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The SHORT WAVE LISTENER AND TELEVISION REVIEW

DEVOTED TO
SHORT WAVE RADIO RECEPTION
AND AMATEUR TELEVISION

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THE SHORT WAVE LISTENER
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EDITORIAL

VISITING

With the holiday season right on us, many SWL's will be thinking of taking the opportunity to visit local stations, or other SWL's, in the district in which they happen to find themselves.

This is all in accordance with the tradition of Amateur Radio—but remember that sudden appearance as an unexpected caller is not always the best way of introducing oneself to a transmitter from whom one has happened to have had a card, or to an SWL whose address may have appeared in print.

Most radio enthusiasts, in either category, have interests and responsibilities quite outside their hobby, and so it is not always convenient—at no notice at all—to entertain a casual caller for hours on end, talking about radio.

On the other hand, making personal contacts of this kind is both interesting and helpful, and always very interesting. But there is a proper way to set about it. Either drop your prospective contact a card in advance (in time for him to reply if necessary) or ring him for a first introduction over the telephone.

Most amateurs of any experience are always glad to see SWL's, and to help with advice and suggestions. It is this constant handing-on of knowledge and experience that helps to keep Amateur Radio in the forefront of activity and the live force it now is. But all this does not mean that a stranger—even if he is an amateur—can be expected to be pleased to see you if you have just called "CQ" on his door-bell.

So in your holiday visits round the countryside and your wanderings abroad, always remember that it is a good thing to fix your calls first.

An HF GDO

IMPROVED GRID DIP OSCILLATOR WITH DC AMPLIFIER

It can fairly be said that a calibrated grid dip oscillator is almost essential if any experimental work at all is being done. It is easy to make, simple to use and has many unsuspected practical applications. This article describes an improved version, giving a wider and more sensitive meter deflection with looser coupling—a twin triode being used with the second half of the valve functioning as an amplifier.—Editor.

ONE of the most versatile pieces of equipment an amateur can possess is a Grid Dip Oscillator. Where much experimental work is carried out, it becomes almost indispensable.

Resonance of a grid dip oscillator with the circuit under test is often indicated by noting the change of grid current as read on a meter inserted in series with the grid leak. As the current is low, a very sensitive meter is necessary, and even then the movement of the needle is only small unless tight coupling is used between the two circuits—and tight coupling should be avoided because it is liable to cause an appreciable change in the GDO frequency.

It is not the actual grid current flowing which is of interest so much as the *change* of grid current, and it is obviously desirable to amplify this effect if it can be done without undue complication. In this case, DC amplification is called for and can easily be arranged with a bridge circuit in which a valve acts as one arm of the bridge. The negative grid potential developed across the oscillator grid leak is applied to the grid of the amplifying valve. When an external circuit interacts with the GDO, the grid current falls, the grid potential becomes less negative, and the resistance of the anode/cathode path of the amplifier valve drops. The balance of the bridge (in the anode circuit) is upset and a good positive upward reading is given on a suitably connected meter. This is altogether more satisfactory than trying to observe a slight dip of the needle. A further benefit is that a more robust type of meter can be used as an indicator.

Circuit

The circuit of an instrument using this principle is shown in Fig. 1. For convenience, oscillator and amplifier triodes are contained in a single envelope and, to permit compact construction, a miniature valve on a B7G base is employed—the Mullard ECC91 and the 6J6 are equally suitable.

The first half of the valve is arranged as a normal oscillator. The second half is the DC amplifier, the bridge being formed by R5, R6, R7 and R8 in series, and the valve itself. The meter is connected with the polarity indicated and the needle adjusted to zero with R7. The actuating voltage is taken from the junction of the two grid resistors R1 and R2, *via* a decoupling network which filters out RF voltage.

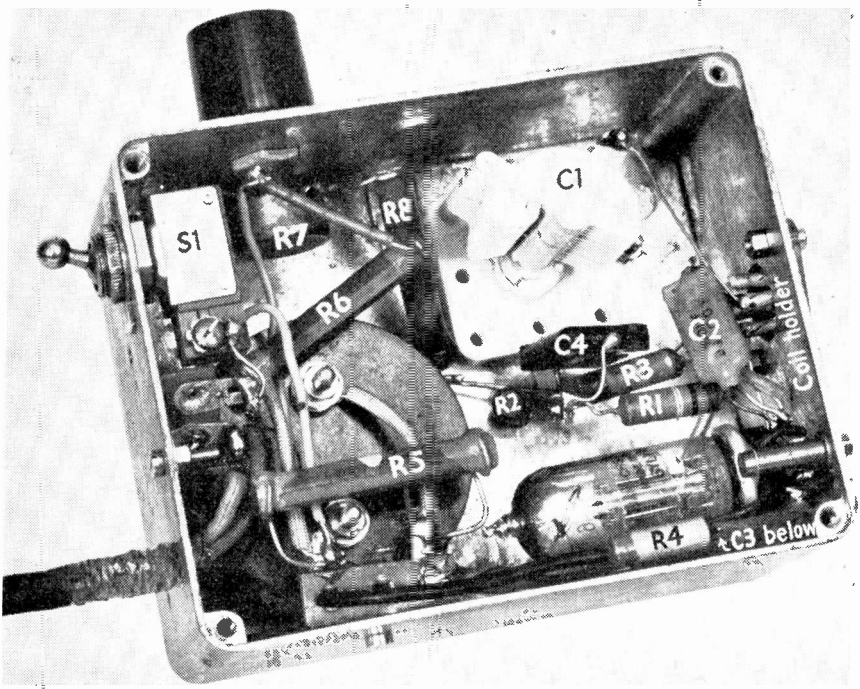
The magnitude of the reading obtained will vary according to the sensitivity of the meter, and this in turn depends on the full-scale deflection. Ideally, a miniature meter reading to one milliampere would be excellent. Such an instrument, with a diameter of 1½ in., is made by Howard Butler (Hobut) and probably by other instrument manufacturers, but unfortunately it is difficult to obtain. Alternatively, an external meter of any diameter can be used, a jack being fitted to the instrument and the meter plugged in when required. This, however, is not so convenient as having the dial and meter observable simultaneously, and it also means an additional loose lead to get into one's way. Therefore, in the instrument illustrated, an 0-5 mA meter, 2 in. diameter, is employed, as it is readily obtainable. The range is on the high side, but the sensitivity is still much better than would be the case when measuring grid current directly.

Another point is that the value of the resistors in the bridge arms depends on the meter full-scale deflection. Obviously if high-value resistors are used with a high reading meter, sufficient current to give a large deflection could not flow even with a bridge completely out of balance. The values given in the list are correct for an 0-5 mA meter, but R4, R5 and R6 should be increased to 47,000 or 51,000 ohms if an 0-1 mA meter is used (½ watt ratings are then permissible). R7 should be 25,000 ohms in the first case, 50,000 ohms in the second. A wire-wound component is desirable but not essential. The potentiometer as indicated is a miniature type, but there is ample room for a full-size component.

Reverting to the oscillator, it will be appreciated that any standard circuit can be used, provided the design is such as permits operation at high frequencies. The present version is for what might be called "normal," high and medium frequencies, the range covered being from 30 mc (actually somewhat higher) to 820 kc. Commercial plug-in coils are used so that an intending constructor can rely on securing a close approximation to the calibration frequencies listed in the panel.

Construction

The construction is straightforward, except perhaps for fitting the valveholder in a



Showing the construction inside the Grid Dip Oscillator unit, as described, with major components identified.

position to give room for the small components attached to it, and which also allows for easy valve insertion. Photographs illustrate the placement of the various parts in the containing metal box—it is suggested that the valveholder could well be mounted a little further away from the side of the box, to allow more room for R4 and C3. The fixing bolts are $\frac{3}{8}$ in. distant from the side, and this should be increased to $\frac{3}{4}$ in. or $\frac{7}{8}$ in.

The valveholder is spaced away with half-inch pillars; all connections to it should be made before bolting in position, and Fig. 2 is provided to simplify this part of the construction.

When the lid is screwed in place, the box becomes almost airtight. To prevent the temperature rising to an undesirable degree, it is necessary to drill a few ventilation holes in the lid and in the box, particularly in those parts adjoining the valve.

Power Supplies

The power requirements are, of course, quite small—6·3 volts 0·45 amps and 150 volts, 4-6 mA—and it would be a good idea to build a small power unit into a second die-cast box, bolted to the first, or better, fitted with a socket to match up with a suitable plug on the GDO box. Such a unit was envisaged (especially as further instruments on the same pattern are being constructed for higher frequencies) and a single plug-in power unit would serve throughout. Rectification and smoothing would present no problem, since metal rectifiers are available and resistance smoothing would suffice. The difficulty lies in the mains transformer, which can and must be of small dimensions. A suitable component is not available as far as the writer is aware, and for the time being, at least, power is drawn from a separate small pack.

The HT supply should have good regulation and, if possible, it should be stabilised at 150 volts or less by means of a small gaseous stabiliser valve. It is permissible to use 200 volts HT if the resistors R5 and R6 are of high value, but no advantage is gained by so doing and, in general, it is wise to keep the voltage between 100 and 150.

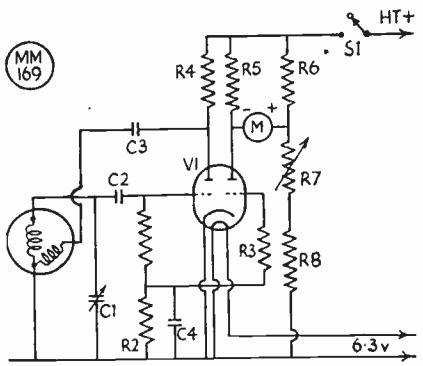


Fig. 1. Circuit diagram of the grid dip oscillator, using miniature plug-in coils and covering a range of about 32 mc to 820 kc. Coil details and coverage are given in the accompanying table.

Testing

For the first test, a coil should be inserted in the holder, and, after allowing time for the valve to warm up, the switch S1 closed. All being well, adjustment of R7 will bring the needle of the meter to zero. Touching the coil should cause the needle to rise rapidly, and this is a sign that the circuit is oscillating properly. The zero adjustment will vary from coil to coil, and it is likely that the needle will move slightly from one end of the range to another, but this effect can be disregarded, as it is a smooth, slow movement, very different to the sharp rise brought about when the GDO is operated in the usual way.

Calibration

The stray capacities on the oscillator circuit are on the low side, which factor affects the frequency range of each coil —it will be seen that the coverage differs slightly from the makers' figures. As a matter of interest, because of the low strays it was found almost possible to obtain complete coverage with a 100 $\mu\mu$F condenser, but the amateur bands fell at the high frequency end of the dial, which is undesirable. The tuning condenser was therefore changed to 140 $\mu\mu$F, thus making certain of complete coverage and bringing the amateur bands well up the dial.

If the constructor has access to a calibrated communications receiver, the signal emitted by the GDO can be picked up and a record made of dial setting against frequency on each range, followed by the preparation of a set of graphs for future reference. Failing this, the figures given in the accompanying panel will be found sufficiently accurate for practical purposes. In the case of the "W" and "P" coils, the coverage is affected by the setting of the dust-iron core, but as both coils include medium-wave broadcast frequencies, a direct check, using a domestic broadcast receiver, should present no difficulty. The dust-core should be adjusted to make the readings actually obtained correspond with those in the panel.

Grid Dip Oscillator (HF)

LIST OF COMPONENTS

1 Diecast Metal Box	*Cat. No.* 650 *Eddystone*
1 Microdenser 140 $\mu\mu$F (C1)	*Cat. No.* 586 *Eddystone*
1 Coil Base (4-pin)	*Cat. No.* 707 *Eddystone*
Miniature Coils (*as required*)	*Cat. No.* 706 *Eddystone*
1 Direct Drive Dial	*Cat. No.* 595 *Eddystone*
1 Knob	*Cat. No.* 785 *Eddystone*
1 Valve type ECC91	*Mullard*
1 Valveholder B7G type XM7/U	*McMurdo*

1 M/C Meter—see text.
1 Switch SP on/off
1 Potentiometer 25,000 or 50,000 ohms (R7)—*see text*
2 3-way Tag Strips.

Fixed Condensers

C2 = 100 $\mu\mu$F Silvered Mica.
C3 = 200 $\mu\mu$F Silvered Mica.
C4 = ·001 μF Moulded Mica.

Resistors

R1, R2, R8 = 10,000 ohms $\frac{1}{2}$ watt.
R3 = 100,000 ohms $\frac{1}{2}$ watt.
R5, R6 = 27,000 or 47,000 ohms (*see text*) 1 watt.
R4 = 47,000 ohms $\frac{1}{2}$ watt.

Coils

Eddystone plug-in, as required (*see* Calibration Panel)

Inverse and Direct Dial Readings

There are two ways of fixing the dial —one with the reading increasing as the condenser vanes mesh; the other (180° diametrically opposite) with the reading increasing as the capacity becomes less. In the first case, frequency decreases as the dial reading increases, and it is often more convenient to have frequency and dial reading increasing simultaneously. Two sets of figures, A and B in the panel, are therefore

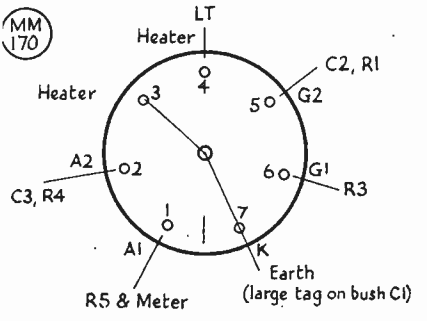


Fig. 2. Underside connections to be made to the valveholder before fitting it in position in the box.

Frequency Calibrations

A						B					
DIAL Reading	LB mc	Y mc	R mc	W kc	P kc	DIAL Reading	LB mc	Y mc	R mc	W kc	P kc
100	16·20	7·00	3·05	1450	820	0	16·20	7·00	3·05	1450	820
90	17·00	7·40	3·20	1520	860	10	16·45	7·15	3·10	1470	830
80	18·20	7·90	3·43	1610	910	20	17·00	7·42	3·23	1510	855
70	19·60	8·50	3·70	1730	970	30	17·90	7·83	3·39	1580	890
60	21·40	9·30	4·00	1870	1045	40	18·90	8·30	3·60	1670	938
50	23·50	10·25	4·40	2050	1130	50	20·40	8·90	3·85	1785	995
40	26·40	11·50	5·00	2250	1240	60	22·25	9·75	4·20	1925	1070
30	30·0	13·20	5·70	2520	1365	70	24·90	11·00	4·73	2125	1175
20	(26° = 32 mc)	15·50	6·70	2860	1520	80	29·20	12·90	5·53	2450	1325
10	—	18·50	7·90	3300	1675	90	—	16·20	6·86	2910	1530

Calibration figures obtained for the GDO built as illustrated; these are given for guidance only, as readings obtained on individual instruments may vary somewhat if not constructed exactly as specified. The coils used are Eddystone miniature plug-in, and can be selected for the ranges required. Table A refers when the dial reading increases with capacity, and B when the dial is fixed to give readings increasing with frequency.

provided, and a constructor can choose whichever method he prefers. The change of capacity over the ten degrees each side of minimum capacity is small, and it is well to ignore the last few degrees. For this reason, the figures in the panel omit readings at zero (inverse reading) and 100° (direct reading).

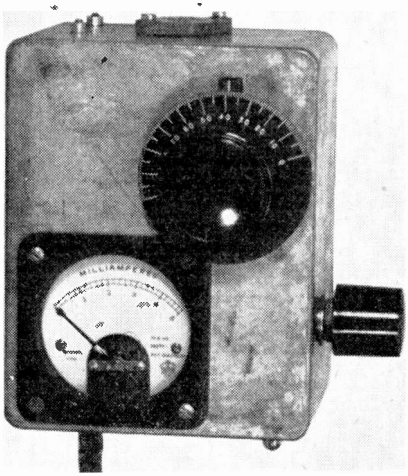
It was found that "squegging" occurred with the LB coil at frequencies above 24 mc. Probably this trouble would disappear if a lower HT voltage was used, but it was thought desirable to eradicate it by modifying the coil. Two reaction turns were removed from the winding nearest the base, an operation easily carried out.

Uses

For the benefit of those not familiar with the uses to which a grid dip oscillator can be put, a brief recapitulation may be of assistance. The chief application is to determine the resonant frequency of a tuned circuit, as found in receivers, transmitters and many other equipments. It is not necessary that the circuit under test be made to oscillate; therefore no power need be applied to associated valves. Also the tuned circuit can be in its proper place, with other components connected, so that the reading obtained takes into account stray capacities. It is only necessary that the coil on the GDO can be brought into fairly close proximity to the coil under test. When this is done and the dial on the GDO is rotated, resonance will be indicated by a sharp upward kick on the needle of the milliammeter (unless the assumption regarding frequency is a long way out). The coupling between the GDO coil and the test circuit can then often be reduced whilst still maintaining a definite meter reading—such loose coupling permits a greater degree of accuracy. Reference to the curve on the graph then gives the actual frequency.

Aerial Resonance

Another application is to determine the resonant frequency of an aerial system. Considerable information can be obtained in this way—in fact for anyone with a definite interest in aerials, the GDO is well worth constructing for this purpose alone. The subject is one which merits fuller treatment than can be given here and will be dealt with in a later article.



General appearance of the finished GDO.

Calibration Checks On Two Metres

USING THE BC-221

(The BC-221 is an extremely versatile instrument, and can be used not only for its original purpose of accurate frequency measurement on the LF bands, but also, as this article shows, for VHF calibration as well.—Editor.)

THE writer recently came to the conclusion that it was high time a frequency meter suitable for the lower frequency bands occupied a permanent place on the operating table. It was soon found that a BC-221 was a very useful acquisition, and one wondered how it had been possible to manage without it for so many years!

However, quite a large proportion of the time at this station is spent on the VHF bands, and with, it must be admitted, no great expectations, the BC-221 output terminal was connected to the 2-metre converter aerial coil. With the converter set to approximately 145 mc, the BC-221 dial was slowly rotated. A number of beats were heard and a check on three adjacent ones showed them to be the 38th, 39th, and 40th harmonics of the BC-221 oscillator fundamental.

The Possibilities

It was soon decided that, with careful setting up of the BC-221, it should be possible to calibrate quite accurately a 2-metre receiver, and it also seemed feasible to read the frequencies of 2-metre stations to plus or minus 2 kc. Furthermore, by using the 40th harmonic of the oscillator, it was only necessary to add a further nought to the figure in the 3rd column of the BC-221 chart to read off the 2-metre frequency directly in kc. It was also found that, in addition to the given frequency check point with its own crystal standard as provided on the BC-221 chart, two strong beats occurred at 3600 and 3625 kc, with a weaker note at 3650 kc, corresponding to 144, 145 and 146 mc respectively. These provide excellent markers for the 2-metre band and also a means of finally touching-up the BC-221 to be exactly "spot on" over the narrow range of frequencies required for calibration.

Setting up the BC-221

In order to obtain accurate results, the first essential is that the internal crystal standard of the BC-221 be set at exactly 1 mc, for it is its 144th and 146th harmonics that will determine how accurate the final results are on 2 metres. This is preferably done by utilising the 25, 30 or 35 mc transmissions of WWV, these three frequencies generally being less susceptible to interference than the lower-frequency calibration signals. Also, using one of these frequencies means that any crystal error is multiplied 24, 30 or 35 times. The time to make use of WWV is during a "carrier only" transmission and when the signal is reasonably steady in strength. The BC-221 should always be given a warming-up period before making any adjustments, and should then be switched to the "Xtal only" position and the name plate on the front panel removed, exposing the slotted head of the crystal oscillator trimmer. Sufficient signal from the BC-221 is then injected into the receiver input terminals to add a further 50 per cent. to the S-meter reading obtained on WWV. The crystal trimmer should then be adjusted to bring the audio beat down to zero, the final setting being made by watching the S-meter for a very slow swing. The writer then prefers to "thump" the BC-221 in order to check for any instability in the crystal, crystal oscillator valve or associated circuits. Any such instability will, of course, no longer result in a zero beat with WWV, and should be investigated before proceeding further. These adjustments are also equally applicable for accurate use of the BC-221 on the lower frequencies.

Calibrating the 2-Metre Receiver

After a warming-up period of quarter to half an hour, the BC-221 should be checked against its own internal crystal standard, using the check frequency given at the bottom of the chart covering 3600-3650 kc. First of all, the centre of the 2-metre band, at 145 mc, should be found on the receiver, as follows:—

Set the BC-221 to 3625 kc with switch in "Het. Osc." position, and couple its output terminal fairly tightly to the receiver input coil. With BFO on, the receiver should now be tuned around the expected 145 mc position, when a beat should be heard. If the receiver is correctly tuned for 145 mc, this beat is the 40th harmonic of 3625 kc. To check that this is so, leave the receiver alone and tune the BC-221 above and below 3625 kc for the first-heard new beats. These should occur at 3717·9 kc and 3566·6 kc, corresponding to the 39th and 41st harmonics of these frequencies on 145 mc. If these frequencies are not obtained, a glance at the accompanying table may help to indicate which harmonic of the BC-221's 3625 kc signal was picked out in the first instance. Suitable corrections can be made and the above procedure repeated until the 145 mc calibration point has been centred on the receiver dial.

The BC-221 should now be checked against its own internal crystal at 3600,

3625 and 3650 kc, using the previously mentioned check points, and if necessary, the corrector condenser should be touched-up to bring the calibration "spot on." The receiver can now have a calibration table drawn up if its dial reading is checked off against, say, every 2 kc change of BC-221 fundamental, corresponding to 80 kc intervals on Two. A graph of ample accuracy can be drawn from the calibration table. The writer now has the habit of switching on the BC-221 at the same time as the 2-metre converter, and logs the frequencies of all stations heard by zero beating the BC-221 with their carriers. A little mental calculation is usually necessary, due to the fact that on this particular BC-221, 2·3 divisions on the main dial correspond to 1 kc at the fundamental; hence, 0·1 of a division corresponds to about 7·75 kc at 145 mc. If it was only 2·0 divisions per kc calculations would be much simplified!

Assuming the BC-221 has been set up as suggested, the writer considers that, with careful use, it is possible to assess frequencies to plus or minus 1 kc at 2 metres—an accuracy of better than 15 parts in one million, which is quite good going by anybody's standard!

Finally, one or two other points worthy of mention. If the BC-221 is operated from a mains power pack, the HT line should be stabilised; a VR150 fits the bill very nicely. It is also a good idea, especially if the BC-221 is left on for long periods, to provide a ¼-in. asbestos heat baffle fixed to the top of the battery compartment. And if you fail to find any BC-221 beats on your 2-metre receiver, then it's time you gave it the once-over, because you won't hear the GDX either! But up to the present the writer has been unable to find the 120th harmonic on his 70-cm receiver!

CHECK POINT DATA

With the BC-221 originally tuned to 3625 kc		Retuning BC-221 for adjacent higher and lower frequency beats	
Receiver Tuned to	Corresponding Harmonic	Lower Beat	Higher Beat
134·125 mc	37th	3529·6 kc	3725·7 kc
137·750 mc	38th	3521·1 kc	3723·0 kc
141·375 mc	39th	3534·4 kc	3720·4 kc
145·000 mc	40th	3536·6 kc	3717·9 kc
148·625 mc	41st	3538·7 kc	3715·6 kc
152·250 mc	42nd	3540·7 kc	3713·4 kc
155·875 mc	43rd	3542·6 kc	3711·3 kc

Crystal Calibrator Unit

FOR ANY COMMUNICATION RECEIVER

(A unit for self-calibration to the high degree of accuracy given by the available standard-frequency transmissions is obviously of great value when incorporated in the station communications receiver. This article describes a small 100 kc crystal oscillator, the mechanical design of which could be modified to fit it into almost any make of receiver.—Editor.)

THE desirability of having an accurately calibrated receiver on the amateur bands need not be stressed. It is a requirement which is now recognised by the leading manufacturers both in this country and America, and many of them are fitting built-in 100 kc calibrators to their latest Communication Receivers, the advantages of which are obvious.

The majority of amateurs, like the writer, will probably be in possession of receivers of war-time or pre-war vintage and are therefore lacking this refinement. It is hoped, therefore, that the following notes may be of interest to those who wish to have calibration facilities.

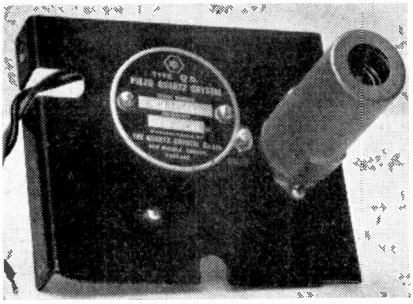
Requirements

The requirements of a calibrator unit are modest, and can be summarised as follows:—

(a) It must produce good harmonics up to 30 mc (the upper limit of the average receiver).
(b) The filament consumption of the valve used must be low, so as to prevent over-heating of the receiver power transformer.
(c) The HT consumption of the unit must be such that the additional load does not cause variation of the receiver supply, thus tending to "pull" the local oscillator and produce slight changes of frequency when the calibrator is switched on.
(d) As the available space in most communication receivers is somewhat restricted, it is necessary to limit the overall size of the unit; in view of this, the use of a (B7G) valve was considered desirable.

Construction

In the writer's case the unit was designed to fit underneath the chassis of an RCA AR88, but it is so compact that it should be possible to find a corner for it in almost any receiver. The odd pieces which can be seen cut out of the bracket on which it is con-



A general view of the 100 kc Calibrator as described

structed were necessary in order to avoid certain obstructions peculiar to an '88.

Fig. 1 shows the bracket, which can be folded up out of any odd piece of metal, 18-gauge steel being used in the original design.

Circuit

Several circuits were tried, and eventually the one shown in Fig. 2 was found to be the best suited. It is easy to get going, and will operate with almost any crystal. Further, it is rich in harmonics owing to the large amount of feedback obtained with the two ·001 μF condensers and 6 mH choke. This tuned circuit in the screen is important, and the values should be kept approximately to those suggested, as these components should resonate at the crystal frequency. Slight variations can be tolerated, but if the values are widely different from those specified, it is possible that the crystal would oscillate in the wrong mode.

In other words:—

$$\frac{1}{2\pi\sqrt{L\frac{C}{2}}}$$ should equal 100 kc.

where L = inductance of choke = 6 mH
and C = value of one condenser = ·001 μF

If a 1 megacycle crystal is used in place of the 100 kc bar, then the values of condensers should be reduced to 200-300 μμF, and the choke to approximately 1mH. Whilst a one-megacycle crystal has a limited usefulness as a band edge marker on the HF bands, it is of practically no advantage on the 3·5 mc and 1·7 mc bands.

An RF pentode such as an EF91 may be used in place of the EL91, if harmonics are not required as high as 28 mc—if they are, then an EL91 was found to be essential. The advantage of the EF91 is its lower filament consumption, which reduces the drain on the main receiver power supply. An EL91, however, was found to be perfectly satisfactory when used in the AR88.

The condenser C3 provides a zero adjustment on the crystal, and may or may not be required, depending on the crystal used. The writer found that about 2-5 μμF was necessary in order to zero-beat the output with WWV.

In the original design this condenser consisted of a 3-25 μμF variable condenser with four of the vanes removed. It was mounted on the rear of the '88 chassis, so that adjustment was possible with the receiver in the normal operating position.

Power Supply

When the unit was first installed, its HT was derived from the 150v stabilised supply in the AR88. It was found, however, that the extra drain was sufficient to cause a very slight voltage drop each time the unit was switched on, resulting in a slight change of frequency, amounting to a few cycles in the local oscillator of the receiver.

This state of affairs was highly undesirable, and steps were taken to prevent it occurring. A series resistance R5 was placed in the HT feed to the unit, and the HT voltage reduced to about 100 volts. Checks were made,

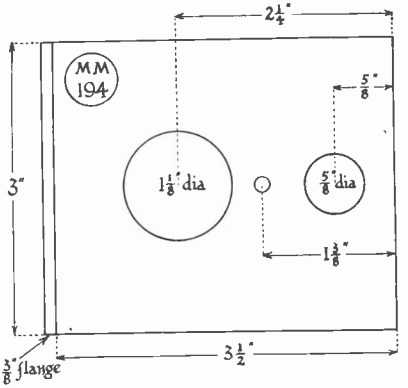


Fig. 1. Sketch of mounting bracket for the Crystal Calibrator, showing important dimensions when fitted to an AR88. With suitable modifications to this mounting, the Calibrator could be fitted to almost any receiver in the communications category.

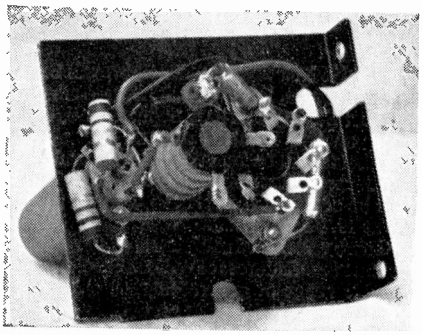
and it was found that the harmonics on 28 mc were still satisfactory, whilst the change in local oscillator frequency, although still noticeable, was reduced. Next, the feed point was removed from the 150v supply and attached to the full HT supply of about 260v, while the dropping resistor was increased to maintain the calibrator at about 100v. This provided a further improvement, and only a very minute change of oscillator frequency

was detected when the calibrator was put in circuit.

After some further experiments, it was discovered that the volts on the EL91 could be reduced to about 70v, while still producing adequate harmonics up to 30 mc. With a suitable resistance in circuit to produce the 190v drop from the main receiver supply, no change in oscillator frequency was detected. As this was considered satisfactory, the investigation was carried no further. The value for R5 finally used with the AR88 was 68,000 ohms, but would-be constructors are advised to determine this value by experiment, particularly if a different receiver is being used.

Calibration Checking and Adjustment

After completion, the unit should be installed in the receiver, the filaments connected to the heater supply, the HT feed to R5 connected *via* a toggle switch located on the receiver panel, and the value of R5 adjusted as described. A check should now be made to ensure that the crystal will zero on 100 kc by means of the condenser C3, after which the receiver may be mounted in the normal operating position, and one of the known frequency standard signals tuned in. The writer used WWV on 15 megacycles, but any other WWV transmissions will suffice, or the BBC Light Programme transmission on 200 kc, which is maintained to a high degree of accuracy. The receiver should be tuned zero beat with the standard signal, the calibrator switched on, and condenser C3 adjusted until the crystal is zero beat with the incoming transmission. This having been done, the calibrator is ready for service, and can be switched on whenever a frequency check is required.



An under-chassis view of the Crystal Calibrator, made up to fit into an AR88.

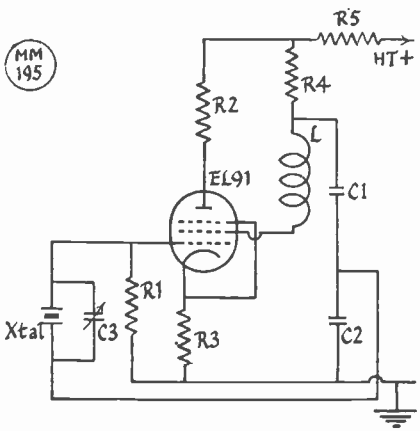


Fig. 2. Circuit of the 100 kc Crystal Calibrator as described in the article. It will give check points up to the 28 mc band and, if incorporated in the station receiver and zero'd on WWV or the BBC's 200 kc transmission, will enable a high order of calibration accuracy to be achieved on all bands.

Table of Values

Fig. 2. Circuit of the 100-kc Calibrator.

Condensers	
C1 and C2	= ·001 μF
C3	= 2·5 μμF variable (*see text*)
Resistances	
R1	= 560,000 ohms, ½ watt
R2	= 47,000 ohms, ½ watt
R3	= 220 ohms, ½ watt
R4	= 10,000 ohms, ½ watt
R5	= *See text*
Coil L	= 6 millihenry, wound on Alladin dust-iron core ⅜ in. former, position of core not critical.
Valve	Mullard EL91
Crystal	Q.C.C. 100 kc, Type Q5.

ZL's NOW ON THE NEW BANDS

With effect from July 1, ZL's were permitted to operate on the bands 21,000-21,450 kc and 26,960-27,230 kc. The frequency area 21,000-21,101 kc is reserved for CW transmission only, with phone in the rest of the 21 mc band. Both CW and Phone are permitted in the 11-metre band.

AMERICAN SUBSCRIPTIONS

If you are subscriber to any of the American radio, handicraft, hobby, technical or scientific publications, remember that subscription renewals (or new orders) can be accepted through the Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1, at sterling rates.

THE NINETEENTH NATIONAL RADIO EXHIBITION

The 1952 National Radio Show will be open at Earls Court, London, daily from Wednesday, August 27, to Saturday, September 6, closing only on the Sunday, August 31. Price of admission will be 2s. 6d. for adults and 1s. for children; parties numbering between 25 and 50 will be admitted for 2s. each, and parties over 50 at 1s. 9d. per head.

There will be 108 exhibitors, of whom 32 are actual manufacturers of radio and TV receivers. A wide range of general-interest exhibits will also be staged, covering practically the whole field of Radio, Electronics, Broadcasting and Communications Equipment, together with stands provided by special users such as the Services and industrial organisations.

Following are details of some of the more unusual electronic exhibits, which will be of interest to a great many visitors.

Robot Announcer

First exhibit seen by the public on entering the Radio Show at Earls Court will be an electronic guide to what's on in the Show each day. By pressing a button marked "Studio," "Celebrity dais," "Underwater television" or "Radio-controlled Boats" an automatic announcer will give, in different languages, through a loudspeaker details of arrangements for that day, including time of demonstrations.

The "Magazine Announcer," as it is called, has been designed for use at railway stations for announcing the arrival and destinations of trains.

(*Exhibit supplied by Westinghouse Brake Co.*)

Underwater Television

Visitors to the Radio Show this year will see the first public demonstration of underwater television. Through glass panels in a tank, they will see the television camera and equipment in conditions reproducing as far as possible those encountered on the bed of the ocean. Direct comparison will be drawn by looking into the tank and watching the television pictures on nearby TV screens.

(*Exhibit by Marconi's Wireless Telegraph Company and Siebe, Gorman & Company*)

Radio Heating

A demonstration of hardening steel by radio frequency heating apparatus will illustrate one of the many uses of this technique. To harden the steel its temperature has to be raised and then quenched rapidly and, by using a radio frequency heater, an output of 7 kW radio frequency is generated by a coil and valve oscillator. This power is fed to a coiled copper tube which is water-cooled, and into the centre of this coil, but not actually touching any part, a steel billet of 1 in. section is put for heating. By pressing a button the heater produces eddy currents which bring the steel billet to a bright red heat in a few seconds. At the end of the heating cycle, water is sprayed over the heated coil. The demonstration aims at showing that great heat can be applied to a highly concentrated (and, if necessary, selective) area by means of radio frequency heating.

(*Exhibit supplied by Redifon*)

Mobile Television Research Unit

A mobile laboratory, complete with power supply from large batteries and a special aerial mast, capable of being raised to 40 ft. and easily erected and dismantled, is to be on view. This vehicle is used for research and development of television aerials, for measuring the field strength of television signals, and for solving reception problems of all kinds. It travels round the country measuring aerial properties and plotting polar diagrams, enabling advice to be given on the correct type of aerial for a particular part. Instruments for locating and measuring interference are important items of the laboratory's equipment.

(*Exhibit by Belling & Lee*)

Radio-Controlled Model Ships

Half-hourly demonstrations, with running commentaries, are to be given during the run of the Show of two model ships controlled by radio from an enclosed cabin at one end of a tank measuring 40 ft. long by 25 ft. wide. The smaller vessel is 4 ft. long and is manœuvred by two controls operating the propeller and rudder; the larger ship is 6 ft. long and has nine controls, including separate controls for port and starboard propellers and for the rudder, making it possible for the navigational operator to work with the greatest accuracy in sailing the ship round the tank and in and out of the model harbour. Radio control is also used for lowering and raising model lifeboats, and the highlight of this demonstration is reached when a model sea-plane is catapulted from the ship's deck into the tank and hoisted back on to its launching ramp by a crane—all by remote control.

(Exhibit supplied by Philips Electrical)

GPO Detector Van

The public will be able to inspect at close quarters the GPO's mobile "sleuth"—a van which is equipped to detect the whereabouts of unlicensed television receiving sets. The method used is as follows: A magnetic induction field is set up by the line of scanning coils of the receiver. The audio output is observed on a meter and on phones, and by comparing the levels of the signal picked up by three loop aerials fitted to the roof of the vehicle, the direction of the receiver is indicated. A small portable locator is then used for exact location of the receiver.

THE NAVAL STAND AT THE NATIONAL RADIO SHOW

The object of the naval exhibit at the National Radio Show at Earl's Court, August 26-September 6, is to demonstrate the many and varied uses that the modern Navy makes of electronics.

On entering the stand, the visitor is confronted with a twin Bofors gun mounting and its separate director sight, from which the gun can be controlled both in bearing and elevation by small hand control. The link between the director and the gun is an electronic amplifier, which is also displayed on the stand. The next item to be seen is a replica of a submarine radar and wireless office manned by ratings of the Submarine Service. In this will be found the complete radio equipment fitted in a typical modern submarine.

Naval aviation is represented by a large model of the Atlantic and Mediterranean dotted with ships and aircraft. A running commentary relayed to a battery of headphones describes the protection of convoys by aircraft and escorting warships. The commentary will include talk by radio between the aircrews and the ships.

The Electrical Branch of the Navy, which is responsible for the maintenance of all electrical, radio and radar equipment in the Fleet, is shown in action in a full-scale model of an electronics maintenance room as found in a modern battleship or cruiser. Repair of defective radio and radar equipment is carried out on board in the electronics maintenance room and the full range of test equipment issued to a ship will be on view at Earls Court, together with Electrical ratings actually carrying out repairs to typical service equipment.

The Royal Naval Volunteer (Wireless) Reserve are showing a model of a typical R.N.V.(W)R. centre, many of which are flourishing concerns in various cities of the U.K. An indication will be given of the interesting work carried out by this popular branch of the Reserve.

In addition to these main exhibits are various interesting displays: For example, a simple electronic computer of the type used in naval gunnery enables the public to multiply two numbers together by the use of servo-mechanisms; servos are also shown controlling the trajectory of a ball-bearing dropped on a metal plate and bouncing into a container. The distance of the container from the plate can be adjusted at will, but the ball will always fall into it.

Other displays include an oscilloscope showing the possibilities of three-dimensional scan, the perspective of which can be changed and the electronic production of numbers on a cathode-ray tube in which any number dialled can be displayed.

HAVE YOU HEARD?

INSTEAD of my traditional opening with some remark about conditions, for once I will leave it to readers to supply this information! See if you can deduce from this whether the month has been good, bad or indifferent—I can't . . . .

Here are some quotes: "Don't think things have been quite as good this month". . . . "Not a very good month as regards conditions" . . . . "Quite a good DX month again" . . . . "Plenty of DX on Twenty" . . . . "Quite good for picking up odd countries" . . . . "Everything is really FB in the DX garden this month" . . . . "Just about a wash-out" . . . . "Read any good books lately?"

So make what you can of all that. Conditions don't vary all that much from place to place—it's only the opinions that vary. What seems good to someone must be absolutely heartbreaking to another.

Certainly the 28 and 21 mc bands have not been in the state necessary to raise any great enthusiasm. In my own opinion 21 mc was better in July than in August, or was that just the first flush of enthusiasm after the band opened? In any case let us deal with that band first.

ACTIVITY ON 21 MC

G. Moses (Crewe) says he puts the characteristics of the band far nearer those of 28 mc than those of 14. CW signals are not as common as one would have expected, and the phones have had more than their share of QSB although PY2CK has always been good value. Maybe, as G. M. says, they are all busy building beams and things and there will be an outburst of fine signals before long.

C. L. Bradbrook (Alton) has logged about 20 countries and thinks activity is on the increase. Phone was heard from FQ8AQ, OQ5HC and Europeans; CW from KP4CC, VQ4's, W, ZC4, 5A, PY and Europe. W. Iball (Wigan) logged EK, EL, FA, FF, KZ5, PY, W, ZC4, ZE and ZS, apart from Europeans.

D. L. McLean (Yeovil) remarks on the prevalence of short-skip, and finds the best time for DX is between 1900 and 2100 GMT. He says it would be a good thing if this band, when not open for DX, were used more for inter-European contacts, to relieve the QRM on 14 mc a little. R. A. Hawley (Goostrey) heard PY4RJ on phone, and CW brought in PY, KP4, VQ4, ZB1 and ZC4.

D. S. Kendall (Potters Bar) has stuck to the band faithfully, and now has a score of 31 countries on phone and CW. Best for July, on CW, were JY1OG, KP4GC, LU6AX, HK3CK, ZP9AH, CE3AG, KG4AF and some of the more usual stuff. K. Parvin (Thornton Heath) collected some South Americans on phone, but was unlucky with CP5EL, OA4CL and YS1O, all known to be on.

D. K. Cocking (Farnborough) says the band has been shaping well between 1800 and 2000, but leaves his Calls Heard list to speak for itself. M. S. Gotch (Saffron Walden) collected new ones with PA, PY, ON, YU and LX—all on phone, giving him a total of 16 countries.

N. C. Smith (Petts Wood) has the best piece of DX so far reported on the band—ZD9AA on phone. He also logged FQ8AQ. And the very next letter (from P. A. Jackson, Bexley) also mentions ZD9AA, apart from whom short-skip was prevalent. There must be something about that North Kent ether . . . .

CONDITIONS ON 28 MC

This band, of course, has now settled down to being just about as useless as any band can be; but even so it will probably show a spark or two of life during the autumn and early winter. It has not many friends at the moment, but here are a few reports.

H. M. Graham's list is almost typical—EA, F and OE! A. Deakin (Manchester) caught an opening at the end of June, and another on July 24-26; during those periods he logged OQ5, CR6, LU, CE, CX, PY and W2ZXM/MM. J. A. Crux (Rochdale) experimented with a converter, which brought in a hum and the local police . . . Even D. L. McLean admits that Ten has been poor, but he did hear CR6, OQ5, and VQ4, plus a W8 portable in the Mediterranean. He remarks that CR6BX is often heard around 1900 on an otherwise dead band. Certainly there seems to be a lot of CR6 activity on Ten and nowhere else.

K. B. Ranger (Strood) finds this band a perfect paradox. He says that a station like a CE, at about S7, is often found in among the welter of 11's at S9, and the strength of Europeans is enough to shatter the headphones most of the time. But still the DX is there, and K. B. R., too, hands a medal to CR6BX for his consistency. Best DX logged was CE3LB, 3LE, 3NC, CR6AO and 6BX, MI3NA, CX4CX, OQ5VD, VQ2DT and W3EU/MM, Mombasa.

K. Parvin (Thornton Heath) mentions a very suspicious "ZD6A"—with a South European accent—giving QTH as c/o P. T. T.,

Nyasaland! Otherwise all short-skip and very little DX. M. S. Gotch (Saffron Walden) also landed a fishy one—LI1PD. Wonder who he is? P. A. Jackson (Bexley) logged mostly short-skip, about the only DX being CE2CC, CX and LU.

THE TWENTY-METRE BAND

And so we arrive at *Twenty*, quite early in the proceedings. The greater part of all letters deal with this band, most of the reporters dismissing 28 and 21 mc in a few words and hastening on to their beloved 14! Certainly it is the one band that seems to keep open for DX all round the cycle. However bad conditions have been, there has not yet been one single month when Twenty did not have a considerable variety of DX to offer.

P. Davies (Whitchurch) describes himself as "about to become an SWL," having bought an old set at an auction and discovered that it had an extra band on the dial! In May he "discovered" 14 mc, and since then he has logged some 38 countries. Among his best bags so far are CT2FR, HC1FG, KV4BB, TA3AA and 2EFA, VP6, VQ4, YI, YV and the like. So we welcome another recruit and hope for great things in the future.

F. J. Wooll (Beverley) has discovered from an out-of-date list that EA7 was once given as

FOUR-BAND DX

(POST WAR)

LISTENER	SCORE	28 MC	14 MC	7 MC	3·5 MC	COUNTRIES
N. C. Smith (Petts Wood)	553	113	232	141	67	236
J. L. Hall (Croydon)	534	26	238	175	95	242
N. S. Beckett (Lowestoft)	478	103	198	121	56	208
K. Parvin (Thornton Heath)	436	146	188	60	42	194 (P)
D. S. Kendall (Potters Bar)	422	150	173	62	37	189 (P)
D. L. McLean (Yeovil)	407	158	187	30	32	198 (P)
J. P. Warren (Croydon)	393	120	183	57	33	188 (P)
R. A. Hawley (Goostrey)	387	131	179	53	24	212
J. W. Cave (Parkstone)	369	183	144	17	25	194 (P)
N. Roberts (Launceston)	360	92	172	60	46	175 (P)
S. Smith (Kenilworth)	354	92	166	65	30	172
M. S. Gotch (Saffron Walden)	347	121	152	42	32	170 (P)
K. M. Parry (Sandwich)	340	123	154	34	29	164 (P)
I. S. Davies (London, N.13)	329	83	152	60	34	157 (P)
W. Neal (Birmingham)	323	82	157	63	21	169
H. M. Graham (Harefield)	301	92	142	38	29	156 (P)
A. L. Higgins (Aberkenfig)	262	79	125	35	23	147
J. H. Lloyd (Enfield)	245	15	147	44	36	156 (P)
A. E. Carter (Romford)	241	82	119	17	23	137 (P)
A. O. Frearson (Birmingham)	238	81	107	35	15	134
H. Warburton (B.A.O.R.)	237	17	160	35	25	165
D. K. Cocking (Farnborough)	217	71	108	23	15	120 (P)
J. Stubbs (Cleckheaton)	197	48	106	26	17	116 (P)
W. J. Amphlett (Smethwick)	194	24	96	50	24	112
B. J. C. Brown (Derby)	178	23	110	25	20	113 (P
H. D. Woodward (Manchester)	163	8	120	20	15	123 (P)
P. L. O'Grady (New Zealand)	161	21	131	4	5	131

the prefix for Rio de Oro, and is puzzled because two EA7's that he heard were in Spain. Alas—they *all* are! There never *was* an EA7 in Rio de Oro, although the prefix was understood to be EA7 at one time.

C. R. Johns (Bournemouth) says interest was just kept alive with CE2CC, CO/CM's and YV3AU. Short-skip has been annoying, with GM and GI stations coming in up to 2200. H. J. Hill (Whitley Bay) laments the fact that there isn't a really good short-wave receiver suitable for "lugging around without a 30-cwt van.". During these periods of fine weather he would very much appreciate a good portable. He, too, has been bothered by the short-skip, but has been logging DX too. He says YA3UU has been active on the band again.

As a matter of fact there have been three very good "DX pieces" on Twenty during the past month—4W1MY (Yemen) and FL8MY, both on phone and CW, and VS5ELA (Brunei) on CW only. Very few of our regular chasers seem to have found them; just circulate the rumour that the band is in a bad state and half the DX-men disappear!

H. D. Woodward (Manchester) says "Everybody says the band is hopeless, but it's still very hard work getting your Calls Heard down to 25." His best were CR6BW, for a new one, also HH and TI. VS1DQ, often at 5 and 9, is hardly worth comment, according to H. D. W.

G. Moore (Castleford) found things good after about July 6, and although he says "Semi-DX for others is DX for me," he found two new countries and a new Zone with KG4AF and CE3LF. Others heard were VQ4BU, VP6FO, HI6TC, OX3WX, HH2PR and CM9AA. H. M. Graham (Harefield) heard a big batch of TI's, as well as PJ2AA, VP7NP, ZP5DC and HC1FG for "better ones." YV2AM, 3AU and 8AG were all heard, but YV5BW seems to be the outstanding one from Venezuela. H. M. G. also heard a four-way going on, from which it emerged that HZ1MY is going to operate from British Somaliland—as 6L6MY!!

R. Williams (Co. Offaly, Eire) has been playing with portables, but when he did get on Twenty he heard KV4BB, ZB2A, JY1OG and HZ1TA—all on phone, with a home-built 0-V-2.

A. Deakin (Manchester) has found the band full of DX in the late evening/early morning sessions. His best were FL8MY, PJ2AA, OA4BC, HI6TC, YS2AG, I5GO, 4WIMY and VS1's. A. W. G. Boulton (Norwich) also found 4W1MY, and he heard him later, as FL8MY, saying that he had 631 contacts from the Yemen station. Others heard (on CW) were FP8AP, YS1O, HI1CX and VS5ELA.

O. H. Black (Leicester) remarks on an excellent period between 1600 and 1900 on July 21. Between these hours he logged S9 signals from VQ2, 4 and 5, VS1, 2 and 7, and ZS. He did also find 4W1MY, but missed a CP and OA who were active. G. Moses says JY1OG and YI3BZL have been so consistent that he no longer bothers to log them. He adds that skip has been very erratic, with W's there one moment and GM's the next, and on a few occasions the S-meter has given a crazy performance with stations roaring in and out faster than one could get a call-sign from them. Best of the month were 4W1MY and FP8AM.

C. L. Bradbrook (Alton) was made very happy by the elusive XE station, who fell into his net at last (XE1CQ on phone in the early morning). Other phones logged were CR6BW, CX, HP, HR1SO, KH6, KL7, OA, PJ2AA, YS1DS and 4W1MY. CW also provided some nice ones, such as FB8BB, FF8, FN8AD, FP8AW, FQ8AT, KX6AI, VP8AJ and 4W1MY.

J. A. Crux logged a number of new ones in the short-skip conditions, and now success in the R.A.E. has produced a sudden interest in Morse, so he will become a CW listener at once! J. P. Warren (Croydon), now being clear of exams., has been getting down to it again. He found FL8MY on his second visit and also logged 4W1MY. Others were PJ2AA, CR5AC, HH3L, ZP5CB and 5CF, CP3CB and VP3LF. Still being chased are ZC2MAC (too late now—he's bound for Ceylon!), KW6BD, ZK2AA and KJ6AW.

D. L. McLean has found DX signals generally weak, but plenty of them there, especially during the period 1700-2000. Among others, he logged AP2K, 2L and 2N; CR6, FL8MY, KW6BD, VS1, 2 and 7, VU ZD1 and 2, ZP and 4W1MY. D. L. M. also gives some of the new Paraguayan calls, with the old ones in brackets: ZP5CB (4BB); 5CF (4AF), 5DC (7AW), 6AI (3NB) and adds that ZP5DC does QSL, usually by Air Mail.

P. M. White (Williton) is another who has been held up by exams., but is now in full blast again. His home-built 1-V-2 has been working overtime between 2115 and 2300 GMT and has brought in most of Central and South America. He wants to know when to pick up the rare Pacific stuff. Of course, it is not obeying any normal rules at present, or one would be hearing it most mornings from 0700 onwards; the answer at present seems to be "when you hear it."

R. A. Hawley was lucky with 4W1MY, and apart from him the best loggings were HP1AP and 1TS, KV4BB and VP2AF—all on phone. R. F. Veysey (Cardiff) heard LX1DU (quite a rarity, Luxembourg!) during a period of short-skip, and tells us that VQ4BU is shifting from Nairobi and will soon be opening up as VQ3BU. New countries last month were EA6, ZS and AP.

M. E. S. Birch (Munster) missed FL8MY last time, and says he didn't dare to mention it, when everyone was raving about him. However, on this visit he was rewarded. D. S. Kendall logged VS2, CM9AA, JY1AJ and 4W1MY—all on phone, but took some time off for a holiday.

K. Parvin heard HZ1MY on both his trips, but says the Gotaways were even better, including such nice ones as FP8PM, KB6AO, KW6BD and ZC2MAC—all on phone. MP4BBI was being called, but his QTH is not known. K. P. tells us that the newly-licensed PJ2's are divided into districts by the initial letter of their call, PJ2A being Aruba, PJ2C Curacao, PJ2S Saba, and so on. But, of course, the whole lot of them fall within one country. Still no VK's have been heard, but one ZL (2BE) did come in.

ANOTHER PHONEY?

B. J. C. Brown (Derby) queries the "2Z2AA" appearing in the Calls Heard lists last month. This station was heard describing himself as "on a British ship"—but it seems more likely that he was a plain phoney. B. J. C. B. has found things pretty good except for the Pacific area, and found some new ones in the guise of 4W1MY, AP2K and VQ3CP. Also logged was VQ5CY. He was asking for SWL reports from Arundel, Sussex. VP3HAG turned up again, but there seems to have been a lack of "good ones" from Central America, such as YN, YS, TG and the like.

A. Mills (Warlingham) is a 15-year-old newcomer with a 0-V-0, and in his first two months he has logged some 30 countries, such as TA, OX, PJ, VQ4, VU and all the more usual ones. More reports will follow! R. J. Saunders (Reading) is trying desperately to make his century, but finds new ones hard to come by just lately and the score is stuck at 98! Most consistent station, he found, was VP6MO, with HZ1TA second. Best of the month were HH3L, PJ2AA, EL6A, ZS3V and ZS6LX. The latter was heard at 2240 and the ZS3 at 0615.

K. B. Ranger, after the chaos caused by exams. and also a domestic shift-round, is settling down to DX again. On Twenty (which he thinks has been really good) he has logged HC1FG, VP5AK, ZP5DC, VP6FO and KP4BM (in a late session) and also found HC1FG and KH6GG "blasting in" in the early morning. The Far East, however, was the real star turn, sessions from 1600-1730 being quite rewarding. AP2K and 2N, DU1AL, KR6IB and lots of VU's and VS's have been hooked at this time.

G. A. Anstey (Nottingham) is another "new boy" who has recently acquired an R.1155, and his results are given in his Calls Heard list. D. E. Nunn (Hove) is yet another

HAZ MARATHON 1952

Listener	Zones	Countries
PHONE and CW		
N. C. Smith (Petts Wood) ..	39	182
B. R. Davies (Beckenham) ..	39	161
R. G. Poppi (Beckenham) ..	38	175
R. Booth (Manchester) ..	38	143
C. L. Bradbrook (Alton) ..	37	156
H. Warburton (BAOR) ..	37	139
B. R. J. Pooley (Pangbourne)	37	136
A. W. G. Boulton (Norwich) ..	36	149
D. S. Kendall (Potters Bar) ..	36	140
R. A. Hawley (Goostrey) ..	36	116
F. H. McClymont (Alloway) ..	35	121
O. H. Black (Leicester) ..	33	110
J. Butcher (Blackpool) ..	29	92
R. J. Riding (Wednesfield) ..	28	89
A. O. Frearson (Birmingham)	18	63
A. L. Higgins (Aberkenfig) ..	14	36
PHONE ONLY		
J. P. Warren (Croydon) ..	36	135
C. L. Bradbrook (Alton) ..	36	133
A. W. Tideswell (Stoke) ..	36	123
K. Parvin (Thornton Heath) ..	35	143
R. Goodman (Edgware) ..	35	143
R. G. Poppi (Beckenham) ..	35	128
H. D. Woodward (Manchester)	35	120
G. Moses (Crewe)	34	137
D. S. Kendall (Potters Bar) ..	34	130
I. S. Davies (London, N.13) ..	34	127
L. Corder (Hadleigh) ..	34	124
K. B. Ranger (Strood) ..	34	117
D. Vincent (Beckenham) ..	34	103
D. L. McLean (Yeovil) ..	33	140
S. Smith (Kenilworth) ..	33	114
L. W. Wilkins (Bromley) ..	32	114
R. A. Hawley (Goostrey) ..	32	98
N. Roberts (Launceston) ..	31	117
A. Deakin (Stretford) ..	31	115
C. J. Rourke (Belfast) ..	31	114
A. E. Carter (Romford) ..	31	93
W. J. Barwick (Romford) ..	31	92
R. Booth (Manchester) ..	31	85
B. J. C. Brown (Derby) ..	30	102
J. Stubbs (Cleckheaton) ..	30	96
R. J. Saunders (Reading) ..	29	98
H. J. Hill (Whitley Bay) ..	29	92
H. M. Graham (Harefield) ..	27	97
P. A. Jackson (Bexley) ..	27	91
D. K. Cocking (Farnborough)	27	72
R. J. Woollard (London, N.17)	26	76
A. Jackson (Huddersfield) ..	23	74
P. L. O'Grady (New Zealand)	23	30
W. G. Semmens (Penzance) ..	21	77
F. J. Wooll (Beverley) ..	19	50

newcomer, but he finds it tricky logging the DX through the Continental QRM in the evenings—never mind, that is all part of the fun! KT1OC was heard, running 9 watts of FM, and other consistent ones were KZ5AA, CO2OZ and FA3DS, with VP6, VP3, ZB1 and ZB2 often there.

H. Warburton (B.A.O.R.) found three "welcome newcomers" in 4W1MY, PJ2AA and TG9HW, and a queer one in 15PR—is he genuine?

A. Jackson (Huddersfield) took a poor view of the band, what with short-skip (G's and GW's simply pounding in) and thunderstorms at times (didn't do the eardrums much good)! L. Corder (Hadleigh) puts in a note about PJ2AA, and we all realise, by now, that he is a genuine PJ (fully licensed and authenticated) at last.

D. C. Stace (Spring Creek, N.Z.) has a grand total of 36Z and 142C, *all* on 14 mc phone. His last two countries were KV4BB and HI6TC, and his Calls Heard list, as usual, will show the unusual kind of DX that he thrives on out there in New Zealand.

M. S. Gotch (Saffron Walden) found some nice ones and quotes ZP6AI, YA1AB, KW6BD, PJ2AA, HR1SO and 4W1MY (all phone). He says, "Was pleased to hear 4W1MY, and in the few minutes that I sat back and listened to his excellent signal he worked eight countries straight off. Given an hour of good conditions it was just the place to make DXCC."

C. R. Burchell (Walsall) found phones from HR1SO, KV4BB, XE1VD, YI3BZL, ZD9AA, ZP's and 4W1MY. HZ1TA was the most consistent station of the month.

N. C. Smith found short spells of very good conditions. For instance, round about 1845 GMT on July 26 he heard VS6CM, ZE5JA, TI2TG, HC1JW, OQ5RA, FQ8AG and 8AP, as well as W6, LZ and GI! Gotaways at the same time were LB6XD (Jan Mayen) and FY7YB.

P. A. Jackson found five new ones this month—KR6IB, TI2RC, DU1AL, KL7AFR and VS6BA. He would like to know if there is ever any phone activity in Zones 16-19 and 23. So far as I know, there is not, and if you score 35 this year you have scooped the pool!

D. K. Cocking (Farnborough) found VS6BA, who gave him his 35th Zone after two years of waiting! He was R5 and S7-8 at 1740 GMT.

DX ON OTHER BANDS

N. C. Smith took a look round 7 mc and was pleased to hear ZS6J one morning at 0650 GMT, working a DL; a few minutes later VK2ST and ZL4CK were heard. FP8AM, also on 7 mc, was another surprise. M. S. Gotch logged two new ones on the band—CO8PT and KT1LU, both phone. On one occasion he went on to 3·5 mc, looking for DX, and heard a W3 working a W6, but the latter got away.

B. J. C. Brown found CM2HD on Forty (July 16 at 0505) but he thought band conditions pretty grim, although they seem to be improving now. H. D. Woodward logged HB9GX/MM on Forty, and LB7PC (a Norwegian portable) on Eighty.

SOME TOP-BAND NOTES

It won't be long before this band comes back into its own, but it has been sadly neglected through the spring and summer. One faithful devotee is W. Iball (Wigan), who has found some of the GDX on the band quite interesting. Stations up to 200 miles distant have been received, even in daylight, including GI2ARS at 1907 GMT.

B. J. C. Brown, in Derby, logged two GW stations in the Gower Peninsula, but otherwise he thought the band had deteriorated badly. H. J. Hill has found the band "still hanging on steadily and still well usable—must have been the best summer for years." He tells us that W6OZS is appealing for more use of the band out there, and says there are some twenty-five W6's active; who will be the first to hear one of them?

THE PRIZE FROM SCOTLAND

Last month I mentioned a generous offer from GM2DBX (Methilhill) in connection with the photograph of his station, and the QSL cards on the wall thereof. 'DBX received several entries, which took a lot of sorting out, but he arrived at the following result. First was I. S. Davies (London, N.13); second, D. Robertson (Wick); third, N. S. Beckett (Lowestoft). He has, therefore, forwarded us a cheque which has been credited to I. S. Davies, for a year's extension of his subscription. Thanks, GM2DBX, and congratulations, I. S. D.!

MISCELLANY

A bunch of queries from D. K. Cocking, some of which may be of general interest: (1) Is Tasmania a separate country? *No.* (2) How many countries are there in 5A2? *One.* (3) What is the line-up on ZC1, ZC4, ZC6, MD7 and so on? *ZC1 and JY are both in use for Transjordan, which counts as one country. ZC4 replaces MD7 for Cyprus. ZC6, Palestine, still counts as a separate country from 4X, Israel.* (4) Heard a KA2 recently—is he likely to be a good one? *Could be, as there used to be a KA6 in the Philippines.* But unless U.S. nationals in the Philippines are being licensed with KA callsigns (which doesn't seem likely) he is probably just a phoney. (5) Where does Sicily stand? *Our argument is that if Sardinia*

(IS) is accepted as a country (which it is), there is no conceivable reason for treating Sicily (IT) in a different manner. So it counts, as far as we are concerned.

Finally, Question (6), which is a bit longer. "Is it correct that the Far East stuff heard at about 1800 comes over the short Asiatic land route, while the Pacific at 0600 comes over the long sea route via South America, and that both routes are mainly in darkness at the times concerned?"

The first part is correct, but it is only at certain times of the year that one can describe the routes as mainly in darkness. In the spring and early summer one can often hear W6 and W7 stations at about 1600 GMT, and transmitters with rotary beams can confirm that signals *can* be received by either the long or the short path. Usually the long path produces the steadier and often the stronger signal; but after a while it begins to fade, and then one sometimes finds that short-path signals (in daylight all the way) are stronger. But certainly the W6's heard on *Forty* in the winter afternoons come *via* the long path. A VS2 has also been heard (0830-0900 GMT) coming into the U.K. by the long path—that is to say *via* the Pacific and America.

And that concludes the festivities for this month. Please note that next month's deadline is **first post on August 28.** For the following month the date is *September* 25. Address everything to DX Scribe, *Short Wave Listener & Television Review*, 55 Victoria Street, London, S.W.1. Please put your scores on separate pieces of paper, or cards, and please keep your Calls Heard *entirely* separate from your letters, otherwise it is impossible to dig them out to send separately to the printers. And to BSWL members—please put *your* score claims and news items on separate slips clearly marked BSWL REVIEW. Items for different sections, which are managed by other contributors, can lead to delay, confusion, doubt and disappointment if they are all sent in one letter addressed to the DX Scribe, who deals *only* with "Have You Heard?" in *Short Wave Listener*. So I wish you a good month's listening; 73, BCNU, and best of DX.

RADIO INTERFERENCE SUPPRESSION

Radio Interference Suppression: As Applied to Radio and Television Reception, by G. L. Stephens, A.M.I.E.E. Published by Iliffe & Sons, Ltd. Price 10s. 6d. (postage 5d.). Size Demy 8vo. $8\frac{3}{4} \times 5\frac{1}{2}$ in., 132 pages, 7 Chapters, 4 Appendices, Bibliography and Index, 65 diagrams and photographs.

This practical handbook is an up-to-date guide to the various methods of suppressing electrical interference with radio and television reception. The author, an engineer with extensive experience in this field, describes in detail the origins of interference and the whole theory of suppression technique. He then gives many practical applications. Typical interfering appliances discussed include engine ignition systems, switches, thermostats and contactors, electric motors and generators, rotary converters, lifts, neon signs, fluorescent and other types of discharge lighting, trams, trolleybuses and electric trains, radio-frequency heating apparatus, welding apparatus, oil-fired boilers, television receivers, spectrographic equipment and valve-rectifiers.

Throughout the work, particular attention has been paid to the problem of interference at television frequencies. Special attention is also given to suppression arrangements on motor vehicles and on board ship. Other chapters deal with the design and choice of suppressor components, methods of locating the source of interference, and suppression at the receiver itself. Useful reference data are provided in the appendices.

The book has been written for all who have to deal with suppression, from design engineers who must ensure that new equipment will be interference-free, to service engineers in the field who must cope with specific cases of interference.

CALLS HEARD

GENERAL

28 mc

G. Moses, 65 Railton Avenue, Crewe, Cheshire.

PHONE: CE2CG, CR6BX, LU3DH, 4DMG, TA2VDR, VQ2HN. (*Rx: S.680X.*)

K. Parvin, 98 Winterbourne Road, Thornton Heath, Surrey.

PHONE: CE2CC, CR6BH, 6BX, LU2FR, 3DH, PY3SI, W2ZXM/MM. (*Rx:* 504.)

K. B. Ranger, 89 Station Road, Strood, Kent.

PHONE: CE3LB, 3LE, 3NC, CR6AO, 6BX, CX4CS, IT1ABE, LU1DR, 3DD, 3DH, 3DJE, 3DJZ, 4DNG, 5DZ, M13NA, OQ5VD, PY1AGP, 2KF, 3SI, VQ2DT, W3EU/MM. (*Rx:* 0-*V*-1.)

N. C. Smith, 79 Greencourt Road, Petts Wood, Kent.

PHONE: CE3LE, CR6BX, LU5DZ, 7DC, OQ5BI, PY1AGP, W2ZXM/MM.

S. Smith, 40 Stoneleigh Road, Kenilworth, Warks.

PHONE: CNZAD, CR6BX, EA2DA, 8AX, FA3WW, LU5DZ, MI3LK, VQ2NS, W2ZXM/MM. (*Rx: CR.*100.)

D. L. McLean, 9 Cedar Grove, Yeovil, Somerset.

PHONE: CR6BX, CX2BC, 4CS, LU4DMG, 7AJ, OQ5VD, PY3SY, VQ4BP, W8MY/P. (*Rx: SX28 and AR88LF.*)

J. A. V. Deakin, 11 Cressingham Road, Stretford, nr. Manchester, Lancs.

PHONE: CE3CZ, CR6AB, 6BH, 6BX, 6CB, CX4CS, LU4BF, 5DC, 5DZ, OQ5RM, TA2EFA, W2ZXM/MM. (*Rx: H.R.O. Junior.*)

21 mc

G. Moses, 65 Railton Avenue, Crewe, Cheshire.

PHONE: HB9FP, I1NK, MI3NA, OE5BU, OQ5BQ, PY2CK, 4RJ. (*Rx: S.680X.*)

S. Smith, 40 Stoneleigh Road, Kenilworth, Warks.

PHONE: CT1CF, HB9DS, 9HR, 9SD, I1GX, 1KDR, OE1BU, 7FA, OZ4P, 5DA, 7SP, 8JB, ON4MJ, PAQAL, QKDW, PY1CQT, 4IE, 5ZK. (*Rx: CR.*100.)

Please note these simple rules for sending in your lists of Calls Heard.

28 mc: No Europeans.
14 mc: No Europeans or North Africans, no East Coast U.S.A. or Canada, no PY.

7 mc: No Europeans.

3·5 mc: No Europeans.

1·7 mc: Nothing under 200 miles.

Arrange logs in the form given in this section with (*a*) Prefixes in alphabetical order, but not repeated after the first one; (*b*) Numbers in numerical order and repeated as part of the callsign; (*c*) Callsigns in alphabetical order. For example:—VK2GW, 2ZC, 3CP, 4UL, VP1AA, 2GB, 5BJ, 7NM, VQ4RF, 8AF. Underline each prefix; put your name and address at the head, and type of receiver at the foot; restrict your lists to a total of 25 calls. In short, make them out exactly as those shown herewith, but take as much space as you like. Microscopic writing is neither necessary nor popular. And if you want to use our Calls Heard Report Forms, specially produced for the purpose and supplied free of charge, send a large S.A.E. to the office, with a card marked—"Report Forms, please."

D. S. Kendall, 40 Aberdale Garlens, Potters Bar, Middlesex.

PHONE: OQ5BQ, 5HL, PY1AQT, 4RJ, 7QY.

CW: CE3AG, HK3CK, JY1OG, KG4AF, KP4CC, LU6AX, O5QRA, PY1ADA, 2AO, 2CK, 6DU, VQ4HJP, YU1AG, ZC4RX, 4XP, ZE3JP, ZP9AH, ZS1AX, 5A2CF. (*Rx: HRO.*)

K. Parvin, 98 Winterbourne Road, Thornton Heath, Surrey.

PHONE: FA8BG, OQSHL, PY1AQT, 2AQ, 2CK, 4RJ, 9BR, YV5AB. (*Rx:* 504.)

D. K. Cocking, Farnborough, Kent.

PHONE: F8XP, I1RLH, OE7LA, OQ5HL, PAØQE. (*Rx: S.*640.)

M. S. Gotch, Bridgett's, Widdington, Saffron Walden, Essex.

PHONE: CT1GA, F8XP, HB9FP, I1WN, LX1DC, OE1BU, ON4XU, OQ5BQ, OZ7SP, YU4BN, YV5AB. (*Rx: S.*640.)

J. P. Colwill, Hay Common, Launceston, Cornwall.

PHONE: F8JD, 9GZ, 9IZ, I1ARP, 1BPW, 1NK, 1QW, 1RLH, OQ5BQ, 5HL, OZ4P, 7SP, 7SP, PAØJJ, ØKDW. (*Rx: Vidor CN*361.)

N. C. Smith, 79 Greencourt Road, Petts Wood, Kent.

CW: FA8CR, JY1AJ, 1OG, KP4CC, 4UW, OA4C, OQ5BQ, 5BR, PY2AQ, VQ4AQ, 4HJP, W4COK, ZD6DU, ZE3JJ, 3JP, ZS6BT, 6TE.

C. L. Bradbrook, 29 Geales Crescent, Alton, Hants.

PHONE: FQ8AQ, OE1BU, OQ5HC, OZ7SP.
CW: HB9BD, I1AMO, KP4CC, OE1BU, ON4IL, PY2LM, VQ4BU, 4HJP, W1AJZ, ZC4RX, 5A2CF. (*Rx: S.*750.)

Ron Booth, "Dorna," 281 Fairfield Road, Droylsden, Nr. Manchester.

CW: F3HA, G2ZF, 4XA, 8KP, 8OJ, GI3HBO, HB9LO, I1AMO, KP4CC, LA6U, MI3SL, ON4NC, 4QF, OQ5BQ, PAØIF, ØKL, ØUN, W1OJC, W2AJL, ZE3JJ. (*Rx: Hambander.*)

D. L. McLean, 9 Cedar Grove, Yeovil, Somerset.

PHONE: CX1IW, HZ1MY, OQ5BQ, 5HL, PY1AQT, 2CK, 4RJ, 6ZI, YV5AB. (*Rx: SX28 and AR88LF.*)

14 mc

David Woodward, 16 Abbotsford Road, Chorlton, Manchester, 21.

CE3AE, CM9AA, CO2BL, 2BK, CR6BW, HC1FG, HH2EL, KL7ADR, OX3DC, TA2EFA 2VDR, 3AA, 3GCN, 3MP, TI2TG, VP6CJ, 6MO, 6WR, VQ4NJ, ZD4AX, ZP5CB, 4W1MY. (*Rx: SX24.*)

Graham Moore, 27 Briggs Avenue, Glasshoughton, Castleford, Yorks.

PHONE: CE3LF, CM9AA, HC1FG, HH2PR, HI6TC, KG4AF, OX3MW, 3WX, VP6FO, 6JC, VQ4BU, YI3BZL, YV5BZ. (*Rx: Modified R.*1155.)

F. J. Wooll, 101 Holme Church Lane, Beverley.

CE2CC, CN8FF, EA6AP, EA7CJ, 7DA, HZ1AB, 1TA, SU1JP, 5EB, TA3AA, 3MT, VE8MA, VS1DQ, ZB2A, ZP5DC, ZS6KD, 6YZ, 5A2TN, 2TS.

G. Moses, 65 Railton Avenue, Crewe, Cheshire.

PHONE: AP2K, CX1CL, EL9A, FF2AG, FP8AM, HC1FG, HH2AL, HK4BS, HR1UA, KG4AU, KL7AFR, KV4BB, KZ5AR, OA4BC, PJ2AA, TI2TP, VP3HAG, 7NT, VQ3CH, VS7WA, VU2NG, XE2KW, XZ2KN, ZD4AX, 4W1MY. (*Rx:* *S*.680*X*.)

J. A. Crux, 392 Bury Road, Rochdale, Lancs.

PHONE: EA6AR, 8AW, 8AY, EL9A, HI6EC, JY1BB, OQ5BQ, SU1JP, 5EB, SVØWR, VS1DQ, 7BR, 7FG, ZC4XP, ZP5CB, 4W1MY, 4X4CZ.

H. M. Graham, 28 Park lane, Harefield, Middx.

PHONE: CE3FG, CM9AA, CR6BC, HC1LM, HH3L, HK4ES, HP1TS, HZ1MY, KL7AFR, KV4BB, KZ5AA, OQ5VD, PJ2AA, SU5EB, TF5SV, TI2OEC, VP6CJ, 7NP, 9BE, VQ3CP, 4ASC, 5DQ, VS7LB, YS1CM, YV8AG, ZP5DC. (*Rx:* 1-*V*-1.)

P. M. White, School House, Williton, Som.

CE2CC, 2HL, 3AE, 3LE, 5AM, CM9AA, EL3EI, 4HQ, HP1LA, KP4AZ, 4FP, LU1JG, 3DBX, 4AA, 5TZ, 7DX, 8FAO, VP6FO, 6WR, VQ4CO, YV1AA, 3AU, 5BY, ZP5CF, 5DC, 5PN. (*Rx:* 1-*V*-2.)

C. L. Bradbrook, 29 Geale's Crescent, Alton, Hants.

PHONE: CR6BW, CX2AS, HC2LF, HI6EC, HP1LA, HR1SO, KH6BY, 6IJ, KL7AFR, KV4BB, OA4AT, 4SO, OX3BD, PJ2AA, TF5SV, VP6KM, 6WR, VQ2DC, VS1DS, VU2BN, XE1CQ, YV1AN, ZD2TTE, 4AX, 4W1MY.

CW: CX1BZ, FB8BB, FF8AJ, 8AN, FN8AD, 8AG, FP8AN, FQ8AT, I5PR, JY1AJ, KS6ES, KX6AI, KZ5AA, MD6BZL, MP4BBD, 4BBI, OQ5RA, PJ2AA, UC2KAB, UP2KBA, UQ2AN, VP8AJ, VS7RF, ZC4NN, ZE2JY, 4JW, 4W1MY. (*Rx:* *S*.750.)

Neil Roberts, "Aspen View," 29 Race Hill, Launceston, Cornwall.

PHONE: CE3AE, 3MJ, EL9A, HP1LA, KV4BB, KZ5IK, MI3KE, PJ2CB, SU5CC, 5EB, VP6CJ, 6MO, 6SD, 9AX, VQ2DT, 3CP, 4AQ, 4BU, 5DQ, YI3BZL, YV5AB, ZP5BC, 5CF, 4W1MY, OD5AO. (*Rx:* *S*.750.)

R. F. Veysey, 14 Richs Road, Birchgrove, Cardiff.

PHONE: AP2K, HZ1AB, IMY, JY1OG, OD5AS, OX3WX, PY4EJ, SU1JX, 5EB, TA3AA, TF5SV, VQ4AA, 4AQ, 4BU, 4CI, 4CO, 5DQ, YI3BZL, ZC4RX, ZS6BW. (*Rx:* 5 *valve domestic Murphy*.)

A. P. Allchin, 52 Skelmersdale Road, Clacton-on-Sea, Essex.

PHONE: AP2K, CM9AA, CP1DX, FF8CN, FL8MY, HZ1AB, 1SD, 1TA, MI3LK, OD5AD, OX3EL, TA3GCN, 3MP, VQ2AC, 2HA, 3CP, W6NIC, ZC6UNJ, ZD4AX, ZS1BE, 4W1MY, 4X4RE. (*Rx:* *Domestic Murphy*.)

K. B. Ranger, 89 Station Road, Strood, Kent.

PHONE: AP2K, 2N, DU1AL, HC1FG, HZ1AB, JY1OG, KH6GG, KR6IB, OX3PM, VQ2DT, 3CP, VP5AK, VS1CZ, 1DQ, 2CR, 2DB, 7LB, 7WA, VU2BN, 2DB, 2DX, YI3BZL, ZC4RX, ZP5DC, 4W1MY. (*Rx:* 0-*V*-1.)

K. Parvin, 98 Winterbourne Road, Thornton Heath, Surrey.

PHONE: AP2K, 2L, CP3CB, 5EP, CR6AJ, 6BC, 6BW, FF8AP, 8CG, 8CN, FL8MY, HR1SO, JY1AJ, 1OG, KH6GF, 6GG, KL7AFR, KR6IB, PJ2AA, 2AD, 2CA, VQ3CP, VS6BA, VU2DZ, 4W1MY. (*Rx:* 504.)

C. R. Burchell, 109 Dartmouth Avenue, Walsall.

PHONE: AP2K, CE2CC, CR4AJ, FF8AR, HC2LF, HP1LA, HR1SO, HZ1AB, 1MY, I5SG, JY1OG, KG4AU, KV4BB, KZ5AA, OA4AI, 4M, TI2CAF, VQ3CP, VS1DQ, 1DS, 2BS, 2DB, VU2BH, XE1VD, YI3BZL, YK1AC, ZD4AX, 4BF, 9AA, ZP5CF, 6AI, 4W1MY. (*Rx:* *H.M.V.* 1120.)

M. S. Gotch, Bridgett's, Widdington, Saffron Walden, Essex.

PHONE: AP2K, 2M, CM9AA, CR6EC, DU1AL, HC1FG, HP1BR, HR1SO, HZ1TA, JY1OG, KH6GF, KL7AFR, KP4HX, KV4BB, KW6BD, KZ5AA, OA4M, PJ2AA, VK3OP, VP9AX, VQ3CP, 4CO, 2DT, 5DQ, VS1DQ, 1DS, 7ES, 7LB, VU2BN, XE1CQ, YA1AB, YI3BZL, ZC4RX, ZD4AB, ZTTE, ZL2BE, 4W1MY. (*Rx:* 13 *valve Super*.)

R. J. Riding, "Trewatha," Fibbersley, Wednesfield, Nr. Wolverhampton, Staffs.

PHONE: CE2CC, 6AO, CO8MP, HZ1AB, KV4BB, LU2BS, 4DD, MI3KE, OD5AD, OX3MP, PJ2AA, 2CB, VP6MO, ZC4RX, ZP5DC. (*Rx:* *Battery* 1-*V*-1.)

J. P. Colwill, Hay Common, Launceston, Cornwall.

PHONE: AP2K, CM9AA, CO2BL, 7RO, HC1FG, HZ1TA, JY1OG, KP4EE, OD5AM, 5AS, OQ5ER, PJ2AA, SU1GG, 5EB, VP6SD, VQ4AA, 4AC, 4CO, 4CRM, VS7LB, 7WA, YI3BZL, ZC4RX, ZS1BV, 4W1MY. (*Rx:* *Vidor CN*361.)

D. C. Stace, Spring Creek, New Zealand.

CM9AA, CN8FE, 8GF, DL1XY, 4CG, 4IH, F8YZ, HB9MS, HI6TC, HP3FL, I1CGU, 1GX, JA2CC, ØIJ, KG6ABW, KH6AFN, KJ6AW, KL7ADR, KM6AX, KV4BB, VE4AJ, 5AS, 7BF, VK1RG, 2JZ, 3NV, 4HG, 4BG, 5ED, 5HP, 6MK, VP5AA, W1JI, 2ANH, 3RIS, 4DQH, 4SFW, 5SGH/FK8, 5GXP, 5IBE, 6DFJ, 6FFN, 7ADS, 7HQY, 8BP, 8EUC, 8IIP/W7, 9BVX, 9JIC, ØFDY, ØZEP, XE1AL.

P. A. Jackson, 34 Blandon Drive, Bexley, Kent.

PHONE: CE2CC, DU1AL, EL9A, FQ8AI, HC1FG, HP1LA, HZ1AB, 1TA, KR6IB, KV4BB, KZ5AA, LU4DMG, 6AJ, TI2RC, VP6SD, VQ4AA, 5DQ, VS2BS, 6BA, 7LB, W6SHW, ZD2TTE, ZP5BV, ZS6OY, 6Z. (*Rx:* 8 *tube Super*.)

B. J. C. Brown, 196 Abbey Street, Derby.

PHONE: AP2K, CO2OZ, HC1FG, HZ1TA, KP4HF, LU8FAO MI3LV, OA4CH, OX3BC, 3EL, TF5SV, VE4NI, 7AFL, VP3HAG, 6JC, 6WR, VQ2DC, 3CP, 5CY, VS7LB, YV1AP, ZP5CB, ZS6BW, 4W1MY. (*Rx:* *S*.740.)

S. Smith, 40 Stoneleigh Road, Kenilworth, Warks.

PHONE: AP2K, CX2CO, EQ3AL, FN8AQ, HR1SO, KV4BB,OA4AX, SU1TX, 5EB, TA2EFA, 3GCN, VQ2DC, 4AA, 4AC, 4BU, 4ERR, 5AV VS7LP, VU2NG, XE1AC, ZC4RX, 4XP, 6UNJ, ZD2TTE, 4AC, 4X4BO, 5A2CD, 2TO, 2TY. (*Rx:* *CR*100.)

S. G. Gorham, 12 Lloyd Drive, Greasby, Wirral, Cheshire.

PHONE: CE2CC, 3LE, CM9AA, EA8AW, HC1FF, 1FG, HP1EV, HR1SO, JY1AJ, 1OG, KV4BB, MI3LV, OX3WX, SU5EB, VP6FO, 6JC, VQ4BU, 4CI, 4CO, YI3BZL, YV1AA, ZP5CF, 5DC, ZS6OW, 4W1MY. (*Rx:* 5 *valve Phillps*.)

D. K. Cocking, 2 Meadow Way, Farnborough Park, Kent.

PHONE: AP2K, CO2IB, KZ5AR, LU4DD, 6AJ, SU5EB, VP6MU, VQ5CY, 5DQ, VS6BA, VU2DZ, YI3BZL, YU1AC, ZC4RX. (*Rx:* *S*.640.)

C. R. Johns, "Bretton," 22 Paddington Grove, Northbourne, Bournemouth, Hants.

CW: CE2CC, CO2BL, 2WV, CM9AA, EA6AR, EL9A, HZ1AB, 1TA, SU5EB, TA2EFA, 3AA, TF5SV, VQ4AA, 4BU, 4CO, YI3BZL, YV3AU, ZB1AIS, 1BJ, 1BZ, ZB2A. (*Rx:* 0-*V*-1.)

A. Deakin, 11 Cressingham Road, Stretford, Nr. Manchester, Lancs.

PHONE: AP2K, 2N, FL8MY, HI6TC, I5GO, KL7AFR, K5AIR, OA4BC, OQ5CQ, PJ2AA, TI2EV, 2RC, 2TG, VE4QI, 8MA, VSIDQ, 1DS, W6BAX, 6DI, 6EKK, 6TYI, 7AJS, ØDST, YS2AG, ZP5DC 4W1MY. (*Rx:* *H.R.O. Junior*.)

J. Butcher, 27 Westfield Road, South Shore, Blackpool, Lancs.

PHONE: CE3CZ, HZ1TA, KL7AFR, LU2BG, 4DD, PJ2AA, SU5EB, SVØWX, TA2EFA, VQ4AA, 4BU, 4CI, 5CC, YI3BZL, ZC4RX, ZP5DC, 3V8AS.

CW: KP4AO, LU7EZ, SU1GG, 4X4BT, 4RI. (*Rx: Home built 1-V-1.*)

J. P. Warren, 14 Francis Road, W. Croydon, Surrey.

PHONE: CP3CB, CR5AC, FL8MY, HH3L, HP1TS, JY1BB, 1OG, KH6IJ, KL7AFR, KR6IB, KV4BB, PJ2AA, VE8MA, 8RO, VP3LF, 9G, VQ2DT, 5DQ, VS1DQ, VU2BH, XZ2KN, ZD1SS, 4AX, ZP5CB, 5CF, 4W1MY. (*Rx: R.*103/*RF*24.)

D. L. McLean, 9 Cedar Grove, Yeovil, Somerset.

PHONE: AP2K, 2L, 2N, CR6BW, 6BX, FL8MY, KW6BD, KV4BB, PJ2CB, VE8MA, VQ5DQ, VS1DQ, 2CR, 7LB, 7SP, 7WA, VU2BH, 2DZ, YI3BZL, ZD1SS, 2TTE, 4AB, 4AX, 4BF, ZP5CB, 5CF, 5DC, 4W1MY. (*Rx: SX*28 *and AR*88*LF.*)

Ray A. Hawley, "Torview," Brookfield Crescent, Goostrey, Cheshire.

PHONE: 4W1MY, CE2CC, 3CZ, CO2AC, HP1AP, 1TS, HZ1TA, KV4BB, LU2NC, 4CN, 5EB, OX3EL, PY2XZ, 4ACZ, 7EZ, SU5EB, VE8MA, VP2AF, VQ4CO, YI3BZL, YV1AA, ZB2A, ZC4RX, ZP5CF, 5DC. (*Rx: AR*-88 *and S.*504.)

W. G. Semmens, "Lancarffe," 26 Trescoe Road, Long Rock, Penzance, Cornwall.

PHONE: HC1FG, HP1JF, HZ1TA, KP4KC, OA4M, OD5AS, PJ2AA, SU1AF, VK2HK, YV3AU, ZC6UNJ, 4X4AT. (*Rx: R.*208.)

G. N. Anstey, 82 Hadbury Road, Nottingham.

PHONE: EA8AY, HIGTC, HZ1TA, JY1OG, KG4AA, KT1LU, KV4BD, LU7DX, 8FAO, 9AF, OD5AS, SU5SB, TI2RC, TA3AA, VPGWR, VQ4BU, 4CO, YI3BZL, YV5BJ. (*Rx: R.*1155*N.*)

H. Warburton, Munster Lager, B.A.O.R.

CW: FF8AG, FQ8AP, I5PR, PY7LN, SU1FX, VK3KS, VQ4BU, VU2CM, W6NIG, YUA, 7BUW, CVE, OPO, ZE5JA.

PHONE: AP2K, CR6BF, HC2IL, 2OM, HI6EC, HK4DF, 4FV, HP1EV, 1FF, JA2OM, PJ2AA, SU1JP, TG9HW, VS7YL, VU2BF, 2NG, W5BGP, MMK, 6SHW, 7AUS, BAC/6, EKA, GUI, HIA, MBX, XE2FC, YK1AC, 4W1MY. (*Rx:* 11 *tube Super.*)

A. Jackson, 57 De Lacy Avenue, Almondbury, Huddersfield.

PHONE: HZ1CS, 1TA, KV4BB, LU2DBX, 6AJ, SU5EB, VP6FO, VQ4CO, 4ERR, YI3BZL, ZC4RX, ZP5CF. (*Rx:* 0-*V*-0.)

M. E. S. Birch, Munster, B.A.O.R. 12.

PHONE: FL8MY, OX3PM, VK5RN, VP6MO, W6BAX, 7AUS, 7H1A, ZD4BF. (*Rx: HRO.*)

R. A. E. Fronius, Brentwood Hall, Brentwood, Essex.

PHONE: AP2K, 2M, CN8FQ, 8FR, EA8AW, 8BE, FL8MY, FM7BI, HZ1MY, IM7J, KG4AB, KP4HX, 4WL, LU4FB, OD5AS, TA3AA, TI2PG, VK3HL, VQ2DC, 4CO, YV5CI, ZL4FO. (*Rx:Sx*17, *Telefunken T.E. "B".*)

N. C. Smith, 79 Greencourt Road, Petts Wood, Kent.

CW: CP1BK, FI8AB, FO8AB, KG6GX, KH6ACD, 6EV, KR6IG, 6IN, KS6AA, PJ2CC, UAØKKB, VS6CM, ZD2JAB, ZP9AH, ZS8MK.

PHONE: AP2K, CE3CK, CR5AD, 6AJ, 6BC, HK4DF, OA4AM, 4BC, PJ2CD, TG9RV, TI2CR, VP7NT, VU2BU, 2DZ, ZD4AX, 4BF, ZP5BB, 5CF, 4W1MY. (*Rx:* 750.)

7 mc

R. D. Lancaster, 4 Coughton Lane, Coughton, Warks.

PHONE: LA1DC, OA4MA. (*Rx: No.* 18 *Mk III.*)

N. C. Smith, 79 Greencourt Road, Petts Wood, Kent.

CW: CE3AE, CO8AI, 8AQ, FP8AM, K5FBB, LU8EE, OY3IGO, PY4FI, 7QI, SUIGG, TI2TG, UA9KCA, 9KCC, UG6KAA, VK2AX, 2ST, VP6AG, 7ND, W5TCI, 5TQO, ZL2IQ 4CK, 4FM, ZS6J, 4X4DH.

3·5 mc

B. J. C. Brown, 196 Abbey Street, Derby.

PHONE: W1CNT, 4CH, 5ONV' 5OSP. *Rx: S.*740.)

N. C. Smith, 79 Greencourt Road, Petts Wood, Kent.

CW: K4AF, KN2AHE, KP4ON, 4QR, OY3PF, VE1XE, 2GF, W4AEK, 4SAI, WN1UNV, 1VOK, 1VUF, 2FRR, 2MSD, 3TNZ, 4VPN, 4VSR, 4VTJ, 4VZW, 4WSJ, ZS2HI. (*Rx: S.*750.)

PSE QSL

The operators listed below have informed us that they would like SWL reports on their transmission, in accordance with the details given. All correct reports will be confirmed by QSL card. To maintain the usefulness of this section please make your reports as comprehensive as possible.

CO6NF *P.O. Box* 136, *Las Villas, Las Villas, Cuba.* 14 mc CW and phone, 2100-0200 GMT. Any chirp: details of modulation.

CR6AJ *Adelino dos Santos, C.F.B., Lobito, Angola.* 14 and 28 mc phone and CW, 1200 and 1900 GMT.

CT1FY *Rua da Constituicao* 379, *Porto, Portugal.* 14 mc phone, operating 2000-2359 GMT.

CT1GE *Rua de Cedofeita* 271, *Porto, Portugal.* 3·5, 7, 14 and 28 mc phone, 0800-0900, 1100-1200 and 2000-2359 GMT.

CT1ST *Av. Almirante Reis* 11-5, *Esq., Lisbon, Portugal.* 3·5, 7, 14 and 21 mc phone and CW, 2100-2359 GMT.

DL1HD *Frankfurterstr,* 92, *Seligenstadt/Hessen, Germany.* 7 mc CW, 14 mc phone; 1700-2100 GMT. Stability; any chirp: details of modulation.

DL1MS *Luetzowstr.* 58, *Hagen, Germany.* 3·5, 7, 14 and 28 mc phone and CW, 1400-1900 GMT.

DL2QT *W/O.I Earl, HQ Sqdn., 7th Arm. Div. Sig. Regt., B.A.O.R.* 32. 3·5, 7 and 14 mc CW, weekends.

DL3SC *Nachbarsweg.* 22*a*, *Mulheim/Ruhr, Germany.* 14 mc phone and CW, 1500-2130 GMT.

DL4BP *B. K. Lubinski, APO.* 696, *c/o P.M., N.Y.C., U.S.A.* 14 mc phone, 1500-2359 GMT. Modulation.

DL6RA *Schoengeisingerstr.* 51, *Fuerstenfeldbruck/Bay, Germany.* 14 and 21 mc phone, 1200-1500 and 2200-0100 GMT. Stability and modulation.

DL6US } *Vogelbeerenweg.* 6, *Hamburg* 39, *Germany.*
DL6USA ∫ 3·5, 7, 14 and 28 mc phone, weekends. Comparative reports: details commercial QRM.

DL6XT *J. Birner. Gessenberg Post Waging,* 13*b, Germany.* 7 mc CW, 1900-0400 GMT. DX reports.

DL9FO *Schulze-Delitzschstr.* 46, *Pforzheim, Germany.* 3·5, 7, 14, 28 and 144 mc phone and CW.

DL9NJ *Moerserstr.* 61, *Homberg, Germany.* 28·0-29·7 mc phone and CW, afternoons and evenings.

DL9NM *Stefasntr.* 28, *Nuernberg, Germany.* 3·5, 7, 14 and 28 mc CW, 0600-0800 and 2100-0100 GMT.

DL9OF *Beiden Kornschrammen.* 17, *Nordlingen/Bay, Germany.* 3·5 mc CW, operating at 2100 GMT.

F8WS *Rene Armand. Remoncourt, Vosges, France.* 7 and 14 mc CW and phone, 0600-1300 and 1500-2000 GMT. Modulation reports.

G2BBZ 174, *Holders Hill Road, Mill Hill, London. N.W.7.* 1·7, 3·5, 7, 14 and 28 mc phone, 21 mc CW; 0600-0900, 1230-1330 and 1700-1900 GMT.

G2CMH 158, *Upper Lewes Road, Brighton,* 7, *Sussex,* 14 and 21 mc CW, 1900-2200 GMT, weekends 0900-1300 GMT. Reports from Far East.

G3BH 21, *Bramwell Avenue, Prenton, Birkenhead, Cheshire.* 7000-7150 kc CW and phone, 0900-1230 and 1800-1900 GMT. Signal strength and QSB.

G3CMH *c/o* 9, *Cedar Grove, Yeovil, Somerset.* 1·7, 3·5, 7, 14, 21 and 28 mc phone and CW, Wednesdays 1830-2130 GMT and weekends. Speech quality and modulation.

G3FGN 6, *Eldon Square, Newcastle-on-Tyne.* 3·5, 7 and 14 mc CW, weekends.

G3HRK *Rhe Wilderness, Grove Road, Holt, Norfolk.* 14 mc CW, 1600-2359 GMT. DX reports only.

G3IGZ 39, *Dunkery Road, Eltham, London, S.E.9.* 1·7 and 3·5 mc CW reports, outside England, 7 and 14 mc CW reports, outside Europe.

G3IPM 103, *Claybrook Road, Hammersmith, London, W.6.* 7 mc CW. Comparative and DX reports.

G8JC 4, *Kennels Road, Station Road, Fernhill Heath, Worcester.* 1·8-1·9 mc CW and phone, evenings. Reports from the North, East and West.

HB9KH *P. Weber. Hohlgasse, Meilen, Switzerland.* 14, 21 and 28 mc phone and CW. Speech quality.

I1DAJ *Dott. Carlo Winspeare, Depressa di Tricase, Lecce, Italy.* 14 and 28 mc phone.

I1MA *Via S. Pietro.* 5, *Bolzano. Italy.* 7010 and 14020 kc CW, QRP, 1200-1400 and 1800-2349 GMT.

IS1CYZ 53, *Matteotti Street, Iglesias, Sardinia.* 7, 14, 21 and 28 mc phone, 0900-0100 GMT.

KZ5TT *Box* 387, *Coco Solo, Panama Canal Zone* 14240, 14298 and 28575 kc phone and CW, 1800-2200 GMT. Any ripple: modulation details.

KZ5WD *Box* 94, *Corozal, Panama Canal Zone.* Reports on 28 mc phone, operating weekends.

LU9PC *Ameghino.* 99, *Desamparados. San Juan, Argentina.* 3·5, 7, 14 and 30 mc phone and CW, operating 1200-1600 GMT.

LX1DO 126, *rue de Luxembourg, Esch s/Alzette, Luxembourg.* 3·5, 7, 14 and 28 mc phone, 0600-0800, 1100-1400 and 1900 GMT onwards.

ON4GP *Vladimir.* 37, *Rue W. Churchill, Courcelles, Belgium.* 7 and 14 mc CW, 0500-0700 and 0800-1000 GMT.

OQ5CP *P.O. Box* 396, *Elisabethville, Belgian Congo.* 14 mc phone, operating 1500-2100 GMT.

OZ4FB *Willemoesgade.* 39, *Aarhus, Denmark.* Reports on 7, 14 and 21 mc CW and phone.

PY1RF *P.O. Box* 54, *Petropolis. Estado do Rio de Janeiro, Brazil.* VFO-controlled 14150 and 14250 kc phone, 2100-2330 GMT.

PY2AKA *Rua Dr. Penaforte Mendes* 45, *Sao Paulo, S. Paulo, Brazil.* 14200, 21272 and 28350 kc phone and CW, 1800-1900 GMT and weekends. Comparative reports and modulation details.

PY2XZ *P.O. Box* 103, *Goiania, Goias, Brazil.* 14150-14200 kc phone, 2130-2230 GMT.

PY4PC *Rua Israel Pinheiro* 4, *Caete, M. Gerais. Brazil.* 14·2-14·3 mc phone, 2100-2359 GMT.

SL5BO *P.O. Box* 12150, *Stockholm.* 12, *Sweden.* 3·7-3·9 and 7·1-7·2 mc phone. 1050-1125 GMT and evenings. Details of modulation.

SM6BER *Box* 736, *Dals-Langed, Sweden.* Reports on 7 mc CW operation.

VE2AAU 8535 *Drolet, Montreal, Quebec, Canada.* 7010, 7023, 7012·5-7036 kc, and 28 mc, CW and NB.FM phone.

VE2ACM 163, *Kings Road, Valois,* 33, *Quebec, Canada.* 14 and 28 mc phone, 2300-0300 GMT. Modulation.

VE2ADQ *Apt.* 4, 2950, *Barclay Avenue, Montreal,* 26, *Quebec, Canada.* 7 and 14 mc CW, 2200-0300 GMT, weekends 1100-0300 GMT.

VE2AFC 132, *Aberdeen Street, Quebec City, Canada.* Reports on 14 and 28 mc phone and CW, operating 0001-0500 and 1200-1700 GMT.

VE2AND 314, *Rue Arago, Quebec City, Canada.* 14·15-14·2 mc phone, at 1730, 1930, 2130 and 2330 GMT. Speech quality and modulation.

VK2BQ *G. C. Page. Richmond Street, Tumut, N.S.W., Australia.* 21 mc phone, 14 and 21 mc CW; operating 0900-1400 GMT.

VK2JO 10, *Simpson Street, Bondi, Sydney, N.S.W., Australia.* 7026, 14052 and 28104 kc phone and CW, 0400-1400 and 2000-2200 GMT.

VP8AI *A. S. Betts. Pebble Island, Falkland Islands.* 3550 kc CW, operating 0001-0200 GMT.

VQ4CO *Box* 3224, *Nairobi, Kenya.* Operating phone mainly, all bands. Enclose I.R.C.

VQ4CW *M. C. Pavely. c/o Standard Bank of S. Africa, Ltd., Nairobi, Kenya.* 7010, 14020 and 14168 kc phone and CW, 1700-1900 GMT, weekends 1700-2200 GMT. Speech quality and modulation.

VQ5DQ *P.O. Box* 391, *Kampala, Uganda.* Reports on 7, 14 and 28 mc phone and CW.

VR1B *S. Silver. Tarawa, Gilbert and Ellice Islands.* 14 mc phone and CW, 0400-1100 GMT.
VS1EU 12, *Orchard Road, Singapore, Malaya.* 14 mc phone, operating 0900-1300 GMT.
VS1EV *F/O. W. Blanchard. Officer's Mess, R.A.F. Changi, Singapore,* 17, *Malaya.* 14150-14350 kc phone, 1200-1800 and 2130-2359 GMT. Modulation.
W1COC 4, *Prospect Street, Penacook, N.H., U.S.A.* 14 and 21 mc CW, weekends 1000-1800 GMT.
W2DOD 60, *Peart Avenue, Rochester,* 9, *N.Y., U.S.A.* 7000-7070 kc CW, 0300-0500 GMT. Comparative reports: any echo, flutter.
W2RDO 109, *Toylesome Lane, Southampton, N.Y., U.S.A.* 3610 kc CW, 0400-2000 GMT.
W2TVR 908, *Arnold Avenue, Utica,* 4, *N.Y., U.S.A.* 21020 kc CW, weekends 1700-2200 GMT.
W2YHY 2985, *Ocean Parkway, Brooklyn,* 35, *N.Y., U.S.A.* 14 mc CW. 0300-0800 and 1300-1800 GMT.
K3NRU *R. L. Burton, USNRTC, Williamsport, Pa., U.S.A.* 3505, 7020, 14020 and 14072 kc CW, operating 1700-2300 GMT.
W4FPK 181, *N.W. 47th Avenue, Miami, Fla., U.S.A.* 7000-7015 kc CW, 0100-0400 GMT; 14000-14050 kc CW, 2130-2300 GMT. DX reports of keying legibility at 35-45 w.p.m.
W4IIL 3850, *N.W. 35th Avenue, Miami, Fla., U.S.A.* 3850-3950 and 14210-14250 kc phone.
W5GAN/MM *Otis K. Lovette. P.O. Box* 849, *Port Arthur, Tex., U.S.A.* 28000-29450 kc phone and CW, 1800-2359 GMT. Speech quality.
W5IX 1412, *Blodgett Street, Houston,* 4, *Tex., U.S.A.* Reports on 14 mc phone and CW.
W9ATE 1215, *N. Gladstone Avenue, Indianapolis, Ind., U.S.A.* 14 mc phone and CW, 0001-0400 GMT.
YU4BN *Post Box* 420, *Sarajevo, Yugoslavia.* 3·5, 7, 14, 28 and 144 mc phone and CW.
YV1AI *Calle Churuguara* 33, *Coro, Falcon, Venezuela.* 7 and 14 mc phone and CW.
YV2AM *J. Rincon. Radio Office, Merida, Merlda, Venezuela.* 7, 14, 21 and 28 mc CW and phone.
ZC4MH *M. W. Heffernan. Cyprus Broadcasting Service, Nicosia, Cyprus.* 14 and 28 mc phone and CW, 1800-2100 GMT. Modulation reports.
ZC6AG *Andre Gielis. Belgian Consulate General, Jerusalem, Palestine.* Reports required on 14 mc phone, operating 1500-1900 GMT.
ZD4BB *G. Wilcock. P.O. Box* 140, *Accra, Gold Coast.* 14140 and 14348 kc phone, Wednesdays and Fridays 1700-1800 GMT.
ZD6HN *H. J. Nolan. P.O. Box* 41. *Zomba, Nyasaland.* Reports on 7, 14 and 28 mc phone and CW.
ZE4JT 19, *New Africa House, Union Avenue, Salisbury, S. Rhodesia.* 7 and 14 mc CW, 1600-2000 GMT. Stability and speech quality.
ZE4JZ *D. J. Parry. B.S.A.P., Box* 5, *Causeway, Salisbury, S. Rhodesia.* VFO-controlled 14180-14280 kc phone, 1400-2359 GMT. Modulation.
ZE5JP *Transmitters, R.A.F., Kumalo, Bulawayo, S. Rhodesia.* 7000-7050 and 14000-14100 kc CW, operating 1770-2200 GMT.
ZS5LU *P.O. Box* 2228, *Durban, Natal, S. Africa.* 7 and 14 mc phone and CW, 1600-2200 GMT.
ZS5LX 124, *Church Street, Pietermaritzburg, Natal, S. Africa.* 3·5, 7 and 14 mc phone and CW.
ZS6VA 108, *Clovelly Road, Greenside Ext., Johannesburg, S. Africa.* 7, 14 and 28 mc phone and CW. Details of modulation.

NEW RADIO DRY BATTERIES

Seven popular new all-dry low tension batteries in attractive new-style cartons have been introduced into the G.E.C. Blue Label range of radio dry batteries. At the same time two new layer batteries have been added to the Red Label range of The General Electric Co., Ltd.

All of these batteries are designed for the latest battery portable and combined mains/battery operated receivers. Full details of all nine batteries are shown on leaflet BB.1721 obtainable from The General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.

★ ★

BRITISH RAILWAYS FIT SUPPRESSORS

Suppressors have now been fitted to all British Railways petrol-driven road motor vehicles operating in the area to be covered by the new television transmitter at Wenvoe in South Wales, to minimise interference with programmes.

Road fleets operating within range of television stations at Alexandra Palace, Sutton Coldfield, Holme Moss and Kirk O'Shotts have all been similarly equipped. The total number of British Railways vehicles fitted now exceeds 11,000—at a cost of £3,000.

BOOK SALES DEPARTMENT

The business formerly conducted by Gage & Pollard at 55 Victoria Street, S.W.1, has now been taken over by Short Wave Magazine, Ltd. In future our new Publications Dept. will handle all radio book sales, including the *Radio Amateur Call Book* and other agencies operated by Gage & Pollard. Orders and enquiries for American radio books and periodicals, subscription renewals, and new subscription orders should be addressed to: Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1. Good stocks are held and most books (but *not* magazines) can be despatched by return.

THE VHF END

by **A. A. MAWSE**

Marathon Contest Comment—

Conditions Generally Good—

Many New Stations Reported—

Calls Heard and The Tables—

REPORTS for the last month confirm that conditions have been generally good, with some flashes of brilliance—as when DL and OZ were coming into the Midlands—and that they were better in the South than up North. By "generally good," of course, we mean that the 100-150-mile stations have been regularly available when on, that G5YV (Leeds) has continued to spread his mantle over the whole of the South, and that EI2W has been getting plenty of QSO's with G stations in the Midlands and South.

The first leg of our Marathon Contest over the week-end (July 19-20) met with conditions no better than average, which meant that activity was apparently low. In fact, this first leg did not have the support that was expected, either from Transmitters (15 logs) or from SWL's (two entries only!). However, that does not matter much—though it is always a pity from the organisers' point of view—because, for one thing, there are still three legs of the Marathon Contest to go, and, for another, we shall in the end have gained a pretty accurate impression of the general reaction to the whole Contest theme.

Those gallant SWL's who did their stuff for the first leg were A. W. Blandford (Mitcham) with 187 points, and M. McBrayne (Westcliff-on-Sea) with 102. If all the other SWL's who, for various reasons had to explain that they could only put in a short period of listening, had sent in a score for what they did hear, we should just about have had our ten SWL entries!

However, the logs from A. W. B. and M. McB. are very interesting. The former heard 11 different counties on Two, with G5YV as best DX; the number of stations logged to score totalled 29. A. W. B. was also able to listen on 70 cm, the three stations heard—G2DD, G3FD and G4CG—giving him 16 points in two counties. For M. McBrayne, who is not well placed with regard to the main areas of activity, the best DX was ON4BZ (Brussels); he heard nine G counties and logged a total of 23 different stations.

The next leg of the VHF Marathon is August 23-24 (*see* Rules and Log Form on p. 250 of the last issue), and we would ask all SWL's who are able to put in any time at all over this period to send in a score. (These should be received by September 3 for Contest purposes.)

Individual Reports

In spite of the disappointing fact that we are unable to show a Contest entry table, this month is nevertheless high-lighted for us by the largest total of SWL VHF reports ever received for this feature—12 in all. Here is a quick run through them:—

W. C. Askew (Melton Mowbray) was delighted to hear DL6SV, on July 24, for his first German station. This makes him seven countries heard on Two, and his current list in VHF Calls Heard includes five countries. W. C. A. also reports that G2FNW, his local, is now firing on 70 cm and would be very glad to have any reports from anyone at any distance; they can be forwarded *via* W. C. A.

A. G. Malins (Liverpool, 21) is still unable to hear anything on Two, though he can receive ship-shore traffic in the band above! As he has G3DA and G3GSS quite near, as well as many other active stations within a radius of 30 miles or so, it *must* be that he has not yet found the band. In this connection, we cannot do better than refer him to the excellent article by G5RZ in the August issue of *Short Wave Magazine*, which explains in detail this business of finding the band, and how it can be done by using Lecher lines. By next issue, we hope to hear that A. G. M. is There!

From Bolton, E. A. Lomax comes in again and, though his activities have been somewhat restricted due to pressure of work, he is able to claim two new counties—G3EGW/P for Westmorland, and G6NB/P for Herefordshire. E. A. L. remarks on how the hitherto rare county of Westmorland has been visited by no less than three /P operators—G3DA, GM3EGW and G4JJ—during the last couple of months; but they have found it difficult to work to the South, and to get QSO's at all it has been a matter of looking for gaps in the hills through which to aim the beam! E. A. L.

himself is now on 70 cm, with a G5BY-type converter (see *Short Wave Magazine*, May 1950) feeding into a BC-788, with a 4-ele. Yagi, though the popular Lancashire version of the City Slicker is to be tried. Apart from the Dutchmen on July 4, E. A. L's best DX on Two was G6RH (Bexley, Kent); the total of different stations heard during June-July was 85.

Reporting for the first time is A. W. White, BSWL 3979 (Leigh-on-Sea), who has been on the two-metre band for nearly three months now—but, like M. McBrayne not far away, does not consider that he is in a very good position for the main areas of activity. About ten stations have been heard at the 25-50-mile mark, including G8AO/MM. The Rx gear at BSWL 3979 is an Eddystone converter into an R.1155; he also has a modified RF-26 unit and plans for the future include a grounded-grid RF stage, a head amplifier to boost input into the 1155, and a 3-ele. beam, which should give much improved results over the dipole at present in use.

E. R. Crane (London, W.1) puts in a good calls heard list, and remarks upon the generous assistance he has been having from L. A. Whitmill, in the real amateur tradition. E. R. C. hopes to be on for the next leg of the Marathon, advances his scores usefully, and reports the appearance of some more QSL cards.

In addition to his Contest score, A. W. Blandford sends in a general report; in spite of a holiday break, he has been able to add DL, with DL3TD on July 4, to his countries total, making it seven, and he also logged several PA's and ON4BZ on that good evening. G3VM (Norwich) is listed for a new county, and A. W. B. is another whose scores are advanced.

Over in Co. Offaly, Eire, R. Williams, BSWL 4263 (Birr) is still trying to hear his first signal on Two, and has once again stripped down the converter. Our own feeling is that he also might profit from the experiences of G5RZ—*see* the note earlier in this piece, reference A. W. Malins—and having made sure that he is in the band by Lecher line check, listen at the peak hours of 2200-2300 clock time, and, during Contest periods, until he hears a signal. Stations in the North, like G3DA, G5YV and GW5MQ, working EI2W (which they often do) should ensure signals in his direction; and from that he should find it possible to obtain the co-operation of EI2W in

VHF CALLS HEARD

A. W. Blandford, 1 Biggin Avenue, Mitcham, Surrey.

DL3TD, G2ANT/A, 2AOK/A, 2AVR, 2FNW, 2FQP, 2FTS, 2FZU, 2HCG, 2UQ, 2XV, 3ABA, 3VM, 3WW, 4WW, 4SA, 5YV, 8IK, 8PX, ON4BZ, PAØIKS.
(*Rx: Cascode*/1155; *Aerial:* 4-*ele close-spaced Yagi* 30 *ft. high. Best DX heard July* 1-19.)

L. A. Whitmill, 762 Kenton Lane, Harrow Weald, Middx.

G2AHP, 2AIW, 2AJ, 2AOK/A, 2AVR, 2BM, 2BMI, 2BN, 2FKZ, 2FVO, 2FZU, 2HCG, 2HDZ, 2KF, 2LW, 2MI, 2MV, 2PU, 2YC, 3AEX, 3BCY, 3BLP, 3BPM, 3CAT, 3CFR, 3CGQ, 3CVO, 3CNF, 3CWW, 3ECA, 3EHY, 3ENI, 3FD, 3FSO, 3FUM, 3GBO, 3GHI, 3GSE, 3HAR, 3HBW, 3HCK, 3HSC, 3ISA, 3MI, 3WW, 4DC, 4KD, 4MW, 4OT, 4RO, 5DT, 5KH 5LK, 5QL, 5SZ, 5UM, 5WP, 5YV, 6AG, 6JP, 6LR, 6NB, 6NB/P, 6QN, 6RH, 6WU, 6XM, 6YP, 8AO/MA, 8HY, 8KL, 8OU, 8SB, 8VZ, GW2ADZ. (*Rx:* 6J6 *pre amp RF*27 *mod. into S*640 *Aerial: 5-ele Yagi delta matched. July* 6 *to August* 4.)

A. H. Edgar, 15 Dene Terrace, South Gosforth, Newcastle-on-Tyne, 3.

Phone and CW: G2BCY, 2DKH, 2DKH/P, 2FNW, 2FO, 2FQP, 2HOP, 2PU, 3AMM, 3BKD, 3BPD, 3CC, 3CCH, 3CJY, 3CYY, 3DA/P, 3DIJ, 3DXZ, 3EGF, 3GCX, 3GEA, 3GWD, 3VM, 3WW, 4JJ/P, 4LX, 4MW, 5BD, 5GX, 5QU, 5UD, 5YV, 6LI, 8AO/MM, 8GL, GM3BDA, 3EGW, ON4BZ. (*Rx: 6J6, 6J6,* 2×955 *into S*640, *4-ele V.W.S. Yagi* 7 *ft. above roof. All heard during July.*)

W. C. Askew, 2 Burrough Road, Somerby, Melton Mowbray, Leics.

DL6SV, EI2W, G2AJ, 2BVW, 2FJR, 2FNW, 2FQP, 2FZU, 2HCG, 2HIF, 2HOP, 2IQ, 2PU, 2UQ, 3BJQ, 3BK, 3CFR, 3CGQ, 3CHY, 3CXD, 3DUP, 3EHY, 3FFC, 3FUW, 3GHO, 3GMX, 3GWB, 3GZM, 3HZF, 3VM, 3WW, 4DC, 4MW, 5JO, 5LJ, 5ML, 5RW, 5YV, 6LI, 6NB, 6YU, 8IK, 8MZ, 8SY, GW2ADZ, OZ2FR. (*Rx: 6J6 converter into "Commander." Aerial:* 4-*ele Yagi* 600 *A.S.L. July* 1-*August* 1.)

E. R. Crane, 29 Seymour Buildings, Seymour Place, London, W.1.

G2AHP, 2AIW, 2AJ, 2ANT, 2ANT/A, 2BN, 2BRR, 2DD, 2DHV, 2DTO, 2FNW, 2FVD, 2HCG, 2HDZ, 2MV, 2TP, 2UN, 2UQ, 2YC, 3AEX, 3ASG, 3BCY, 3BLP, 3BPM, 3BVG, 3CDJ, 3CGQ, 3CNF, 3CWW, 3ECA, 3ENI, 3EOH, 3EYV, 3FD, 3FSD, 3FSG, 3FXG, 3GBO, 3GDR, 3GHI, 3GSE, 3HAB, 3HBN, 3HBW, 3HSC, 3HWJ, 3ISA, 3MI, 3NR, 3VM, 3WW, 4CI, 4DC, 4HT, 4KD, 4RO, 5DS, 5LK, 5MA, 5NF, 5PY, 5SZ, 5UM, 5WP, 6AG, 6CB, 6FO, 6JK, 6JP, 6NB, 6QN, 6RH, 6TA, 6UH, 6WU, 6XM, 6YP, 8AO/MM, 8DV/A, 8GS, 8HY, 8LN, 8OU. (*Rx: RF amp, two CV*66 *GGT, into RF*26 *unit into Hambander. 5-ele Yagi* 60 *ft. high. June* 30-*July* 30.)

R. L. Bastin, 152 Avon Street, Coventry.

50-100 miles: G2CG, 2DUS, 2FJR, 2FQP, 2HIF, 2PU, 2UQ, 2XV, 3BK, 3HZF, 3WW, 4GR, 4MW, 4SA, 5TP, 6NB, 8DA.
100-150 miles: G2AJ, 2ANT/A, 2BCB, 2DTO, 2FTS, 3AOO, 3BCY, 3BLP, 3BPD, 3CC, 3FAN, 5AM, 5DS, 5MA, 5UF, 6AG, 6JP, 6LI, 6RH, 6XX, 8GL, 8IC, GW8UH.
150-200 miles: G2DKH/P, 3AUS, 3BW, 3DA/P, 3EGW/P.
Over 200 miles: ON4BZ, PAØFP, ØIKS, ØWO. (*Rx: G2IQ CVTR* (955-955 *osc.*) *Broad-Band. Tune* 3-5 *mc BC*342-*N, 3-ele vws Yagi in roof space of* 30 *ft. Location* 200 *a.s.l. NGR*42/359803. *July* 1-25.)

J. Jones, 51 Geldeston Road, Clapton, London, E.5.

Phone: G2CD, 2HDZ, 3BCY, 3CNF, 3CWW, 3ECA, 3FD, 3FSG, 3GHI, 4DC, 6TA, 6YP, 8TL. (*Rx: RF*27 *into S*640 *on* 7·7 *mc, 3-ele c/s Yagi, indoors. July* 27-*August* 2.)

lining up the converter, by means of a signal over the air. BSWL 4263 would very much like to know if there are any other EI-SWL's (and so should we), with the idea of organising a little mutual assistance.

Up in Newcastle, A. H. Edgar is fairly happy about things, but his periods of best conditions do not all coincide with those experienced in the South. ON4BZ was logged on July 5, which is an excellent piece of EDX for the distance, and during the month no less than 17 new stations and four new counties were heard by A. H. E., which seems pretty satisfactory to us! He has been putting in a good deal of time on the converter; having made the oscillator coil more rigid (with 12g. wire) and, increasing oscillator injection, the next thing was to re-neutralise the 6J6 RF stage; in this connection, A. H. E. says it pays handsomely to neut. each half of that stage separately, and he has now got his noise-level down low enough to make S2 phones readable. His most consistent GDX signal is G3WW (March, Cambs.) at about 180 miles, who is often there when no other station is audible. And now we can pass on the buzz that, having achieved the R.A.E., it may soon be a case of "another good SWL gone wrong," for, when A. H. E. has got the gear together, he will be On the Air—though that may not be for some time yet. Anyway, all readers of "The VHF End" will want to congratulate Edgar, and we look forward to hearing of his progress and activities. Incidentally, he adds a word of sympathy for BSWL 4263 over in Eire (above), saying that he, too, went through much the same sort of thing, but that "when you get there it is very much worth it."

Back South to Bournemouth: P. J. Towgood is still so caught with business (which must always come first, after all) that he has "not been able to compile even a very small Calls Heard List"—however, he hopes shortly to be in the clear, and, in any case, intends to be in on the next three Contest sessions. On the other hand, Ray Bastin, BSWL 3484 (Coventry) has much to report; first, he has built himself a Cascode converter to the *Short Wave Magazine* design (March, 1952) and has been trying it against his G2IQ-6J6 job—but signals are down about ½S-point compared with the 6J6. The feature of the Cascode, Ray finds, is the extreme stability of the oscillator, which does not drift at all and gives a T9x beat; so it looks as if the 9002 oscillator in the circuit, as described, would be a good bet for any other type of converter. With him, conditions were outstandingly good during the period July 1-13, when he logged no fewer than 19 new stations, including three PA's, GW8UH (Cardiff) and G4GR (Newport) for Monmouthshire. All this pulled his scores up no end, and Ray is a happy man thereby. He also heard G3EGW/P for his second signal from Westmorland on July 20, and G3AUS (Torquay) for his first Devon station logged this year. Another /P outing with G5ML is in prospect, and altogether it has been a very good month for BSWL 3484.

L. A. Whitmill (Harrow Weald) found conditions patchy, but, in spite of that, says he has had "not a bad month." The best days were July 23-27 and August 4. Among the more interesting signals logged were G6NB/P for Herefordshire and G8KL for Staffordshire, with a number of others heard for new stations. L. A. W. remarks on the visit he had from E. R. Crane, and reports that 70 cm activity has been very low during the month.

M. McBrayne (Westcliff-on-Sea) says that his report and Marathon entry represent a return to the fold after many months' absence. His converter is 6J6-6J6 without an RF stage, with an 1155A on 7·5 mc as IF strip, the aerial being a 4-ele. beam in the roof space; an RF stage is to be added in due course, and should

TWO-METRE COUNTIES HEARD IN 1952

***Starting Figure*, 10**

P. J. Towgood	46
R. L. Bastin	41
W. C. Askew	34
L. A. W. Whitmill	30
A. W. Blandford	29
A. H. Edgar	21
J. R. Paul	19
H. J. Balsam	18
M. McBrayne	14

NOTE: Only counties heard since January 1, 1952, may be claimed for this Table.

ALL-TIME

***Starting Figure*, 10**

P. J. Towgood (Bournemouth)	54	(378)
E. A. Lomax (Bolton)	47	
R. L. Bastin (Coventry)	45	(254)
L. A. Whitmill (Harrow Weald)	38	(424)
A. W. Blandford (Mitcham)	36	(424)
H. J. Balsam (Didcot)	36	(167)
W. C. Askew (Melton Mowbray)	36	(145)
E. R. Crane (London, W.1)	22	(256)
A. H. Edgar (Newcastle)	22	
J. R. Paul (Lymington)	20	
P. Finn (Iver)	17	
M. McBrayne (Westcliff-on-Sea)	13	

NOTE: The figure in brackets gives the total number of different stations heard. Entries start with 100 stations.

certainly improve matters as it will help to bring in the weaker CW signals and the under-modulated phones, of which there are now so many on the two-metre band. But, having heard OZ2FR and ON4BZ for a very good signal on CW and phone, M. McB. wonders if the RF stage is really necessary! Well, we should say it will be found well worth while.

That brings us to the end of the deepest pile of SWL reports we have yet seen for "The VHF End," and, to all those who took the trouble to write, we are most grateful; and once again we repeat that we hope not only to see them all in for next month, but also letters from some new correspondents as well. It is evident that far more readers follow "The VHF End" than ever write in to tell us of their doings; it is from them we would very much like to hear.

Finally

Don't forget the second leg of the Marathon Contest, and note that most stations taking part will probably be calling "CQ MVC" to identify themselves as being in the Contest. What we would like to have for next month is a report from everyone reading this piece, and a list of Calls Heard—*and* a Contest entry!

Closing date will be **September 5**, and the address: A. A. Mawse, "The VHF End," *Short Wave Listener & Television Review*, 55 Victoria Street, London, S.W.1. With you again on September 18 with another budget of news, views, ideas and suggestions.

NEW AND SIMPLIFIED TV AERIALS

Without entering into the pros and cons of the matter, it is a fact that certain local authorities and a number of private property owners regard the usual types of outdoor television aerials with some disfavour on the grounds of appearance. In some instances a ban has been put on the erection of outdoor aerials where it is considered that an indoor aerial should be adequate for the area.

To meet the demand for an inconspicuous aerial which shall not offend these æsthetic tastes, Wolsey Television, Ltd., have introduced a new model—called the "Sky-Wand"—which has the appearance of a single tapering rod secured to the chimney stack by a small, neat bracket. It is, in fact, a single dipole consisting of two equal lengths of heat-treated duralumin tubing, the upper half of $\frac{3}{8}$ in and the lower of $\frac{1}{2}$ in. diameter, firmly held together by a specially designed insulator.

The dipole is centre fed and the feeder passes through the centre of the lower rod, a method that in no way influences the signal pick-up, with the result that the polar diagram is virtually a perfect circle. The additional height obtained over a normal dipole through the fixing of the "Sky Wand" being at the lower extremity instead of the centre, and it being chimney-mounted instead of wall-mounted, results in markedly increased gain. Moreover, it has been found that the larger diameter of the lower half of the dipole improves the relative response curve, showing an almost constant gain over a very wide bandwidth.

Here, then, is an efficient aerial of slim unbroken line that cannot possibly offend the eye.

Another new Wolsey aerial is the "Switched All-Ways," a loft aerial designed to reduce to a minimum the time required for finding the best arrangements of elements and the best spot for the actual installation. The bakelite unit into which the elements are screwed has a movable centre of circular shape, and to select the type of aerial required—T, L, V or dipole types—it is only necessary to rotate the centre until an indicating arrow is brought into line with the appropriate letters engraved on the outer portion of the unit. This automatically brings the correct electrical alignment into position.

Thus, changing the aerial from a T to a V or any other shape does not entail dismantling the whole assembly. All that is necessary is to unscrew the element rods, rotate the centre to the new position required and screw in the rods again. A matter of a few seconds.

The bakelite unit is carried on a metal supporting bracket, which in turn is mounted on a metal base plate. The supporting bracket is fully rotatable in any direction, thereby allowing the best position for maximum signal or minimum interference to be found *after* the aerial has been fixed on a loft rafter, or on a roof, wall or floor. The ability to rotate the entire aerial also facilitates the selection of the most suitable spot which will accommodate the element rods.

These two new Wolsey Aerials will be shown for the first time at the Earls Court Radio Show, August 26 to September 6, together with all other types of Wolsey television aerials, including the famous F3E folded dipole and the Broadside Array for fringe areas. An interesting range of improved types of accessories for use when installing aerials will also be shown.

WORLD WIDE RECEPTION OF SHORT WAVE PROGRAMMES

DX *broadcast*

MONTHLY COMMENT BY R. H. GREENLAND, B.Sc.

THERE are reports that reception of short wave broadcasting stations has been good during the summer months this year. V. T. E. Hovell (Great Dunmow, Essex) ventures the opinion that the evenings have seen a vast improvement on mid-winter conditions, but he deplores the incessant jamming and other man-made interference devices which so frequently make listening a headache, particularly when a search is being made for the weaker DX! But he is ever an optimist, as can be judged by his words: "All in all, I suppose it is worth a few headaches, sometimes, if satisfaction is gained!"

Nevertheless, one does feel that something should be done on an international level to try to clear the various short wave broadcast bands of this senseless jamming. It is well known that success has been achieved in piercing the interference thus caused by means of high-powered beamed transmissions, but surely it would be better if intentional interference could be eliminated at its source by the method of direct negotiation. It would appear that no one wishes to listen to transmissions from a power which itself is attempting to stifle broadcasts from other nations and this is a reason why a free use of the ether is indicated, to the satisfaction of all concerned.

V. T. E. Hovell does hear VLC17, 17840 kc, at the comparatively early hour of 0615. In this S.E. Asia transmission he has listened to a discussion on wheat growing in Australia in the feature, "Radio News Reel." At 0630 he found VLB9, 9580 kc, a very loud signal, with the News in its European beam. At 0430 on July 12 we noted "Waltzing Matilda," the call of the kookaburra and the words: "You are listening to Radio Australia—the Overseas Service of the Australian Broadcasting Commission." Then the time was given as "Just 29 minutes to three in Australia: this is the Western United States-Canada beam over VLC17, 17840 kc; VLA15, 15200 kc, is also in service. E. Kirby (Leeds, 7) has heard VLB11, 11810 kc, at 1900 when it was giving a news bulletin in English.

Arne Skoog (Stockholm) informs us that Hollandia, Dutch New Guinea, is now testing on 5090 kc in addition to 7135 kc between 0930 and 1200 each day. According to C. Costello (Wellington, N.Z.), Radio New Zealand is operating ZL18, 9520 kc, at 1800-1945 on weekdays and at 1930-1945 on Sundays.

Africa

ZNB, Mafeking, Bechuanaland, is now supposed to be working on 7895 kc with a power of ½ kW at 1100-1200, 1700-1930 weekdays, and 1800-1900 Sundays, but we have yet to hear it on this channel. O. Lund-Johansen (Copenhagen) says they will shortly operate a 200-watt transmitter on 5900 kc in addition. ETAA, Addis Ababa, Ethiopia, 15047 kc, has been logged on numerous occasions with native instrumental music at 1720 and Amharic News at 1733. On July 12, ETAA came on the air at 1630 with announcements in Amharic after a native air on pipes as an opening signal.

J. C. Catch (South Shields) tells us that Johannesburg, 11937 kc, with its "Calling Africa" transmission, has been a good signal around 1700, and he has logged another interesting African in Radio Mogadishu, Somaliland, 7385·5 kc, with light music at 1745: at 1800 it gave directions in Italian, then closed with a short piece of popular music. Johannesburg, 11937 kc, was again a clear signal at 1700 on August 2, when broadcasting its English News. The Saturday evening feature, "Punchbowl Quiz," at 1730, is a most entertaining affair. It is reported that the SABC is building new and powerful transmitters at Bloemfontein for the purpose of providing a more stable service for the entire African Continent.

We welcome a newcomer in N. J. Pollard (Bacup, Lancs.), who is 14 years of age and who, in nine months, has logged over 40 stations on his 0-V-0. He gives us some important news recently received in a letter from Leopoldville, Belgian Congo. It is that, as from July 15, the broadcasting station there has been operating only as a *relay* station for

the Belgian National Broadcasting Service, Brussels. The address for letters and reception reports is given as: The Belgian National Broadcasting Service (Service Mondial), P.O. Box 26, Brussels, Belgium.

From Arne Skoog we learn that Radio Omdurman now occupies 7004 kc instead of 7385 kc, and that Egypt is broadcasting on 11815 kc to the following schedule: 1820, French; 1830, English; 1840, Greek; and 1850, Italian. Actually, on July 14 Radio Omdurman was well heard on this new channel with an Arabic talk at 1615, and at 1935 on August 2 we listened to a talk on the Egyptian theatre broadcast from the Cairo studios over 11815 kc.

Asia

Radio Peking, China, 15060 kc, is heard at 1330, when an English News is read by a female; occasionally a commentary, this time given by a male reader, follows at 1345 and the transmission closes at 1400. C. Costello supplies details of their English broadcasts, which are: 0900-0930: 6100 kc, 9040 kc, 10260 kc, 11690 kc, 15060 kc, 15170 kc; 1330-1400: 11690 kc, 15060 kc, 2230-2300: 11690 kc, 15060 kc. R. P. Welch-Bartram (Aylesbury, Bucks) offers "The Voice of Free China," Taipeh, Formosa, which broadcasts in English from 1820 until 1840 over 11920 kc.

V. T. E. Hovell gives DZH8, 15300 kc, one of the outlets of the Far East Broadcasting Co. in Manila, as a "doubtful regular." On one occasion (a Sunday) from 1400 to 1430 he listened to a very interesting half-hour from this station, the programme in question being "The Greatest Story Ever Told," presented by the Goodyear Rubber Co. The latest schedule gives the hours of broadcasting as: 2100-0600, 0800-1700. English features are given as follows: 2330-0130, 0500-0600, 0800-1015,

TABULATED SCHEDULES

I. All-India Radio, Delhi

English News Broadcasts.
0030-0040: 11850 kc, 15290 kc.
0410-0420: 15130 kc, 11870 kc.
0800-0810: 11705 kc, 15160 kc.
1330-1340: 15190 kc, 11780 kc.
1545-1555: 9550 kc, 7145 kc.
1900-1910: 11790 kc, 9565 kc, 7240 kc, 6085 kc.

II. The National Broadcasting Station of Thailand, Bangkok

Overseas Programme: 1000-1130 (English Announcement at 1130).
Frequencies: 6240 kc, 7105 kc, 11910 kc, 15910 kc.

III. Radio Ankara, Turkey

Daily Transmissions in English.
To Far East: 1230-1315 over 17820 kc.
Western Europe: 2100-2145 over 15160 kc and 9465 kc.
North America: 2315-2400 over 9515 kc.
Special Features:
(1) "Come To Turkey" at 1300, 2130 and 2345 (Saturdays).
(2) "We Live in Turkey" at 2130 and 2345 (Thursdays).
(3) "Mail Bag" at 1300, 2130 and 2345 (Sundays).

IV. Brazilian Short-Wave Broadcasting Stations

(*a*) Radio Nacional, Rio de Janeiro: PRL7, 9720 kc; PRL9, 6147 kc.
(*b*) Radio Ministerio de Educacao e Saude, Rio de Janeiro: PRL4, 9770 kc.
(*c*) Departamento Federal de Saguranca Publica, Rio de Janeiro: PRN9, 9290 kc.
(*d*) Radio Tupi/Radio Tamoio, Rio de Janeiro: ZYC9, 15370 kc; ZYC8, 9610 kc; ZYC7, 6195 kc.
(*e*) Radio Quitandinha, Petropolis: ZYP23, 5045 kc.
(*f*) Radio Inconfidencia, Belo Horizonte: PRK9, 15190 kc; PRK5, 6000 kc.
(*g*) Radiodifusora Sao Paulo, Sao Paulo: ZYB9, 15155 kc; ZYB8, 11765 kc; ZYB7, 6095 kc.
(*h*) Radio Clube de Pernambuco, Recife: PRA8, 6015 kc.
(*j*) Radio Record, Sao Paulo: PRB23, 15135 kc; PRB22, 9505 kc; PRB21, 6055 kc.
(*k*) Radio Jornal de Commercio, Recife: ZYK2, 15145 kc; ZYK3, 11825 kc; ZYK3, 9565 kc; ZYK2, 6085 kc.
(*l*) Ceara Radio Club, Fortaleza: ZYN7, 15165 kc; ZYN6, 6105 kc.
(*m*) Governo Territorio Guapore, Porto Velho: ZYY2 and ZYY20, 4995 kc.
(*n*) Radio e Voz do Oeste, Cuiba: ZYZ5, 4985 kc.
(*o*) Radio Timbira, Sao Luiz: ZYY9, 4975 kc.
(*p*) Radio Ribamar, Sao Luiz: ZYM8, 4785 kc.
(*q*) Radio Bare, Manaos: PRF6, 4895 kc.
(*r*) Radiodifusora do Amazonas, Manaos: ZYS8, 4805 kc.
(*s*) Radio Clube do Para, Belem: PRC5, 4865 kc.
(*t*) Radiodifusora de Teresina, Teresina: ZYU8, 4845 kc.
(*u*) Radio Ecucadora Parnaiba, Parnaiba: ZYE7, 4825 kc.
(*v*) Radio Borborema, Campina Grande: ZYJ21, 3325 kc.
(*w*) Radio Tamandare, Recife: ZYK21, 3265 kc; 15100 kc.
(*x*) Radio Araraquara, Araraquara: 2480 kc.
(*y*) Others: Natal: ZYI21, 4935 kc; Sao Paulo: ZYY3, 4755 kc.
Also: ZYN22, 3345 kc; ZYR31, 3275 kc; ZYV30, 2340 kc.

1200-1400 and 1500-1530 over DZH8, 15300 kc; DZH7, 9730 kc; DZH6, 6030 kc and DZB2, 3320 kc. On June 11, however, we heard DZH8 terminating its final English session at 1630. The address is: P.O. Box 2041, Manila, Philippines.

J. C. Catch listened to English News at 2230 from Radio France-Asie, Saigon, over 9750 kc; English is also used as follows: 2330 on 7230 kc; 0130 on 11935 kc; 0900 on 15430 kc. Radio Ceylon, 11975 kc, was heard with excerpts from the old London success, "Lady Be Good," at 1400 on July 12. V. T. E. Hovell enjoys Radio Pakistan's English broadcasts from 2015 to 2100 over 9484 kc; reception on 11914 kc is not particularly good. R. Abrahams (Hounslow, Middlesex) has sent along their complete schedule which we hope to present in the near future. We heard English News at dictation speed from Karachi at 1715 on July 8 over 7010 kc; the transmission terminated with the playing of their anthem at 1730. V. T. E. Hovell has been able to hear a relay of the England *v.* India Test Matches at 1530 from Singapore on 15435 kc. On August 2 at 1450 also, John Arlott's entertaining commentary on the Glamorgan *v.* India match at Swansea was well received over this same channel! We have logged Singapore on 11955 kc and 7120 kc at 1300 in addition; the closure came at 1632 with the words: "On behalf of the British Far Eastern Broadcasting Service may I wish you a very good night," and the playing of God Save The Queen.

Kabul, Afghanistan, 9975 kc, was unusually clear when it opened up around 1644 on June 29; the direction given by a female was: "You are listening to the Afghanistan Broadcasting System." After a statement of medium and short wave outlets, and a musical flourish, she said: "Stand by for the news bulletin in English" and made a further announcement about "Our Sunday night special programme." At 1650 this session was conducted by an Englishman—it consisted of vocal numbers by Bing Crosby and other favourites. Finally, at 1720, the statement of frequencies was followed by the words: "I hope you will all tune in again next week," and there was no closing musical air.

What we presumed to be the Hashemite Broadcasting Station, Ramallah, Jordan, on 7000 kc, was heard with native music at 1615, followed by an Arabic talk at 1620 on July 14; this one closed down at 1930. J. C. Catch logged another with Arabic music on 7370 kc at 1740 on July 7 and asks if it is Sanaa, Yemen, which used to broadcast from 1630 to 1715 over 7385 kc.

According to V. T. E. Hovell, the SBS, Damascus, Syria, 11915 kc, provides good entertainment for Europe from 2130 to 2230 daily.

E. Kirby says their English News is at 2215. E. K. also listened to the Voice of Zion, Jerusalem, on 9000 kc, with an English Newscast at 1915. 4X4EA, Tel Aviv, 6725 kc, is often weak, but its songs can be heard usually around 1830; and EPB, Teheran, Iran, 15100 kc, is still a strong signal at 2000 when its English bulletin is given. Radio Ankara continues to provide excellent fare at 2100-2145 over 9465 kc and 15160 kc. On June 9, V. T. E. Hovell heard a graphic account of the arrival in Turkey on a goodwill visit of the King and Queen of Greece.

V. T. E. H. writes: "We were taken to Ankara station and presented with the fully military-style ceremony upon the arrival of the royal visitors."

North America

V. T. E. Hovell has quite a lot to say about U.S. stations. This is what he writes: "When one is tired of searching for DX the Voice of America is always at hand to please! I think the quality of their programme is generally tip-top and we certainly have a good radio friend in this vast organisation. I am a regular V.O.A. fan and get great pleasure at hearing Uncle Sam's views expressed! The United Nations Review is one of their outstanding shows, Sundays 1715-1745. I find best reception on WRUL, 15230 kc and 17750 kc. WGEO3, on 17760 kc, is usually very strong daily, 1745-1800, with the latest News." This last-named station was logged at 2003 on July 12 with a recording of General Eisenhower's Acceptance Speech made at the Chicago Republican Convention. V. T. E. H. also found WLWO3, Cincinnati, Ohio, 15250 kc, between 1315 and 1330 with the programme: "Report from Washington." This is a comparatively new service directed to North Africa. R. P. Welch-Bartram tells us that Radio Boston (WRUL) is now using 15280 kc and 15350 kc for its English transmission from 200 to 2100 daily. Your commentator heard WABC2, New York, 15270 kc, at 2100-2115 with the Voice of America Stamp Club which feature is presented on Saturdays only—an excellent show!

"Canadian Chronicle" is always a worthwhile feature; at 1725 on July 9, for example, we heard an outside broadcast with cowboys lassoing and holding their bulls in an organised stampede at Calgary, Alberta. The station was CKCS, 15320 kc, over which V. T. E. Hovell heard a speech by Lord Alexander during his recent visit to Korea.

Central America and West Indies

B. Mercer (Hulme, Manchester) has observed XESC, Difusoras, XEMC-XESC, Mexico City, 15205 kc, coming in at good strength from around 2300; the address for

reports is: Apartado 22717, Mexico D.F.

We noted XEWW, 9500 kc, with good dance music at 0414; B. M. also logged YNVP, La Voz de Nicaragua, 6758 kc, at 0045; HROW, Radio Monserrat, Tegucigalpa, 6675 kc, with chimes and call at 0042—a strong, steady signal! We spotted YNBH, Radio Panamericana, 6550 kc, with two cuckoo calls followed by syncopated pianoforte selections at 0445.

YNWW, Radio Sport, 7850 kc, is on the air daily until 0400. TGWA, Guatemala City, 9764 kc, gave announcements in Spanish and marimba music at 0350; HRA, Tegucigalpa, 5920 kc, was prominent with Strauss waltzes at 0352. At 0356, the orchestral leader said: "Hasta Manana," three vibraphone notes preceded the final Spanish direction and the station closed down to the strains of marimba music. J. C. Catch heard a weak Spanish-speaking station on 5949 kc at 0030 and supposed it to be TGNA; he logged 4V2S, Port-au-Prince, Haiti, 5955 kc, at 0030 with chimes and call in French. B. Mercer also logged 4VPL, "La P.B.S.," Pekionville, Haiti, 8984 kc, with "Begin the Beguine" at 0100; HI2T, La Voz Dominicana, 9739 kc, with call at 0200; COBZ, Radio Salas, Havana, 9030 kc, at 0100; and COCY, Cadena Azul, 6450 kc, with chimes and call at 0035. At 0355 on June 15 your commentator heard a church choir rendering religious music over Radio Jamaica, 3360 kc.

From the London *Daily Telegraph* we learn that British Honduras is to have a better short wave service in the near future in order to combat the Communist-controlled broadcasts put out by the Guatemalan Radio and directed towards the British colony. Initially, a 1-kW medium-wave transmitter for local reception is to be installed, and a 5-kW short wave transmitter is expected to be in operation by next March. Commander John Proud, Public Relations Officer to the British Honduras Government, is in charge of these developments and later it is intended that the administration shall be controlled by a Broadcasting Council in Belize, the capital, and that operations shall be financed at least in part by incorporating sponsored programmes.

South America

HCRL2, Quinta Piedad, Guayaquil, 6635 kc, which is heard only in the early hours of Wednesday morning, was a reasonable signal between 0412 and 0455 on June 18. Recordings from grand opera are a feature and you cannot fail to recognise the voice of the director-announced, Dr. Roberto Levi. After announcements and the playing of the Ecuadorean national anthem at 0442, further Spanish directions were made by both male and female announcers. HCJB, Quito, has vacated 12455 kc, which it has used for so many years, and instead is operating on 11915 kc. R. Abrahams has heard HCJB on both 11915 kc and 9745 kc, with an English-language programme to the Pacific at 0700-0730; he says that the 11915 kc channel was an excellent signal. R. P. Welch-Bartram informs us that HCJB is now using 6050 kc instead of 5995 kc and 9745 kc instead of 9970 kc. They have been asking for reports on these new frequencies.

D. W. P. Mitchell (Kings Lynn) has enjoyed the programme from YVMQ, 4940 kc, which he hears in the early hours; the direction was: "Barquisimeto, Republica Venezuela, transmite Radio Barquisimeto." B. Mercer offers YVLA, La Voz de Carabobo, 4780 kc, with call at 0003. O. Lund-Johansen sends word of three new Colombians. HJFV, Radio Neiva, Neiva, operates on 4855 kc (5 kW); HJFW, Transmisora Caldas, Manizales on 5020 kc (1 kW); HJKH, Accion Cultural Popular, Sutatenza, 5060 kc (1 kW). HJEV, La Voz de Valle, Cali, formerly on 4825 kc, is now using 6135 kc; HJDW, Medellin, 5050 kc, signs off at 0500 with chimes, "Strike Up The Band" and the Colombian National Air.

B. Mercer's Brazilians are: ZYS8, Radiodifusora Amazonas, Manaos, 4805 kc, with call at 2230; ZYP23, Radio Quitandinha, Petropolis, 5045 kc, with Strauss waltzes at 2340; and ZYY9, Radio Timbira, Sao Luiz, Maranhao, 4975 kc, with Brazilian music at 2352. He further spotted CE1515, Radio Corporacion, Santiago de Chile, 15150 kc, at moderate strength at 0001, and ZPA3, Radio Teleco, Asuncion, Paraguay, 11850 kc, with pianoforte music at 2325. R. Abrahams offers PRA8, Radio Clube de Pernambuco, Brazil, 6015 kc, with a sponsored Coco-Cola programme at 2225; and ZYK2, Radio Jornal de Commercio, 11825 kc, opening up at 2159 with Portuguese station directions followed by similar announcements in English by Janet Swaton: at 2200 there is a studio clock-chime for six o'clock local time. On June 8, however, we heard an English broadcast at 2115 on this new outlet of 11825 kc.

Niteroi Radio, 6195 kc, with 1-kW power, is, according to Arne Skoog, on the air from 1000 to 0400; the address is: Avenida Rio Branco 173, Rio de Janeiro.

CE920, Radio Militar Austral, Punta Arenas, Chile, 9195 kc, is on the air daily from 1530 until 0300; OAX4S, Lima, Peru, has moved from 5965 kc to 6564 kc. Both L. Lumsden (Edinburgh) and C. Young (Coldingham, Berwickshire) have sent in reports on the Argentina transmissions. L. L. logged LRS, 11880 kc, with a Portuguese feature at 2230, and LRU, 15290 kc, with an English talk on Trade Unionism in Argentina, this at 2000; whilst C. Young heard their French pro-

gramme over LRA5, 17720 kc, at 1915. The current schedule for the English broadcast to the British Isles is 1800-1900 over 11880 kc. Radio El Mundo operates LRX, 9660 kc, and LRX1, 6120 kc, which are on the air from 1130 to 0435 each day. The latest schedule received from Radioemisoras La Cruz del Sur, Cajon 8, La Paz, Bolivia, informs us that CP38, 9505 kc, is on the air as follows: Sundays, 1155-1430, 1600-2130; weekdays, 1055-1230, 1430-1745, 2255-0230.

Europe

Radio Swedeh presents a special programme for short wave enthusiasts every Friday and Saturday on 6065 kc as follows: Fridays, 1545, 2230; Saturdays, 0715. On and after October 10 the first Friday broadcast will be radiated at 1515 over 11705 kc. L. Lumsden possesses a recent verification card from "the land of the midnight sun" for a report on the Hörby, Sweden, station on 11705 kc; he logged the "Happy Station," Radio Nederland, Hilversum, with the English Sunday broadcasts. The schedule is: 1600-1640 on 17775 kc, 15220 kc and 6025 kc; 2130-2210 on 11730 kc, 9590 kc and 6025 kc; 0230-0310 on 11730 kc and 9590 kc. R. P. Welch-Bartram gives a detailed account of Radio Luxembourg's short wave activities. This station broadcasts on 15350 kc from 1100 to 1300 on Sunday, Thursday and Saturday, and from 1100 to 1315 on Monday, Tuesday, Wednesday and Friday. All programmes are relays, except for the following special programmes which are broadcast only on short wave: 1300-1315 on Mondays in Albanian, 1300-1315 on Tuesdays in Bulgarian, 1300-1315 on Wednesdays in Roumanian, 1300-1315 on Fridays in Yugoslavian. In addition to the above programmes on 15350 kc, broadcasts are made on 6090 kc from 1800 (or earlier)-2300 daily except Sunday, and from 1800 (or earlier)-2330 on Sunday. These broadcasts are made in the English language; one interesting programme is called "The Answer Man" and any question the listener cares to send in is answered either over the air or by post. R. P. W-B. is informed by Radio Luxembourg that their short wave transmissions are aimed primarily at Sweden and the power is 5 kW; their QSL card is a huge and brilliant affair. The address is: Villa Louvigny, Luxembourg, Grand Duchy of Luxembourg.

R. Abrahams listened to the Swiss DX programme over HEU3, 9665 kc, in which they gave the results of their May contest. He was surprised and thrilled to hear his name mentioned as a "runner-up" in their SWL report section. Our hearty congratulations! He has now received their special card and flag, together with a copy of *World Radio Handbook* as prize. HBQ, Geneva, 6672 kc, gives a powerful tuning note and the interval signal notes me-doh-soh-soh-soh-doh before coming on the air at 1830 with the words: "This is United Nations Radio calling the peoples of the world." E. Kirby logged Paris, 6200 kc, with English News at 2010. C. Costello in New Zealand hears this one at good strength with commendable programmes; his schedule reads: 0600-1700 Saturdays, 0630-1700 Sundays, 0845-1700 other days. According to Swedish DX, F8REF broadcasts a fortnightly DX programme in French on Thursdays and Fridays on 7050 at 1130 and on 14150 kc at 1730.

L. Lumsden offers CSB51, 12865 kc, heard at 2030 with music and the call: "Radio Club Portugues, Parede, Portugal;" he also heard Tirana, 7850 kc, with a talk in English about the Albanian Communist Party at 2115. The Rev. S. W. Bowen (Falmouth) has received a letter in French from Radio Tirana; the address is: Comite de la Radiodiffusion D'Albanie, 3 rue Conférence de Peza, Tirana. R. Abrahams heard Albania's English News at 2115 during which session they announced the use of two frequencies, namely 7850 kc and 6560 kc. The Rev. S. W. Bowen has other letters from George and Olga Vukovich, of Radio Yugoslavia. Here is a quotation: "I learn from your letter that your hobbies are DX'ing and stamp collecting. In connection with this may I propose an exchange. I offer Yugoslav mint stamps for books published in Great Britain. I am now interested in some good books (textbook, grammar and dictionary) for learning Japanese." The Yugoslav verification card shows a photograph of part of Belgrade. R. Abrahams informs us that the English News bulletin from Bucharest is heard on 6210 kc and 9252 kc between 2100 and 2115, after which they usually give a musical programme. They announce: "Here are the broadcasting stations of the Rumanian Peoples' Republic on the 25·00, 32·43 and 48·31-metre bands." B. Mercer has received Sofia's new card according to which the current English schedule is: 2000-2015 and 2100-2130 on 6070 kc and 7670 kc; 0100-0130 and 0400-0415 on 15330 kc.

Lastly, the new Belgian short wave station at Warve near Brussels is scheduled to give a regular English broadcast from 1900 to 2000 on probably 9665 kc or 9770 kc and 11720 kc or 11850 kc. The power is 100 kW so that reception should present no difficulties.

Reception reports for the October issue will, as usual, be greatly appreciated. They should reach this office not later than September 15; the address is: R. H. Greenland, *Short Wave Listener and Television Review*, 55 Victoria Street, London, S.W.1. Thank you, and Good Listening!

SHORT WAVE BROADCAST STATIONS

Revision 25·62 to 31·12 Metres

Giving Frequency, Wavelength, Callsign and Location

These lists appear each month, covering the 11-128 metre section of the wave band within which all short wave broadcasting services of the world operate. For economy of space, this band is dealt with in eight sections, a list of active stations in one of these being given in full every month. Such revising is necessary due to constant changes of frequency, callsign and operating schedules. All stations appearing in our lists are normally receivable in this country and are under regular observation.

Frequency	Wavelength	Callsign	Location
11710	25·62	WRUL1	Boston, Mass.
		WLWO5	Cincinnati, Ohio
		VUD7	Delhi.
		VLA11	Shepparton.
		VLG11	Lyndhurst.
			Paris.
			Tangier.
11705	25·63	JOB2	Tokio, Japan
		CKXA	Sackville.
		CBFY	Vercheres, Quebec.
		SBP	Motala, Sweden.
11700	25·64	GVW	London.
			Paris.
11695	25·65	HP5A	Panama City.
11690	25·66		Peking, China.
			Moscow.
11682	25·68	HJCO	Bogota.
11680	25·68	HVJ	Vatican City.
		GRG	London.
11630	25·79		Moscow.
11117	26·99		Moscow.
11090	27·05	CSA92	Ponta Delgada.
11040	27·17	CSA30	Lisbon.
11035	27·19	CR6RA	Lobito, Angola.
11030	27·20	CSA29	Lisbon.
11000	27·27	PLB9	Djakarta, Java.
10780	27·83	SDB2	Stockholm.
10750	27·91	FLA6	Douala, Cameroons
10660	28·14		Moscow.
10365	28·94	PLB4	Djakarta, Java.
10262	29·23		Peking, China.
10060	29·82	PMB3	Bandoeng, Java.
10048	29·86	CR6RJ	Sa Da Bandeira.
9990	30·03	4VRW	Port au Prince, Haiti.
9975	30·08		Kabul, Afghanistan.
9953	30·14	FZI	Brazzaville.
9915	30·26	GRU	London.
9880	30·36		Moscow.
9870	30·40		Johannesburg, S.A.
9854	30·45	HVJ	Vatican City.
9840	30·48	CR7BJ	Lourenco Marques.
9836	30·50		Leningrad.
9833	30·51	COBL	Havana, Cuba.
9832	30·51		Budapest.
9830	30·52		Moscow.
9825	30·54	GRH	London.
9805	30·60	YDS	Menado, Celebes.
9800	30·61	CE980	Antofogasta, Chile.
9790	30·64		Moscow.
9785	30·66		Monte Carlo.
9780	30·67		Moscow.
			Munich.
			Taipeh, Formosa.
9770	30·71	PRL4	Rio de Janeiro.
9765	30·72	CR7BE	Lourenco Marques.
		TGWA	Guatemala City.
9760	30·74		Moscow.
9756	30·76	4VEH	Cap Haitien, Haiti.
9755	30·76	APK	Karachi.
9754	30·76	CR6RL	Loanda, Angola.
9750	30·77		Saigon, Indo-China.
9747	30·78	CSA27	Lisbon.
			Omdurman, Sudan.
9745	30·79	HCJB	Quito, Ecuador.
		OTC2	Leopoldville.
9740	30·80		Moscow.
9735	30·82	ZPA4	Asuncion, Paraguay.
		HI2T	Santo Domingo, D.R.
9730	30·83	DZH7	Manila, P.I.
		CE970	Valparaiso, Chile.
		BEA8	Nanking, China.
			Shanghai, China.
9727	30·84	CSA26	Lisbon.
			Leipzig.
9720	30·86	PRL7	Rio de Janeiro.
		VUD	Delhi.
			Moscow.
9715	30·88	ZQP	Lusaka, N.Rhodesia.
			Cairo, Egypt.
9710	30·90	CHLR	Sackville.
			Moscow.
9700	30·93	CE970	Santiago, Chile.
		WLW08	Cincinnati.
		KCBR3	Los Angeles.
		GWY	London.
			Tangier.
9695	30·94	FZF6	Fort de France, Mart'q.
		FIQA	Tananarive, Madagascar
		JKM2	Osaka, Japan.
9690	30·96	GRX	London.
			Singapore.
		LRA	Buenos Aires.
			Moscow.
9685	30·98	WLW03	Cincinnati, Ohio.
			Tangier.
9680	30·99	VLB9	Shepparton.
		VLC9	Shepparton.
		VLG9	Lyndhurst, Victoria
		HI2A	Santiago, D.R.
		VUD2	Delhi.
		XEQQ	Mexico City.
			Paris.
			Moscow.
9675	31·01	KRCA1	San Francisco.
		GWT	London.
		WRCA3	New York.
9670	31·02	VUD3	Delhi.
		CSA24	Lisbon.
		KGEI1	San Francisco.
		WRCA1	New York.
		WABC6	New York.
		OLR3C	Prague.
			Rome.
			Moscow.
9668	31·03	TGNA3	Guatemala City.
9665	31·04	HEU3	Berne.
9660	31·06	VLQ9	Brisbane, Queensland.
		LRX	Buenos Aires.
		GWP	London.
		VUD11	Delhi.
		HOXC	Panama City.
		4VBM	Port au Prince, Haiti.
		EQC	Teheran, Persia.
			Moscow.
9655	31·07	HED6	Berne.
		HVJ4	Vatican City.
		JKI2	Tokio, Japan.
9650	31·09	ZJM8	Limassol, Cyprus
		WABC1	New York.
		KRHK	Honolulu.
		VLB9	Shepparton.
			Tangier.
			Paris.
			Moscow.
9645	31·10	LLH	Oslo.
		APK2	Karachi, Pakistan.
			Djedda, Saudi-Arabia.
		TIFC	San Jose, Costa Rica.
9642	31·11	HVJ4	Vatican City.
9640	31·12	YVKC	Caracas, Venezuela.
		CXA8	Montevideo, Uruguay
		GVZ	London.
		DZH2	Manila, P.I.
			Moscow.

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