapman, 127 Springfield Drive, Ilford, Essex.
- G3JTG**, E. G. Gibbins, 13 Mountbatten Place, Kingsworthy, Winchester, Hants.
- G3JTO**, F. E. Gell, 17 Lincoln Street, Old Basford, Nottingham, Notts.
- G3JTP**, E. Oldham, 5 Round Acre, Nabs Head Lane, Samsbury, Preston, Lancs.
- G3JTZ**, D. Mellor, 555 Wakefield Road, Dalton, Huddersfield, Yorkshire.
- G3JUB**, S. Turner, 5 Balfe Street, Seaforth, Liverpool, 21.
- G3JUC**, R. G. Timms, 160 Woodside Avenue, Green Lane, Coventry, Warks.
- GM3JUD**, C. Urquhart, 153 Den Walk, Methil, Fife.
- G3JUW**, C. L. Lovell, 17 Albion Mews, Albion Street, London, W.2. (*Tel.: AMBassador 8976*).
- G3JVK**, R. P. Wayne, 6 Colebrook Close, Worthing, Sussex.
- G3JVT**, M. J. Ayres, 328 Beavers Lane, Hounslow West, Middlesex.
- G3JVU**, F. B. Allen, 4 Cobham Street, Gravesend, Kent. (*Tel.: Gravesend 6344*).
- G3JVV**, J. H. B. Mulcahy, 36 Engel Park, Mill Hill, London, N.W.7.
- G3JWE**, D. P. Cockle, 18 Gatcombe Road, Tufnell Park, London, N.19.
- G3JWQ**, B. A. Maycock, 25 Oxford Street, Ripley, Derby. (*Tel.: Ripley 189*).
- G3JWU**, J. E. Hunt, 49 Oxford Street, Ripley, Derby. (*Tel.: Ripley 102*).
- G3JWY**, B. Reddington, Snr., 42 Woodhouse Avenue, Fartown, Huddersfield, Yorkshire.
- G3JWZ**, A. Rowley, 37 Leveson Road, Hanford, Stoke-on-Trent, Staffs.
- G3JXS**, J. T. McMillan, Ventnor, The Green, Dunmurry, Co. Antrim.
- G3JZB**, F. W. Boulton, 15 Holmcroft Road, Stafford, Staffs.

CHANGE OF ADDRESS

- G2ACK**, M. T. Aitken, 5 Dell Road, Stoneleigh, Ewell, Surrey.
- G2ALB**, A. W. James, 15 Harbour Hill Crescent, Poole, Dorset. (*Tel.: Parkstone 4699*).
- G2AMX**, C. D. Bailey, Evere, Swallow Street, Iver Heath, Bucks.
- GW2CPM**, W. B. Mansell, Franklin House, Upper Frog Street, Tenby, Pems.
- G2DWM**, H. E. Hardy, 4 Ravencroft Avenue, Golders Green, London, N.W.11.

- G2HLU**, H. Owen, B.Sc., Ph.D., 31 Beechwood Avenue, Woodley, Reading, Berks.
- G3ABG/A**, C. J. Morris, D.F.M., Cannock School Radio Club, Walsall Road C.P. School, Walsall, Staffs.
- G3AQZ**, J. E. Cowley, Calary, Wyndham Crescent, Reading, Berks.
- G3CVO**, M. Barlow, 10 Baddow Place Avenue, Gread Baddow, Chelmsford, Essex.
- G3EKV**, M. J. Newington, Halmer House, Spalding, Lincs.
- GM3EOJ**, C. F. Sherrit, 5 Springbank Terrace, Aberdeen.
- GC3FSN**, R. A. Butcher, 5 Valley Gardens, Bel Royal, St. Lawrence, Jersey.
- G3FZL**, G. M. C. Stone, 10 Liphook Crescent, Forest Hill, London, S.E.23. (*Tel.: FOR. 6940*).
- G3GAC**, E. J. Leech, Foxes Bench, Sutton Field, Whitegate, Northwich, Cheshire.
- G3GHQ**, D. Metcalf, 80 Kings Road, Southsea, Hants.
- G3HCS**, H. F. W. Martin, Trinity House Depot, Holyhead, Anglesey.
- G3HHS**, B. J. Kite, 3 Loddon Bridge Road, Woodley, Reading, Berks.
- G3HLJ**, D. M. Robinson, The Bungalow, Peacemarsh, Gillingham, Dorset. (*Tel.: Gillingham 298*).
- G3HSL**, F. B. Peppert, 1 Brenda Road, West Hartlepool, Durham.
- G6WI**, R. J. Crutchley, 7 Cobham Close, Charford, Bromsgrove, Worcs.

CORRECTION

- G3CCX**, P. Craw, Dinard, Sea Lane, Rustington, nr. Littlehampton, Sussex. (*Tel.: Rustington 1953*).
- G3FZR**, M. W. Capewell, 20 Stainburn Road, Leeds, 17, Yorkshire.

THE MONTH WITH THE CLUBS

By "Club Secretary"

(Dead-line for Next Issue : OCTOBER 15)

IN this section we publish, in full, the rules for this year's "MCC," the ninth of the series. All Club Secretaries and officials are asked to make due note of this, the *only* publication of the rules, which will not, as heretofore, be circulated to Clubs.

Last year's set of rules is virtually unchanged; the only alteration, in fact, is the very important stipulation that Club stations, after sending their "QRA," must add the word Club. This should finally remove the lurking ambiguity that has haunted all contestants since the Contest started in 1946. Even if your fraternity calls itself a Society, or embodies the word Society in its initials, e.g., TVARTS and others, the word Club must still be sent to remove all doubts.

All participants in last year's event seemed quite satisfied with the operating hours — two Saturday and two Sunday afternoons. Scoring was fast enough at all times to keep up the interest, and single-point contacts with non-Club stations were important enough to make all the difference between a winning score and a runner-up.

This year we hope for more than the customary 25 contestants, and look forward to a real trial of resourcefulness and operating skill. A further reminder will be given next month, but the rules will not be repeated.

The Winter Season

Now that even the calendar agrees that our so-called "summer" is behind us, Clubs are getting down to their routine once more. Meetings are becoming regular, attendances increasing, and the mystic letters "AGM" appear on Club notepaper of all kinds.

From a rather larger batch of reports than of late we gather the usual odd scraps of news, many of which deal with the final outdoor items of the "summer" programme. *Chester*, for instance, set out on a WABC expedition for Merionethshire, complete with three cars and a 4-5 ton lorry. The weather was cold, overcasts the order of the day, and the Hon. Sec. slipped down a mountain, injured his knee and finished up in bed (we hope he is once more mobile). The previous outing, to Mold, North Wales, was marred by wind, mist and heavy rain, but some contacts were made.

Liverpool held a D-F Contest, but no one found the transmitter. The final one of the season was due on September 19. Several members have been out with portables, and the Club station, G3AHD, was active one Sunday from Altcar, 12 miles North of Liverpool.

Lothians held a Bucket-and-Spade Party at North Berwick. Instead of trying to work DX, they were shown GM3AEL's radio controlled motor-boat. After the outing they attended evening service, conducted by GM3BDA at the Church of St. Andrew.

Fine weather actually favoured the *Reading* outing to Sandbanks and Swanage, and everyone had a good time.

Indoor Activities

Chester and *Liverpool* had a "Club-to-Club Natter" over the air (on the Top Band), when many members "met" for the first time. An actual meeting between members of two Clubs was arranged by *Southend* and *Medway*, when many amateurs who knew one another well over the air were able to meet in person for the first time. It is reported that the oldest member (94) and the youngest (2½) were both present!

At the recent regular meeting at *Torbay* the theme was crystal-grinding. At the meeting on September 18, the subject of Transistors was discussed after a talk by G3AVF.

West Lancs. now own the call G3JQA, and are working on their winter programme, both on and off the air. Plenty of test gear is available, and new members will be welcomed.

Gravesend is also appealing for more members, although the Club already has a nucleus of some extremely good operators and technicians. Their winter programme will include a visit to the G.P.O. station at Cooling. Normal meetings are on Thursdays at 7.30 p.m.

More than 50 members and friends attended *Clifton's* Junk Sale, right in the middle of the summer season. A Tx and Rx Contest, held on August 7-8, was won by G3DIC and Mr. N. Moore.

The Hon. Sec. of *Lancaster* notifies us of his recent change of address — see panel for new QTH.

QRP Exhibition

The *QRP Society* is breaking new ground by holding an exhibition at Walton-on-Thames on October 30. G2MI will be performing the opening ceremony at 2.30 p.m. on that day. A low-power transmitter, G3JNB/A, will be on the air, and there will be a "live" display by members of RAEN. Transistor Tx's, VHF gear and a display of all kinds of modern components will be balanced by historical exhibits going back to 1913. The location is St. Mary's Parish Church Hall,



Displayed at the Hastings Hobbies Week exhibition was this radio-controlled launch, built by T. A. Curtis; the boat is powered by a 20-volt motor, and the control transmitter is a self-excited push-pull oscillator, with a quench receiver. The control motions give five steering settings, half-speed and stop.

and blocks of six or more tickets may be obtained in advance (at a reduced rate) from the Hon. Sec. (see panel for address).

Good Cause

The *Radio Amateur Invalid and Bedfast Club* reports an increasing membership. There is no subscription, but the Club is restricted to those who are either invalid or bedfast, and have Amateur Radio as their hobby. The Club may be assisted by sending surplus books or magazines (to John Gill, 30 Sholebroke View, Leeds 7) or small donations (to EI5L, Oldbawn, Gordon Avenue, Foxrock, Co. Dublin) or unwanted components (to the Hon. Sec.).

Portsmouth have now acquired their own premises at the British Legion Club, Queens Crescent, Southsea, and meet every Tuesday at 7.30 p.m. A high-power transmitter is being designed, and the clubrooms are available to members every evening.

A newcomer to our columns is *Newark* with meetings on the first Sunday of the month, 7.0 p.m. in the Northern Hotel. In October the programme continues with a talk by G3HLG on Telephone Systems, followed later by a visit to the local G.P.O. Exchange.

Deadline for next month's reports is :

First post on Friday, October 15,
addressed "Club Secretary,"

Short Wave Magazine
55 Victoria Street, London, S.W.1.

Coming Events

CHESTER: October 12, U.S.I.F. Film Strip. Talks: "Moving QTH" (G3ITY); "Making and Adjusting of TVI Filters"; "Home-Built Electronic Organ." At the Tarran Hut, Y.M.C.A. Grounds, Tuesdays, at 7.30 p.m.

CLIFTON: October 8, Junk Sale; October 15 and 29, Constructional Evenings; October 22, Talk on Miniaturisation (G3BCM).

EDINBURGH (LOTHIANS): October 21, Exhibition Business; November 4, Grid-Dip Oscillators. Hobbies Exhibition, Edinburgh. October 27-30.

HOUNSLOW: October 14 and 28, at Grove Road Junior School, and fortnightly thereafter.

LEEDS: October 13, Transmitting Evening; October 27, Visit to Leeds Police Radio; November 3, Talk on Record Reproduction. All at Swarthmore Educational Centre, 3/4 Woodhouse Square, Leeds 3.

LIVERPOOL: October 12, Rummage Sale; October 17, Film Evening; October 26, Tape Recorder Demonstration; November 2, Constructional Contest. All at St. Barnabas Hall, Penny Lane, Liverpool.

NAMES AND ADDRESSES OF CLUB SECRETARIES REPORTING IN THIS ISSUE

CHESTER: N. Richardson, 23 St. Mary's Road, Dodleston, Chester.
CLIFTON: C. H. Bullivant, G3DIC, 25 St. Fillans Road, London, S.E.6.
EDINBURGH (LOTHIANS): L. Stuart, 38 Caledonian Crescent, Edinburgh.
GRAVESEND: R. Appleton, 23 Laurel Avenue, Gravesend.
HOUNSLOW: R. J. Parsons, 16 Cypress Avenue, Whitton, Middx.
LANCASTER: A. O. Ellefsen, G3FJO, Silver Birches, Manor Lane, Hest Bank, Lancaster.
LEEDS: B. A. Payne, 454 Kirkstall Road, Leeds 4.
LIVERPOOL: A. D. H. Looney, 81 Alstonfield Road, Knotty Ash, Liverpool 4.
NEWARK: R. Clayton, 160 Wolsley Road, Newark.
PORTSMOUTH: L. Rooms, G8BU, 51 Locksway Road, Milton, Portsmouth.
QRP SOCIETY: J. Whitehead, 92 Ryden's Avenue, Walton-on-Thames.
RADIO AMATEUR INVALID AND BEDFAST CLUB: W. Harris, 25 Playford Lane, Rushmere, Ipswich.
READING: L. Hensford, G2BHS, 30 Boston Avenue, Reading.
SLADE: C. N. Smart, 110 Woolmore Road, Birmingham 23.
SOUTHEND: J. H. Barrance, M.B.E., G3BUJ, 49 Swanage Road, Southend.
SOUTH MANCHESTER: M. Barnsley, G3HZM, 17 Cross Street, Bradford, Manchester.
SPEN VALLEY: N. Pride, 100 Raikes Lane, Birstall, near Leeds.
STOKE-ON-TRENT: A. Rowley, G3JWZ, 37 Leveson Road, Hanford, Stoke-on-Trent.
TORBAY: L. D. Webber, G3GDW, 43 Lime Tree Walk, Newton Abbot.
WEST LANCS.: S. Turner, G3JUB, 5 Balfie Street, Seaforth, Liverpool 21.
WIRRAL: A. C. Wattleworth, 17 Iris Avenue, Cloughton, Birkenhead.

MCC — NINTH ANNUAL

1.8 MC CLUB TRANSMITTING CONTEST

RULES

1. **Duration:** Saturday, November 20; Sunday, November 21; Saturday, November 27; Sunday, November 28. On each of these days between the hours of 1430 and 1830, GMT. Sixteen operating hours in all.
2. **Frequency and Power:** All contacts will be in the 1800-2000 kc amateur band, using CW only, with a power not exceeding 10 watts input to the final stage. All reasonable precautions will be taken to avoid interference with other services using the band.
3. **Call-Signs:** Where a Club has its own transmitting licence and call-sign, that call-sign is to be used. Clubs without their own call may use a member's station, provided this is nominated as their official entry by the Club Committee.
4. **Calling:** Club stations will call "CQ MCC" (Magazine Club Contest) and will sign off at the end of each transmission with "AR MCC K" or "AR MCC VA." Clubs in contact with one another will identify themselves by giving, after the RST report, "QRA" instead of "QTH." This will be followed by the name of the Club, abbreviated forms being permitted, e.g., "QRA Grafton Club" or "QRA Medway Club" or "QRA TVARTS Club." **The word Club must be sent in EVERY CASE.** Clubs working non-Club stations will send their QRA, and will log the other station's QTH.
5. **Scoring:** Other Club stations may be worked on each of the four days of the Contest, and will count for *three points* each time. Non-Club stations may be worked only once during the Contest and will count *one point* only. The three points for in inter-Club contact must not be claimed until the "QRA" and the word **Club** have been logged. Thus any Club station may be worked four times, giving a total of 12 points, but other amateur stations may be worked only once for one point.
6. **Logs:** Contest logs must give the following information: Col. 1, *Date and Time*. Col. 2, *Call of Station Worked*. Col. 3, *QRA, if Club*. Col. 4, *QTH, if non-Club*. Col. 5, *RST, outwards*. Col. 6, *RST, inwards*. Col. 7, *Points claimed for contact*. Col. 7 must be totalled at the bottom of each page and the running totals brought forward.
7. Any Club stations receiving reports consistently worse than T9 will be liable to disqualification.
8. Logs, addressed to "Club Secretary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1, must be posted to reach us by Monday, December 6, 1954. The Editor's decision on the results will be final, and will appear in the January, 1955 issue of *Short Wave Magazine*.

PORTSMOUTH: October 12, Junk Sale; October 19, Open Date; October 26, Business Meeting; November 2, Film Show.

READING: October 9, Films; October 30, Lecture by Mr. Edwards of A.E.I.; November 13, Junk Sale.

SLADE: October 15, Transistors, by Mr. J. Hughes (G.E.C.); October 23, Annual Dinner; October 29, SSB, by G3AYJ.

SOUTH MANCHESTER: October 8, Annual General Meeting; October 22, Fault Finding (G3DQU); November 5, Simple Receiver Construction.

SPEN VALLEY: October 20, Multi-Channel Telegraphy; November 3, Radio Valves and their Uses (G3FQH).

STOKE-ON-TRENT: Regular meetings at the rear of the Cottage Inn, Oakhill, Stoke-on-Trent.

TORBAY: Third Saturday of each month, 7.30 p.m. at the Y.M.C.A., Castle Road, Torquay.

"RADIO CURB ON REDS"

Thus the *Christian Science Monitor* of Boston, Mass., dated July 23, discussing the possibility of the Federal Communications Commission refusing to grant amateur or commercial operating licences to persons classified as "security risks." If the FCC proposals become effective, it seems that all licensed W's will have to be re-examined for security, and finger-printed for record! There are many arguments on both sides, but the American Civil Liberties Union sums it up most sensibly by saying "No person bent on espionage will be deterred by being required to sign a loyalty oath" and that "The restriction would not reach the secret operator with the clandestine transmitter." It will be interesting to see the ARRL reaction to this situation.

OUR CHANGING TIMES

With the recognition, now imminent, of the West German Federal Republic as a sovereign power, it may be expected that one result will be either the cessation of DL2/DL4 activity as we now know it, or a change in the status of British and American amateurs operating on German territory. What is certain is that the DL5 situation will be interesting!

NEW GECALLOY PUBLICATION

Salford Electrical Instruments, Ltd., has prepared *Gecalloy Low Loss Cores and Micropowder Magnets* to describe the production and use of various kinds of Gecalloy material. Full technical specifications are given, with graphs, and there is a section describing suitable designs of low-loss cores and magnets for different applications.

V.E.R.O.N. — NEW QTH

The offices of VERON, one of the two Dutch amateur organisations, have been established at Sweelinkplein 40, The Hague, and all correspondence for the Secretary should be addressed to: VERON, P.O. Box 6011, The Hague. The QSL Bureau address (only) is still: VERON QSL Bureau, P.O. Box 400, Rotterdam, Netherlands.

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HRO receivers, Junior and Senior models, complete from ... **£27**
RADIOVISION Expander, 27-61 Mc/s **QUAD**. Amp and pre-Amp, complete as NEW ... **£30**
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MARCONI Valve voltmeters, as New, Type TF887 ... **£25**
AVO Model 7 ... **£15/10**
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TAYLOR signal generator, as New, 65B 65C ... **£10**
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EDDYSTONE, 640 ... **£22/10**
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 680 ... **£65**
RME 69, excellent condition, 550 kc/s-32 Mc/s ... **£30**
RCA, AR77E, as New ... **£37/10**
 AR33LF and D in stock.

HALLICRAFTERS, SX28 ... **£45**
 SX24 ... **£30**
 S20 ... **£22**
 S20r ... **£25**
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 ASK FOR SM/H918, **3/-** Each or 3 for 7/6 POST 3d. POST PAID
 Cap. 32 mfd. 450V. D.C. Wkg. Dia. 2" x 4 1/2". With waxed cardboard cover and mtg. plate. U.S.A. made.
 ASK FOR SM/H852, **1/9** Each or 3 for 7/6 POST 6d. POST PAID
PAXOLIN WAFER ROTARY WAVELENGTH SWITCH
 Three wafers each, 2-pole, 5-way. Dim.: 3 1/2" x 2 1/2" x 2", spindle projects 1 1/2" single hole mtg.
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RESISTANCES. 100 Assorted, all useful values, etc. Wire end ... **12/6** per 100
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PLASTIC CASES. 14in. by 10 1/2in. Transparent. Ideal for maps display, etc. ... **5/6**
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REMOTE CONTACTORS for use with above ... **7/6** each
DIMMERS. Wire wound in bakelite case ... **1/3** each; **12/-** doz.
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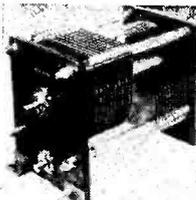
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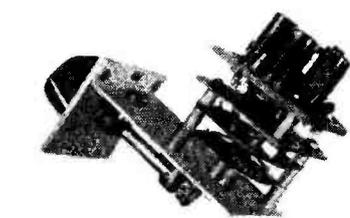
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10,000 ERIE RESISTORS, 47K, 2-watt, boxed in 50's and 5's. **ERIE RESISTORS**, 1,200 ohm, 1/2 watt. Boxed in 50's. Also 33K 2 watt, 150K 1 watt, 22K 1 watt, 70K 1-watt; price 2 watt, 3d.; 1 watt, 2d. 1/2 watt, 1d.

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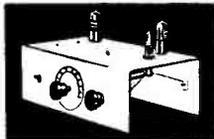
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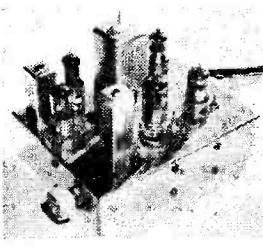
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SMALL ADVERTISEMENTS. READERS—continued

FOR SALE: Eddystone Communication Receiver 640; perfect condition; with matching speaker. Offers wanted.—Box 1479. Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: Eddystone Receiver S.640, in mint condition; £17 10s. 0d. or nearest offer.—T. Chrisp, 39. Holystone Avenue. Whitley Bay, Northd.

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SALE: Commercially-built 5 Amateur Band S Transmitter; 100 watts phone or CW; fully TVI-proofed; 3-deck cream-finished console cabinet; cost £125; accept nearest offer to £90 (going QRT). Grundig tape "Reporter." mint condition, cost £84. sell for nearest offer to £70.—G3UY. 41 Ashden Road. Guildford (Tel.: 4885).

CR 100 COIL PACK CONDENSER, IF's Xtal Filter, BFO, new. £3 10s. 0d. GEC VHF Tx. Xtal Oscillator, three Doublers, RK34 Final, Modulator, easily modified 144 mc. £3 10s. 0d. Eddystone 400X Receiver. similar 358X. less coils. valves cabinet, 100 kc. IF's. Twin Xtal Filt., Manual, £3. BC221. perfect, but case damaged, £10. Twenty *Wireless World* (mostly 1952/3). 10/-; 36 *RSGB Bulletins*, 1947/50. 15/-; 36 *QST*, 1946/51. 30/- . All postage extra.—Chorley, 6 Calton Road. New Barnet, Herts.

FOR SALE or Exchange: For any useful Rx. Ecko 12-volt Car Radio. preset tuning. Offers? —GD3KY, Uwch-Y-Don. Llanfwrog. I.O.A.

AR 77, £12 10s.; SX17, £13; BC221, £8; Vibroplex Bug, £2. Buyers must collect (callers preferred); evenings or week-ends.—G3CCN, Highfields, Bath Road. Sturminster Newton. Dorset.

FOR SALE: Army 12 Set, £20. **WANTED:** HRO. 28 mc B.S., coil. — G2IO, 17 Trevoze Gardens, Sherwood, Notts.

FOR SALE: Table Model SX28. as new; any trial; buyer collects. **WANTED:** E52B or any parts.—R. Field, 103 Claybrook Road, Hammer-smith. W.6.

WANTED: *Bulletin*, July 1926; *CQ*, January, March, April, June, November, December 1945. May 1946; *Radio* before 1936; *R/9* before April 1935; *QST* before 1924; *Radio REF*, April 1935; many *QTC*, *Ham Chatter*, *Radio ZS*. *Amateur Radio*. *Break-In*, *Xtal*, *I.R.T.S. News*, *QRV*, *QMF.*, *R.S.G.B. Guide*, 1934; *Call Book*, *Diary*, 1927/8; *Hints and Kinks*, Vols. 1-2; *Calling CQ* (de Soto).—G3IDG. 95 Ramsden Road. London, S.W.12.

YOUR PRICE for Scrap BC-348.—Box 1490. Short Wave Magazine. Ltd., 55 Victoria Street. London, S.W.1.

CR 100 RF Section, re-built with miniature valves. S-meter; sprayed grey; excellent condition; £21 (or reasonable offer).—G2BIP. 724 Anlaby Road. Hull.

ELIZABETHAN Tx. 150w. CW/120w. Phone; built as per designer's specifications in same cabinet; separate Mod.-Preamp. and PU; Acos Xtal Mc type 22-2 relay controlled. Inspection and demonstration without obligation. £60 (or nearest offer). Owner going QRT. Buyers collect. — B. Wormald, 23 Coda Avenue, Bishophorpe, York.

SMALL ADVERTISEMENTS, READERS—continued

EDDYSTONE 750 with S-meter: little used; E perfect, circuit; £45.—(Croydon 7722, Ext. 14). Gibbs, 61 Clancarty Road, Fulham, London, S.W.6.

SIGNAL GENERATOR for sale; Taylor 65c. 100 kc to 160 mc; dummy aerial; audio output; perfect condition; £13 (o.n.o.).—White, 38 Cliffsea Grove, Leigh-on-Sea, Essex.

SEVERAL DOZEN VALVES must be cleared. Interesting types at Amateur prices. S.A.E. for list.—G2XV, 129 Cambridge Road, Trumpington, Cambridge.

FOR SALE: CR100, £17 10s.; 1155N, £9 10s.; Class-D Wavemeter, £4; DST 100, £19. **WANTED:** BC221 for cash, or exchanges with above.—Box 1491, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: BC221; offer £20 or exchange LM7 and £5.—Box 1492, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

HRO POWER PACK and eight coils, £26 10s. **WANTED:** BC221. Would exchange above plus small cash adjustment.—Bo—1493, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SX 28 in new condition, £45, or would consider exchange for BC221 and/or AR88; cash adjustments.—Box 1494, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

VALVES: 6J6, 6AK5, EF91, EF92, 6SN7, 6Y6, 6V6GT, 5/6; 6C4, EB91, VT52, CV329, 6J5, 3/6; TZ40, 809, 811, 832, 15/-; 810, 805, 20/-.—Box 1495, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

NATIONAL NC120 11-Valve Receiver, 0.54 mc to 30 mc; S-meter, Xtal, Noise Limiter; FB condition; £17 10s. 0d.—Full details, Barrington, 4 Coxstalls, Wootton Bassett, Swindon.

SALE: New Marconi B36 Receiver, 1 to 21 mc, 2 RF, 3 IF; coil turret, circuit; less valves; £6. New unused Marconi G56 Wavemeter, 15 kc to 25 mc; charts, valves, circuit; £4. Both carriage extra.—Box 1480, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

EDDYSTONE 740, as new; few hours used only; mint condition; £28. Canadian 19 Set, Mk. III; complete installation; perfect working order and condition; £15 (carriage extra).—Details: L. Grout, 68, The Drive, W. Worthing, Sussex.

GERMAN Communication Receiver R3; seven "E"-series valves, 2.5-26 mc, 3 wavebands, 110-220v, AC, 24v, DC; carrying handle; gift, £6.—Huggins, 46 Helmsdale Road, London, S.W.16.

EDDYSTONE 640, excellent condition; phone and dust cover; £20 (or near offer).—H. Bell, 60 Canterbury Road, Morden, Surrey.

FOR SALE: AR88D with matching speakers, and S27; both in superb condition, with handbooks. Would consider part-exchange of either or both above for SX28, SX42 or similar.—Details to Box 1482, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

EDDYSTONE Receiver, 358X, with 10 coil units, giving complete coverage from 40 kc to 31 mc; power pack, crystal filter, switched meter, BFO, noise limiter; condition almost as new; £12.—Box 1483, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

CR 100, good condition, £22 10s. 0d.; Laine Tape Recorder, £25; R.1355 TV, conversion partly completed; p/pack complete with brand-new components; £6 the lot.—Box 1481, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

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HRO SENIOR for sale; 9 general coverage coils; 50 kc to 30 mc; grey crackle and first-class condition; with power pack; £30.—G2AKQ, Heathlands, Ashley Heath, Ringwood, (Ringwood 708).

£40 OFFERED for AR88: collection arranged. **FOR SALE:** HRO Power Pack and eight General Coverage Coils. £25.—Box 1484, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

EXCHANGE: CR100 Receiver for BC221; small cash adjustment.—Box 1485, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: AR88 Receiver. Would consider exchange for clean SX28, plus cash adjustment. Collection arranged.—Box 1486, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

R 109 and **R208** for sale or exchange. **WANTED:** 813 Valves, BC221 and S27 Receiver. — Box 1487, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: CR100 Equipment Cabinet, £1 2s. 6d.; Driver and condenser, £2 10s. 0d.; Audio filter, 17/6; Mains Transformer, £1 2s. 6d.; Coil Assembly, £2. Also AR88 Cabinet, £2 5s. 0d. All carriage paid.—Box 1488, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

VALVES (new, unused), majority in makers' cartons; 8013A (4), 393A (4), 6AJ7/6AC7 (8), 6H6M (4), 6AK7/6AG7 (2), 6X5GT (3), CV31 (4). Offers? Vibroplex *De Luxe* Morse Key in case, £5. or exchange photographic or motor-cycle workshop equipment.—Pratt, Hoyland Vicarage, Barnsley, Yorks.

SALE: Army Transmitter No. 12, £10; 1155 Receiver, £7; TX33, 250w., £20; MCR1, £6. **WANTED:** Eddystone 640.—G2DFH, Pendennis, St. Erth, Cornwall.

SELECTION Miniature Valves, 6BW6, DH77, S 6AG5, EBC41, etc., 6/- each; s.a.e. list.—Blackwell, 25 Barons Way, Thorpe Lea, Egham, Surrey.

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30 mA	M.C. 2 1/2" Round	7/6
30 mA	M.C. 2 1/2" Flush	10/7
50 mA	M.C. 2 1/2" Square	7/6
150 mA	M.C. 2 1/2" Square	7/6
200 mA	M.C. 2 1/2" Flush	10/7
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