

The

SHORT WAVE

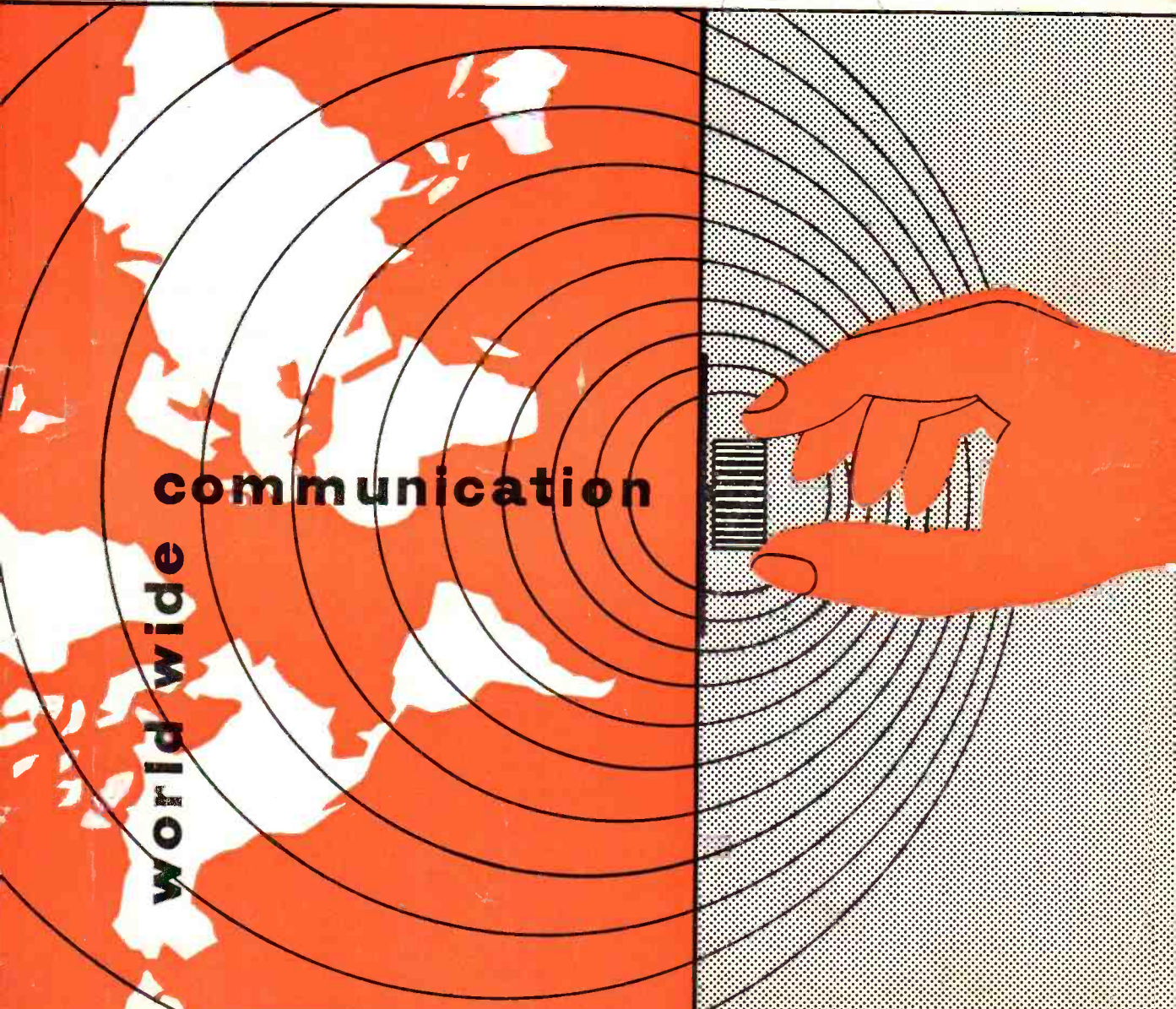
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VOL. XV

NOVEMBER, 1957

NUMBER 9



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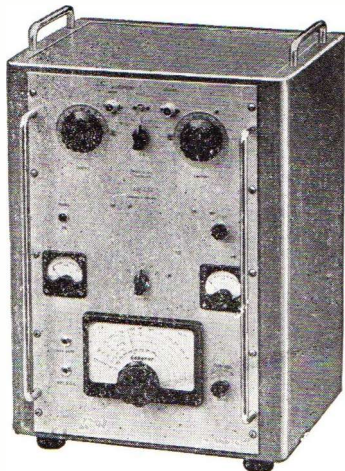
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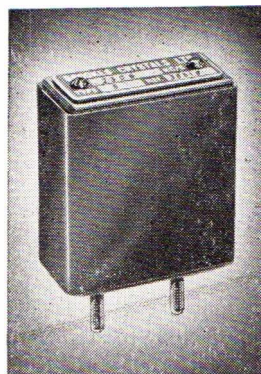


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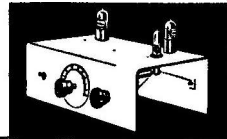
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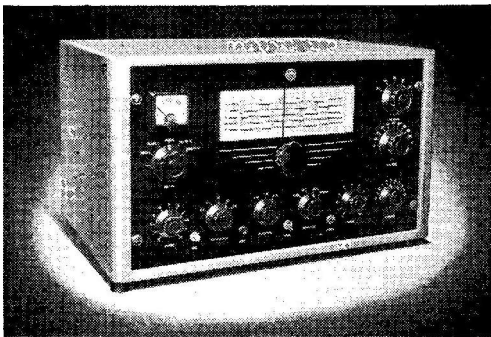
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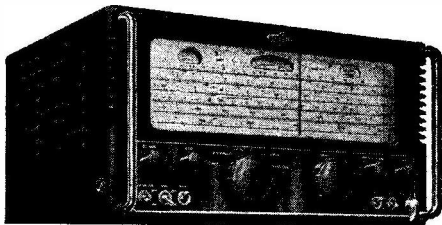


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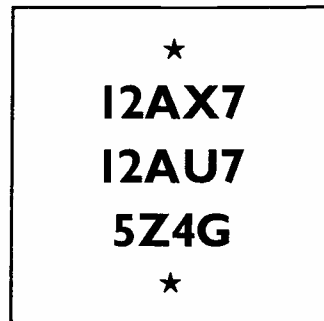
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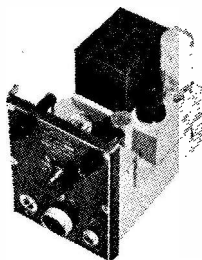
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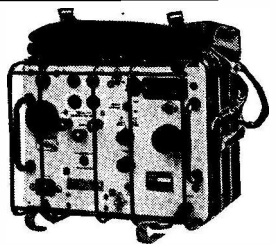
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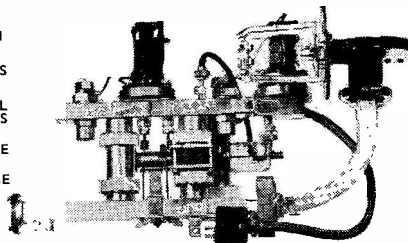
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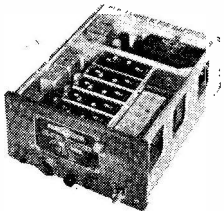
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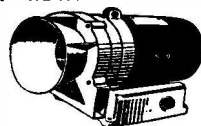
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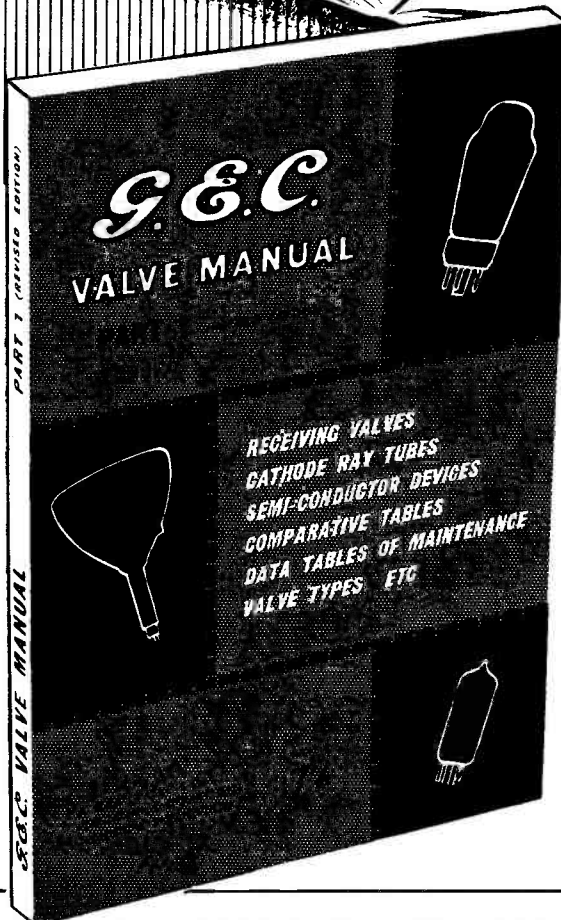
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FOR THE RADIO AMATEUR AND AMATEUR RADIO

The SHORT-WAVE Magazine

E D I T O R I A L

Show *With more than 7,000 people through the doors for the Radio Hobbies Exhibition just concluded, this can be rated as the best of its kind yet held — not only for the attendance, which was well over double the highest figure for any recent year, but because the Exhibition itself was such as to appeal to everyone with any interest in Amateur Radio.*

It is not our intention here — nor is this the right place — to attempt any sort of Exhibition review, which will in any event be done for our next issue, when there has been time to digest the facts. The points to be brought out now are that this year's undertaking set a standard and established a pattern for future Amateur Radio exhibitions. By going out to attract the radio-interested public as well as those already initiated, this Exhibition has done what none of its predecessors succeeded in doing, which was to bring in the public. In fact, it was very noticeable at most stands that the majority of visitors did not hold call signs at all — one therefore had the opportunity of preaching to the unconverted, instead of being at a sort of glorified radio convention (which is what most of these exhibitions have been in the past).

The convention interest, which is undoubtedly strong and should be catered for, can easily be taken care of by arranging meetings for the specialists — VHF, SSB, DX, Old Timers, Mobile and so forth — during the period of the Exhibition. This is certainly something that ought to be organised for the next such undertaking as this year's very successful Radio Hobbies Exhibition.

*Austin Fobler
G6FA*

GIRDLE ROUND THE EARTH

AS the whole world knows, on Friday, October 4, the Russians succeeded in putting the first artificial earth satellite into orbit, and at the moment of writing it is still up there.

After all that has been written about the Artificial Satellite, it does not need saying here that the Russian achievement is of the greatest interest and the deepest significance—and not only to the world of science. One heard the BBC's early-morning news broadcast on October 5 with mixed feelings—astonishment, admiration and intense interest, combined with immediate forebodings about the long-term implications, and a strong sense of frustration (not to say irritation) because it was the Russian and not the long-promised American "space-vehicle" that had been put there first.

The BBC announcement on October 5 gave the diameter of the "new Russian moon" as 23 ins., its weight as 180 lbs., its speed as about 18,000 miles an hour, its orbital time as 90 minutes, and said that two transmitters were being carried—but omitted to mention, amidst all this detail, the actual frequencies on which they were operating. This essential information was, fortunately, given in some of that day's newspapers, so that it was possible to open watch on 20.005 and 40.002 mc without delay.

Signal Characteristics

On the night of October 5/6, signals were very strong on both channels; indeed, at 0025 on October 6, they were so loud on 20.005 mc that a spacer could be heard from the transmitter, and key-clicks were evident. It was clear that the transmitters were crystal-controlled. The note also had obvious telemetering characteristics (though at first this was flatly denied by the Russians).

During the next circuit, with signals still very strong, pronounced Doppler effect was noted at 0155, with complete disappearance of the 20.005 mc signal at 0200 GMT on the 6th.

The same note characteristics reappeared on succeeding circuits, heard at various times until the morning of October 7, when at 0835 the first actual signal change occurred; this took the form of a hesitation in the keying, which sounded as if a relay had stuck on, producing not the familiar periodic dash, but a succession of long, slow, irregular dashes. (The note in the log says "meteorite collision?"). The periodic dashes had been timed on both bands as occurring at the rate of 9 per 5 seconds; by October 9, this had accelerated to nearly three a second.

At 0840 the transmitter recovered itself, and during October 7 was pulsing normally again on each circuit at the steady rate of 9 beats per 5 seconds. One of the best daylight runs over this country was on the 7th, when the 20.005 mc signal was held, and its characteristics carefully noted and tape-recorded, from 1300 to 1325, with a very marked Doppler

The Russian Satellite — Summary of Immediate Results — Tracking and Ranging Methods for Radio Amateurs

effect occurring between 1306 and 1313 GMT.

On the evening of October 7, the satellite and its signals were featured on the BBC's "Radio News Reel" —unfortunately, however, the recorded signal radiated during this particular programme was *not* "the satellite passing overhead," but a good, deep cut of WWV . . . (It must have been noticed by anyone who had already heard the real thing!). By Tuesday, October 8, signals had become weak and erratic, and nothing was heard all that day anywhere in the northern hemisphere. On the 9th, they reappeared as a continuous note, and at 0530 that morning the first sighting of the satellite (since known to have been actually its launching rocket) was reported from Edinburgh. By October 13, the periodic signals had started again, on both frequencies, at the rate of 14 beats in 5 seconds. The transmission later became a continuous, weakening signal, finally ceasing altogether on October 25, exactly three weeks after the launching—as the Russians had forecast.

Data on The Sphere

It was on the 9th that the Russians admitted officially that the transmission was telemetering, and they added that the satellite was carrying "two powerful transmitters with four antennæ, two each 7 ft. 10½ ins. and 9 ft. 6 ins. long, spring loaded for release on launching, with chemical batteries to last 2-3 weeks." The Russians further reported that to equalise the temperature within the sphere, passing quickly through intense heat into extreme cold, nitrogen was being continuously circulated through it. It also emerged that about November 7-14 they proposed putting up a second satellite, to be solar-powered. (November 7 was the significant date!)

Furthermore, it was stated that there were 70 observing stations operating in the territory of the U.S.S.R., and that there were actually three objects in the orbit: The sphere itself, its (exhausted) launching rocket, and the cradle in which the satellite had been mounted for launching.

If the sketch herewith, taken from a Russian official photograph, is accurate, it would appear that the diameter of the sphere is nearer 31 than 23 ins. The aerial layout seems to be arranged as follows: By taking one short (7 ft. 10½ in.) and one long (9 ft. 6 in.) element length together, the total length is about right for a half-wave on 20 mc with a small loading coil, in which would be the feed point. Similarly, the other pair would be full-wave on 40 mc, with a current antinode (the feed point) on a loading coil inside the sphere. This is conjectural on the lengths having been correctly stated, and

explains the compromise between an asymmetrical electrical layout and a symmetrical mechanical arrangement of the aerial elements. (It would obviously not be possible, in this case, to feed the full-wave aerial at one end, whereas the other feed point would be a current antinode inside the sphere, well off-centre of the system.)

Shape of the Orbit

Firing of the satellite on October 4 apparently took place from the neighbourhood of Archangel, in a south-westerly direction; the orbit finally taken up was given as $64^{\circ} 20'$ with respect to the earth's equator; it moves 3° west every 24 hours.

The shape of the orbit is elliptical, the height varying from a maximum of 580 miles going southerly to 250 miles on the northward traverse. Later, it was reported that the height (over the U.K.) was changing, from a maximum of 250 miles to a minimum of 150; it was also stated that if the height should decrease to 125 miles, the life of the satellite would be reduced to ten circuits.

Having started with an advertised rotation time of "about 90 minutes," this was established as 96 mins. 10 secs., and five days after launching the speed started to increase (in time) at the regular rate of 3 seconds each 24 hours. It is from readings of this sort, if they can be made with sufficient accuracy, that the eventual life of the satellite can be estimated.

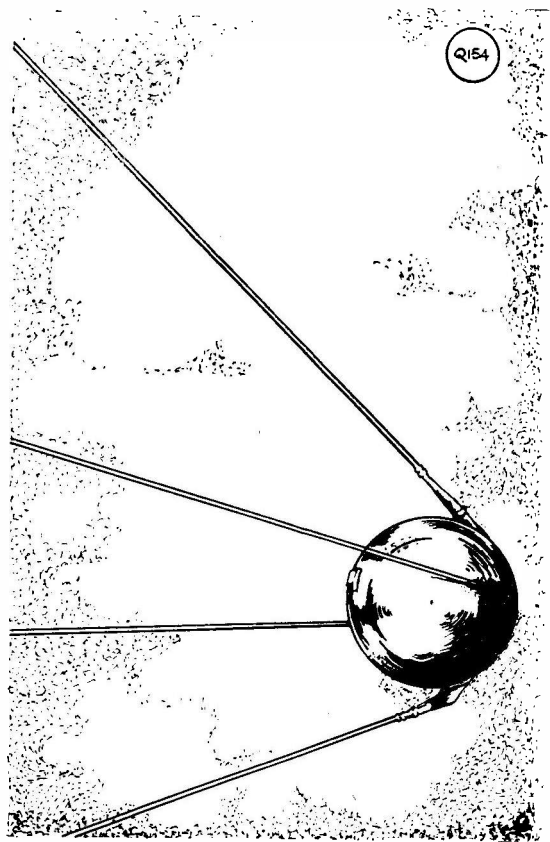
Further Observations and Comment

Estimates by the professional astronomers as to the expected life of the satellite varied from weeks to months, a year, and even "indefinitely"—which is a pretty fair indication that nobody really knows, and that there are not sufficient data on which to make a reliable calculation.

These estimates are, in any event, qualified by the possibility of meteor collision, or a series of collisions, which might either destroy the sphere or reduce its speed till it could no longer maintain the orbit, in which case it would commence spiralling in towards the earth (as the rocket launcher did) finally to vaporise in our atmosphere. The slightest interference with the sphere could upset the delicate balance between its own tangential velocity and the earth's gravitational pull, which is what maintains it in the orbit. In fact, it was thought that interference of this sort might occur during the evening of October 9, when the earth (with the satellite) went through the meteor shower of Giacobini-Zinner.

When the satellite was reported in orbit on October 5, neither of the two radio observatories in this country—at Cambridge and Jodrell Bank—were ready for it. However, the BBC's receiving station at Tatsfield was on continuous watch on both channels from the time the first launching report came in, and thereafter fed regular progress reports (covering reception only) to the BBC for their news broadcasts.

During that Saturday afternoon, a new aerial system was installed at the Cambridge observatory, and Dr. Ryle commenced tracking by the evening of the 7th. As already mentioned, on October 8, all signals disappeared completely, and some ten circuits



Sketch based on the official Russian photograph, which has been widely published, of the satellite, from which the dimensions can be deduced; the shorter aerial elements are given as 7 ft. 10½ ins. and the longer 9 ft. 6 ins. Launching took place from Archangel on October 4, and the satellite is still orbiting, though it has stopped radio transmission.

were made without anything being heard. By the 9th, signals were back again with a continuous note; though this was much weaker than the first transmissions received, the Cambridge team was able thereafter to make important observations.

Meanwhile, at Jodrell Bank, Professor Lovell was under extreme pressure from all quarters. Though the structure of his radio telescope was ready, final installation of the equipment itself had not been completed. By immense effort on the part of all concerned, it was prepared for final testing (on the moon) by the morning of October 10; at the very first attempt the radar transmitter was locked on the moon and automatic tracking commenced, with entirely satisfactory results.

This great feat of radio engineering at Jodrell Bank—far ahead of anything yet achieved in this field, and which otherwise would have made world headlines—passed quite unnoticed in the general excitement, with so much news pouring in about the progress of the earth satellite itself. On the evening of October 11, on the 11.00 p.m. transit of the

"Russian moon." Jodrell Bank connected, and accurate radar tracking of the earth satellite became possible with equipment designed and intended for the purpose.

The foregoing summary of the happenings immediately following the appearance of the satellite is based not only on BBC and press reports, but also on personal observation, supplemented by information from many radio amateurs—who, of course, were on their receivers as soon as the frequencies became known.

Significance of Frequency

Many points of great interest and importance emerge. Reception at such strength and over a period as long as 35 minutes could hardly have been expected at 20.005 mc, in the light of current theory on the structure of the ionosphere. On the other hand, it is also true to say that one of the known "windows" in the ionosphere occurs in the neighbourhood of 23 mc, as "sharsh" from Jupiter can be heard in this frequency area. Indeed, the choice by the Russians of 20.005 mc was an extremely clever move, since it enabled WWV to be used as a reference signal for tracking the satellite! (The choice of the second frequency of 40.002 mc was probably dictated by D/F considerations.)

The 40 mc signal, while not lasting so long, was always extremely strong, and the polarisation appeared to be "solid," or circularly polarised, *i.e.* it showed no particular directivity or plane polarisation on a simple aerial system. This is not entirely accounted for by the fact that the satellite itself was rotating slowly on its own axis.

An interesting correlation between amateur and professional observation occurred for 40 mc during the 10.50 p.m. transit on October 10. The Cambridge Radio Observatory gave the duration of the signal

as 6½ minutes from 2251; G3CGQ at Luton made it 8 minutes from 2250, with the maximum at 2254.75 GMT. He also confirms what other observers have said—that the 40 mc signal at its maximum was stronger than any signal ever heard on any band, including locals. G3CGQ gives the longest duration of the 40 mc signal as 10 minutes, from 2248 on October 8. Some transit times reported by others have been less than 5 minutes and as low as three minutes.

Future Possibilities

The Doppler effect was noted immediately by many radio amateur observers, and later in this feature we are able to show—by a method evolved by G3HMO, Stowe—how ranging of future satellites will be possible using quite simple apparatus.

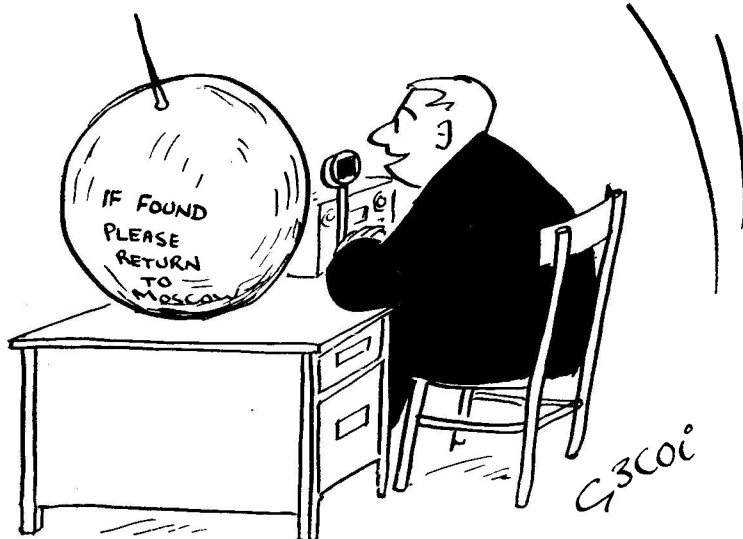
Similarly, by means of a sharp beam or a pair of crossed dipoles feeding into a search-coil assembly, or "radiogoniometer," it should be possible to obtain quite good directivity on any VHF channel when the path of the satellite is such as to make a fairly low angle with the point of observation; this is where a tiltable beam head would be very handy.

By the combination of ranging (by G3HMO's method) and obtaining directivity by D/F techniques, the position of the satellite—and, possibly, its path—could be determined within reasonable limits.

If the Americans are able to get their first satellite into the proposed equatorial orbit some time during December, and if, as promised, the Russians put another one up on a polar orbit during this month, then by about Christmas there will be at least two radio-transmitting satellites "on the air." What is not clear yet is what frequencies will be chosen.

The previously-agreed channel for all satellites for the IGY was 108 mc—see SHORT WAVE MAGAZINE, p.37, March 1957. The Russians having already departed from this in what they claim to be a "pilot project," the doubt now is what frequencies will be used for the next one. We may assume that the Americans have already designed for 108 mc, so that for them any change of plan at this stage would be a major problem, and might well further delay their launching. The Russians, on the other hand, have established the 20.005/40.002 mc technique and, with so many ground stations equipped for tracking, are unlikely to want to change their system—they might, however, instal a 108 mc transmitter as a gesture to the IGY! They have, in any event, promised to notify frequencies in advance.

It also seems desirable that some internationally-agreed system of radio identification should



" . . . Funny thing is, it works just as well on AC . . . "

be established. If the same frequencies are to be used, and more than two satellites are in orbit (the Russians have talked about an eventual total of *twelve*) it is obvious that call-letters will have to be allotted to identify them, even if they are in different orbits.

Broadcast Technical Information

It is particularly to be hoped that when the next satellite does go up, the BBC will not fail to announce the operating frequencies and all other available technical data as early and as often as possible—as it was, for this first one, there appeared almost to be a “security ban” on any frequency announcement by the BBC. It was several days after publication of the frequencies in the (more responsible) newspapers that the BBC gave them.

In circumstances such as these, the BBC has a direct and an urgent responsibility to disseminate factual scientific information which can be used by the thousands of interested workers who are not in touch with radio research centres.

A.J.F.

RANGING THE SATELLITE BY DOPPLER SHIFT OBSERVATION

EXPERIMENTAL METHOD USING SIMPLE APPARATUS

J. M. OSBORNE, M.A. (G3HMO)

Having done all that was possible in receiving the signal from the Russian satellite on several orbits, it was felt that something more should be attempted than merely listening to it, exciting as that was. The first thoughts on direction-finding offered little hope in view of the complexity of the aerial system required and the difficulty of putting it into operation. Another possibility of gaining information was from the frequency shift to be expected from a source of radio waves travelling at such a high speed—17,000 miles an hour. Measurement of this shift and its interpretation have proved so interesting that this article has been written, rather hurriedly, that it might be in time for the next satellite.

Doppler Variation

The change in note of the horn of a passing car or the whistle of a passing train, called the Doppler Effect, has its exact counterpart in the realms of electromagnetic waves. If a source of radio waves is travelling towards or away from the observer, its apparent frequency differs from its true frequency by a fraction given by its velocity (relative to the observer) expressed as a fraction of the velocity of light. Thus, if the satellite is coming over the horizon towards the observer with a velocity of 5 miles per second, then its frequency will be raised by 5 parts in 186,000 (the velocity of light being 186,000 miles per second). At 20 mc this amounts to a change of about 500 c.p.s. On disappearing over the horizon on its departure, the frequency will be correspondingly lowered by 500 c.p.s. What this

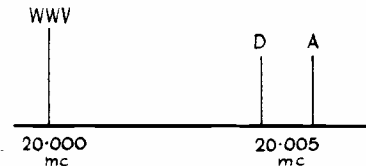


FIGURE 1

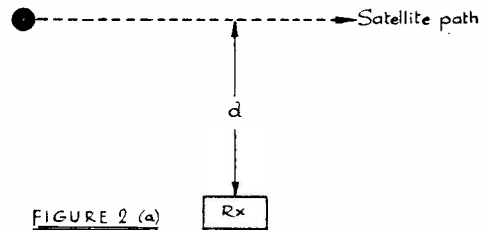


FIGURE 2 (a)

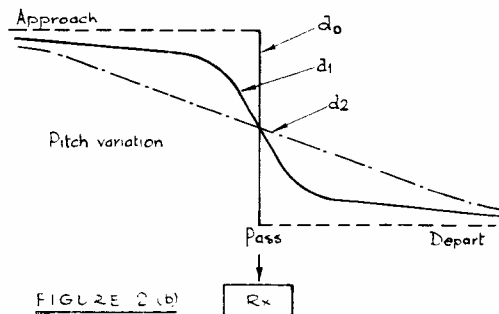


FIGURE 2 (b)

The significance of these sketches is explained in the text. In Fig. 2 (B) is shown the sort of pitch variation to be expected at different relative distances; it can be measured by the method described by G3HMO.

means may be seen more clearly by reference to Fig. 1. Here the frequency spectrum in the neighbourhood of 20 mc is shown; WWV, the American standard frequency station, transmits on 20.000 mc. The satellite transmits on 20.005 mc. When the satellite is approaching the observer its apparent frequency will be 20.0055 mc, dropping to 20.0045 mc on departure. When overhead, or at its nearest point, *i.e.* not approaching or departing, but just passing, its frequency will be 20.005 mc. Thus, careful measurement of the satellite's frequency will show a swoop from A to D in the diagram as it passes.

The time the satellite passes nearest the observer can be obtained from the time the swooping frequency is halfway between A and D. The range, or actual distance, from the observer can be found from how fast the swoop occurs. The mechanism will be understood by reference to Fig. 2. Diagram (a) shows the situation, while Fig. 2 (b) indicates the resulting change in frequency or pitch of the signal

Q155

as heard. (The general argument applies equally to locomotive whistles and satellites!) If the source passes close to the observer, the frequency is higher as it approaches and drops suddenly to a lower frequency as it passes. If it passes further away, the change in frequency, while being just as great, takes place more slowly.

In Fig. 2(b) the change is shown for a source of radio frequency passing the observer at differing ranges. When the listener is on the path, the change in frequency occurs instantly, d_0 . For some value of d the change takes place over a period of time, d_1 . When d is very great, the change is so slow that the source may be out of range without the full frequency shift being apparent. This is the case when the satellite's orbit only brings it above the horizon for a small arc at great range. The effect of the larger value of d is shown in curve d_2 . Notice that the further away the satellite's nearest point is, the more gradual the rate of change of frequency at the middle point becomes.

Method of Measurement

To detect this change in frequency is quite possible, using simple apparatus and a little care. The satellite signal is mixed with another signal on an adjacent frequency, so that an audible beat note is obtained in the receiver. Suppose this frequency was 20.006 mc. Then, as the satellite approached, the audio note would be 500 c.p.s., rising through 1000 c.p.s. as it passed, to 1500 c.p.s. as it departed. The fact that the audio frequency increases is due solely to choosing a reference frequency HF of the satellite; an LF side frequency would result in a drop, while a frequency of 20.005 mc dead would result in a drop to zero beat, followed by a rise on the other side. In all cases it is the *change*, and more particularly the *rate at which the change is taking place*, that gives the information.

It is clear that the reference frequency must be stable to better than 1/10th of the change to be detected over the period of observation. Considerably better stability is desirable and can be achieved in good oscillators. To use the receiver BFO would suffice simply to hear the satellite's carrier, and possibly get an indication of shift under maximum shift conditions. However, an adjustment in tuning, or any drift in either the BFO or receiver local oscillator, will result in changes of audio note probably greater than those to be measured. Hence, an external oscillator is necessary. A very stable VFO meets the requirement, though if the right crystal is available a CO is likely to be an improvement. The oscillator is loosely coupled to the front end of the receiver—see block schematic Fig. 5. It is adjusted to give a suitable beat; slightly HF of zero beat is ideal, as this keeps the shift frequencies low in the audio range without the inconvenience of going through zero beat. The receiver can be peaked up on the signal, and since the BFO is not used, no change in note results from exalting the satellite signal in this way.

Supposing now that the satellite has been correctly identified and everything is set right, then the audio

beat note should rise slowly at first and then rapidly as the signal peaks at its closest point. The note continues to rise further and tails off to a steady high note as the signal weakens and fades. Superimposed on the general level is a very marked periodic variation in strength, which could be related to the rotation of the satellite; if this is so, it must be rotating several times a minute.

Obtaining the Readings

To measure the audio frequency exactly, and quickly, the frequency was compared continuously with a calibrated audio oscillator. A set of readings of audio frequency against time are obtained during the passage of the satellite. In the absence of a tape recorder, at least two operators are required for reading and recording, and dummy runs are advisable to develop the necessary skill. The audio oscillator is adjusted until the slow beat is so slow as to be almost imperceptible. The reading of frequency is taken together with the corresponding time. While this is being done, the satellite's frequency will have shifted, and the oscillator frequency is raised until zero beat is again obtained. It is helpful, if the shift is taking place quickly, to set the frequency above and wait until the beat note falls to zero. As the audio frequency from the receiver drifts (or, more accurately, shifts) to that of the audio oscillator, a rough note is generated. This resolves itself into rapid beats which reduce in period until the two frequencies hang together for a fraction of a second at zero beat, and then the beat note reappears, grows in frequency, goes rough, and finally disappears as the receiver note goes 'way HF of that of the oscillator. The clock used must, of course, give "real time" if the time of passing is to be obtained as well as the range.

The block diagram at Fig. 5 shows how the apparatus was set up. The VFO had no deliberate coupling to the receiver and the resulting injection was quite adequate. Too much coupling would overload and desensitize the receiver. It should do no more—in the absence of other signals—than produce a perceptible increase in noise as it is tuned through the receiver frequency. The audio oscillator feeds its own LS, and the two speakers are placed so that both may be heard simultaneously. A volume control on the audio oscillator enables its output to be continuously adjusted to about the same level as the receiver output. The satellite signal strength changes rapidly, and the audio beats are only easily discernible when the two output volumes are about equal. One audio tone can drown out the other and the beat passes unnoticed.

A typical set of readings has been plotted in Fig. 3. They were taken on Monday, October 7, and show that the satellite came to within 360 miles of Buckingham and was at that range at 2250.45 GMT. (This time may not be exact, as the watch used had not been accurately synchronised with Greenwich.)

The readings, taken so early in the life of the first artificial satellite, have an interesting history. When the 20 mc signal was first heard at 2236 it

was "bleep-bleeping" normally, though, at that range, faintly. A minute or two later it disappeared—a normal phenomenon, presumably related to ionospheric refraction on 20 mc—but failed to reappear. At 2248 a strong CW carrier was noted on the frequency. On the preceding morning G6FO had observed that the bleep mechanism had stopped for some time. A bit of quick detective work based on this evidence enabled the right conclusion to be reached—that it was the satellite on steady tone—and from 2248 readings were taken on this CW carrier. Incidentally, provided the carrier can be identified correctly, it is easier to take readings on a steady signal than on a bleep. From the graph, it may be deduced that the time of passing, *i.e.* time of maximum slope, was 2250.45, and that at this time the note was changing by some 100 c.p.s. every 1/2 minute; that is, 400 c.p.s./min. or 6.6 c.p.s./sec. As this maximum slope is important, it may be derived more accurately by plotting a second graph, Fig. 4. Having drawn a smooth curve through the points of Fig 3, the increase in frequency in each 1/2-minute interval is measured from the graph. Doubling this figure gives the average rate of increase in frequency per minute—a convenient figure to plot and compare with Fig. 3. The maximum point of Fig. 4 shows more clearly the maximum slope, 400 c.p.s., and also the time of maximum slope. Superimposed on Fig. 3 is a steady drift of about 40 c.p.s./min., which was thought to be due to VFO drift. (This is not unreasonable, as the tuning condenser plates had just been bent to get the 21 mc output on to 20 mc!) Anyhow, the graph of Fig. 4 was plotted by subtracting 40 c.p.s. from the readings, to eliminate this known error.

Calculating the Range

The range is obtained by using the formula:

$$d = \frac{f \times u^2}{c \times \frac{df}{dt}}$$

where *d* is the range in miles (as shown in Fig. 2 (a)), *f* is the nominal RF frequency in c.p.s., *u* is the satellite velocity, *c* is the velocity of light, and $\frac{df}{dt}$ is the rate of change in frequency in c.p.s./sec.

Hence, taking *f* as 20×10^6 , *u* as 4.70 m.p.s., *c* as 186,000 m.p.s and $\frac{df}{dt}$ as 60 c.p.s./sec..

we have:

$$d = \frac{20 \times 10^6 \times 4.70^2}{186,000 \times 60} = 356 \text{ miles}$$

A useful approximation which should work for all closer satellites whose time of orbit is less than

100 minutes is:

$$d = \frac{2,400}{\frac{df}{dt}}$$

Thus, from the results of readings taken on Thursday, October 10, at 2245 GMT, $\frac{df}{dt}$ was 13 c.p.s./sec. Hence,

$$d = \frac{2,400}{13} = 185 \text{ miles}$$

These results—and others obtained in the same way—agree satisfactorily with the known position of the satellite, worked out from the transit forecasts as published by the Russians.

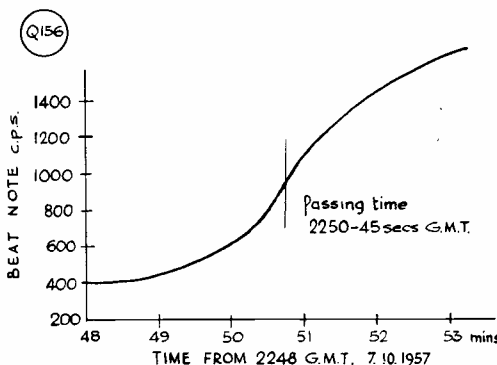


Fig. 3. Plot of the audio beat note change, against time, obtained on one particular run on 20.005 mc. The pitch variation is checked against an audio oscillator, which itself can be calibrated against the tone signals radiated by WWV or MSF. The "passing time" is the point at which the curve is steepest—see text and Fig. 4.

Some General Observations

The "Doppler Shift" method of ranging, as described here, can give accurate results under good conditions. The limitations lie in the speed and accuracy with which the sliding audio note can be measured, the stability of the VFO, and in the mathematical corrections which should be made to the simplified formula above (based, paradoxically, on a flat earth!).

The first limitations are of experimental techniques and can be improved on by practice and experience. As regards the latter, it is clear that the satellite as it comes over the horizon is not travelling towards the observer—it is rising in an arc over his head. Its full relative velocity and Doppler shift are not realised. The higher the orbit the less the total shift, and for very great orbits relative to the earth (such as the moon) the total shift would be negligible. Nor has any allowance been made for the observer's velocity as he rotates with the earth. This amounts to some 1,000 m.p.h. on the equator and about 650 m.p.h. at our latitudes. [Over

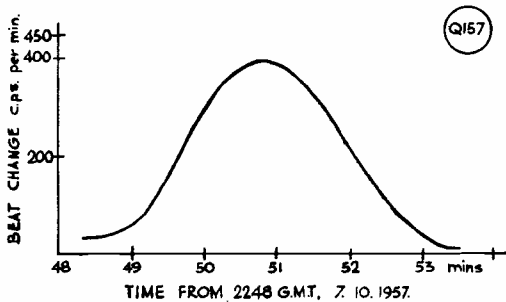


Fig. 4. Showing the rate of beat change, measured in cycles per second, expressed per minute; this curve is produced from Fig. 3, and also gives the passing time, which is the peak of the curve. The values obtained are converted by the simple formulae given in the text.

Taking the Russian satellite as an example for procedure (because other satellites may come up on different frequencies), to find its signal on 20.005 mc the following method was adopted: First, WWV was located on 20.000 mc at a convenient time of the day when its signals were strong. The one second tick and periodic announcements make identification easy. Next, the VFO was set zero-beat on WWV and then taken HF until the beat was 6 kc (a high-pitched whistle which could be selected with the audio oscillator). Then, the receiver and preamplifier were peaked on the external VFO frequency by removing the aerial and going HF from WWV until the "sharsh" increased. When the satellite signal appeared, the receiver and preamplifier were retuned to the signal, but the VFO was not touched unless it was necessary to alter the beat note. This preliminary setting up should be done early, to get everything steady, or the results will be invalidated. Sudden small discontinuous shifts in the satellite frequency were noted, which could have been due to slight frequency jumping in the satellite transmitter. The reason for this is not quite clear, and it could be that the external oscillator used was not above suspicion.

More recent observations at this QTH have been taken down on a tape recorder. This enormously simplifies the whole business. Time is fixed on the tape by announcing it into the microphone, or letting the tape run on afterwards and putting on a time signal from the BBC, or MSF or WWV. Incidentally, the latter stations also provide steady tones

which can be used for calibrating or checking the audio oscillator.

The audio frequency measurements are made from the tape at a convenient time after the run. They can be gone through again and again to ensure accuracy, since several sets of readings can be taken from the same recording. It is also helpful if the recorder is a two-speed machine; the facility is then available to record at $7\frac{1}{2}$ in./sec. and play back at $3\frac{1}{2}$ in./sec. tape speed. The scale of the graph is altered, of course, and the slope has to be multiplied by four to obtain the true rate of change of frequency. But this is an advantage.

It is hoped on the next occasion to use an oscilloscope to detect the satellite beat note by means of Lissajou figures. The audio from the tape will be fed to the Y-plates and from the oscillator to the X-plates. This suggests that for those with no audio oscillator it should be possible, with the 50-cycle mains on the X-plates, to watch the Lissajou figures go through the frequency range 50 c.p.s. — 2×50 c.p.s. — 3×50 c.p.s. and so on. At the higher frequencies, however, some skill and much practice would be needed to ensure accurate interpretation.

It is hoped that this article will prove of interest to those who have no special facilities but who wish to find out for themselves something about these satellite orbits. It is not suggested that the results will be up to the accuracy of the professionals at Cambridge and Jodrell Bank, using interferometer and radar techniques, but the point is that many readers should be able to improvise on their own apparatus to work along the lines suggested in this article.

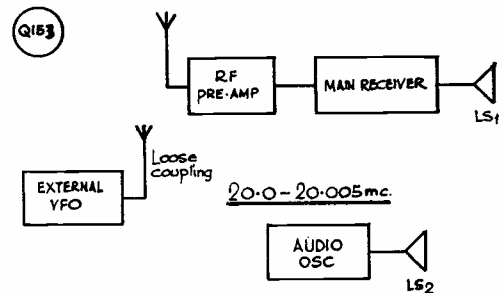


Fig. 5. Equipment set-up for the measurements of Doppler effect on the transit of the satellite. The external VFO should be capable of good stability, and the audio oscillator reasonably accurately calibrated over the range shown in the curves of Figs. 3 and 4.

BBC ON COLOUR TV TESTS

The Crystal Palace (Channel 1) TV transmitter is now being modulated with test transmissions in colour, taking place after normal programme hours on Mondays, Wednesdays and Fridays, and during Tuesday, Thursday and Friday *afternoons*, 3.30 to 4.15 p.m. This is a full-week programme, after which there is a no-colour week, then transmissions during the third week on the Tuesday-Friday schedule only, followed by another no-colour week. The tests will

continue for about six months, and the next full-programme week after publication is that commencing on Monday, December 2.

CQ/QST SUBSCRIPTIONS

Readers are reminded that we can negotiate, in sterling, subscriptions and renewals for *CQ* (44s.) and *QST* (36s.). Send your subscription order, or renewal notice, with remittance, to: Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

DX FROM CHRISTMAS ISLAND

AMATEUR OPERATION FROM THE MEGATON TEST SITE

P. R. Cheesman, VR3G (G3KDE)

FEW small and sparsely-populated areas can have seen the same amount of amateur activity as did Christmas Island during the first six months of this year. The Island itself is the one in the Pacific, and has no connection other than by name with the Christmas Island near Java. It is one of the Line Island Group in the Central Pacific, almost on the equator, some 1,200 miles south of the Hawaiian Islands. Christmas is one of the islands in the group under British control, and is the residence of the district officer of the Line Island Group District of the Gilbert and Ellis Island Colony. The parent Islands are, however, many hundreds of miles to the west. Christmas Island, a coral atoll, is shaped rather like a clutching hand; the fingers, at the western end of the Island, form one of the largest lagoons of its kind in the world. The "wrist" end is mainly sand, and it is here that one can find the highest points on the Island—that is to say, the dunes rise as high as fifty feet above sea level! When discovered by Captain Cook on Christmas Eve, 1777, the Island was uninhabited, as, in fact, it would have remained but for the forming of large coconut plantations at the end of the nineteenth century. Islanders from the Gilbert and Ellis Group were brought in to work these plantations for the copra. At the time of the arrival of British forces on the Island towards the end of 1956, the population was about two hundred Gilbertese on contract to the Government, which now runs the plantations.

The Amateur Radio side of the Christmas Island story started on an R.A.F. station in England in the middle of last year. Here the advanced party of the British Megaton Trials Task Force was collecting. Among these few Servicemen were holders of three G calls; an attempt was at once made to obtain the necessary permission to operate amateur stations on Christmas.

In the months that followed the landing of the advanced party on Christmas Island a certain amount of band monitoring activity was possible, and although no reports were sent out, the information obtained helped in the later operational phase. Early in the New Year the original trio re-formed, and in January, 1957, came the great day when permission was given to operate. This authority allowed three stations, the original trio: VR3E, VR3F and the writer under VR3G.

Getting Started

Equipment now proved the stumbling block, as none of us had brought anything out, and a coral island is not the likeliest place to find suitable equipment or even the odd component. VR3E had been to KH6 and, through the kindness of the

U.S.A.F. authorities and ex-VR3D, he obtained some gear which was eventually modified to put out a respectable signal on Ten. VR3F and the writer obtained the loan of some Service equipment and had many hundreds of contacts on Twenty phone; VR3G came on the air on 2nd February, 1957. But, as was expected, after just over a month of activity, the loan equipment was required for other purposes, so that VR3F and VR3G became temporarily QRT. After nearly two months, VR3F was in possession of a Panda Cub transmitter, which he used mainly into a dipole. For the writer's part, a visit to KH6 land had produced a second-hand (and rather dilapidated) U.S. "Novice" type transmitter. This was a thing called a "W.R.L. Globe Chief." It surprised not only the stations worked but also the operator; running about eighty watts to a long wire aimed on Seattle, reports of 599x were common throughout the States. Rock-bound operation on Twenty CW was then the next phase of operation for VR3G. A gift of crystals from KH6APS greatly aided the process of spreading out the calling stations, when, as happened at times, one spot frequency became just a bit too crowded!

About this time a fourth Christmas Is. call was issued, VR3H, to ex-G3FNL; he was, however, not very active.

These, then, were the stations operational on Christmas Island, and the activity continued from these four till July, 1957. Then, within a few days of each other, the stations closed and their operators returned to climates cool and pleasant.

Activity there has been before from Christmas Is.—VR3D, then employed by an American Pacific airline, was, so far as is known, the first VR3 to operate from that *locale*. All other genuine VR3 stations have operated from the neighbouring island, Fanning. At the time of our operations, the only station on Fanning was VR3B. One patchy QSO with him was managed on Twenty CW, at a range of about one hundred miles. It is quite possible that other stations have operated from the area, as during the war and up to as late as 1948 the United States Forces had a base on Christmas.

Results and Experiences

So much for the general picture. The writer's own most interesting time on the air was the period of rock-bound operation. From the commencement, the rig had to be set up and taken down after a spell on the air, as there was no place where it could be left set up for days on end. Simplicity was indubitably the key word! An AR88 was available as the receiver, and the Globe Chief is a compact job. The long-wire was made to serve both the transmitter and receiver by means of a very crude leaf switch. Operating periods were, for the most part, limited to evenings, with a few all-night stands on Saturdays; that is to say, around 0500 to 0900 GMT, with the odd spell going on as late as 1400. About the only times Europeans could be heard was around 0800 GMT—a fact confirmed by the earlier SWL period.

Operation on the CW band always resulted in pile-ups. It was found that the best way of getting

started was to listen around on the crystal spot frequencies and then pick out one station. The resulting contacts were, as a rule, the best of the evening, as during the QSO the "wolf pack" formed up on and about the frequency, and on completion of the contact a fairly quiet band with the odd S8 signal suddenly became a solid S8 level up to 10 kc either side of the frequency! It was astonishing to hear a large part of the band "vibrating with the call-sign in many voices." Having started a QSO, near-silence reigned until that contact drew to a close; then the round started again. One says "near silence" as there were always the operators who apparently thought you had misread their call, or that you would have preferred to work them rather than the station you did call; or, in some cases, thinking they weren't getting out as you hadn't replied to them, started to tune up and test at great length right on the frequency.

On the whole, however, the American stations were very good, and the number being troublesome was smaller than one would have encountered in the European theatre. (This comment is based on experience obtained whilst working from semi-DX locations in the Middle East.) It was, of course, nearly always the strongest stations that got the QSO's in the end. A look back over the log shows that there were days when all the stations worked—some thirty or more—had been S8 or over.

This accounts for the small number of European stations worked on CW; on phone, with the limited American phone band, the position was easier, and some score of Europeans were worked. On the common CW band, however, the odds were heavily against Europe, even when the call was limited to "CQ Europe," and the W's respected it by easing off for a while. The small number of QSO's with Europe, and the U.K. in particular—only six G's, and GM3CDL, were worked—was the greatest disappointment, as such contacts would have given great satisfaction at both ends.

Many kindnesses were shown to the writer while

out in VR3. When it became obvious that a WAS was on the cards, some little time was spent on the look-out for the few States at that time outstanding. On one occasion, while in QSO with a W5, he was asked about activity in New Mexico; his answer was: "I've got a good friend in Albuquerque; I'll give him a call on the land-line tomorrow and arrange a sked." A protest that he shouldn't go to all that trouble, as a time could not be fixed, met with the reply that it was no trouble, and anyway he'd call up and let his friend know VR3G was looking for New Mexico. (The land-line call was about a thousand miles.) The sequel was that a couple of QSO's later New Mexico was worked, because a station in Boston, Mass., had overheard the earlier contact with the W5! Such is the assistance given to a DX station working into the States. Many were the invitations received, and though none could be taken up, it was possible to spend a few days in KH6.

Some Statistics

For the record, 2365 "Christmas cards" have been sent out for VR3G alone. Contact was made with 62 countries in all Continents, on phone and CW. The WAS is pending with one state to confirm. Some of the more "exotic" calls worked were: FK8, FO8, KG6, KM6, KW6, KX6, KP6, VR2, VR3, ZK1, ZK2—all comparatively local to Christmas Is.; ZD3, VQ4 and the Europeans were the best of the DX.

This is, then, part of the Christmas Island 1957 story; much that was behind the scenes cannot be discussed. But, thanks to the permission of the Task Force Commander, the assistance and understanding of the signals officers and their staffs, to say nothing of the co-operation of amateurs too numerous to mention, the calls were obtained and the operations made successful. In the words of the song, "How would you like to spend Christmas on Christmas Island?" Well, the writer has and, thanks to Amateur Radio, the stay was very enjoyable.

NEW G.E.C. VALVE MANUAL

This has always been a very useful publication, and the new issue of Part I—now available at 7s. 6d., or 8s. 3d. post free, of the G.E.C. Valve and Electronics Dept.—should be kept within reach not only by those with design or research problems, but also by anyone having an interest in the application of valves, CR tubes and semi-conductors. Part I is of over 200 pages, in a stiff cover.

"MCC"—MAGAZINE CLUB CONTEST

This annual affair—the twelfth of the series—is now a well-established event in the Amateur Radio calendar. This year, it takes place during the week-ends November 16/17 and 23/24, 1600-1900 GMT each day. MCC is fought out on Top Band and is open to all Clubs; non-Club operators are also invited to be on, to give the vital single-point

contacts to the Club stations. Rules in full appeared on p.440 of the October issue of SHORT WAVE MAGAZINE. Anyone keen on snappy CW work on 160 metres should find a session or two of this Contest very stimulating. Check logs from non-Club operators will be appreciated, and credited.

NEW IN THE LIST

At about 5.00 p.m. on Wednesday, October 23, we were visited, at the SHORT WAVE MAGAZINE stand at the Radio Hobbies Exhibition, by Stephen Gibbs and Peter Watson; they had come to report that at 4.00 p.m. that same afternoon they had each taken their G.P.O. Morse Test, and immediately afterwards had been issued with their call-signs. So they were able to sign our visitors' book as G3MBS and G3MBT respectively. They were at school together, are both with the Marconi Company, and now will appear in sequence in the *Call Book*.

Power Supply and Suppression in Portable/Mobile Working

SOME OF THE PRACTICAL POINTS

D. T. BRADFORD (VQ4EV)

The author of this article — who will be well remembered as G3GBO — is now concerned professionally with mobile working out in Kenya, besides being a keen /P/M operator himself. The problems he discusses here are essentially practical, and will be encountered by anyone who is either going /M, or contemplating the possibility of mobile operation. Hence, his ideas and suggestions will be of interest to all mobileers, whether active or potential.— Editor.

IF you have ever built mobile and portable gear you will know that there are quite a few little problems that arise. In this article an attempt has been made to review some of the difficulties and suggest possible ways of getting round them. The first problem that presents itself is invariably that of power supplies.

LT Supply

The car battery is the obvious choice for the LT supply, although when using 6 volt valves from a 12-volt system a certain amount of caution is necessary; 12-volt heater valves are of course the easiest way out, but sometimes one finds that there are no 12-volt equivalents made, or available at the right price. In this case, six-volt types can be connected with their heaters in series — that is, of course, provided that each valve has the same current rating. If the valves are of different rating and wired in series, a separate shunt resistor must be connected across the heater pins of the smaller valve to protect it from excessive current. This is in general bad practice, and one should not resort to this method unless it is absolutely necessary. No attempt at all should be made if the valve filament/heater currents differ by more than about 30%. The reason for this is that a cold valve filament has a very low resistance and at switch-on passes a high instantaneous current until its temperature rises. Naturally, the higher the filament current of a valve the

lower its working resistance, while its cold resistance is proportionately lower still. Consider a large high current valve in series with a small valve which has in parallel with it an appropriate shunt resistance. (see Fig. 1.) The shunt resistance will have almost the same resistance value whether or not current is flowing. At switch-on, therefore, the current passing through the filament of the smaller valve is many times higher than its normal rating. If the difference of the relative filament current is sufficiently large it is quite likely that the smaller valve would disappear in a shower of white hot filament particles on switching-on for the first time. In order to avoid this difficulty a series-parallel arrangement (as shown in Fig. 2) should be adopted. A small resistor R2 can be added to bring the currents in the two sections exactly equal. (see Fig. 3.) In this way valves will not be endangered; even if one valve filament fails, the resulting overload on the others will not be too serious. All valves in the whole installation, either six or twelve volt, should be grouped together as in Fig. 3.

There are now available some thermal-sensitive resistances which behave in a similar manner to valve filaments, *i.e.* low resistance cold and rated resistance when the specified current flows. If one of these resistances of appropriate value can be obtained for the R1 position the method shown in Fig. 1 becomes safer. If a resistor of the correct value in the thermal-sensitive variety can be obtained for the R2 position shown in Fig. 3, this method is safer still.

HT Supplies

Provision of HT is more troublesome than the LT side in /P/M working. There are three popular ways of obtaining HT. The first and least efficient is to use HT batteries, either dry or the old "Milne" type of re-chargeable bank. Both of these are expensive; the former would not supply enough current for most purposes, while the latter is very bulky and heavy for /P/M use. High tension batteries will therefore be neglected as impractical for

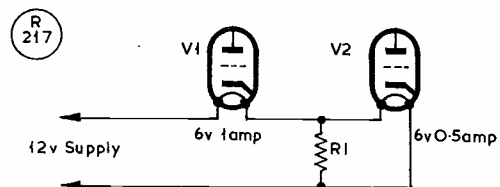


Fig. 1. This method of coupling valve heaters endangers V2 when switching on if it takes considerably less current than V1; for reasons explained in the text, R1 is not sufficient protection.

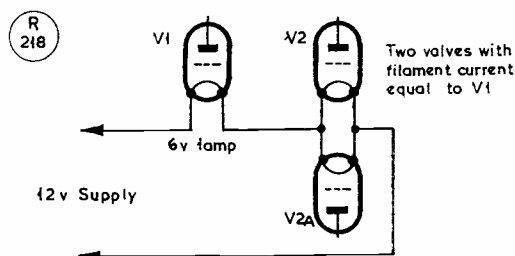


Fig. 2. A better paralleling arrangement than in Fig. 1, to equalise heater current. V2A can be the unused half of a double-element valve.

most purposes.

The next method is by means of a vibrator pack. The usual basic arrangement is that a vibrating reed (electromagnetically sustained) acts as a high speed change-over switch breaking the incoming DC supply into pulses. These pulses are fed into a step-up transformer, after which the high alternating voltage is rectified and smoothed by conventional means. (See Fig. 5.) Vibrator supplies commonly available can be expected to give between 100 and 300 volts at currents between 30 and 120 milliamps depending on make and rating. This form of supply is most useful where mechanically quiet operation and medium voltages and currents are required. For feeding receivers, exciters and speech amplifiers they are usually ideal. One big snag is that the alternating wave-form produced is very "peaky" and rich in harmonics, due to "ringing" effects within the step-up transformer caused by the pulsing DC input to its primary winding. This means that great care must be taken to filter and screen all associated wiring to avoid radiation of radio frequency hash (or audio frequency hum in the case of speech amplifiers). It is a wise precaution fully to screen both ingoing LT and outgoing HT leads, from the battery right through to the equipment in use. If possible vibrator packs should be enclosed in tight fitting metal boxes to minimise radiation.

Rotary generators or rotary transformers are a very popular source of HT, particularly for uses where heavy instantaneous currents are required. A rotary generator consists basically of an electric motor of either six, twelve or 24-volt rating which drives a high voltage DC generator. The construction may be compared to that of an electric motor with two commutators. A great disadvantage of the rotary transformer is its mechanical noise, producing a whine like a baby vacuum cleaner! Provided that the generator can be located away from the operating position this presents

no great difficulty. Rotary generators are to be had with primaries from 6 to 32 volts and outputs ranging from 150 volts, at 50 or so milliamps, to 1500 volts, at a quarter of an amp. (It should be remembered when planning, that these large high wattage generators consume a proportionally high primary current from the battery!) Hash filtration on rotary generators is usually not quite as difficult as with vibrator packs, while ripple smoothing is far easier as the superimposed AC component is higher in natural frequency. These generators have another advantage over the vibrator pack in that they will usually produce higher peak currents than vibrators for a given voltage drop on load. This means that they are better suited for feeding Class-B modulators or keyed amplifiers, which make fluctuating demands on the HT supply. Generator bearings should be greased regularly and care taken to exclude dust. Apart from this attention, rotary converters are in general very reliable, even if noisy.

Power Conservation

Unless one is prepared to carry a large diesel generator around, every care should be taken to keep power consumption to a minimum. Even then your gear will probably still consume more than you expected! Here are a few short notes to help make the installation more economical:

As the HT generating devices mentioned above can vary between say 50% and 75% in efficiency, 3 watts of HT (that is only 10 mA at 300v.) can mean as much as a whole amp of LT current from a 6-volt battery. It is therefore obvious that the utmost economy

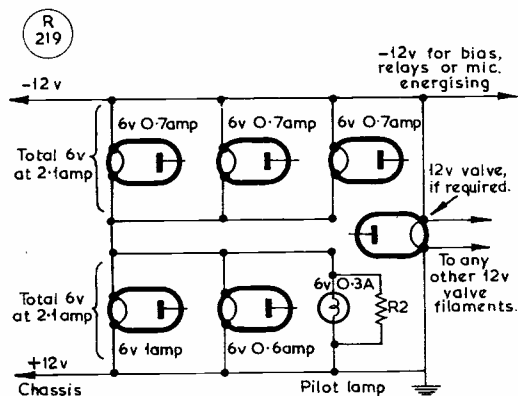


Fig. 3. Showing a typical filament/heater layout for equipment using a variety of 6 and 12 volt valves, of varying current ratings. R2 is a load resistor of 30 ohms at 0.2 amps.

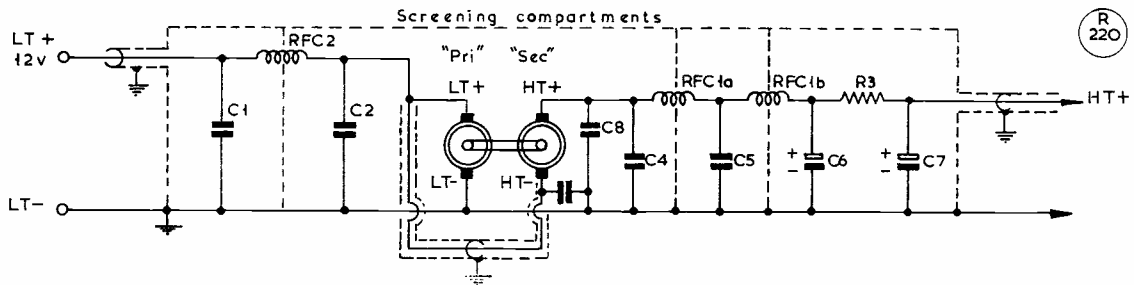


Fig. 4. The layout of a typical rotary generator power supply unit, incorporating full suppression. Values are given in the table, the notation used being common to all diagrams in this article. Chokes RFC1a-b and RFC2 are inserted to give adequate hash suppression when the unit is feeding a receiver; if a transmitter only is to be run from the machine, these items can be omitted.

must be exercised if the battery drain is not to be prohibitively large. The receiver set-up in particular is important, for only a small percentage of time on the band is spent actually transmitting. While on the subject it is worth remembering that audio stages in particular can be used twice, as a speech amplifier on "transmit" and as the receiver audio channel when listening. The switching can be achieved fairly simply and the result saves running one or two valve heaters more than necessary (see Fig. 8). The low impedance output of the receiver can be easily switched to a screened lead from a remotely sited modulator in the luggage compartment, as suggested in Fig. 8.

Replace 6V6 or similar type output valves with a 6J5 or other small valve, and you will find that there is still ample audio output. Alternatively, HT alone will be saved if you increase the value of the cathode bias resistor on your receiver output valve. If you go too far the quality will suffer, but quite a lot of distortion can be tolerated for phone reception under mobile conditions. If your receiver uses more than one pilot lamp, try removing the

others, or if pairs are in series, replace with lower wattage types. Some vibrator packs use valve rectifiers such as 6X5 or 6X4 types. Filament current will be saved if you replace them with suitable selenium rectifiers. A small change-over

Table of Values

All circuits and references Figs. 1-8

Ca, Cb,	= 1 μ F, metal cased	C9	= 1 μ F
Cc, Cd	= .01 μ F, mica	R1	= 12 ohms
C1, C4	= .01 μ F, mica	R2	= 30 ohms
C2, C5	= 0.1 μ F	R3	= 500 ohms
C3	= .001 μ F	RFC1	(A-B) = 2.5 mH RF choke
C6	= 8 μ F	RFC2	= 40t. 14g. 5/8-in. diam. close-wound
C7	= 16 or 32 μ F (at HT working voltage)		
C8	= 560 μ F (for VHF suppression)		

relay in the receiver power supply will enable you to remove HT from the car radio on "transmit" and have a supply available for the exciter and/or modulator; this will also automatically mute the receiver when transmitting.

The battery supply line can be useful in several ways. If the positive side of the battery is earthed 6 or 12 volts of negative bias is readily

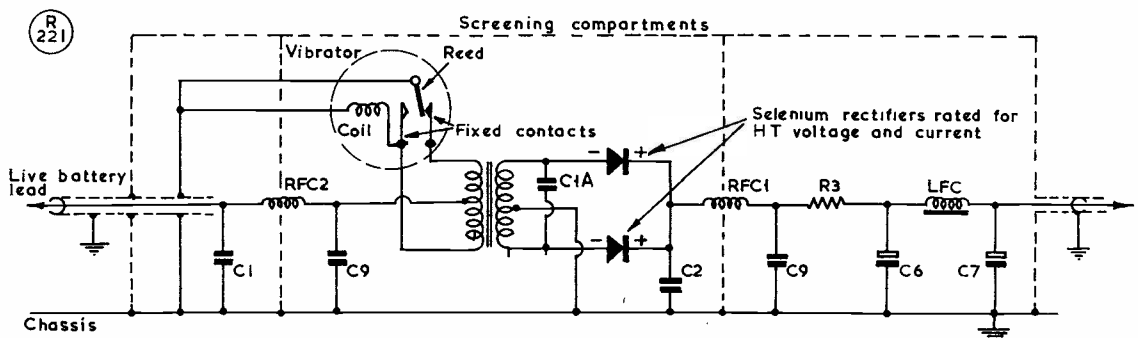


Fig. 5. Typical vibrator supply using selenium rectifiers to economise on LT power. C1A is a hash-suppression capacity, the value of which can be found by experiment, starting with a .01 μ F condenser. In general, vibrator HT supply units should be on constant load to avoid excessive voltage build-up; this is easily arranged by putting a high-value bleeder resistor across the output, 10% of which can usually be spared for bleed purposes; in this circuit, the bleeder should go across C1A.

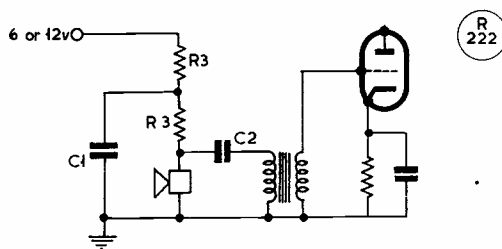


Fig. 6. Circuit for energising a carbon microphone from the car battery. C1, C2 are both 50 μ F, and R3 resistors each 500 ohms.

available. With a negative earth system the negative side of the vibrator pack or rotary transformer secondary can be returned to the primary "live" side (see Fig. 4) thus obtaining a further 6 or 12 volts of HT with respect to earth. In either case a relay or carbon microphone energising supply is there for the taking. (see Fig. 6.)

Even a small voltage drop on filaments or primary circuits of vibrators and rotary transformers will *seriously reduce* output and efficiency. Make sure that all your LT wiring is of really heavy gauge wire. Those who have a 6-volt supply will need at least twice the cross sectional area of copper wire compared with the more fortunate "12-volt boys." For remotely operated gear or for cars with the battery situated a long way from the operating position, a heavy-contact relay can save yards of thick wire and half a volt of LT drop. Finally, remember that a 40 amp fuse at the battery take-off point may well prevent a burnt out car — Oh, yes, it *can* happen!

Suppression of Interference

When designing receiving gear for mobile use, start right and include a noise limiter for even if your car *is* well suppressed, others around you on the road will not all be silent! Now, although all good amateurs and self-respecting car owners should already have suppressors fitted, it remains to be seen how effective suppression has been. Here are details for systematic suppression which holds good for most makes of car. First, the ignition system:—A 10,000-ohm lead suppressor should be inserted between the HT terminal of the ignition coil and the distributor rotor arm, as near the distributor as possible. Similar value resistor type suppressors should be fitted to the tops of each sparking plug. Some makes of car (like the writer's Volkswagen) have their HT leads run through metal conduit tubes, but in cases where this is not done and interference

is still troublesome, screened ignition wiring can be substituted. Large $\frac{3}{8}$ in. diameter coaxial cable can be used here, but take care to run it clear of the hot parts of the engine, or the polythene inside will melt with disastrous results! The braid should be well and truly earthed, at both ends if possible. The battery (*not* the distributor) side of the ignition coil should be de-coupled to earth by a 1.0 μ F condenser C_a, keeping leads as short and direct as possible. (see Fig. 7.) There are now available sparking plugs with built-in suppressor resistors which can be installed to advantage.

Generator hash can usually be cured by de-coupling the live brush to earth with a 1 μ F condenser in a similar way to the ignition coil primary, C_e in Fig. 7. Windscreen wiper motors need the same treatment as the generator, C_a. In severe cases of windscreen or generator hash an RF choke of about 10 turns of 12g. enamelled wire $\frac{3}{8}$ in. in diameter can be inserted between the de-coupled terminal and the rest of the vehicle wiring (see Fig. 7). It is barely worth suppressing the starter motor, but if required this also should have a 1 μ F condenser C_b to earth from its live terminal; do not use

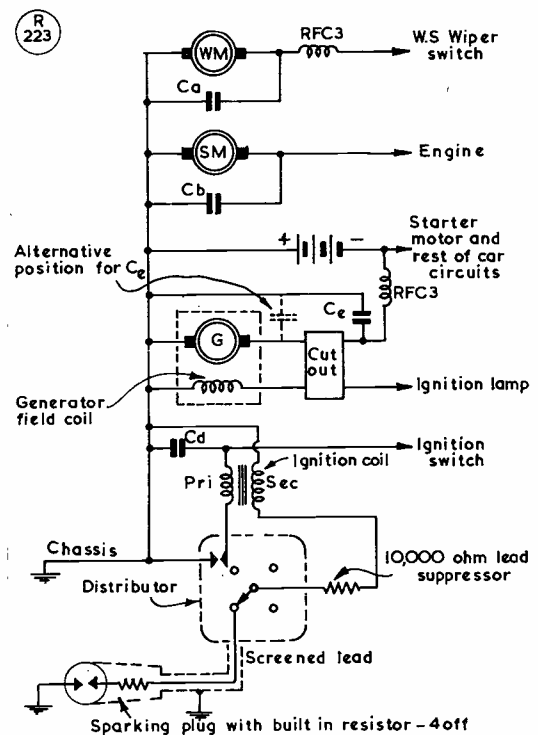


Fig. 7. Schematic of a typical car electrical system, showing where suppression will have to be applied. C_a-C_d are 1 μ F metal cased condensers, and RFC3 is 10 turns of 12g. enamelled wire, $\frac{3}{4}$ ins. diameter, used for hash suppression.

an RF choke in series because of the very high current which flows when the starter button is pressed.

Ensure a good contact between bonnet and bodywork by bonding with heavy copper tape or braid. This also applies to exhaust pipes and silencers which can be the cause of static interference and odd crackles. Extra bonding of the engine to the chassis has been found to help in many cases, and sometimes effects an improvement in the working of the starter motor! No two cases are alike and a little experimentation often produces unexpected results. Finally, if you have the engine at the front, mount your aerial near the rear — conversely, for a car with the engine at the rear mount the aerial as far forward as possible. It all helps! Very thorough and solid earthing of everything in the way of radio or electrical gear is essential. It is rare that any single item of suppression effects a complete cure; generally, it is a case of systematically dealing with each source of interference as it is identified.

Petrol Electric Sets

Finally, a word about petrol-electric alternators for portable stations. These are often suppressed during manufacture, but for small installations the following points are worth noting: Earth down one side of the AC output to the engine frame and earth the frame. (Taking care that the other side is not earthed already.) De-couple the un-earthed or "live" lead with a $.01 \mu\text{F}$ mica condenser to earth at the generator terminal, and insert an RF choke in series with the live line. The choke must be suitable to carry the full current on load. If hash is still noticeable, have the leads from the generator to the radio gear lying on the

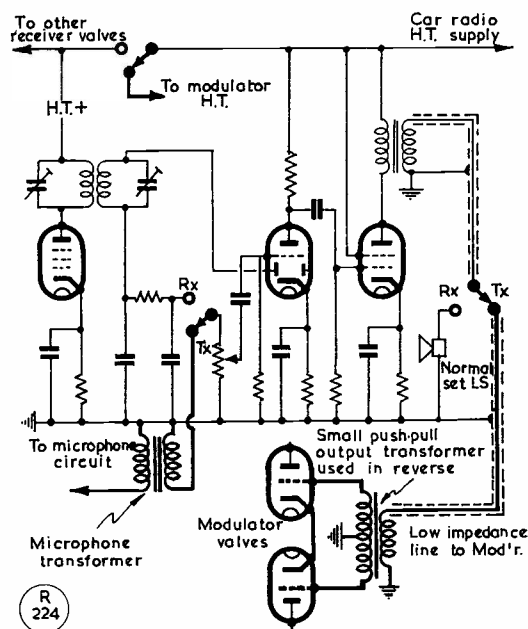


Fig. 8. Circuit re-arrangement, and additional items, on the output side of a standard car radio receiver to enable it to be used as the speech amplifier for the mobile modulator.

ground and not festooned in an overhead run. Burying the leads a few inches below the surface of the ground has been known to effect miraculous cures in the suppression of noise! The ignition system of the PE set should be suppressed as in the case of the car sparking plugs. The PE set should always be sited some yards from the gear so that mechanical noise and exhaust fumes will not hamper the operators. Finally, never re-fuel a petrol-driven engine whilst it is running — unless your eyebrows are growing too thickly!

THE MASER TECHNIQUE

An entirely new form of microwave amplifier and oscillator, known as the Maser ("Microwave Amplification by the Simulated Emission of Radiation") has now been evolved and is in operation at the Signals Research and Development Establishment of the Ministry of Supply, at Christchurch. It is said to depend for its action on the energy emitted by a beam of ammonia molecules, and can be used not only as a relatively high-gain amplifier, but also as a very accurate frequency source at UHF/SHF. Work is now going forward to exploit the principle using solid materials, with promising results. A lecture on the subject was given by Dr. R. A. Smith, M.A., Ph.D., of R.R.E., Malvern, on October 16 to the Radar

Association. We hope to publish some information on this interesting new development in an early issue.

BBC RESEARCH SCHOLARSHIPS

The BBC has awarded research scholarships, valued at £435 a year for two years, to Mr. J. B. Izatt (Aberdeen University) and Mr. W. A. Voss (London University). These valuable scholarships, which are awarded annually, are for two years in the first instance. They are limited to male British subjects resident in the U.K., and the only other condition applying is that the subject chosen for research should be in those fields of physics and telecommunications having a bearing on sound and television broadcasting.

HOPPING MAD

OR, CAN WE AVOID
THE PILE-UP?

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

NO-ONE with the slightest interest in working DX can fail to know just what is meant by a "pile-up." It is a post-war phenomenon stemming from the habit of single-frequency QSO's and the universal use of VFO's. (Before 1939 one used to call CQ on a crystal and tune the whole band for replies, and the rudimentary pile-up tended to occur at the bottom end of the band.)

The number of DX-conscious stations has increased so greatly in the last few years that there seems to be a universal desire to work "new ones," rather more among the CW fraternity than the phone men. Thus, the merest hint of a genuine new country will gather a crowd, and the very first time the station concerned puts out a signal, he is likely to be snowed under with calls.

All very natural and unavoidable, so far. But in next to no time the whole situation gets completely out of hand owing to operating that is (a) not very clever; (b) frankly stupid; and (c) just plain moronic. When stage (c) is reached the sensible ones all pack up and go to bed, or switch on the TV.

Crowd Psychology

We have recently been observing pile-ups, of which there have been many prime specimens on show—from the point of view of a spectator, not a participator. Until one has done this, it is hard to conceive of the wasted effort and wasted power that go into one of these pernicious affairs. Two notorious examples have centred round JT1AA and CR8AC, both in the middle of the CW section of Twenty, and both audible at times when short-skip is in evidence.

Not having been a serious competitor, we can describe exactly what goes on without getting hot-under-the-collar, and review the thing with a kind of clinical detachment. Had we been as keen on working either station as most of the types calling them, we should have been just another signal in the middle of the mess. As it is, we have emerged with a serene temper, a tape-recording of the whole affair, and a sad but detached opinion of the general level of operating.

The Start

Let us set the stage and begin at the beginning. JT1AA is the *only* amateur in Mongolia, and probably the only active one in Zone 23, wanted by countless amateurs the world over for their WAZ award. He tunes up on 14060 kc and puts out his first CQ, audible over at least half the world. He immediately gets replies from a few hundred stations; some on his frequency, some above, some below. He picks out one of these and goes back to him; but his frequency is so covered by scores of others still calling him that hardly anyone is aware that he

has replied. So practically everyone, thinking either (a) he didn't hear anyone that time, or (b) he probably replied to *me* but was wiped out by QRM, has another go.

By now a second layer, hearing all the hoo-ha round the frequency, has materialised. Everyone in this group thinks "Give him a quick call in case he happens to be listening"—and they all let fly, too. By this time, anyone, anywhere, who can hear JT1AA when he does transmit again is extremely lucky.

Now maybe, if you're a tolerant, easy-going type, you will agree that the above is more or less unavoidable—for perhaps the first five minutes or so. But you *would* expect it to sort itself out sooner or later. You would be disappointed! What actually happens is this . . .

JT1AA, being an OK amateur himself, hears an OK station calling him, somewhere on the fringe of the mess. He replies to this station and has a QSO, as best he can with the QRM all round. Most of the others on the frequency, instead of looking for the station being worked, stay on the DX man's frequency, or very near it. Each time *he* goes over to the OK he is trying to work, they think (if they think at all!) "Ah, at least he must be *listening* now, because he isn't transmitting," and have another bash. Others, even more at sea, haven't heard the DX station at all, but when a new wave of calling him breaks out they just join in the chorus. Their chances of getting a reply must be about a million to one, and, if they did, they probably wouldn't hear it, but they join in just the same—this is just human nature, or something.

Strategy

But what of the more intelligent types, who have tried to locate the station being worked? In an ideal world, they would all silently position themselves very near his frequency and sit there ready to call as soon as the QSO had finished. Note that if this ever did happen (which is improbable) there would be the most shocking QRM on the calling frequency at the end of each QSO, but at least the DX man's frequency would be clear and one would have a chance of hearing what he was doing and who he was working. This, of course, would only be possible if we were *all* the intelligent types mentioned.

Unfortunately, however, the other lot are still at it, blocking the DX frequency, sending *while he is sending* because they can't hear him, anyway (they don't listen!) and calling him all the time he is listening to someone else on a different frequency.

The point we are trying to make is this: That the greatest volume of noise, the worst noise, the most damaging noise, is the completely wasted effort made by people who never will be heard because the DX station is either listening on another frequency or is actually transmitting while they are calling him. All they do is to make the situation almost impossible for the types who attempt to use their heads.

By now the last line of attack has arrived and the Klots have rolled up in force. With a ponderous,

very important-sounding fist (let down somewhat by a T6 note and a hefty chirp), one of them sends "Dah-de-dah-de-dah" five times and then begins to call JT1AA with all the dignity of a senior executive dictating a letter. His mate, not to be outdone, thinks he will be smarter, and sits nearby calling "CQ JT." If we are really lucky a third one, not yet having listened on the band, will sit plumb on top of the whole lot and call "CQ DX"; probably someone about three countries away will reply and they will have a nice jolly QSO, repeating each other's names and QTH's about five times after having given each other 599 (with T6 signals!) All this goes on right on top of JT1AA, who is patiently pursuing QSO's off his frequency. Never mind, it takes all types . . .

The Remedies

Now, none of the foregoing is at all constructive, and the main question is "What can we do about it?" The trouble is that any advice one may give will be mainly preaching to the converted, because it is true that there are very few really bad G operators competing on the DX bands. The sad thing is that the DX station could break up the whole thing by one crack of the whip, but he very seldom bothers, so long as he can pick out his QSO's one at a time. (If the writer ever operated from a rare DX spot, he would infuriate everyone by shifting frequency after about five QSO's, leaving the pile-up going frantic while someone else was called on quite a different spot in the band.)

So quite a lot of blame must be laid on the DX man's own handling of the situation. The first announcement of JT1AA's existence stated that anyone calling him on his frequency would be black-listed; the first time we heard him he was only working stations within about 1 kc of his own setting, and it was sheer waste of time to call him 5 or 10 kc away!

But if the DX man would co-operate to the extent of asking for calls "10 high" or "10 low," how would that clear things up? First, by listening to a couple of QSO's before barging in, one would know whether he really means VA when he sends it, in the sense that he has finished with his man and is ready for someone else, or when he sends VA he then listens to the other chap's final, and possibly replies to it even once more. When we know this, we know the strategic moment to drop right on the previous man's frequency and to call.

Disillusionment again! For we may well find that while we are polite and don't call until the QSO has really finished, someone else who barges in while the previous man is sending his 73 hits the bulls-eye. Again, it is the DX man's fault . . . if he once replies to a butter-in, he is going to encourage butting-in for the rest of the session—he has shown that it pays dividends.

With so much of the onus on the DX operator himself, all we can do is to behave ourselves within the limits of decency and use common-sense in two ways—time and frequency. The elementary point is to locate the DX man's frequency and stick to it

on the receiver, undeterred by the fact that all-hell is let loose on and around it. If the stations he is working are within 5 kc we shall probably be able to hear them; if not, we shall have to search a little for them, carefully logging the vital spot and hoping that we can return to it accurately—good band-spread is, of course, a great help.

So much for frequency; but even more important is the timing of calls. Having located the actual station being worked by the DX man, do we (a) wait until he has finally signed, right down to the last VA? or (b) do we try a call when he has got past the "73" stage and is just about to sign off? What we do *not* do is (c) start calling away, irrespective of whether the QSO is still in being or not.

If we settle for (b)—probably the most popular proceeding—then we must be slightly off the other man's frequency, or mutual jamming will be such that our call-sign may not get through, but will merely make a mess of the other chap's last few words or groups. On the other hand, if we stick to (a) we must jump in very smartly, right bang on the frequency, without a moment's hesitation, and make it a very short call.

The Untouchables, of course, will not dream of trying to do anything as subtle as this—they will just sit on or near the frequency and call, and call, and call the DX man practically all the time. They will listen for a few seconds in between calls, and if they don't hear him actually sending, will call again. This is what accounts for the amount of calling that goes on while the DX station is actually transmitting . . . the callers never really know what is going on.

If you have not been listening to the rarity through a QSO or two, and merely call "on spec" when you are pretty sure that he is not actually transmitting, then you may be interrupting a QSO, or calling on a frequency to which he doesn't listen, or, in fact, calling at the same time as he is, because he may have started up just as you did. There's no doubt about it, only the man with full break-in facilities can possibly know what is really happening all the time.

Solving It!

Here, then, are our suggestions for avoiding the worst features of these pile-ups—offered with only the faintest amount of hope! First, the DX station must make his intentions clear; preferably he should say "call 10 up" or some such instruction. Secondly, if you just happen to come on the scene of battle, *listen* and see what is going on before you land in it with both feet. Thirdly (and this means *you*), don't assume that you have a kind of divine right to the very next QSO. Even if you can only hear twenty stations calling the chap, there may be hundreds of others audible to him. If he repeatedly comes back to W6 and W7, don't waste watts on creating extra QRM—he won't hear you through that lot, but a couple of hours later (or tomorrow) things might well be better.

Finally—*do not* try to chew the rag with a station that is obviously in great demand. Leave out

the "dr ob's" and the "Pse QSL direct to this QTH . . ." and, of all things, don't expect him to listen for your phone on a different frequency. If you do any of these things your QSO will assuredly break up, because all the others listening will lose their patience, brand you as an incurable Lid, and descend on the frequency like a pack of wolves—and not without justification.

Rubber-stamp QSO's don't please everybody, but when you are working a real rarity they are all you are entitled to. (We worked SVØWQ on Crete a few days ago. The first QSO, on 14 mc, took twenty seconds; and the second one, on 21 mc, took ten! But they were proper QSO's, each pulled off

with one short, fast call and the absolute minimum of QRM caused to others. We heard someone who *thought* he was working the same chap, and while he was telling him all about his rig and the weather, SVØWQ had worked at least five other stations without even hearing him.)

So keep it short; find out what's happening before you do anything; and remember that you're just one more individual in the pack. (For the benefit of the primitives we might add "scrap that 1925 note and learn to send Morse," but they probably can't read, anyway.) Good luck to you in the next pile-up—and may you hear all that you work.

Combined GDO and Absorption Wavemeter

SUITABLE INSTRUMENTS
AND SOME OF THEIR
APPLICATIONS

E. COHEN, M.Sc., Grad.I.E.E., A.Inst.P.

Although designs for a grid dip oscillator have frequently appeared and the instrument is well known in amateur circles, its true worth can only be fully appreciated once it has been used. The notes given here are primarily for the guidance of the newcomer, for whom the circuitry is discussed and some of the practical applications of a GDO/AbW are reviewed.

—Editor.

A USEFUL and inexpensive general-purpose instrument is an oscillator covering a wide radio frequency range. As an RF oscillator it may be made to generate signals that can be used for receiver alignment, for calibrating absorption wavemeters and for furnishing small RF voltages for whatever purposes may be required. When equipped with a milliammeter connected to read the oscillator grid current it becomes a grid-dip meter and can be used for checking the resonant frequencies of tuned circuits, the detection of unwanted resonances in the various television bands, and it can also provide the means for measuring inductance and capacity in the range of values used in RF circuits.

The grid-dip meter is so called because when the oscillator is coupled to a tuned circuit the grid current will show a decrease or "dip"

as the oscillator is tuned through resonance with the unknown circuit. The reason for this is that the external circuit will absorb energy from the oscillator when both are tuned to the same frequency; the loss of energy from the oscillator circuit causes the feedback to decrease and this in turn is accompanied by a decrease in grid current (Fig. 1). The grid current indication is quite sharp when the circuit to which the oscillator is coupled has a reasonably high Q. Since it is its own source of RF energy it does not, like the absorption wavemeter, require the circuit under investigation to be energised. As an example of an industrial application, such an instrument has been found to be invaluable in the setting up and adjustment of a crystal controlled RF induction heater.

Circuit Considerations

In considering the various types of oscillator circuits available, it is well known that a Hartley oscillator offers advantages over the tuned-plate and tuned grid (TPTG) at frequencies in excess of 40 mc, the greatest advantage being that the feedback winding, being a part of the tuned circuit, does not offer the same

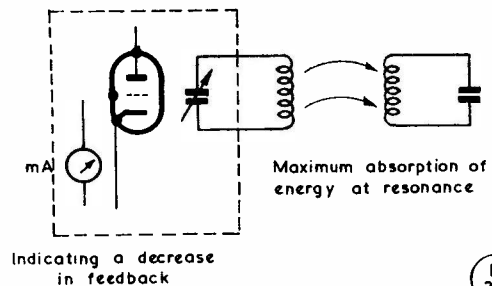


Fig. 1. Principle of operation of the grid dip oscillator, enabling unknown inductances (and capacities) to be checked and coils wound for required coverage, within the tuning range of the GDO.

difficulties as other arrangements in which the natural resonant frequency may approach the operating frequency. In the two types mentioned, if the feedback winding has greater inductance than the tuned winding, the oscillator can easily change over from one mode to the other, *i.e.*, tuned-plate becomes tuned-grid, and *vice-versa*, and satisfactory tuning is obviously impossible. This trouble is not as unlikely as may be thought since it is often very difficult to obtain sufficient amplitude of oscillation as the frequency increases.

The Hartley circuit is shown in Fig. 2 where the amount of feedback depends upon the

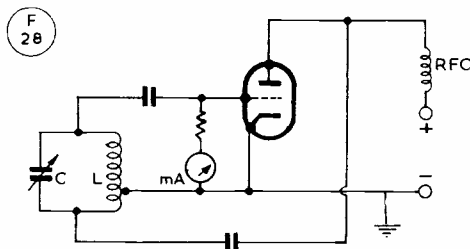


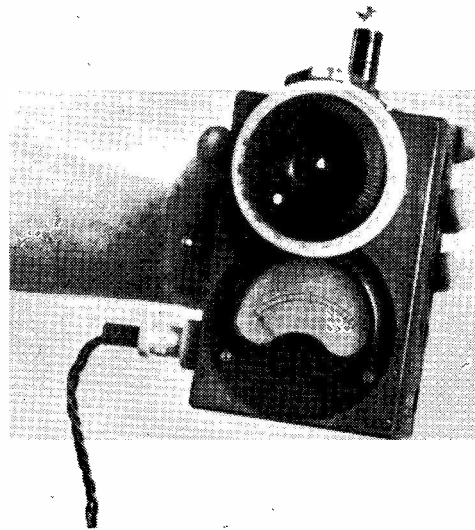
Fig. 2. Basic Hartly oscillator circuit, often used for grid dippers. Feedback to maintain oscillation is obtained by tapping the grid and cathode across a portion of the tuned circuit.

position of the tap. If the tap is too near the grid end the voltage drop between grid and cathode is too small to give enough feedback to sustain oscillation; if it is too near the plate end the impedance between the cathode and plate is too small to permit good amplification. Maximum feedback is obtained when the tap is somewhere near the centre of the coil. However, *see* later with regard to this point.

The Hartley circuit can be made to give satisfactory operation (in GDO applications) to frequencies up to about 150 mc, but the chief disadvantages are:—

- (1) Its liability to parasitic oscillation as the frequency increases.
- (2) The possibility of the valve acting like a modified Colpitts oscillator because of stray and valve inter-electrode capacities.

Tuned circuits will always have at least one additional resonance point determined by the leads and stray capacitances. Usually, in radio frequency circuits these parasitic oscillations have very high frequencies, but they become troublesome and lead to "dead spots" and large fluctuations in oscillator amplitude if sufficient care is not taken with the arrangement of leads and components. The usual cure for these troubles is the use of "stopper"



One way of constructing a GDO. The plug-in coil is at the top, with slow motion drive for the tuning condenser. Indication is on the 0-500 μ A meter, and power brought in by the lead. Sufficient information is given in the article for a grid dip oscillator to be constructed in any convenient form.

resistors in series with one or more of the valve electrodes concerned.

Stray capacities can be minimised by having the inductance and capacity terminals as close as possible to the valve pins, but inter-electrode capacitances, especially in the Hartley circuit, can assume considerable importance. This

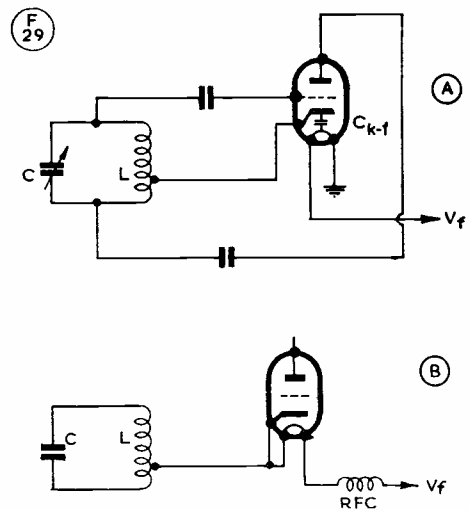


Fig. 3A. Illustrating the shunting effect of the cathode-filament capacity C_{k-f} across the tapped portion of the coil L. Fig. 3B. By connecting one side of the heater to cathode and the other end to the supply through an RF choke, the shunting effect of C_{k-f} can be reduced.

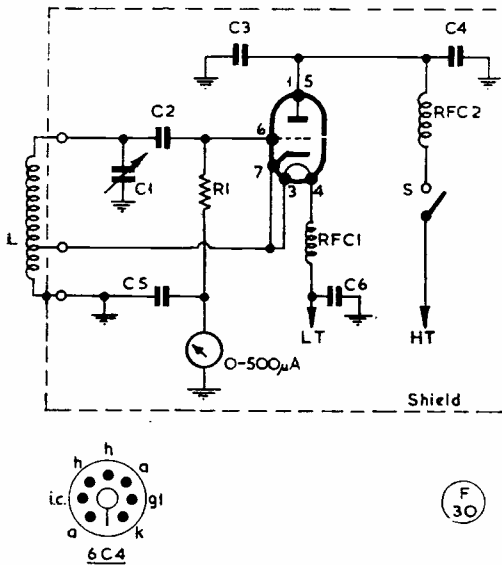


Fig. 4. A grid dip oscillator circuit using the earthed anode arrangement, the valve being a 6C4. The coil L is made plug-in, and a wide frequency range can be covered—see Coil Table.

Table of Values

Fig. 4. Earthed anode circuit for GDO

C1 = 50 μ F variable	RFC1 = 50 turns, 30g. enam. on 1-watt resistor body
C2 = 100 μ F tubular ceramic	RFC2 = 1 mH RF choke
C3, C4, C5, C6 = .001 μ F ceramicons	S = On-off toggle
L = See Coil Data	M = 0-500 μ A meter
	V = 6C4, L77 or similar

arises because the heater-cathode capacity is directly across part of the tapped inductance (see Fig. 3A), which in effect means that part of the tuning inductance is shorted out. This can again be minimised by connecting one side of the heater directly to cathode and using an RF choke in the other heater lead to avoid shunting the tuned circuit with the heater circuit (Fig. 3B).

The circuit to be described, which is based on a design in the 1954 issue of the A.R.R.L. *Radio Amateur's Handbook*, works well from 3 mc-150 mc, though for satisfactory operation at the highest frequencies all leads must be kept short, with the rotor and stator terminals of the variable condenser nearly touching those of the corresponding pins of the coil socket. Reference to Fig. 4 shows a 6C4 operating in an earthed-anode Hartley circuit with the cathode tap adjusted for maximum sensitivity, i.e., greatest change in grid current when tuning through resonance with a coupled circuit. All "hot" RF wiring is made from flexible copper strip. The frequency range is covered with

five plug-in coils which are wound on $\frac{1}{2}$ -in. diameter former (polythene) provided with octal-based valve pins. (The latter may be obtained from Denco, Ltd., of Clacton, and the coil data are summarised in Table 1.)

Absorption Operation

In order to use the instrument as a sensitive absorption wavemeter the anode supply is disconnected by means of the changeover switch S, and the valve now functions as a diode with the control grid acting as the anode.

Alternatively, the instrument can be used as an oscillating detector to determine the frequency of radiating RF fields, the indication in this case being an audible beat in the headphones when the meter is tuned to the frequency of the radiating circuits. As can be seen, the power supply is conventional. The potentiometer shown in Fig. 5 is for adjustment of anode voltage. In any grid dip meter with fixed anode voltage the grid current will show changes in different parts of the frequency range. It is then necessary to choose an anode voltage that will keep the reading on-scale in the part of the range where the grid current is highest. This usually results in rather low grid current at some other part of the range. With variable anode voltage such a compromise is unnecessary.

The photographs show the general appearance of instruments made up as described here. A vernier slow motion drive allows fine discrimination near the minimum dip position. It has to be emphasized that, in using the instrument for resonance measurements in an external circuit, the coupling should be kept to the point where the grid current dip is just perceptible. This reduces interaction between the two circuits to a minimum and gives the highest accuracy. Of course, in practice one would use initially tight coupling to get a well-marked dip, then progressively loosening the coupling whilst continuously retuning.

Another GDO type which has often been

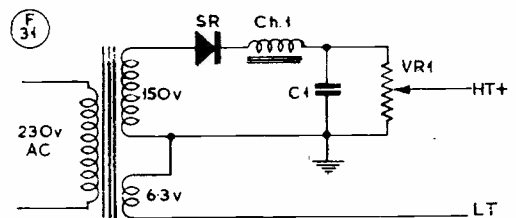


Fig. 5. Simple power supply unit for the GDO. Using a miniature mains transformer and smoothing choke Ch.1, values are 8 μ F 350v. for C1, with a 10,000-ohm wirewound potentiometer for VR1. The rectifier element is a selenium unit, SR.

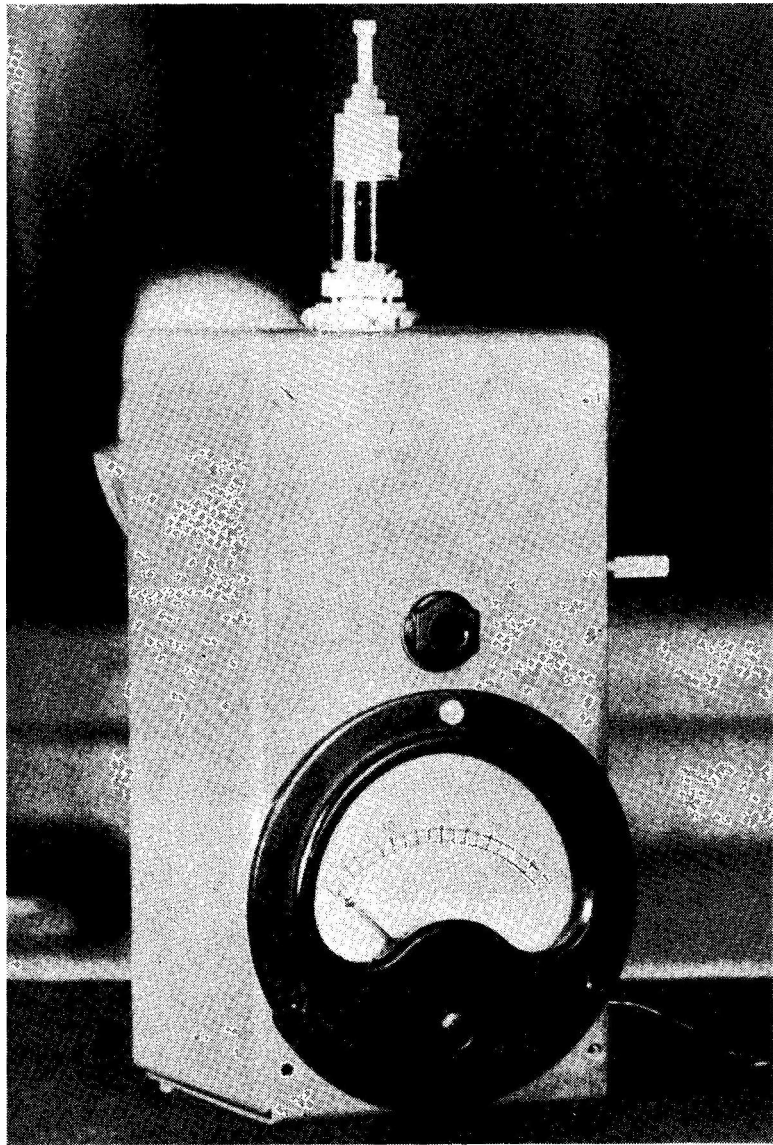
used and described in the past is the Colpitt's circuit. A circuit diagram is shown in Fig. 6, with a photograph of a completed model. An interesting arrangement is the ability to modulate the RF by means of a miniature AF transformer, thus also obtaining the use of the GDO as a modulated signal-generator for receiver alignment. As in the previous case, an unknown frequency can be found by using the instrument as an oscillating detector, when an audible beat is given in the headphones when the meter is tuned to the frequency of the radiating circuit. Or, similarly, the meter can monitor external modulated transmissions.

To facilitate handling the noval based coils (made by Denco, of Clacton) 1-in. long nylon bolts are fixed to the top of the coils. Such an arrangement is shown in the photograph.

Calibration

Either direct-reading concentric scales for the various ranges or a graph drawn for each coil can be adopted. The latter method is preferred in that if the calibration should alter, it is easy to plot another graph afresh. If a standard signal-generator does happen to be available, a calibration curve can be produced by using the GDO, with loose coupling, as an oscillating detector; the flick of the meter needle is noted as the signal generator frequency approaches that of the GDO. Alternatively, a pair of headphones inserted on the earthy side of the meter will provide an aural *null* indication when both signal generator and GDO frequencies are the same.

A communications receiver can also be used as a sensitive detector, provided its range covers that of the GDO, and will probably be



A GDO can be constructed in a small box with the coil fitted externally, as shown here. Denco coil formers and mounts are used, with a nylon bolt fixed in the top to facilitate handling and prevent damage to the coil windings.

the easiest approach for most constructors.

(1) *Measuring Inductance.* The ability to measure the inductance of coils and the capacity of condensers frequently saves time that might be otherwise spent in cut-and-try. For checking inductance the coil is connected to a condenser as shown in Fig. 7. With the unknown coil connected to the standard condenser, the GDO coil is coupled to the un-

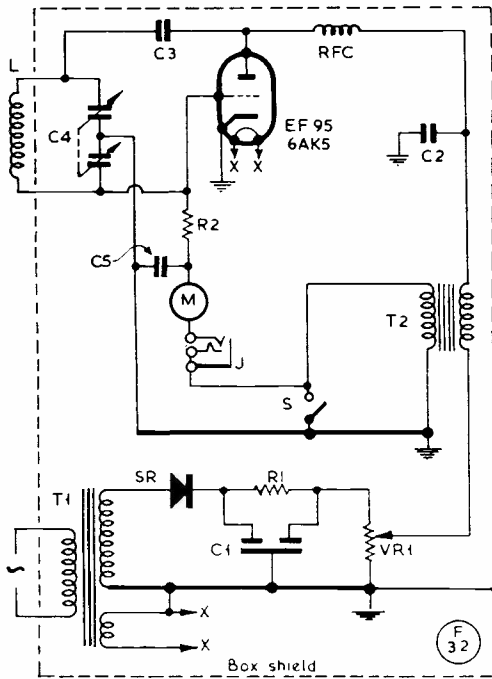


Fig. 6. A grid dipper using the Colpitts oscillator circuit and incorporating internal modulation with built-in power supply, making the instrument into a practical form of signal generator for bench work. In this circuit R1 is the smoothing element. For convenience, T1 and T2 should be miniature components.

known inductance and the oscillator frequency adjusted for grid current dip, using the loosest coupling giving detectable indication. Then:

$$L_{\mu H} = \frac{25,300}{C_{\mu F} \cdot f^2 \text{ mc}}$$

Conversely, using a known inductance, an unknown capacity can be determined by this equation. A normal radio silver-mica condenser of $\pm 5\%$ tolerance constitutes a satisfactory capacity standard for this measurement.

A graph could be drawn showing the resonant frequencies of the known coil with a number of condensers of known capacity. Then, by placing an unknown condenser across the coil terminals by short leads and noting the resonant frequency of the combination, the value of the capacity can be read from the graph.

(2) *Receiver Adjustment.* One should ascertain before performing any alignment, whether, in a superhet receiver, the oscillator frequency is above or below signal frequency; then the GDO can be used to align the RF stages and to check the frequency of the oscillator.

Table of Values

Fig. 6. Internally modulated Colpitts GDO

C1 = 8 x 8 μ F, 350v. wkng.	RFC = RF choke
C2, C3, C5 = .001 μ F Erie ceramics	SR = Metal rectifier
C4 = 25 μ F split stator	T1 = Miniature mains xformer, 150v./10 mA, 6.3v./0.3a.
R1 = 1,000 ohms, $\frac{1}{2}$ -w.	T2 = Any small audio xformer
R2 = 22,000 ohms, $\frac{1}{2}$ -w.	S = On-off toggle
VR1 = 10,000-ohm 2-w. pot'meter	L = See Coil Data

In TV receivers, if the GDO is square wave modulated the vision RF stages can be checked using picture quality as indicator.

In determining the resonant frequencies of coils and tuned circuits in TV receivers it must be remembered that in a normal receiver the majority of coils are tuned by circuit and valve capacities, so that the valves should be plugged in. The heaters should not be switched on since the cathode-grid conducting path damps the tuned circuit heavily.

As close a coupling as possible is required for this test and a single turn loop mounted on the grid dip coil should actually encircle the coil under test, if this is practicable.

(3) *Parasitic Oscillations.* Unless steps are taken to prevent it, parasitic oscillation in the VHF range will take place in almost every RF power amplifier. The parasitic frequency can be determined by the GDO either when the latter is acting as an absorption wavement or as an oscillating detector; then the particular resonant circuit giving rise to the parasitic can be traced.

(4) *Applications to Transmitter Adjustments.* Without the GDO one is seriously handicapped in attempting to set up a transmitter with the minimum amount of trouble and time. For without applying power to the transmitter, circuits can be adjusted with the GDO alone, thus avoiding possible damage to valves by excessive and dangerous off-resonance currents. Also, when winding coils, the time and labour involved in the usual cut-and-dry methods are avoided, and there can be no doubt that the coil has been correctly wound to the desired frequency, and not to a harmonic. Further, the relative Q of circuits may be found by noting the meter dip—the greater the dip the higher the Q.

When the tuned circuits of a transmitter have been lined up with the aid of a GDO then power may be applied, the tuning precisely adjusted, and the instrument employed as an absorption type meter to check the frequency of each anode circuit.

Again, a great deal of time can be saved

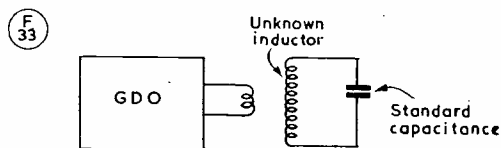


Fig. 7. Arrangement for measuring an unknown coil value, with a known capacity in parallel.

when installing traps and filters for TVI-proofing by using the GDO to ascertain the resonant frequency and relative Q. The filter should always be checked after it has been wired in the circuit to ensure that stray capacity has not affected the resonance.

(5) *Aerials and Feeders.* For very quick checks it is sufficient to make a loop of the bared ends of the feeder and slip it over the GDO coil. Any aerial or resonant line should give a very strong dip when the meter is brought into tune. Failure to dip indicates either a non-resonant aerial or line, or if the aerial is known to be resonant, a break or failure at some point. Untuned feeders can be checked with the GDO by measuring the resonant frequency of the aerial with and without the feeders connected. With correct matching no change in resonance should be noticed. In the case of tuned feeders the reading should be taken at the aerial tuning circuit, and if the observed frequency is not correct, suitable alterations can be made.

For measurements on the aerial itself remove the feeders and couple the instrument inductively into either a current or voltage antinode

Table I

GDO COIL DATA

Range	Turns	SWG	Dia.	Turns/inch	Tap
3.0- 7.5 mc	46	32	½-in.	close	13
7.5- 17.5 mc	40	24	½-in.	32	15
17.0- 40.0 mc	15	20	½-in.	16	5
38.0- 80.0 mc	4	20	½-in.	16	1½
80.0- 150.0 mc	U-shaped No. 14 wire, ¾-in. spacing between arms, 2-in. long, tapped 1½-in. from earthy end.				

position. A slight inaccuracy will result if a measurement is made at one of the ends of an aerial and it will be observed that changes in height will greatly affect the observed resonant frequency.

The meter can also be used as an absorption type wavemeter for obtaining relative field strength measurements, and for checking whether standing waves are present on a feeder.

Other applications of the GDO will probably occur to the reader. Certainly the writer has found that in a large number of cases of amateur equipments described in recent A.R.R.L. *Handbooks* a GDO is a "must" for the preliminary adjustments. As has so often been said before, every radio enthusiast is urged to make or acquire such a versatile and indispensable instrument.

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The recent large increase in postal charges compels us to make a small advance in the direct subscriber rate, partially to offset the cost of posting SHORT WAVE MAGAZINE for a year of twelve issues; this is now no less than 5s. With effect from January 1st, 1958, all new subscriptions and renewals will, therefore, be surcharged 3s. for postage, making the direct-subscriber rate 33s. for a year. Until January 1st, all subscriptions will, however, be accepted at the present rate of 30s. The cover price, i.e. the cost to readers who buy SHORT WAVE MAGAZINE from bookstalls or through newsagents will not be affected, and remains at 2s. 6d. a month.

VP2VB AND "YASME III"

According to Danny Weil, *Yasme III* is a better proposition than her predecessors. Teak built and 50 ft. long, she is deep draught (7 feet) for a sloop

of her size—but that will help to accommodate the \$3,000-worth of American radio gear, which will include a one-kW generator, to be donated by Hallicrafters. *Yasme III* is to be fitted out over here, and the radio equipment is being shipped to Southampton, instead of to the Caribbean, as originally intended. It is reported that since his return to England, VP2VB himself has shown no inclination to make any personal amateur contacts, or to get into touch with Amateur Radio circles in this country.

FIRST CLASS OPERATORS' CLUB

Present membership of the F.O.C. is given as 324, of whom 143 are overseas. The honorary secretary of the First Class Operators' Club is L. A. Belger, G3JLB, 103 Whitehill Road, Gravesend, Kent. The annual dinner is to be held in London on December 14.

THE "G2IQ" TWO-METRE CONVERTER

SELF-EXCITED AND CRYSTAL- CONTROLLED VERSIONS

Probably the best-known converter design ever published is that which has been called "The G2IQ," after its originator—his article first appeared in SHORT WAVE MAGAZINE for August, 1949, and the CC version in August 1954. This does not, however, make it in any way out-moded, particularly from the point of view of the VHF beginner, wanting a good converter with which to make a start on two metres. We have had many requests for a reprint—here it is, with acknowledgements to G2IQ and G5RZ, who suggested the CC arrangement. Some additional new material has been written in, so that the article as a whole is a useful discussion on the construction of VHF converters in general.—Editor.

THE main advantage of the triode over the pentode in VHF RF amplifiers is that it has no screen. The noise energy in pentodes is higher than in triodes of similar characteristics because of the added noise caused by the screen current. A pentode is usually between three to five times as noisy as a triode producing equivalent amplification. For example, the Equivalent Noise Resistance of a 6AK5 is approximately 1,500 ohms, whereas that of the 6J6 is only about 400 ohms. However, in single-ended circuits, full advantage of the triode superiority cannot usually be taken. In the push-pull mode, however, the triode demonstrates its superiority because of the following factors: The push-pull connection halves the input capacity (it becomes here only 1 $\mu\mu\text{F}$), making it possible to use a comparatively large inductance in the grid circuit, a step-up aerial transformer and a truly balanced input circuit. In addition, the input resistance is doubled so that the damping of the grid coil is halved, with consequent improvement in the gain. In point of fact, the input resistance of a properly neutralised 6J6 is better than 10,000 ohms at 145 mc, whereas that of the 6AK5 is as low as 3,000 ohms. One further big advantage of the push-pull 6J6 is that this valve has only one cathode, common to both triodes. In the push-pull Class-A mode no RF current flows in the cathode lead; in other words, the cathode is cold to RF and consequently the evil effects of cathode lead inductance are eliminated.

When added together, the foregoing advantages make a properly designed push-pull 6J6 RF amplifier approximately 5 to 6 dB better than a well-designed 6AK5 stage on the score of signal-to-noise alone. This may not look much on paper, but consider to what lengths we are willing to go to get another 6 dB gain from our beam aerials! Moreover, the gain we are getting from the 6J6 is better than that we could get by increasing the beam gain by 6 dB,

because it represents pure signal gain without any additional noise. Increasing the beam gain also increases the noise component to some extent!

Further Design Considerations

Having decided on the balanced RF amplifier stage, it is as well to carry the symmetry throughout the converter and use a balanced mixer and balanced oscillator. A push-pull mixer has the disadvantage of requiring balanced output, and as the single-ended output coil was easier to construct, a push-pull mixer was decided upon with plates strapped. A crystal controlled oscillator was regarded at G2IQ as an unnecessary complication, as stability at 144 mc is easily attainable with self-excited oscillators when carefully designed. Balanced injection to each side of the mixer is essential, and for this reason the oscillatory circuit shown was chosen. With stabilised power supply, this oscillator has no tendency to drift after the initial warming up period and gives a pure DC tone, a most desirable but not often encountered characteristic of oscillators at VHF.

Construction of Two Units

The components are spaced across the chassis in "chronological order," starting with the RF grid circuit and ending with the oscillator plate tank. This type of construction has the necessary symmetry and is, perhaps, easier than the second type. Both converters, however, have identical noise factors. The first was constructed almost entirely of surplus components on a home-made chassis; the second uses well-known types of components and a commercially made cabinet and chassis. In order to get everything into the commercial chassis, it was necessary to use a different layout, but the balance has not been impaired.

The input end in both converters uses a pre-set butterfly-type condenser; this circuit is sufficiently broad-band to allow the grid condenser to be tuned to the middle of the band and left there. The neutralising condensers lie on each side of the tuning condenser, making the grid leads as short as possible. The neutralising condensers are midget 30 $\mu\mu\text{F}$ air-spaced trimmers with all the plates removed except one rotor and one stator. Neutralising is fairly tricky, and experiment with various types of neutralising condensers led to the adoption of these as the best for this application. It should be remembered that everything connected with the tuned circuits should be of as small dimensions as possible so as to reduce inductance external to the tuned circuit and capacity to earth. These tiny condensers, when modified as suggested, provide the required capacity variation (2 to 3 $\mu\mu\text{F}$) with least circuit losses.

The grid leads to the tuning condenser are crossed over at the valve socket, so that the plate neutralising leads may come straight across to the neutralising condensers. A metal shield screens the input and output circuits, with a cut-out for the valve socket. Keep all leads as short as possible; cup type mica by-pass condensers are an advantage in keeping down lead inductance. The cathode resistor is not by-

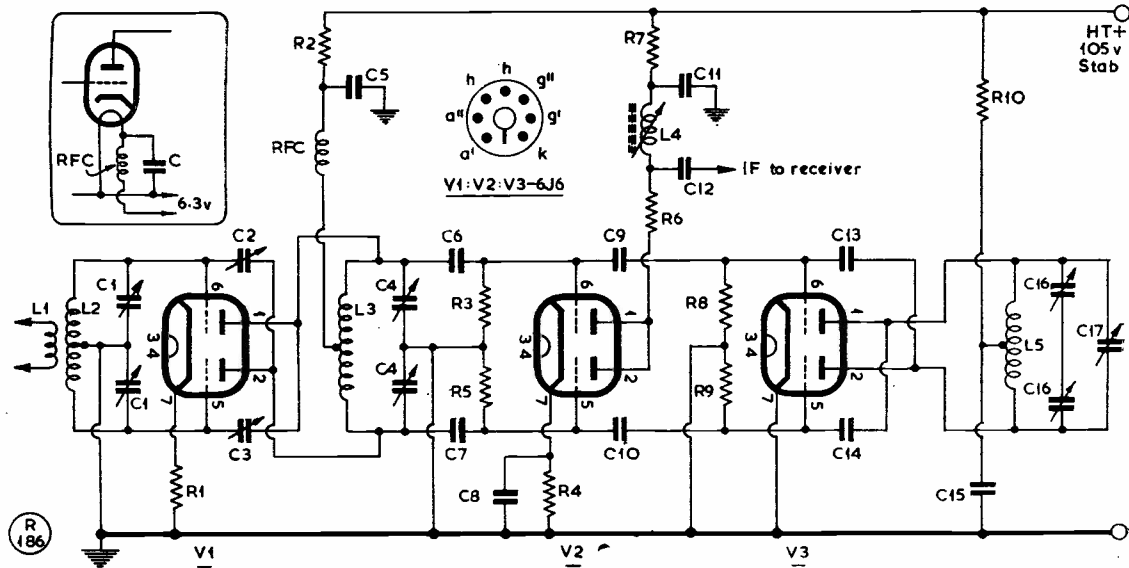


Fig. 1. This is the original G2IQ two-metre converter circuit, using the tuned oscillator (L5, C16) and selected 6J6's throughout. The essential feature of the circuit is its symmetry, which should be translated into the constructional form. A great many converters have been built to this circuit and it is still one of the most popular two-metre designs in use today.

passed for the reasons enumerated above. The grid coil is mounted direct on to the tuning condenser.

All earth returns are taken to a tag secured to the chassis by the valve socket bolt. The plate tank is similar to that of the grid, with HT fed to the centre tap of the coil through an RF choke. Condensers from each side of the coil feed to each mixer grid, which has no tuned circuit. The mixer grid resistors are raised about 1/4-in. from their respective socket pins to allow injection to be obtained by home-made condensers. These consist of parallel insulated wires from each oscillator grid pin brought to each mixer grid pin and looped once around the 1/4-in. resistor lead. The mixer does not appear to be unduly critical as to oscillator power, and varying amounts of injection have been tried with little or no variation in the noise factor.

SOME FURTHER PRACTICAL CONSIDERATIONS

Considerable simplification of the original has been achieved by dispensing with the grid tuning condenser in the RF stage and making the grid coil "self-resonant." This means that the only capacity across the coil is that of the valve (about 1 μμF) plus strays, and a worth-while increase in inductance is obtained. Instead of the original 6 turns, the coil may now be increased to 8 turns 1/4-in. inside diameter with the turns spaced the diameter of the wire (20 SWG). It will be found that by judicious squeezing or opening of the turns the coil can be resonated within the band. By over-coupling the aerial—that is, by using a comparatively large aerial coil of 3 or 4 turns wound over the centre of the grid coil—the resonance curve is further broadened, and it will

Table of Values

Fig. 1. Circuit of the G2IQ 145 mc SEO Converter using 6J6's

C1 = 8 × 8 μμF " Butterfly "	R2, R7, R10 = 2,000 ohms 1/2 watt
C4 = 15 × 15 μμF " Butterfly "	R3, R5 = 100,000 ohms 1/2 watt
C2, C3 = 1/4 μμF trimmers (see text)	R4 = 470 ohms 1/2 watt
C5, C8, C15 = 500 μμF mica	R6 = 56 ohms 1/2 watt
C6, C7 = 30 μμF Ceramicon	R8, R9 = 15,000 ohms 1/2 watt
C9, C10 = See text	All RFC = 20in. of 26 SWG enamelled on 1/2 watt resistor or 1/8-in. former
C11 = .01 μμF mica	L2, L3 = 6 turns 1/4-in. diam. centre tapped
C12 = 50 μμF mica	L1 = 2 turns over centre of L1
C13, C14 = 10 μμF Ceramicon	L4 = 7 mc IF coil
C16 = 5 × 5 μμF split-stator	L5 = 4 turns 1/4-in. centre tapped
C17 = 30 μμF trimmer (Philips)	
R1 = 56 ohms 1/2 watt	

be found possible to peak up the response at 145 mc and rest assured that the circuit is effective from 144 to 146 mc. Incidentally, there is very slight improvement in the signal-to-noise ratio with this over-coupled aerial coil, although the stage gain will be down a little.

Neutralising

In every case of difficulty over non-neutralisation it has been revealed that condensers other than those originally described have been used. Only a very small capacity of between 1.5 and 2 μμF is required, and this was obtained by using condensers with miniature plates of about 1/4-in. × 1/4-in. spaced approximately 1/8-in. Anything bigger than this adds to the external inductance of the tuned circuits and makes neutralising more difficult.

There is no need to stress that the oscillator

depends for its stability on the mechanical strength of its parts. Short, rigid leads are particularly vital here. The coil should be wound with not less than 18 SWG wire, and its centre should receive added support by a short rigid wire from the centre tap to the by-pass condenser. The tuning condenser requires a rigid supporting bracket and should be connected to the slow-motion drive by a flexible coupling. Use a concentric condenser for trimming the oscillator, as this type may be rigidly supported in the wiring. If desired, the VR105/30 stabiliser may be mounted on the same chassis with no ill effects.

Putting the Converter into Operation

There should be no difficulty in getting the converter working satisfactorily. The first step is to peak up the IF coil, and this can be done by turning up the main receiver gain and trimming the IF coil for maximum hiss at the frequency chosen. The next step is to trim the oscillator coil to approximately 138 mc—that is, 145 less the intermediate frequency. With the HT to the RF valve temporarily disconnected, rock the RF plate tuning condenser. Two positions of increased hiss in the receiver output will be noticed, corresponding to frequencies of 131 mc and 145 mc. The latter is the correct one—that is, the one using less capacity. Now apply HT to the RF valve, and in all probability (unless you have been very lucky) the receiver will become distinctly unstable! With the neutralising trimmers at maximum, reduce the capacity of each uniformly, a little at a time, until tuning the grid coil into resonance does not produce self-oscillation in the RF stage. When the receiver is properly neutralised, tuning the grid coil should produce a slight increase in hiss at resonance, but the tuning should not be sharp, neither should the increase in hiss be pronounced. Pronounced “sharsh” and sharp tuning denote that the receiver is working on the threshold of instability, and whilst the gain will be higher, the *signal-to-noise ratio* will suffer. If this condition exists, it is as well to experiment with the neutralising condensers until the RF stage becomes more docile. When properly adjusted, the stage should remain stable, even with the aerial disconnected.

The Input Load

The converter works better with a balanced aerial system with an impedance of between 300 and 600 ohms. The use of coaxial cable with one side of the aerial coupling coil earthed upsets the balance somewhat. For those who are using coax the following suggestion may be of help: it is not always recognised that when the aerial is used for reception its function is reversed and the receiver becomes the load and the aerial the generator. Therefore, matching the aerial to the receiver must be done at the receiver end. In this case, the 70-ohm coaxial line may be matched to the 300-ohm input of the converter by means of a quarter-wave matching transformer of 150 ohms impedance, and the need to earth one side of the input coil is obviated. This transformer can take the form of two lengths of 70-ohm coax 13-in. long (*i.e.* 20-in. times the velocity

factor) with the outer braid connected together at each end and the inner conductors connected to the aerial feeder and receiver input. Alternatively, two lengths of 300-ohm twinlead, each 16-in. long, may be used in parallel to effect the desired balance. Attention to small points like this are well worth while and will help achieve the near-perfect reception of which this type of converter is capable.

Do not be disappointed, during the first few hours' work with this receiver, at its apparent lack of liveness. Its abnormal quietness is not due to sensitivity, as it will soon demonstrate when a signal appears on the band.

The Oscillator

Some trouble has been experienced with squegging from the oscillator. This can be recognised by the presence of “birdies” as the oscillator tuning is varied. This should not be confused with the self-oscillation caused by faulty neutralising and may be easily recognised by taking out the RF and mixer valves, when the trouble will persist if the cause is squegging. The tolerance for 6J6 valves is wide; so in the case of the 6J6 squegging, the trouble may easily be remedied by increasing the decoupling resistor R10 to either 5,000 or 10,000 ohms; one or the other is always effective.

The oscillatory circuit used in the original converter is remarkably stable under varying conditions and, moreover, is very tolerant of widely different component values. For example, the grid-to-plate capacities can be varied from 2 to 10 $\mu\mu\text{F}$ with no noticeable difference in performance; likewise, the grid resistors may be any value between 10,000 and 25,000 ohms.

Incidentally, if anyone obtains other than an extremely pure T9 note from this oscillator, then there is something wrong. The only occasion when an impure note was encountered turned out to be due to a faulty 6J6.

Oscillator and Mixer Coupling

This is not at all critical, and the capacity from the oscillator grids, consisting of stiff wires, may be wrapped around the mixer grid pins or may be left lying within an inch of them. The gain is slightly higher with the tighter coupling, but the noise factor is not affected. Indeed, provided that the RF stage is properly neutralised, there is nothing at all critical about this receiver, and it may safely be left for months on end without further attention.

(To be continued)

NO RECIPROCAL ARRANGEMENTS

A reader who has recently departed to live in British Columbia reports that the Canadian authorities “do not recognise a U.K. amateur licence”—so, as our correspondent (who held a G3 call over here) says, he has got to start from scratch again. It certainly seems odd that inconveniences of this sort cannot be avoided between countries of the British Commonwealth.

15-Watt Modulator/Amplifier

TWIN-CHANNEL AUDIO UNIT

J. N. WALKER (G5JU)

By having two different types of audio front-end, the driver and output stages of this Amplifier can be used either as a "hi-fi" unit, or as a modulator capable of giving full control of a 25-watt carrier. For QRO audio work the Amplifier would give ample output for driving a pair of DA42's in Class-B zero-bias. Since the requirements for high-fidelity audio with a radio driver unit and good speech modulation with a crystal microphone are quite different, they are taken care of in the design of the (switched) first-stage sections of the Amplifier.—Editor.

BECAUSE of the considerable interest being shown these days in high-fidelity equipment, several miniature types of audio output valves have become available and these can well be usefully employed in various Amateur Radio applications.

As regards audio work, two different approaches have to be considered. On the one hand, the high-fidelity enthusiast seeks a substantial power output with the lowest possible degree of distortion, of any kind, over a wide frequency range. The transmitting amateur requires mainly high efficiency and the maximum possible power output over a frequency range restricted to normal speech—say 100 to 4,000 c.p.s. Distortion over a wider frequency range does not matter so much, provided of course it is not of a degree such as materially to affect speech quality. At the same time, and particularly for local working, really good speech quality is definitely pleasant to hear and helps to give the station a good reputation.

In the ranks of present-day amateurs, it can happen that there is this dual interest, and, although many will prefer to have two entirely separate amplifiers, one for high-fidelity reproduction, the other for modulating a transmitter, there is no real reason why the two should not be combined into one unit. A simple switching system allows a change over from one function to the other and expense is thus saved.

This is the idea behind the design of the modulator-cum-amplifier described in this article. In conjunction with an FM tuner unit, it provides really first-class radio reception. When required, it can be used to modulate a 25-watt transmitter and, if care is taken not to over-drive the modulator in an attempt to

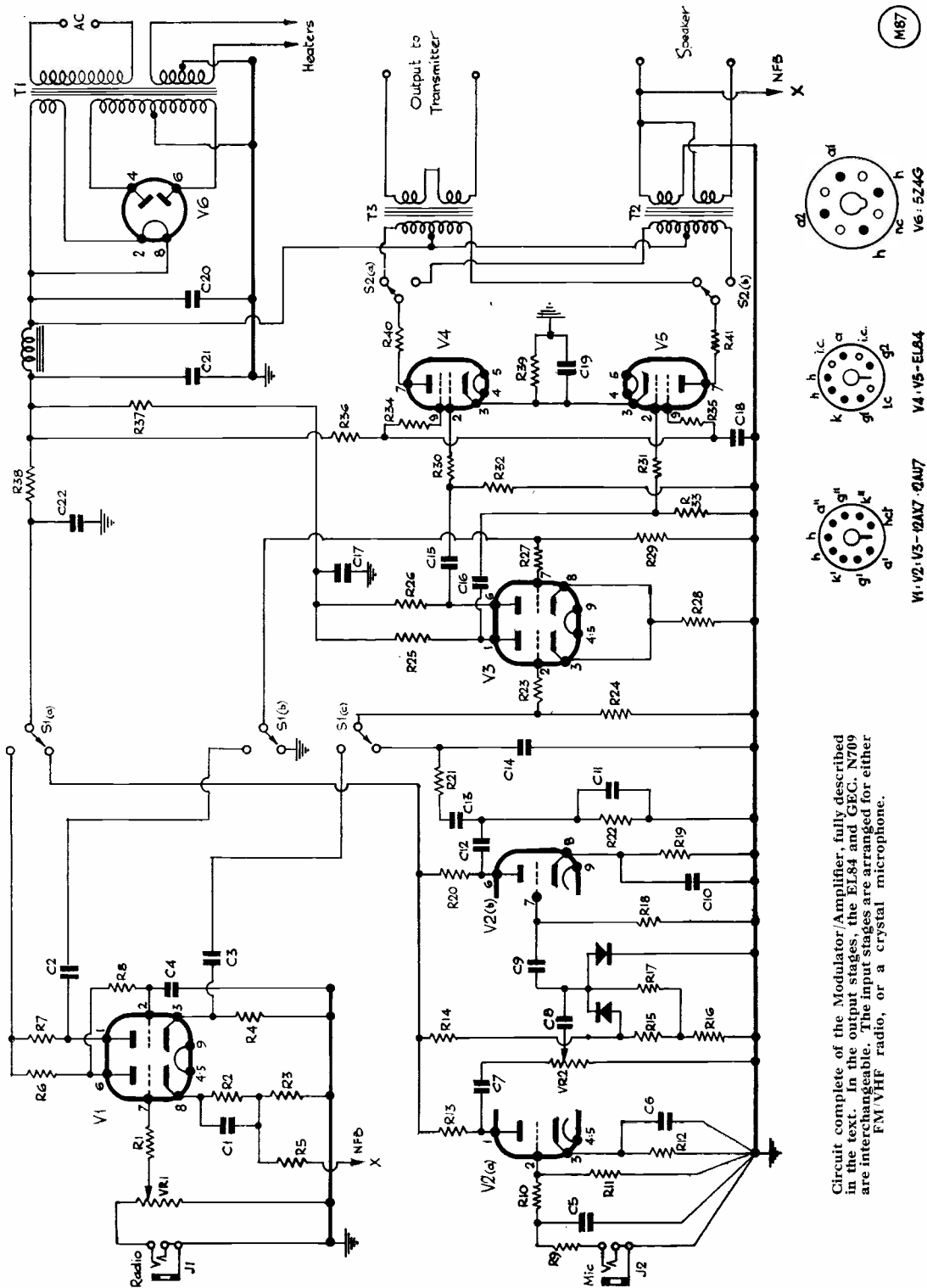
secure more output than it will give, the speech quality is very good.

Basic Design

It is convenient to consider the output stage (V4, V5) first. No one will be surprised that here the choice has fallen on the G.E.C. N709 valve which is becoming increasingly popular on account of its high efficiency and because its power rating falls into a convenient category for audio work. At low outputs—say 4 watts or so—the valves operate in Class A but by driving them harder, into Class AB1, a substantial power output becomes available. With 300 volts on the anodes, the measured output, at speech frequencies and with low distortion, is 15 watts, which, taking transfer losses into account, is just about right for a 25-watt transmitter. Up to 10 watts is available under "hi-fi" conditions but usually a much lower output is ample for the average size of room.

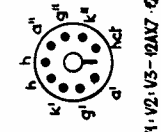
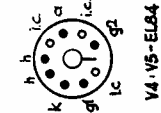
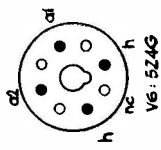
A low-impedance double-triode V3 is employed to provide a balanced drive for the output valves and ensures an ample grid swing for any class of service. The gain realised in this stage is not high but it helps to ease the gain requirements on the earlier stages.

There are two separate "front-end" stages, either of which can be switched in at will. The one on the "hi-fi" side, V1, is intended to take an output of up to 200 millivolts from a VHF/FM tuner unit, and the whole then functions as an amplifier giving superb quality on broadcast programmes. The otherwise high gain is reduced by the inclusion of negative feedback, which operates over all stages and includes the output transformer. The benefits obtained in this way are well known and need



Circuit complete of the Modulator/Amplifier, fully described in the text. In the output stages, the EL84 and 6X4, N709 are interchangeable. The input stages are arranged for either FM/VHF radio, or a crystal microphone.

M87



V1: V3-6X4
V4: V5-EL84

not be reiterated here.

The other front-end stage V2a-V2b, is quite different. The gain required is much higher, to cope with the very small voltage delivered by a crystal microphone. One section, V2a, of a double-triode valve operates at full gain and the output is fed into the second section but with a clipper circuit between the two. This clipper circuit, whilst not being drastic in action (speech quality would otherwise suffer) prevents "spiky" peaks being passed on and helps to maintain a higher average percentage of modulation than would be possible without

it. A simple R-C network is included in the anode circuit of the second stage and performs two functions—one to tailor the overall response for speech frequencies, the other to attenuate the higher order harmonics resulting from the clipping action.

The standing bias on the clipper diodes (approximately 2 volts) has been set at a value such that clipping commences with the gain control advanced by about 90° (one third travel from the minimum position), when, with an "Acos" microphone, the full output is developed and maintained. There is sufficient gain in hand to allow for microphones of a less sensitive type. At lower output levels, it is not so important to use clipping but, in individual cases, a second gain control can be fitted immediately following the clipper stage, to permit settings which result in the clipper becoming effective at low levels.

A Yaxley type switch S1 brings into circuit one or other of the front-end sections, at the same time removing HT from the anodes of the inoperative valve. It is also necessary to switch from one output transformer to the other, S2. Because of the higher voltages encountered (HT *plus* audio swing), it is better practice to use a separate switch, with ceramic insulation, and construction is also then simplified. If all controls are wanted on the front panel, a multi-wafer ganged switch can of course be wired in.

Output Transformers

A special word is advisable on the output transformers since, in both modes of operation, these have to be really right for the job. The products of R. F. Gilson, Ltd. are well known to audio enthusiasts and their output transformers (the cores of which are of special silicon steel) are most efficient and also relatively inexpensive. Gilson's manufacture several types of speaker output transformers and a standard component, the type W.O.696A, serves well in the present case.

The difficulty then arose for a suitable modulation transformer and Gilson's were asked for assistance. They agreed to produce an output transformer similar to the speaker type but with a high impedance secondary winding. On the basis of a complementary transmitter operating at an input of 500 volts 50 mA., the secondary impedance was specified as 10,000 ohms, with a current rating of 60 mA. Doubtless if a different ratio is required, the firm would be able to oblige. This modulation transformer also employs the same silicon steel core, resulting in a more efficient component.

Table of Values

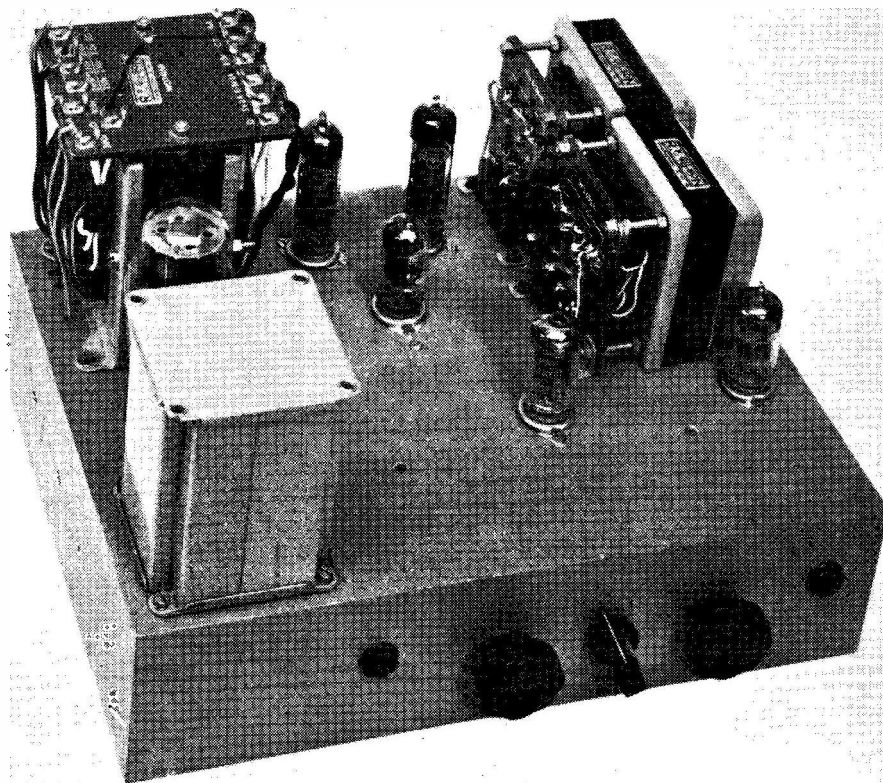
Circuit of the 15-Watt Modulator/Amplifier

C1, C6	R1,	R2,	R3,	R4, R7,	R5,	R6, R8,	R9,	R10,	R11,	R12,	R19,	R14,	R15,	R16
= 25 μ F, 12 volt elec-trolytic.	= 300 μ F, mica	= .002 μ F, mica	= .001 μ F, mica	= 100,000 ohms $\frac{1}{2}$ watt	= 10,000 ohms $\frac{1}{2}$ watt	= 8 μ F, 350 volt, electrolytic	= 30 μ F, 15 volt, electrolytic	= 50 μ F, 450 volt, electrolytic	= 0.5 megohm potentiometers					
C2, C3	C4, C5	C7, C8, C9	C10	C11	C12	C13	C17,	C21	C22	C19	C20	VR1,	VR2	
= 0.1 μ F 350 volt paper	= 100 μ F, mica	= 1000 ohms $\frac{1}{2}$ watt	= 4700 ohms $\frac{1}{2}$ watt	= 150 ohms $\frac{1}{2}$ watt	= 1000 ohms $\frac{1}{2}$ watt	= 4700 ohms $\frac{1}{2}$ watt	= 150 ohms $\frac{1}{2}$ watt	= 100,000 ohms $\frac{1}{2}$ watt	= 10,000 ohms $\frac{1}{2}$ watt	= 680,000 ohms $\frac{1}{2}$ watt	= 20,000 ohms $\frac{1}{2}$ watt	= 2 megohms $\frac{1}{2}$ watt	= 2,700 ohms $\frac{1}{2}$ watt	= 200,000 ohms $\frac{1}{2}$ watt

PARTS LIST

- 1 Mains Transformer, T1 W.O.741AB, 300.0.300 volts 150 mA., 6.3 volts, 3/5 amps, Sv, 2 amps. *Gilson*
- 1 Speaker Transformer, T2 8000 ohm C.T. primary, W.O.696A, 3 and 15 ohm secondaries *Gilson*
- 1 Modulation Transformer, T3 8000 ohm C.T. primary, W.O.696/10K-Mod 10,000 ohm secondary *Gilson*
- 1 Smoothing Choke 50-60 Henry, 30 mA. *Gilson*
- 2 Chassis *see text*
- 2 Valves V4, V5 type N709 G.E.C.
- 2 Valves V1, V2 " 12AX7 *Brimar*
- 1 Valve V3 " 12AU7 *Brimar*
- 1 Valve V6 " 5Z4G *Brimar*
- 5 Valveholders B9A Octal
- 1 Valveholder Octal
- 1 Yaxley Switch (S1) 3-pole, 2-way
- 1 Yaxley Switch (S2) (preferably ceramic) 2-pole, 2-way.
- 2 Jacks
- 4 Control Knobs
- 2 Output terminations (insulators or sockets) *G.E.C.*
- 2 Crystal diodes type GEX34

R22,	R34,	R35,	R36,	R37,	R38,	R40,	R41
= 470,000 ohms $\frac{1}{2}$ watt	= 100 ohms $\frac{1}{2}$ watt	= 15,000 ohms 1 watt	= 27,000 ohms 1 watt	= 270,000 ohms $\frac{1}{2}$ watt	= 10,000 ohms 1 watt	= 12 ohms $\frac{1}{2}$ watt	



Finished appearance of the dual-purpose Modulator/Amplifier discussed in the text. Mains components are on the left and the output transformers on the right. This amplifier will give either a high-fidelity audio output (up to about 10w.) with drive from an FM/VHF radio feeder unit, or sufficient audio watts fully to modulate a 25-watt PA from any standard crystal microphone; it can also be used as an audio driver for a high-power modulator. By having a two-channel audio input arrangement, the output quality is adjusted for adequate speech transmission, with a clipping circuit incorporated in the modulating speech amplifier.

Construction

It is not proposed to deal with the construction at great length, nor to provide detailed drawings of the chassis layout, since many readers will wish to adopt their own ideas of shape and size, or to use existing hardware and ironmongery. It was convenient, in the writer's case, to use a diecast chassis measuring 12ins. by 8ins., but all the components would fit on a somewhat smaller chassis if overall space is a factor to be considered.

The gain controls and input jacks must be readily accessible and are therefore mounted on the front panel. Fitted between them is the switch for changing from "hi-fi" to "modulator," positioned to keep wiring short. The switch for changing over output transformers is fitted to the rear wall of the chassis. As can be seen in the photograph, the output

transformers are mounted close together on one side of the chassis, and the mains transformer (also of Gilson manufacture) and the smoothing choke on the other side, to maintain the maximum possible separation.

The stage-by-stage type of construction is adopted and the majority of the small components are mounted on five-way group boards (three in all), some preliminary wiring being done before the boards are bolted down. The anti-parasitic resistors which, as will be seen, are fairly numerous, should be soldered close up to the appropriate tags on the valve-holders and the wiring kept reasonably short.

It is hardly necessary to tell readers that the feedback, on the high fidelity side, must be in the right sense, to be found by trial and error. If the feedback is positive, the amplifier will oscillate violently and produce enormous output noise with no input!

A BIG bundle of news this time, because so much of interest has happened since our last appearance. Practically everybody will know that on Sunday, September 29, we had the biggest and the best Aurora opening ever recorded on the VHF's—it was the biggest-and-best because it occurred at a time when nearly everyone could be on, and lasted over a very much longer period than is usual for Aurora manifestations; roughly, this was 1330-1930 BST for the GM's and stations to the north, and 1500-1830 or thereabouts for the southern part of the U.K. After 1930, the two-metre band reverted to normal—but opened up again for Aurora working from 2330 till about 0100 BST during the night of the 29/30th. Directivity was mainly north-east, which is unusual.

Thus, we had a maximum of something like eight hours of Auroral conditions during *one 24-hour* period, an experience never previously encountered on five metres, let alone Two! Here it should be explained that what is meant by an "Auroral opening" in this context is when the curtain is dense enough to reflect signals above about 50 mc. The Aurora Borealis is frequently in evidence, but it does not always achieve a density sufficient to reflect signals above, say, 100 mc. In other words, when an Aurora display is known to be on (and may even be visible) it does not necessarily mean that the curtain is good enough to reflect 144 mc signals, though it may be effective at 50-60 mc. Until this last year or so, experience had been that the Aurora did not help much on two metres; then, we started getting brief Auroral openings, of extreme interest because they *were* effective at 144 mc. Now, we have the experience, on two metres, of an Auroral opening of greater duration and intensity than anything recorded previously on five metres. Truly, we live in stirring times!

Getting back to what actually happened on September 29, there are a number of very interesting reports. Take GM3DIQ (Kilbarchan): Clarke started at 1345,

VHF BANDS

A. J. DEVON

Big Aurora Opening,
September 29—

Much EDX/GDX Worked—

EI2W on Six Metres makes
EI/W "First"—

Notes, Gossip and the
Tabular Matter—

immediately after he'd had his lunch, and thereafter QSO'd solidly, *via* Aurora, until 7.15 p.m. He worked some 40 stations and heard about ten more, in five countries. Many other GM's were on, making U.K. and EU contacts which were "first-time" for most of those concerned.

Then we have G5YV (Leeds): Many people will be surprised to hear that it was Harold's very first experience of Aurora conditions; as it was, he did not get on till 4.30 p.m., but from then until 7.30 he had 12 contacts in 7 countries, his outstanding QSO's being with HB9BZ and HB9RG, both in the Zurich district; this is the first time stations so far south have been worked *via* Aurora, and shows how effective (for practically the whole of Europe) the reflecting curtain must have been; the distance Leeds-Zurich is 620 miles, but the actual signal path could not have been much less than 5,000 miles! It should be noted that both these HB's were operating, not from mountain tops, but from their normal QTH's;

Zurich itself is not high up, and is screened in the northerly directions by much higher ground—so the Auroral signals must have been arriving at quite a steep angle. Both HB9BZ and HB9RG heard and called G5MA, and HB9BZ was also receiving G2NY, but the only U.K. contact they had was with G5YV. Harold remarks that among the many G stations logged, he worked three in Bristol and G2ADZ in North Devon. Signal levels varied from S5 to S9+, and all notes were of the usual "rusty" character.

GM6KH (Hamilton) has a nice log of DX worked between 1500 and 1900 BST, and heard numerous G's not shown in his list. G3CGQ and G3HBW were among the many VHF operators who, during the afternoon of September 29, were at the Mobile Rally at Woburn—instead of at home working the DX! The Rally two-metre station was G3FZL/P, at which much of the stuff was being received all right, but could not be raised, probably because the frequency was too high in the band; with the GM's workable from Europe, and many

TWO METRES

COUNTIES WORKED SINCE

SEPTEMBER 1, 1957

Starting Figure, 14

From Home QTH Only

Worked	Station
43	G5MA
41	G3GHO
33	G3HBW
32	G8VZ
31	G2CIW
30	G3JWQ
27	GM3DIQ
25	G3KHA
17	G3DLU
15	G2AHY

This Annual Counties Worked Table opened on September 1st, 1957, and will run till August 31st, 1958. All operators who work 14 or more Counties on Two Metres in the year are eligible for entry in the Table. The first claim should show a list of counties, with stations worked for them, as soon as 14C have been achieved. Thereafter, the list can be added to as more counties accrue.

TWO METRES

ALL-TIME COUNTIES WORKED

LIST

Starting Figure, 14
From Fixed QTH Only

Worked	Station
78	G5YV (787)
73	G6NB
71	G3CCH
70	G6XM
68	G3BW, G3GHO
66	EI2W (286), G3IUD (302), G5BD
64	G3BLP, G5MA
63	G2FJR (542)
60	G2OI (402), G3DMU, G3HBW
59	G3EHY, G4SA
58	G3FAN (637), G3IOO, G8OU
57	G8SB
56	G3WW (770), G5DS (654)
55	G2HDZ (495), G2HIF, G5BM, GW5MQ
53	G2AJ (519), G3KEQ, G4CI, GM3EGW (196)
52	G2NH, G6RH, G6XX, G8VZ, GW2ADZ
50	G3ABA, G3GSE (518)
49	G3HAZ (358)
48	G3FIH, G5ML, G6TA (487)
47	G3DKF, G3JWQ (357), G5WP
46	G2CIW (247), G4HT (476), G5BY, G6YU (205)
45	G2AHP (647)*, G2DVD (362), G2XC, G3BJQ, G3LHA (261), G5JU
44	G3BK, G8DA
43	G2DDD, G3BA, G3COJ, G3DLU*, G3HWJ, G3KHA (262), G4RO, G5DF
42	G2HOP, G3BNC, G6CI (220)
41	G2CZS (282), G2FQP, G3DO, G3WS (255)
40	G3CGQ, G3IER, G8KL
39	G2IQ, G3DVK (208), G3GBO (434), G3VM, G8IL (325)
38	G2FCL (234), G3APY, G3CKQ, G3HTY, G5MR (343), G8VN (190)
37	G2FNW, G2FZU (180), G3DLU, GC3EBK (260)
36	G2DC (155), G3CXD, G3DLU* G3IIT, G3KUH (169), G6CB (312), G8IP
35	G3FZL, G3FYY (235), G3HCU (224)
34	G3AEP, G3CKQ (162), G8IC
33	G3FUR, G3GFD, G3HHY (125)

stations on from the north of England, most of the activity was between 144 and 145 mc. Indeed, several HF-end operators have reported that they found it impossible to attract any DX attention at all, and had to be content with listening and logging—as in the case of G3JHM (Worthing), who heard 18S with auroral notes during 1700-1845 BST.

This neglect, on such occasions, of the HF area of the two-metre band is most unfortunate, and is extremely disappointing (not to say frustrating and infuriating) for

Worked	Station
32	G3HIL, G8QY, G8VR, GC2FZC
31	G3HXO, G3KPT (108), G5RP, GM3DIQ
30	G2AHY, G3FRY, G3GOP (208), G3GSO (160), G3GVF (129), G3IRA, G3KEF (110), G5NF, GW8UH
29	G3AGS, G3AKU, G3FIJ (194)
28	G3ITF, G3KUH, G8DL, GM3BDA
27	G3CVO (231), G3DAH, G3ISA (160), G3KQF (106), G6GR, G3GQB, GW3GWA
26	G2BRR, G3CFR (125), G3SM (211), G3YH, G4LX, G4MR (189)
25	G3JMA, G3JXN (220), G5SK, G6PJ
24	G3FD, G3FXG, G3FXR, G3JHM
23	G3CWW (260), G3HSD, G4IJ/A G5PY
22	G2DRA, G3AGR (135), G3ASG (150), G3BPM, G5AM, G8NM
21	G2AOL (110), G3DVQ, G3IOE, G3IWI, G6XY
20	G3EYV,
19	G3FEX (118), G3GCX, G5LQ (176)
18	G3DBP, G3JGY, GC2CNC
17	G3EGG
16	G3FRE
15	G3IWA
14	G2DHV, G3CYY

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

* New QTH

those who have to suffer it by reason of their respect for the Zone Plan; for that is all there is to it! From the EU point of view, there are usually more than enough interesting U.K. stations at the LF end to keep the activity going throughout such an opening, and there is simply no need for the EDX to tune higher than 145 mc. Yet those who do find nearly as many stations as there are at the LF end.

Back at the Woburn Rally, some of the /M's with a two-metre receiver on the car (but no BFO!) were listening to the DX on the "sharsh"; others made tracks for home, and in some cases were in soon enough to catch the end of the opening; but the potential G activity for it during the afternoon must have been reduced by at least 30!

G5MA (Gt. Bookham Sy.) got in with the DX on September 22 and 29—it will be remembered that there was another Aurora opening on the afternoon of Sunday, 22nd, though it was of much shorter duration than the phenomenon of the 29th—and during both these openings Bob was heard in SM (by an SWL). He was very unlucky to miss the HB stations on the 29th; however, good GM contacts are some consolation, with two OZ's also worked. For G3GHO (Roade, Northants.) it was a first Aurora experience on the 29th; he worked GM, OZ and EI6A, a particularly useful contact.

How much more interesting and exciting are all these results compared with a laborious and long-drawn-out contest, worked under indifferent conditions! Total activity during the September Aurora openings must have exceeded by far the turn-out for any recent VHF contest. The conclusion to be drawn seems to us to be obvious!

Fine "First" for EI2W

Though no G can now emulate him, all who read this piece will be interested and pleased to hear that Harry of EI2W—having managed to persuade the Irish authorities to grant him a conditional licence for the old 50 mc (6-metre) band—has scored another all-time new one for EI. On

Sunday, October 27, on 50.016 mc, EI2W had an RS-59 contact with W2JTE at 1528 GMT; running 40w. input and a GP aerial, Harry also worked W2UTH and W8CMS during the same period.

His licence for 50 mc is "temporary for four months," and we can be quite sure that EI2W will make good use of it; he will have many interesting opportunities because, apart from the large number of W's active on Six and always on the look-out for openings, 50 mc is also used under several African prefixes, as well as in VK and ZL (!). Long-distance working on 6m. is, of course, achieved mainly by normal reflection (when the MUF goes high enough) and not often by the propagation mechanisms so familiar to us on VHF. In fact, 50 mc is in that "twilight zone" which can be affected by several different propagation modes, results varying accordingly.

Tropospheric Conditions

The period October 5-9 saw steadily improving conditions for GDX, as the weather got warmer and the glass higher. The 8th was a good evening, but the 9th even better, after which conditions fell off again. On October 8, many good N-S contacts were made over the U.K., though activity did not appear to be very high; on the 9th, it was generally foggy, with a fine, clear night above the fog—always an indication of good tropospheric conditions. The EU's, including DL's (and DL3VJ in particular) were getting into the Midlands, and the GM's were coming over the Cheviots, with GM3EGW a good, workable signal. LX1SI was heard in the south of England, and the activity generally was good. Some of the outstanding contacts were G3LIM/DJ2NR, G5MA/GM3EGW and G5MA/G3IOE. By the evening of the 10th, the weather had turned wet and cold, and the DX faded away again.

At different times during "normal working hours" on October 9, PE1PL had unscheduled contacts with G3GFD, G6BX and GC3EBK, the latter being a particularly good QSO in the morn-

TWO-METRE ACTIVITY REPORT

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

GM6KH, Hamilton, Lanarks.
WORKED: G2AHP, 2JF, 3CGQ, 3EVV, 3FAN, 3GHO, 3HBW, 3JZG, 3KEQ, 5BD, 5MA, PA0FB, 0UHF.
HEARD: DL1RX, 3YBA, F3JN, PA0GER and many G's.
(Aurora September 29 only).

PE1PL, The Hague.
WORKED: G2HCG, 2NY, 3BA, 3GFD, 3JWQ, 3KEQ, 5YV, 6BX, 6FO, GC3EBK.
(September 16-October 16, day-time only).

G2AHY, Crowthorne, Berks.
WORKED: G2ANT, 2CDB, 3BA, 3BEQ, 3CKQ, 3ENY, 3FEX, 3FQS, 3GZN, 3HAZ, 3IIT, 3JFR, 3JWQ, 3KQC, 3LHA, 3LKA, 4MK, 5CP, 8VZ.
(September 20-October 20, phone only).

G2HDR, Bristol, 9.
WORKED: G2ADZ, 2FQP, 3BA, 3DKF, 3DLU/P (Mon.), 3EHY, 3FIH, 3FKO, 3IER, 3IRS, 3JWQ, 3JZG, 3KHA, 5DW, 5MA, GW6AG/M (Brecon), GW6AG/M (Pembroke).
HEARD: G2BVV, 2FNW, 2HCG, 3EJO, 3HHY, 3IWJ, 3JZN, 5BM, 5PP/A, 5YV, 6NB, 6WF, 6XM, GC3EBK, GW8SU.
(September 18-October 22).

GM3DIQ, Kilbarchan, Renfrew.
WORKED: DL3YB, G2DVD, 2HCG, 2NY, 2XV, 3BOC, 3BW, 3FAN, 3FZL, 3HAZ, 3HBW, 3JWQ, 3JZG, 3KEQ, 3KJM/A, 5BD, 5CP/A, 5MA, 5YV, 6NB, 6XM, GM3BOC/A, 3DDE, 3EGW, 3GAB, 3GUO, 3HLH, 3INK, 3NG, 4PW, 5VG, 6KH, 6SR, 6WL, 6WL/P, 6XW, 6ZV, ON4DW, PA0FB, 0NO.

SWL Tomlin, Malvern, Worcs.
HEARD: F8MX, G2FNW, 2HDF, 2XV, 2YM, 3ARK, 3AVE, 3DF, 3DLU, 3EMY, 3ENY, 3FTN, 3FZL/P, 3GHO, 3GZM, 3HAZ, 3HTY, 3IER, 3IIT, 3IOO, 3IRA, 3JWQ, 3JWQ/P, 3KBA, 3KEQ, 3KFD, 3KNT, 3LAY, 3LHA, 3LTF, 4DC, 4MK, 5BM/P, 5MA, 5ML, 5YV, 6AG, 6AG/M, 6AG/P, 6NB, 6OX/P, 6WF, 6YU.
(September 1-30, week-ends only).

**HEARD: DJ1XX, DL1LB, G2ADZ, 5DW, GM2CQI, 2FHH, 3FSD, OZ2BB, 3AO.
*(September 1-October 15).***

SWL Winters, Melton Mowbray, Leics.
HEARD: Phone, G2BVV, 2CDB, 2FMO, 2FNW, 2HCG, 2NY, 3ALC, 3BA, 3BOC, 3BU, 3FUW, 3GHO, 3GSO, 3HBW, 3HZK/M, 3HXS, 3IWJ, 3IT, 3IOO, 3JWQ, 3JZK, 3JXN, 3JZN, 3KQF, 3KUH, 3LHA, 3LKA, 3LKA/P, 4MK, 5CP/A, 5HB, 5KG, 5MA, 5YV, 6NB, 6XM, 6XX, 6YU, 8CZ, 8VZ, GB2RS
CW: G2CIW, 2FNW, 2NY, 2YB, 3ALC, 3EKK, 3GSO, 3JWQ, 4DC, 4MK, 5HB, 5MA, 5YV.
(September 12-October 13).

SWL Woodhouse, Storrington, W. Sussex.
HEARD: G2ABD, 2ADZ,

2AHP, 2AHY, 2AJS, 2ANS, 2ANT, 2ATK/M, 2AUD, 2BDP, 2BMZ, 2BVV, 2BZ, 2CDB, 2CIW, 2DDD, 2DSP, 2DUS/M, 2DVD, 2FCA, 2FM, 2FMJ, 2FMO, 2FNW, 2HCG, 2HDJ, 2JM, 2NM, 2NM/P, 2NY, 2WJ, 2WS, 2UJ, 2XV, 2YB, 3AAZ, 3ALC, 3US, 3ARL, 3AYT, 3BA, 3BEK, 3CBE, 3CBU, 3CCX, 3CGQ, 3CZZ, 3DKF, 3DLU, 3DOR, 3EJO, 3ENY, 3EVV, 3FAN, 3FCQ, 3FEF, 3FIH, 3FMI, 3FMO, 3FQS, 3FTN, 3FZL, 3GDR, 3GFD, 3GJI, 3GGR/P (Worcs.), 3GHI, 3GHO, 3GNR/P, 3GOZ, 3GSO, 3HAZ, 3HBW, 3HCU, 3HHY, 3HRH, 3HXS, 3HZJ, 3IAM, 3IBI, 3IIT, 3ION, 3IPB, 3IRA, 3IRS, 3IUL, 3IWJ, 3JAZ, 3JDK, 3JEP, 3JGY/M (Hereford), 3JHM, 3JR, 3JTO, 3JWQ, 3JZG, 3KEQ, 3KHA, 3KQC, 3KOR, 3LAY, 3LHA, 3LIM, 3LOA, 3LOK, 3LTF, 3XC, 4DC, 4KD, 4MK, 4PS, 5BD, 5CP/A, 5DF, 5DS, 5DW, 5KG, 5KW, 5LL, 5MA, 5ML, 5NF, 5PP, 5PR, 5UM, 5WW, 5YV, 6AG, 6FO, 6LI, 6LL, 6NB, 6NW, 6OX, 6OX/M (Nr. Hampton Court), 6SN, 6WF, 6XM, 6XX, 8AL, 8KW/M, 8OS, 8RW, 8SC, 8VZ, GB2RS, GB3IGY, GC3EBK, G3GXP, GM3DIQ, 3HLH/A, 6KH, 6WL, GW6AG/M (Pembroke), GW8SU, 8UH, ON4ZK, PA0FB.
(September 23-October 20).

G3KHA, Bristol, 4.
WORKED: G2ADZ, 2AHP, 2AUD, 2BZ, 2CIW, 2DVD, 2FM, 2FQP, 2HDR, 3BA, 3CNU, 3CGQ, 3CZ, 3DKF, 3DLU/P (Mon.), 3EHY, 3EYV, 3FAN, 3FCQ, 3FIH, 3FKO, 3FQS, 3GHO, 3HBW, 3HHY, 3IER, 3IRA, 3IRS, 3JGJ, 3JTO, 3JZW, 3KEQ, 3KQC, 3LOA, 3LOK, 3LTF, 4AP, 4DC, 5DW, 5KG, 5MA, 5PP, 5UF, 5WW, 5YV, 6NB, 6NW, 8AL, 8KW/M, 8VZ, GC3EBK, G3GXP, GW2AHL/M, 3HAW, 5SA/P (Carms.), 8KW/M, PA0FB.
HEARD: DJ1XX, DL3VJ, 3YBA, EI6A, G2AHY, 2BVV, 2FNW, 2HCG, 2JM, 2NM, 2NY, 2UJ, 2WJ, 2XV, 3ALC, 3AYT, 3BOC, 3CO, 3DF, 3DLU, 3FZL, 3GHI, 3HAZ, 3HRH, 3IUL, 3IWI, 3JWQ, 3JZN, 3KUH, 3LIM, 3PY, 3SM, 4KD, 4PS, 5BD, 5BM, 5DF, 5KW, 6AG, 6FO, 6SC, 6XM, 6XX, 6YP, 8DA, GM2FHH, 3EGW, 3DIQ, 6KH, 6XW, GW8UH, ON4CP, 4DW, 4ZH, PA0EZ, 0GER, 0NO, 0UHF.
(September 12-October 15).

G5YV, Leeds, Yorks.
WORKED: DJ3KO, DL1LB, 1RX, GM2FHH, 3DIO, GW8SU, HB9BZ, 9RG, ON4CP, OZ3A, 9AC, PA0FB.
HEARD: DJ1XX, DL1NH, 3AH, 3YBA, 6SV, EI6A, F3JN, G3GXP, GM3EGW, 6KH, 6WL, 6XW, ON4DW, OZ2BB, 2IZ, 2KH, 5AP, 7IGY, 9EA, PA0AGJ, 0BZH, 0EZ, 0GER, 0GRN, 0RK, 0UHF, SM7BE, 7BZX.
(Aurora September 29 only).

70 CENTIMETRES ONLY
G2CIW, Cambridge.
WORKED: G2FNW, 3HAZ, 3IOO, 5BD, 5KG, 5LL, 8AL.
HEARD: G2BVV, 2XV, 3HBW, 3JHM, 5DT.
(September 21-October 13).

ing, with high signal level. The PE1PL schedules continue to give very interesting results; G2NY, at extreme range, is heard, if not worked, most mornings; G6FO, at 223 miles, is a regular daily contact; since this schedule was started back in August, there have been only two failures, both due to the Tx going u/s at the Maids Moreton end. PE1PL's two-metre signal exhibits all sorts of change-

able characteristics: Most mornings, he sounds just like a W6 on the HF bands, with echo and flutter QSB; at other times, the signal has only a deep, slow fade; signal levels vary from S3 to S8 (at G6FO), and often PE1PL is strong and steady enough to be copied solid on phone, on the speaker, all through a contact. One interesting fact that seems to be emerging from this schedule is

that so long as pressure (whether high or low) is about equal at both ends, signals are steady.

TWO-METRE FIRSTS

G/DL	G3DIV/A-DL4XS/3KE	5/6/50
G/EI	G8SB-EI8G	23/4/51
G/F	G6DH-F8OL	10/11/48
G/GC	G8IL-GC2CNC	24/5/51
G/GD	G3GMX-GD3DA/P	29/7/51
G/GI	G3DA-GI2HML	29/6/49
G/GM	G3BW-GM3OL	13/2/49
G/GW	G5MQ-GW5UO	22/10/48
G/HB	G6OU-HB1IV	12/9/53
G/LA	G6NB-LA8RB	29/6/53
G/LX	G5MR-LX1AS	23/7/55
G/ON	G6DH-ON4FG	25/9/48
G/OZ	G3WW-OZ2FR	1/6/51
G/PA	G6DH-PA0PN	14/9/48
G/SM	G5YV-SM7BE	1/6/51
GC/DL	GC3EBK-DL3VJ/P	22/3/53
GC/EI	GC2CNC-EI2W	8/10/51
GC/F	GC2CNC-F9OK	17/11/53
GC/GI	GC3EBK-GI3GXP	14/9/56
GC/GW	GC2FZC-GW8SU	16/6/54
GC/ON	GC3EBK-ON4BZ	4/3/53
GC/OZ	GC3EBK-OZ2FR	2/3/53
GC/PA	GC3EBK-PA0HA	16/7/55
GD/EI	GD3DA/P-EI2W	30/7/51
GD/GM	GD3DA/P-GM3DA/P	29/7/51
GD/GW	GD3DA/P-GW5MQ	28/7/51
GI/DL	GI3GXP-DL1SE	5/1/56
GI/EI	GI3GQB-EI2W	13/6/51
GI/GD	GI2FHN-GD3DA/P	29/7/51
GI/GM	GI2FHN-GM3OL	1/7/49
GI/GW	GI2FHN-GW3ELM	8/7/49
GI/ON	GI3GXP-ON4BZ	5/1/56
GM/DL	GM2FHH-DJ1XX	29/5/55
GM/EI	GM3BDA-EI2W	12/6/51
GM/HB	GM3HLH-HB1RG	4/8/57
GM/ON	GM3EGW-ON4BZ	21/11/53
GM/OZ	GM2FHH-OZ2I2	18/6/57
GM/PA	GM3EGW-PE1PL	22/4/53
GM/SM	GM2FHH-SM6ANR	22/7/55
GW/DL	GW5MQ-DL4XS	22/9/51
GW/EI	GW2ADZ-EI8G	19/4/51
GW/F	GW2ADZ-F3LQ	14/5/50
GW/HB	GW2ADZ-HB1IV	14/9/53
GW/ON	GW2ADZ-ON4YV	13/5/50
GW/PA	GW2ADZ-PA0HA	13/5/50
GW/SM	GW2ADZ-SM6QP	1/7/53
DL/CN8	CN2AO-CN8MB	26/6/55
DL/OZ	DL6SW-OZ2FR	4/3/51
DL/SM	DL2DV-SM7BE	10/3/51
EI/DL	EI2W-DL3VJ/P	29/8/52
EI/F	EI2W-F8MX	9/8/56
EI/ON	EI2W-ON4BZ	21/9/51
EI/PA	EI2W-PA0FC	10/10/53
ON/LA	ON4BZ-LA1KB	4/7/53
ON/LX	ON4TR-LX1MS	? ?
ON/OZ	ON4BZ-OZ2FR	3/6/51
ON/SM	ON4BZ-SM7BE	2/3/53
ON/9S4	ON4UD-9S4BS	19/8/56

What is surprising is how often PE1PL and G6FO do check at nearly the same barometric reading—and also how frequently temperatures are equal within a degree or two. The latest schedule contacts reported were G2NY/PE1PL at 0905 and G6FO/PE1PL at 0915 on November 1.

Incidentally, with the change to GMT over here, PE1PL now searches for U.K. calls daily during 0800-0815, 1300-1330, and 1500-1520 GMT; further week-day schedules with U.K. stations are still wanted by PE1PL—see p.373 September "VHF Bands" for details and procedure.

The Tabular Matter

Panels appearing herewith are up-to-date with all latest claims; we also start the new season's Annual Counties Table this month, for which we look forward to having many entries as time goes on. It is better to make a claim as soon as 14 or over are acquired, rather than to come in late with a large total.

And here an apology is due to Bob. G5MA, with the explanation that *he* should have appeared in the leading position, with 60C. for Annual Counties, 1956-57. It is not often that we mislay claims, but that is what happened in this case, and it is most unfortunate that it had to be such an important one. G3GHO has himself pointed out our error, and gives way to G5MA accordingly—so, humbly, your A.J.D. hopes that honour is now satisfied.

On the subject of priorities, we are glad to be able to credit GM2FHH with the GM/OZ and GM/SM "Firsts," in the appropriate place.

News and Gossip

G3CZZ (Cornwall Tech. Coll.) is a new one for that county; he is on 145.64 mc. at a very good location, and offers evening schedules with anyone wanting Cornwall (which means nearly everybody!). A twice-daily daytime schedule is being kept with PE1PL. Beam at G3CZZ is a 3-stack slot-fed job at 70 ft., and the PA runs 20w. input; the converter is CC, and quite a number of contacts have already been

made, with some 20S heard during the Aurora opening of September 22.

G2AHY (Crowthorne) keeps steadily at it on 145.12 mc, and G8VZ (Princes Risboro'), who puts out such a good signal with QRP, was glad to catch GM6XW, at RST-563, on the 22nd. The G3JWQ/G8VZ schedule is now at the 300-mark, and G3JWQ (Ripley) goes into the new Annual table with the healthy total of 30C worked already.

The tropospheric openings of October 9 and 15 extended into the West Country, and G3KHA (Bristol) had some good DX contacts; he also managed GI3GXP, to put him on the first rung of the Countries ladder. G3DLU (Sheffield) has been kept off the band by the "dire necessity" of having to strip and re-fit his car engine, so has missed a lot. G3GFD (Bradford) makes various claims, which we are glad to enter, and runs 60w. to a slot-fed 4/4; he gives a list of nine stations regularly active within a radius of 10 miles. G3GFD has been able to visit DJ2XM, one of the stations he worked during the June opening. G2AHP (Perivale) writes in again, adjusts his positions in the Tables, and reports some very good contacts during the recent openings; he says he hasn't so much time for it these days, but will "keep plugging away." G2HDR (Nr. Bristol) managed six new counties during the period, and hopes soon to work London-way, which is his worst direction; a new beam is up, and SWL reports would be much appreciated.

G3HBW (Bushey Heath) finds he has worked 9 GM counties—4 via Aurora, 3 by tropo, and the other two by a combination of tropo/Aurora! G3GSO (Derby) stands at 106S worked in 27C, and is now running more power.

Dead-Line—

This is **November 20** certain, with everything addressed A. J. Devon, "VHF Bands," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. With you again on December 6 — in the meantime, look out for more Aurora . . .

DX COMMENTARY

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

THIS month's comment on conditions need not take up many lines—they have been marvellous for most of the time, with only occasional lapses. All bands are generally open to somewhere or other, even in the small hours, although we are now reaching the stage where the HF bands will fold up during the evenings.

Rare DX has been in evidence, the major upheavals having been caused by JT1AA, CR8AC and SVØWQ/Crete. Pacific stations like ZM6AS, ZK1BS and ZK2AD have often come through with terrific signals of the W6 type instead of the usual watery little affairs one expects from the Pacific islands. In short, if you look for it closely enough you can find practically anything you want.

OK1JX tells us that JT1AA has "caused a devaluation of the WAZ Certificate." We don't know his present tally, but in his first six weeks on the air he worked over two thousand stations, most of whom wanted him for WAZ! He has been sent "the material for a better antenna," and as his present receiver has only general coverage, it is hoped to get a better one to him with bandspread, a modern front-end and a Q5'er. Other points on JT1AA: he will *not* listen for phone, either on the frequency or elsewhere; he will *not* accept any pre-arranged skeds; and cards must go to OK1JX, who is relieving JT1AA of all paperwork except the actual writing of the QSL's. (Cards from hopefuls have been arriving at the Czechoslovak Embassy in Ulan-Bator, but all to no avail!)

Meanwhile, JT1AA does not



VS2EF

CALLS HEARD, WORKED and QSL'd

come up too often on the air, but he is showing a distinct tendency to work stations 10 or 12 kc below his frequency. This must make it easier for him, but doesn't help the other customers much, as his own frequency is always submerged in Klottery of all kinds. (*Late Flash*: OK1MB tells us that JT1AA has been QRT for over a week, filling up those 2,000 QSL's!)

And so to the summary of doings on the DX bands . . .

Ten Metres

Ten has been behaving more or less as one would expect it to during the peak years. The fact that there is no exotic DX around the CW end is doubtless due to the neglect of this band by the said DX stations: if they would come on, we would hear them. W's predominate all day from noon onwards, with a surprising number of openings to the West Coast. JA's are pretty prolific on certain mornings, and VK and ZL signals are good—when they use the band. Contests show it up in its true light.

G3DO (Sutton Coldfield) raised VP8CF and VP2GC on phone, at

1955 and 1810 GMT. G3FXB (Southwick) worked SVØWQ (Crete) on phone, and VK9XX on CW.

G3BHW (Margate) thought September 21 was a wonderful day, and his phone raised VK6KW, 4S7YL, ZS4F, ZC4JU, VP9DM, HK7, TI, ZD2, 4 and 6, VQ5 and 6. He made WAC and WBE between 1605 and 1653 GMT that day. G3BHW remarks on the deep flutter-fading often heard on this band, but instead of presaging a fade-out it seems to continue for a long time.

G3ABG (Cannock) used the CW end and collected OX3DL, VP6UN, ZC4KF, ZB1GUH, VQ2RG, CR6AI and CR7LJ. Phone brought in 5A, VQ3, ZD6, ZS and two W2 Mobiles.

G3FPQ (Bordon) worked phone with AP5T, PJ2AB, VP5CM, VQ6ST, VS9AI and K61WG/HC6, who was using 6 watts. SVØWQ was also worked—on all bands from Ten to Eighty on phone.

GM3EOJ (Aberdeen) winkled out VK9HO (New Guinea). G3LCI (Wallasey) worked VU2EJ, W7ACD and several W and VE 1GY stations—all CW. G3BDQ (St. Leonards) bagged CR7LU,

and W7HWQ (Arizona)—also CW.

G6VC (Northfleet) says the band was open but he heard nothing but the usual crowd of W's. G2BLA (Morden) scored two new ones with UN1AB and YV5BX. G3HQX (Mitcham) worked a CO on phone. G3KMA (London, N.W.11) pulled in WØPHR (S. Dak.) for his 45th State.

Fifteen Metres

In a way, this is the most popular band nowadays, avoiding the long, dull periods of Ten on the one hand, and the terrors of short-skip on Twenty on the other. Although, from mid-day onwards, the W's seem to predominate, there is always something else around, especially in the phone section. But the CW band is generally lively, too, and on good mornings all sorts of exotics can be heard, and sometimes even worked!

G3JZK (Cambridge), while operating from GM-land, raised UO5, VS1, UN1, JA and VP8CI on CW. On arrival back at Cambridge he worked FK8AC (1050) and SVØWQ. G2YS (Filey) collected two W7's in Montana.

SVØWQ, UO5AA and VE8PB in the Arctic. He just missed PJ2ME and PJ5CA.

G3WL (Plymouth) spent some time re-building, and now has a PA with push-push 807's. He raised XE1PJ for his best DX of the period. GM3EOJ, who, by the way, is enquiring whether there *are* any active XE's, worked ZP5CF and FK8AT.

G3DO's phone connected with OQØDC, CR5SP, EA9BK, PZ1AG, VE3AHU/SU, and SVØWQ. G3FXB fetched in IS1FIC and VP8CC (phone) and FK8AT. FP8AS and SVØWQ (CW).

G3JIG (Mitcham) stuck to CW and came out with CT1JL, OZ4FF, EA4GA, SVØWQ, VK9XK, UQ2AS and FK8AT. G3LET (Westcliff) made his very first excursion on the band and worked VE8. JA. VK. PY and W's, but then TVI reared its ugly head and Fifteen is "out" for the present.

G3ABG used CW for ET2US, OX3DL, VS9AG, VS1JF, KZ5DK, KL7PN, VE8PB, ZC4, ZS and Europeans. Phone brought in VK3AZY (the 12-watt station), VP5CM, MP4BCC, FP8AR and a ZC4. G3LCI worked XW8AG.

SVØWY, W4EWS/MM and plenty of W's and VE's.

G3BHW raised XW8AG on CW, while phone accounted for CP1CM, YN1MF, OA1H, VR2, KH6, KG1 and T1. G3BDQ worked VQ3GC (*ex*-VQ5GC/G3IAD), who is now at Songea Airport, Southern Rhodesia, for QSL purposes, and also SVØWQ, plus many W6 and 7, JA, VK, ZL and the like.

G3FPQ made it with FK8AC, FK8AS and KW6CE on CW, as well as DU1GF, H17LMQ, FK8AC and FE8AK on phone. New ones for G6VC were KL7AU, FK8AC, SVØWQ, UQ and UR; got aways were KX6AF, KW6CE and VKØAB. G2BLA worked UA9CQ, a new one for the band.

Twenty Metres

As always, "good old Twenty" has been bearing the brunt of the rare DX, despite all the hazards of short-skip and the Klottery that it makes painfully audible. There *are* times of day when we don't suffer from it, though, and these can be very rewarding if conditions happen to oblige at the same time. We have noted monumental pile-ups over JT1AA, ZM6AS, SVØWQ, CR8AC, ZK1BS, KS6AD and a very phoney VR5AB, but you don't *have* to join in, and you can frequently find something else worth working within a few kc of the mess.

G3JZK raised VP8BO and DU1RTL (from his GM QTH) and, like many others, heard JT1AA early in September, before the news got round, and didn't even call him. G2NS (Southbourne) was another who said "They can't fool me!" Reverting to G3JZK, he operated G6UW/A from the Cambridge University Societies' Fair on October 8-9, and raised 3A2BT on phone. From his own station he worked EA9BM on CW for a new one.

G3HLY (Godalming) now heads the Marathon Table with all 40 Zones to his credit, having raised JT1AA! Others were CR8AC, VKØ, SVØ, VQ3, ZS3, HE and 3A2BT. G3HLY has just received three QSL's from XW8AB, so

FIVE BAND DX TABLE
(POST-WAR)

Station	Points					Countries	Station	Points					Countries		
	3.5 mc	7 mc	14 mc	21 mc	28 mc			3.5 mc	7 mc	14 mc	21 mc	28 mc			
DL7AA	841	110	167	234	178	152	247	JA1CR	348	19	49	174	70	36	176
W8KIA	732	68	148	265	138	113	265	W6AM (Phone)	347	13	32	242	39	21	242
G3FXB	718	72	129	208	183	126	232	G3JWZ	282	50	61	72	66	33	116
G5BZ	704	64	118	240	168	114	246	G3IGW	272	42	63	82	64	21	110
G3FPQ	647	66	91	194	175	121	215	G3JLB	270	41	43	67	64	55	110
G3DO	604	24	46	230	151	153	247	G6TC	261	17	62	118	37	27	129
W2EQS	539	79	114	161	104	81	177	G3JZK	231	15	46	49	84	37	123
W6AM	504	30	58	273	86	57	273	G3HQX	217	12	37	74	45	49	103
G2YS	452	65	85	148	100	54	165	G2BLA	209	24	45	57	52	31	95
G3WL	450	39	77	146	115	73	177	G3JIG	194	36	42	83	31	2	98
G3ABG	449	45	83	168	87	66	183	G3DNR	180	10	21	79	35	35	93
G3BHW	422	15	32	154	126	95	190	GW3DNF	142	21	30	49	33	7	58
GM2DBX (Phone)	417	34	31	158	100	94	173	G3IDG	90	11	15	20	16	28	40
G6VC	348	33	45	138	77	55	152								

(Failure to report for three months entails removal from this Table. New claims can be made at any time).

take heart, those who are still waiting . . .

G2YS raised YK1AT and SVØWQ, and heard a peculiar one signing FY9182, QTH 500 km. S. of Oran. He was calling amateurs "to compile a radiation pattern" and is believed to be at one of the Sahara oil-prospecting stations.

GM3EOJ worked HL9KT, DU1RTI, ZC5AL and CP1CJ; good gotaways were VU2DR, HL2AM, HI8BE, KS6AD, YK1AT, ZM6AS—all Twenty CW. It just shows what's on the band!

G3DO added FB8XX (Kerguelen) on CW, as well as HE9LAC and KS6AF on phone. The latter was at 0845, with a YL operator (Evelyn Scott, Pago Pago, American Samoa). But G3DO had already worked W6UOU/KS6, so this wasn't even a new one for him.

G3FXB stuck to the key for FF8BF, KG1AS, KG6, VP9, VQ3GC, YK1AT, SVØWQ, UAØKAR, UAØSO and ZK2AD (1800). Five outstanding gotaways were CR8AC, JT1AA, ZM6AS, FW8AA and W4FCB/KS4!

G3JIG, on CW, collected FB8AI, LA2JE/P (Spitzbergen), UAØKAR, SVØWR, HB1MQ/FL, KH6KD, VS2DW, CR6AI, K2QOO/VE8, FP8AS and other lesser fry.

G3LET spent most of his time on Twenty CW, which brought in UJ8AF, UN1AB, IS, FF8BF, JA's, VP9, VK, ZL and numerous South Americans. JT1AA was heard; KG6AAY was S 7/8 at 1700.

G3ABG's CW fetched in FP8AS, CR6AI, FF8CA, FB8ZZ, VS9AD, OY2H, SVØWQ, VE8, JA, PJ5AA and 5CA, UP and ZC4. G3LCI, also CW, worked TI2PZ, FA3QY, CE3DZ, VE7, VE8 and ZL—and plenty of W's.

G3BHW is convinced that this is still the DX band. He stuck to CW, and the results include C9XF, FP8AS, YK1AT, VKØAS, SVØWQ, KG6, DU1RTI, HE9LAC, VS9, VP8 and others such as OY, KR6, VP2, ET2 and so on. He has heard CR8AC frequently, but no luck as yet. G3BHW says he has only been DX-conscious for two years and



"CQ DX de ZBIHKO." Her father says he will be looking for G's on Top Band from mid-November onwards, and would like to make schedules, especially with GI/GM stations.

has not even heard Zone 23 as yet, so his beam will be spending most of its time lined up that way.

G3BDQ thinks his call has a great fascination for JA's, and wishes it were equally attractive to JT1AA or CR8AC. On CW only, he raised VE8, FB8AI, FP8AS, VKØAS, KH6's, TI, UAØ, TA, VS9, VP9 and a dozen or so JA's.

G3FPQ pulled in FK8AS and ZK2AB on phone; on the key he collected FB8XX, FP8AS, FK8AS, FY7YF, KAØSC, YK1AT and ZC5AB. G6VC added VS9AD and LA2JE/P for new ones, but HL9KT, UL7, UI8 and UM8 all got away. New for G2BLA were UP2AN, CT2BO and CX1DZ. During an Auroral patch he worked an ON4, who was RST 564 . . . but shortly after, VQ3SS was 579x, using a beam four feet off the ground.

G3HQX worked VK9XK on CW. G3KMA found conditions better but erratic, and was amazed at the strength of some of the Antarctic stations. On CW he raised EL2P, FB8AI, JA6AO, LU7ZC and VK6WT, as well as three interesting ships—TI3DRK/MM (GW3DRK operating); UA2AW/MM (near Jan Mayen); and JA3XX/MM (Santos).

Forty Metres

Forty is not to be sneezed at these days, if you can stand the racket and don't mind late hours.

One night after midnight we had a forty-minute ragchew with a W3 friend which couldn't have been bettered on any band, and the QRM just didn't matter—but he did have a good signal!

G3BST (Bletchley) stuck to this band alone, and during the period he worked UF6AP, 3V8RC, ZS1BT, ZL1GQ, W6MOJ, CN8GZ and 8HA, 3V8KS and CX6CB (the order is chronological). DU9DDJ was heard, as well as other ZL's and ZS's. Even on Forty were the Funny Men, such as "ZS2AA," who said his aerial was a "dipolo" and had a T5 note. Another phoney was K4MCG/KP4 (according to SM7WT). And for Klottery—all through G3BST's QSO with CX6CB, he was being called by an SM—who presumably just managed to hear G3BST but couldn't get the other station at all.

G3FPQ raised KZ5RF, UO5KAA, UL7KKB, UP2AN, VP2LU and 3A2BT, all on CW. G3KMA collected UAØKAR (Polar Radio Club, Dickson Island). G3LET managed to raise SVØWQ "after a long struggle" and also CN8FH.

G3JIG was glad to get HB1VW/FL (2300) and also worked a W1. G3WL raised ZC4GT.

Eighty Metres

Nothing of note is reported on this band except by several of the

'chasers who raised SVØWQ, both on CW and phone. There should be plenty of good DX around the band, however, during the CQ Contest (November 30-December 2).

Top Band

W1BB notifies us that the dates chosen as the official test week-ends this season will be December 9 and 23, January 6 and 20, February 10 and 24. As usual, the hours will be from 0500 GMT onwards, with the W's mostly on 1800-1825 kc. Europeans should *keep off* this slice of the band, or nobody will hear anything. Around 1830 kc seems to be the best frequency on which to call the W's, but it doesn't give us much room. Elsewhere they are troubled by Loran.

Although in this peak year one would have expected conditions

on One-Sixty to be at their poorest, summer DX work has not indicated that. Further details of the tests will be given from time to time; and, as usual, intermediate week-ends will still be used as unofficial test periods.

ZB1HKO writes that he will be looking for G's from mid-November onwards, and he will be pleased to make skeds with anyone—especially GI and GM stations. QTH is 1, Eileen Flats, Balzan Valley, Malta.

G3KEP (Bingley) regretfully notes a great falling-off in Top-Band CW since the abolition of the "first year on CW" clause in the licence.

G2CZU (Bath) has stuck to the band and increased his WABC-Phone score with Cambs. and Norfolk; he would like to see more activity from Southern Scotland.

Top-Banders who enjoy snappy CW working would do well to be on during the MCC times—1600-1900 GMT on November 16, 17, 23 and 24. The Club stations will be looking for contacts with all and sundry; no serial numbers, but QTH must be given. *Do not* call "CQ MCC," though—unless you are a competing Club. A straight CQ or a call to a Club station who is CQ-ing himself should do the trick. We hope there will be about forty Clubs active during these times, and the standard of operating will be high.

News from Overseas

G3ICH finally left hospital in Habbaniya and was posted to Cyprus, whence he is on the key occasionally from ZC4AM and is awaiting his own ZC4 ticket. He looks on it as a good exchange from YI-land and inactivity, but says that the situation may be a little better out there by now. But be prepared for the strange new prefix—HN—which will be used, since YI is now reserved for Iraqi nationals. ZC4II has gone QRT and is probably on from G3III by now.

G3LWS (London, S.E.2) was ex-ZC4FB and is probably ex-G3LWS by now, since he should be cropping up as a VP8 very shortly. This move, we are told, is indirectly the result of the small

paragraph which appeared on p.259 of our July, 1957, issue.

G3LOL writes from VK5-land and says he will be returning in November, after having taken part in the atomic tests out there. He has met VK5QL, who is also from the U.K., and out there for two years.

W2EQS (Westwood, N.J.) tells us that they "sure had a ball operating FP8AS and FP8AR." FP8AS was his particular concern, the other one being managed by W2HTI. From September 11 to 17, FP8AS had 782 contacts, nearly all on CW; 570 with W's and 212 with DX, including 45 countries. On the Top Band, 22 W's were worked—every one of them a "first"; Loran was even worse in FP8 than in W2! Europeans who failed to raise FP8AS are assured that there was no discrimination—the hordes of W's just made it impossible to hear them except at certain times. W2EQS was glad to learn what a pile-up looks like from the other end, and says he will never forget the experience.

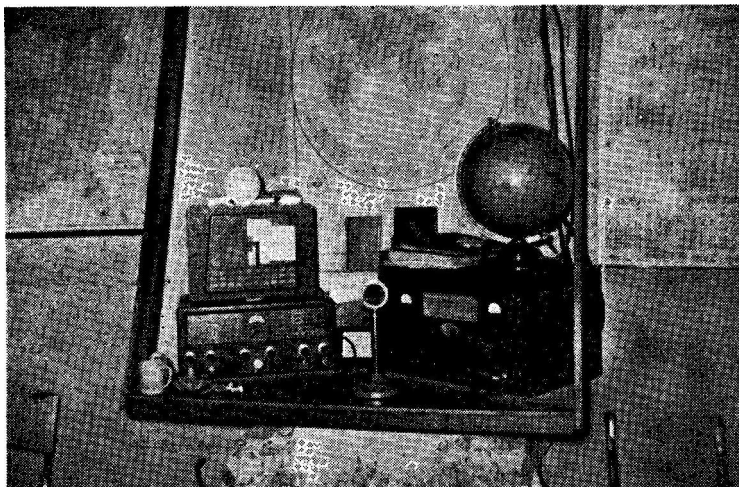
DL7AA (Berlin) pushes his Five-Band score still higher, with SVØWQ, JT1AA, CR8AC, ZM6AS, W4FCB/KS4, FP8AS, HL9KT, UL7FA and CP1CJ distributed over the various bands. The JT, CR8 and ZM6 were all-time new ones.

VE2LI (ex-G5LI) operates from Montreal and also from VE2LI/2 "up in the mountains." Up there he has an aerial farm with a G4ZU beam, and also two half-waves in phase with directors, for Europe; he also has two separate Lazy-H's with the top elements about 60 feet up, and cut for three-band operation. He runs a single 6146 with 75 watts (65 watts phone), and the aerials make it up to a kilowatt (or it sounds like it sometimes). He has worked 180 countries, mostly from VE2LI/2. At the other QTH, George has a dipole, ground-plane for Fifteen and Twenty, 135-ft. wire for Forty and Eighty. Future plans involve a Cubical Quad and possibly ground-planes for the LF bands, but VE2LI/2 is too cold in the winter for aerial work, and these will have to wait until the spring or summer.

W A Z MARATHON, 1957

All Bands

Station	Zones	Countries
G3HLY	40	180
G3FKM	39	184
G3DO	39	174
G3BHW	39	172
G3FXB	39	171
G3BDQ	39	145
G3JKF	38	117
GM3EOJ	37	122
G3HCU	36	98
G3KMA	35	105
G2DC	35	102
G3GGS	35	99
G3FPK	35	93
G3GZJ	34	100
G3LET	34	93
G5FA	34	89
G2BLA	34	87
GM2DBX	33	87
G3HQX	32	98
G3JWZ	32	88
G6PJ	32	86
G3JJG	30	84
G3DNR	26	78
ZL3CP	24	52



At KL7ALZ, Anchorage, Alaska, the station has been hung on the wall in the manner shown here. This method of assembly was suggested, as practicable for those lacking floor space, on p.265 of the July 1956 issue of "Short Wave Magazine." Incidentally, the operator of KL7ALZ is an XYL (Mrs. Geraldine Nichols).

Miscellany

G3JZK is trying a new DX tactic, which consists of giving very short (two by two) calls, and if the other man doesn't come back at once, he swings the VFO very slightly and repeats—keeping off the DX frequency, of course. This plan usually works, but doesn't help if a Klot is blotting out the frequency. If the distant station is looking for a reply in a clear spot, it seems sensible to try as many spots as possible in a short time!

G3JZK also asks "What is the purpose of the U . . . U . . . U . . . machine at the bottom edge of Twenty?" We would all like to know that—U for Useless?

G3KMA, now exiled in G.W.-land, is trying to start up a club for the University College of Swansea, and possibly to establish a station on College premises. He has a Top-Band rig ready for the great day.

G3IDG (London, S.W.12) tells us that W3HQO has now returned to Philadelphia, very impressed with G hospitality and extremely pro-British. G3IDG suggests that a lot of us could do more than we do as "ambassadors of goodwill." Certainly the hit-and-run QSO doesn't represent the purpose of Amateur Radio, and, failing personal QSO's like this,

the rag-chew and the regular sked are the next-best things.

DX Gossip

There are many, many G's who still want Vermont for their WAS; they should look for W3DDV/1, who will be in Grafton, Vermont, from November 8 to 21. He will operate mostly evenings on 15 metres, up to 0300 GMT, but will also be using Forty on occasions. From 0300 to 0500 he will be on One-Sixty, CW, 1800-1825 kc. The gear will be a Viking Ranger and a 250-ft. wire, and Bill Parker, W3DDV, will be specially looking for G's. Thanks to Grafton Radio Society (London) for this information.

CR8AC, who has been so strong both here and in the U.S.A. that he was rather suspect, is apparently genuine. He seems to be a friend of PY2CK and is ex-CR4AL. PY2CK, via W2GT, also tells us that PY0CV will have been on from Trinidad Island (not the same as VP4) during October, and probably counts as a new one.

To hark back to CR8AC, G3FXB mentions that he is "reportedly using 50 kW and a poor receiver." Could be! Also from G3FXB: FW8AA was S5 on phone, 14320 (0700) and tuning 14100-14200 kc . . . W4FCB/KS4 is on, but elusive . . .

ZM6AS has been 579 several mornings around 0800, but seldom works any Europeans (and we can vouch for the truth of that!)

G3FPK, working as 3A2BT, raised about 260 stations in 52 countries and at least 24 Zones. Best DX was DU, JA, VE8, SV0WQ, TI, KV4, VQ3 on Twenty; CX, JA, TF, VK0, VS1, ZP and ZS7 on Fifteen. Reception on that band was poor owing to ignition QRM and a hill alongside the hotel; no suppressors are fitted in Monaco, it seems. Anyone else planning a Monaco expedition is invited to contact G3FPK for all the *gen.* (There are still some wooden poles on the roof of the Hotel du Siecle, La Condamine, left by previous expeditions!)

VS1HJ/VS9 (Maldives) is again said to be active, 14100 kc . . . JT1AA worked VR5AA, 14080 kc (0800) . . . FE8AK operates every Saturday, 0900-1200, Fifteen phone . . . ZM6AS will be on phone as soon as his mike arrives . . . HL9KT is active but a bit suspect . . . UA0OM is in Buryat Mongolia, but that is neither Mongolia nor Zone 23—he is about three miles out of each!

W5LHP worked JT1AA by leaving the receiver on frequency all night, with headphones extended to the bedroom—speaks well for the stability of the receiver . . . A "sideband safari" is planned by VQ4EO and others, covering eleven countries, nine of which have not been on SSB before. November to January is suggested, on the three HF bands . . . HV1AA will be on the air during the CQ Contest, CW section (November 30-December 2), and may stay for a few days working phone after that.

A new signal from Timor (CR10) is promised, CT1BQ having left CR9-land for that destination. He will work Ten and Fifteen, but mostly phone; he will have AC mains available and will use rather more power than CR10AA has been doing. There is also rumour of a third station from the same place—another transfer from CR9.

KC4USB and 4USW have been active on phone around the high

end of Fifteen . . . HKØAI was on phone, 14116 kc, during October . . . KS6AD has been on CW (14090), but KS6AF is reported only on phone.

ZC5AL still keeps North Borneo on the map (Twenty CW) . . . ZK2AD is undoubtedly genuine, but there is some doubt about ZK2AB—there *may* be two of them, of course.

JT1AA has been worked by one or two W's on a new frequency of 14092 kc . . . VS4JT is very active on Twenty phone once again . . . UT8KAA has been reported (14070 CW), but where might *he* be?

VS4FC has been heard on Twenty CW . . . CE9AH is a funny one who is probably not worth enquiring into . . . VR4CW is the only call reported from the Solomons for a long time . . .

YK1AT (T7 note) works on 14020 and 14340 kc. He has just sent 250 QSL's through to

OK1MB . . . Two OH2's have promised operation from Aaland Island, OHØ, for the duration of the CQ Contest.

Cross Band Contacts

From G3FXB we hear that ZC4IP has been transmitting on Ten and receiving on Six, resulting in contacts with VQ2, ZE, ZS and ZS3 by "Trans-Equatorial Scatter." The signals are there regardless of the MUF, with fluttery phone barely readable, and CW T7-8. In twenty-five nights there were only two failures. Tests start at 1630 GMT, with the Africans listening for replies on 28320 kc.

F9BG and MP4BBL have also got through, we understand, and HB9QQ has been hearing the DX on Six. Apparently the MUF to the U.S.A. has already been above 45 mc, so reception of W's on Six is likely. (*Flash*: See "VHF Bands.")

New Sheepskin

Yet another for the list, from the Malayan Amateur Radio Transmitters' Society. Overseas associate members will qualify if they can supply proof of QSO's with 10 VS1's, 10 VS2's, two VS4/5's and one ZC5. Cards, with three IRC's, to Awards Manager, Box 777, Kuala Lumpur, Malaya. Members only—but membership is worldwide; application forms available from the hon. secretary, as above.

The VP2's

You can find this information in any reasonable atlas or stamp catalogue, but it may be useful here: The Windward Islands comprise St. Lucia, St. Vincent, Grenada and Martinique; the Leeward Islands, St. Christopher and Nevis, Antigua, Dominica, Montserrat and Guadeloupe. Most VP2's have a first letter which indicates their island, *e.g.* VP2G for Grenada, VP2A for Antigua. St. Christopher, however (also known as St. Kitts) uses VP2K. The only ambiguity we can see is that anyone on St. Vincent might use VP2V—which has already been used for the British Virgin Islands, counting as a separate country from Leewards or Windwards.

Martinique and Guadeloupe are, of course, French and, with their prefixes of FM7 and FG7, they also count quite separately.

SWL End

V. Kelly (Betws-y-Coed) heard HL9KT on Fifteen phone, and gives his QTH as APO 101, U.S. Army, N.Y.C. Other phones on the same band were K4AID/AM, PZ1AP and PJ2AV.

M. Prestidge (Birmingham) wonders about CR8AC, but we understand that he is using the local Airport transmitter with an amateur-band crystal, which accounts for that signal. On Fifteen phone he logged PJ5AA (G5RV), HI8RM and VP2GE, all around 1930. On Ten HC7WK was a useful one. M.P. also passes on the gossip item about PYØCV, Trinidad Island, supposed to be on Twenty phone and CW.

P. Day (Sheffield) heard FZ8A working PY2CK, but even the latter didn't get his QTH. On Twenty he also logged YA1AA (SSB), TG9MQ, AP2U, HB1VW/FL, CR5SP and KC4USH (SSB). Fifteen phone included lots of VS1 and 2, VP4LD, PZ1AG, PJ2AA, FB8BZ, FP8AR and ZS8O. Useful tit-bits included the PYØCV story; FW8AA is on 14312 kc phone; VR5DR is on 14075 kc CW; LA2JE/P on Twenty phone; and an item to the effect that CR4's can't be found until after 2000 GMT—because they don't get their mains supply until then!

V. S. Porter (Loughton), who tapes many of the QSO's he hears, logged VP2DN working PY8SB on Twenty phone, followed by YV4AU working KZ5IEF. Since all V.S.P.'s listening is done on a radiogram with built-in recorder, he is fully occupied "taping" some of the better ones.

That sums up this month's news, and we hope for an even larger post-bag next time. Please note that the next deadline is **first post on Friday, November 15**, and the following one *December 13*. Address all outpourings, as usual, to "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. Meanwhile, use all the bands!

TOP BAND COUNTRIES

LADDER

(Starting Jan. 1, 1952)

Station	Confirmed	Worked
G2NJ	98	98
GM3EFS	97	97
G3JEQ	96	96
G6VC	95	95
G3HEK	92	94
G3GGS	92	94
G3FNV	90	92
G3JHH	89	90
G3AKX	89	89
G2AYG	88	88
G2FTK	86	91
G2CZU	77	77
G3KOG	75	79
G3DO	75	75
G3EJF	60	65
G5JM (Phone)	58	59
G2CZU (Phone)	57	58
GM3COV	49	62
G3KEP (Phone)	49	60
G3HKF	47	61
G2AO	47	57
G3LBQ	34	45
G3LEV (Phone)	30	39
G3LNO	23	41
G3LNR	17	26

NEW QTH's

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

- DL2AT**, R. Filkin (*ex-G3BJT*), Public Safety Branch, British Mil. Govt., Berlin, B.F.P.O. 45.
- EI6AC**, C. A. Strong, Millford, Ballina, Co. Mayo.
- G2AUD**, H. H. Oak-Rhind (*ex-VS1FP*), The Old Laundry, Little Horwood, Bletchley, Bucks.
- G3DHO**, H. W. Cooper, 20 Marsh Hall Road, Widnes, Lancs. (*Tel.: Widnes 3772*).
- G3FYQ**, Pontefract Area Transmitting Group, Queen's Hotel, Pontefract, Yorkshire.
- G3JTF**, F. W. Blake, 34 Whomerley Road, Monks Wood, Stevenage, Herts.
- G3KXS**, H. J. H. Perry (*ex-GM3KXS*), 30 Home Close, Harlow, Essex.
- G3KZI**, J. A. Steele 12 Broad Walk, South Woodford, Essex.
- G3LEO**, G. N. Loftus-Brigham, Forneth, Catisfield, Nr. Fareham, Hants.
- G3LJH**, J. S. MacAulay (*G3DLQ*), c/o No. 1 Sqdn., No. 4 Trg. Regt., Royal Signals, Catterick Camp, Yorkshire.
- GM3LLB**, A. S. Nelson, 34 Montrose Crescent, Hamilton, Lanarks.
- G3LNH**, D. T. Taylor, 38 Linthorpe Grove, Aston Road, Willerby, Hull, Yorkshire.
- G3LOV**, M. Francis, 151 High Street, Banstead, Surrey.
- G3LQF**, R. N. Bingham, Faskally, Norman Close, Foley Park, Maidstone, Kent.
- G3LSD**, E. Dingle, Collingwood House, Stoke Damerel, Plymouth, Devon.
- G3LSJ**, C. S. Gerrard, 27 Brooklyn Avenue, South Norwood, London, S.E.25.
- G3LTZ**, M. Allenden (*ex-DL2ZT*), Glendower, Grovefields Avenue, Frimley, Surrey.
- G3LUR**, G. Normanton, 299 Priory Road, Hull, Yorkshire. (*Tel.: Hull 52622*).
- GM3LVG**, W. S. Gray, 9 Park Street, Aberdeen.
- G3LVN**, D. D. R. Sibbald, 13 St. George's Road, Ilford, Essex. (*Tel.: VA Lentine 7489*).
- G3LWM**, J. D. Harris, 64 Stainton Road, Enfield, Middlesex.
- G3LWR**, J. C. Evans, 11 Byefeld Gardens, Barnes, London, S.W.13.
- G3LWR/A**, J. C. Evans, 2 King's Cottages, Barton Manor, East Cowes, Isle of Wight.
- G3LWS**, E. H. Ross (*ex-ZC4FB*), 18 Abbey Grove, Abbey Wood, London, S.E.2.
- G3LWY**, Mrs. F. Woolley, Rochmount, Sturton Road, Saxilby, Lincoln. (*Tel.: Saxilby 294*).
- G3LXD**, J. L. Hawkins, 37 Burford Road, Catford, London, S.E.6.
- G3LXG**, B. B. Wilson, 18 Holdenby Drive, Park End, Middlesbrough, Yorkshire.
- G3LXL**, A. Davis, 112 Wendover Drive, Aspley, Nottingham.
- G3LXN**, B. Negri, 17 Voltaire Road, Clapham North, London, S.W.4.
- G3LXP**, D. E. Purchase, 44 Chesterfield Road, Barnet, Herts.
- G3LXQ**, D. L. Gallop, 49 Wheaton Road, Pokesdown, Bournemouth, Hants.
- G3LXQ/A**, D. L. Gallop, 46 St. Helen's Down, Hastings, Sussex.
- G3LXS**, J. H. Scott, 50 Nelson Street, Bridlington, Yorkshire.
- GD3LXT**, W. N. Bason, 24 Stanley Road, Peel.
- GC3LYC**, T. J. de Putron, Green Acres, St. Martin's, Guernsey.
- G3LYE**, M. Turner, 58 Frederick Street, Loughborough, Leics.
- G3LYN**, R. J. Amblin, 45 Cherry Road, Banbury, Oxon.
- G3LYU**, D. T. Price, 23 Pythchley Road, Southfields Estate, Rugby, Warks.
- G3LYV**, C. R. Rogers, 275 Green Lane, Coventry, Warks.
- G3LYX**, J. R. Crellin, 30 Harridge Road, Leigh-on-Sea, Essex.
- GM3LYY**, J. T. A. Johnston, 131 Glencairn Street, Stevenston, Ayrshire.
- G3LZC**, A. E. Stirland, 156 Hands Road, Heanor, Derbyshire.
- G3LZL**, F. W. Lindley, B.Sc., Ph.D., 48 Parr's Wood Road, Didsbury, Manchester, 20.
- G3LZM**, M. A. Bush, 34 College Green, College Hill, Hereford.
- G3LZM/A**, A/A Bush, M.A., Hut 354, "C" Sqdn., No. 1 Apprentices Wing, R.A.F. Station, Locking, Weston - super - Mare, Somerset.
- G3LZV**, C. Berry, 4 Godwin Road, Canterbury, Kent.
- G3LZV/A**, LAC Berry C., Hut 6, Trg. Wing, R.A.F. Station, Wythall, Birmingham, Warks.
- G3MAI**, R. W. Stevens, 165 Whitworth Road, Swindon, Wilts. (*Tel.: Swindon 4891*).
- G4IZ**, Gp./Capt. E. C. Passmore, C.B.E., R.A.F. Station, Debden, Saffron Walden, Essex.

CHANGE OF ADDRESS

- G3ATI**, R. W. Pinfold, The College of Aeronautics, Cranfield, Beds.
- G3CPY**, J. K. Piggott, 8 Rufford Avenue, Bramcote, Notts.
- GD3ESV**, Rev. F. Ness, M.A. (*ex-G3ESV*), St. Mary's, Hill Street, Douglas.
- G3GTM**, P. Morey, White Hart Inn, Bridestowe, Nr. Okehampton, Devon.
- G3HEG**, G. Edwards, 23 Boslock Road, Swanvale, Falmouth, Cornwall.
- G3JJA**, E. F. Steventon, 53 Barony Road, Nantwich, Cheshire.
- G3JYA**, M/Sig. Smith E. A., No. 245 A.M.Q., R.A.F. Station, Marham, Nr. Kings Lynn, Norfolk.
- G3KJQ**, D. J. Garner, Tree Tops, Beechwood Drive, Marple, Cheshire.
- G3LAT**, R. Arnold (*ex-DL2VH/5A1TR*), 19 Tonge Road, Kinson, Bournemouth, Hants.

MOBILE RALLY AT WOBURN ABBEY

SUNDAY, SEPTEMBER 29, 1957

OF all the mobile rallies held so far, this has undoubtedly been the outstanding one—in terms of weather, attendance, and in general interest in what was to be seen and who was to be met there.

The afternoon turned out fine, if a little chilly, after rather a wet morning, and from 11.00 a.m. onwards the Top Band was jam-packed with mobiles working the large number of home stations in the Beds. and North Bucks. area. It is significant that by far the greatest number of mobiles operate on 160 metres—there are some regular two-metre mobiles, and a few multi-band /M installations, but it is always on Top Band that most mobiles can be heard or worked.

Woburn Abbey, which is now regularly open to the public and run as a commercial show-place by the Duke of Bedford and his family, is an ideal location for a Rally of this sort. It is fairly central; there is plenty of space; and the house and grounds are well worth seeing for their own sake. The refreshment organisation could be improved, however, and on Sunday, September 29, was very overcrowded—possibly because this was one of the last days of the season when the Park was open to the public.

Rally Enthusiasm

The large attendances recorded at Mobile Rallies this year can be attributed to several factors: A /M rally is something very different from the ordinary lecture-meeting or local get-together; it combines



One of the visitors to the Mobile Rally at Woburn on September 29 was G5PP/M (Coventry) well known to diligent searchers after rare counties on Top Band under such variegated call signs as G5PP/P, G15PP/P, GM5PP/P and GW5PP/P. He has given many first contacts with counties in which there is otherwise little or no amateur activity. It has even been suggested that we should issue a special certificate for "Worked G5PP in All Counties"!



Amid the forest of mobile aerials at Woburn Park, we found one attached to Consul XPB-413, owned by John Rouse, G2AHL/M on two metres, seen here with his charming XYL. They were both very much involved in the organisation and arrangements for this very successful Rally.

both the radio and the motoring interest; it results in memorable personal contacts; the family can be brought along, too, and parked somewhere to get on with its picnic; and, in the case of a setting like Woburn, gives the opportunity for visiting some interesting or unusual place.

At any rate, there could not have been less than 85 vehicles fitted /M or /P in the Rally enclosure by the middle of the afternoon, and some 150 call-signs were recorded in the visitors' book. As usual, there were many remarkable equipages on view, from elderly vintage types and vans, pre-war cars in a high state of preservation, to the more resplendent vehicles of today.

Judging for the best mobile installation—a most exacting task—was undertaken by G2UJ and G6LL, who picked out G3ATL/M, with his Consul and the gear as described recently in SHORT WAVE MAGAZINE. The Duke of Bedford took an interest in this, and presented the prizes; he was also initiated into /M procedure by G3JOL/M, in his smart Rover.

Here it might be said that, on future Rally occasions, it would be advisable to separate the cars to be judged into one group (not everybody wants to enter for this competition), with the owner in his car and ready to give any necessary explanations to the judges. Since it is quite impossible in the time available for the judges to get round more than about 20 cars properly—if they gave them only five minutes each, it would take a good two hours, what with note-taking and walking from car to car—it seems obvious that there should be some preliminary sorting-out of the entries if this event is to go off smoothly and leave no hard feelings. Nobody would question the judges' decision, but it is also true to say that some potential entrants did not know when judging was to be, or even that it was in progress, and so could not be found when wanted.

Some of the Visitors

Long-distance visitors to the Woburn Rally included GW5BI/GW6HB from Cardiff, and among the well-known call-signs on the ground at various times were: G2AHL, G2AK, G2FKZ, G2LW, G2UJ, G2UV, G3BK, G3BZG, G3CGQ, G3FZL, G3HBW, G3HMO, G3WW, G5BM, G5PP, G5TZ, G5WW, G6AG, G6LL, G6SN, G6UT, G6WN, G8ML, G8MZ and G8PX. This short list is by no means complete, as people were leaving and arriving all through the afternoon.

The Aurora Opening!

This Rally was also noteworthy—and will be long remembered—because by an odd coincidence (which is that so many VHF operators were away from home!) the afternoon of Sunday, September 29, produced one of the biggest Aurora openings yet

experienced on two metres. An interested party soon gathered in the tent of G3FZL/P, the two-metre talk-in station for the Rally, and the band was found to be full of T4 signals from EDX and GDX distances, all coming in on a northerly beam heading.

The condition lasted over approximately 1500-1830 BST, and the DX was so strong that at times it could be heard on the (non-BFO) mobile receivers in the cars about the ground.

During the dispersal in the early evening, mobile contacts were being made (but not, through the QRM, held for very long) as cars left in all directions. Minor rallies were organised at certain well-chosen places "after they opened," and the general feeling was that the event had been a resounding success, well worth a long journey to get to it. We may be sure that Woburn Abbey will again be the venue for one of these meetings.

THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for December Issue : NOVEMBER 15)

"MCC"—the Twelfth in the series of Top Band Club Contests sponsored by the *Magazine*—takes place on two week-ends during the month. The dates are November 16-17 and November 23-24, the times 1600-1900 GMT on each of those days.

No previous entry is necessary; if you have a Top-Band transmitter on the Club premises you can make up your mind on November 15 that you will be operating on the 16th. If there is no Club licence and call-sign, you may use a member's station for the event.

The object of the whole thing is to work, primarily, as many of the other competing Clubs as possible, and these may be worked on each of the four days of the Contest; but contacts with non-competing stations are also allowed—only once during the whole period.

Read the rules, published in full on p.440 of last month's issue, and decide now whether there is any reason why your Club should not enter. It does not need a trained team of operators, log-keepers and so forth; it has, in fact, been won before now by a single-operator station. If your Club has anything like the necessary equipment and does not enter, then the members will be missing a most interesting event.

Activity Reports

Brighton elected new officers at their AGM and report to us once again. They meet every Tuesday evening, 8 p.m. at the Eagle Inn, Gloucester Road, where all visitors and prospective members will be most welcome.

Bradford (Grammar School) also had an AGM;

six members were successful in R.A.E. and five of them passed the Morse test and are now active on Top Band. The Club's annual competition will be held on November 13, and they hope to visit a GPO Coastal Station at some future date. R.A.E. classes are in full swing again, for next May's examination.

Aldershot hold their meetings at The Cannon, Victoria Road, Aldershot, on alternate Wednesdays at 7.30 p.m. Next meeting is on November 13, to which new members and interested visitors will be welcome.

Flintshire resumed their monthly meetings in September, and since then have had a lecture on RF in Landline Communication, a Mullard Film Show, a new members' night and a Junk Sale. Next meeting is on December 2, and will be a Film Show at the Railway Hotel, Prestatyn.

Leicester have re-formed and secured new headquarters at Old Hall Farm, Braunstone Lane, with surrounding grounds suitable for an aerial farm. They will be in MCC with a temporary transmitter. Forthcoming talks are on Operating for DX (G2DSF) on November 11; a Two-Metre Tx, and cross-band demonstration (November 18); and Electronics in Medicine (November 25).

Liverpool are showing a film ("Race for Life," it is hoped) on November 12; on the 19th they have a "Natter Night," and on the 26th a Constructional Contest. December 3 is the date for the Junk Sale.

Lothians notify us that the Secretary's QTH given in the September issue was incorrect. Please see panel for correct information.

Medway continue to meet on alternate Mondays

at the Viscount Hardinge Hotel, Gillingham. A full winter programme has been arranged, including a lecture by Messrs. Panda Radio on November 10. Radio Theory and Morse classes are under way.

Nottingham (Amateur Radio Club) meet on Tuesdays and Thursdays at Woodthorpe House, Mansfield Road, 7.15 p.m. Activities include practical construction work, Morse training, lectures and discussions. Their station G3EKW transmits on the Top Band and after rebuilding hopes to be on other bands as well.

Pontefract are now using the new clubroom at the Queens Hotel, with their own station G3FYQ in action. When fully equipped it will be on all bands from Two to One-Sixty, CW and phone. Club nights are the first, third and fifth (if any) Thursdays at 8 p.m. Morse instruction is always on the agenda, with talks and discussions occupying part of the time.

Port Talbot (they have now dropped the "Neath" from their title) meet on the first and third Tuesdays, 7.30 p.m., at the home of GW5VX, their chairman. Radio Theory instruction and Morse classes will be given to all those wishing to qualify for their licences, and an interesting winter programme has been arranged.

Purley held a normal meeting on October 4, and a Junk Sale on October 18. They are very anxious to

find someone with access to a Film Projector during the winter months, to enable the Club to widen its scope a little.

Slade will be hearing two recorded lectures (by the Astronomer Royal and G2WS) on November 8; on November 22 they hold their AGM; and on November 6 there is to be a talk on Air Traffic Control. Instructional and constructional classes are held every Tuesday and Wednesday evening, and extra Morse classes on Mondays if there is a demand. G3JBN is available for the use of members every day of the week.

South Manchester have just held their AGM and retain virtually the same committee. On November 15 they have a Junk Sale and on November 29 they are hearing a recorded tape lecture by G8PP on Worldwide Communications. A new operating room has just been completed and the transmitter is being installed, together with a beam and provision for five-band working.

South Shields held their AGM on September 25, at which new officials were elected (*see* panel for Secretary). The October meeting was a Film Show, and on November 27 G3JDO will talk on "Getting Started on Top Band." R.A.E. and Morse classes are in action, under G2BCY and G3KZZ. The meetings are at Trinity House, Laygate, South Shields.

Stoke-on-Trent will once again have G3GBU on the air for MCC, and their new "country QTH" is making good progress, what with re-roofing, tree-planting, fence-erecting and, finally, power being brought in on poles.

Torbay had a talk for beginners by G3BBF at their September meeting, and on October 12 Mr. R. Barrat gave a talk which was followed by a Junk Sale. On November 9 the entries for the Construction Cup will be judged by G5SY.

Clifton re-elected their officers at the AGM and added one member to their Committee to look after the affairs of the "Junior" membership. The 1956/57 Championship Cup was won by G3HZI. A very efficient team is at present looking after MCC, and a dummy run will be held on November 15 during the evening—reports welcome.

Crystal Palace are meeting on November 16 to hear Mr. P. Coe, of Cossor Instruments Ltd., on Instrument Design—including the new kits. Meetings are at Windermere House, Westow Street, London, S.E.19.

Grafton have held their AGM, a Quiz, a Junk Sale and an illustrated lecture by Avo Ltd. Their Club Tx, G3AFT, will be on the air from their stand at

NAMES AND ADDRESSES OF CLUB SECRETARIES REPORTING IN THIS ISSUE:

ALDERSHOT: S. E. Hume, 25 Kingsway, Aldershot.
 BRADFORD (GRAMMAR SCHOOL): A. F. Fell, G3LXF, 20 Kelsall Terrace, Great Horton, Bradford 7.
 BRIGHTON: R. Purdy, 37 Bond Street, Brighton 1.
 CLIFTON: C. H. Bullivant, G3DIC, 25 St. Fillans Road, London, S.E.6.
 COVENTRY: N. J. Bond, G3IHX, 12 William Bree Road, Coventry.
 CRYSTAL PALACE: G. M. C. Stone, G3FZL, 10 Liphook Crescent, London, S.E.23.
 EDINBURGH: M. Darke, GM3KKG, 44 Howe Street, Edinburgh 3.
 FLINTSHIRE: J. Thornton Lawrence, GW3JGA, Perranporth, East Avenue, Bryn Newydd, Prestatyn.
 GRAFTON: A. W. H. Wennell, G2CJN, 145 Uxendon Hill, Wembley Park, Middx.
 LEICESTER: R. Parry, G3HDG, 71 Braunstone Avenue, Leicester.
 LIVERPOOL: W. D. Wardle, G3EWZ, 16 Mendip Road, Liverpool 15.
 LOTHIAN: J. S. Nicholson, GM3FJP, 10 Hawkhead Crescent, Edinburgh 9.
 MEDWAY: H. G. Cheeseman, G3KNO, 265 Cliffe Road, Strood, Rochester.
 NEWBURY: J. A. Gale, Wild Hedges, Crookham Common, near Newbury.
 NOTTINGHAM (A.R.C.): F. V. Farnsworth, 32 Harrow Road, West Bridgford, Nottingham.
 PONTEFRACT: W. Farrar, G3ESP, Stanton, Hemsworth Road, Ackworth, Pontefract.
 PORT TALBOT: G. Thomas, 2 Morlais Road, Margam, Port Talbot, Glam.
 PURLEY: E. R. Honeywood, G3GKF, 105 Whytecliffe Road, Purley.
 SHEFFORD: G. R. Cobb, G3IXG, 7 Hitchin Road, Shefford, Beds.
 SLADE: C. N. Smart, 110 Woolmore Road, Birmingham 23.
 SOUTH MANCHESTER: M. Barnsley, G3HZM, 11 Cemteery Road, Denton, Lancs.
 SOUTH SHIELDS: K. Sketheway, 51 Baret Road, Walkergate, Newcastle-on-Tyne.
 STOKE-ON-TRANT: W. Luscott, 36 Rothsay Avenue, Sney Green, Hanley, Stoke-on-Trent.
 TORBAY: G. Western, G3LFL, 118 Salisbury Avenue, Barton, Torquay.
 WELLINGBOROUGH: P. E. B. Butler, 84 Wellingborough Road, Rushden.
 WIRRAL: H. V. Young, G3LCL, 9 Easteroft Road, Wallasey.
 WORTHING: J. R. Toothill, 113 Kings Road, Lancing.

SUTTON COLDFIELD

It is hoped to start a Radio Society in Sutton Coldfield, and a preliminary meeting is being held on November 21, 7.30 p.m. in the Station Hotel. (As this is on licensed premises no-one under 18 can attend the meeting.) Anyone interested is asked to attend or to contact the Acting Secretary, G3JFZ, 23 Plantsbrook Road, Walmley, Sutton Coldfield.

the Islington Town Hall Handicrafts Exhibition, November 18-23. Club Headquarters is now Isledon School, Upper Hornset Road, London, N.7.

Sheffield continue to meet every Friday at Digswell House, and the recent programme has included lectures on An Outline of Pharmacy, The Britannia 300, and "Shadow on the Wall." On November 15 the talk will be on Radioactive Fallout; on the 22nd G2DPQ will talk on Fault-Finding in Transmitters; and on the 29th Mr. G. R. Johnson will talk and demonstrate on Precision Engineering. On November 15 the entries for the annual constructional competition are due in.

Wirral re-elected their Committee at the AGM and also appointed G3CSG as contests officer. On November 6 the talk is on Workshop Practice, Part II; November 20 is a Hi-Fi evening; and on December 4 G3LCI will talk on the Gelo/Elizabethan. Wirral issue an excellent *News Letter*, of which they have forwarded a specimen this month.

Coventry meet every Monday, 7.30 p.m., at 9 Queen's Road. On November 14 they have the final inspection and service of gear for MCC (which sounds like business!), and on the 18th a lecture by G5GR. On December 2 there will be a tape-recorded lecture, and on the 16th a Junk Sale. A recent event was the 25th Annual Dinner, with G2YS, a founder-member, as guest of honour. Visits were paid to GB3SP and to the ITA transmitter at Lichfield.

Edinburgh continues to meet at Unity House,

Hillside Crescent, every Wednesday at 7.30 p.m. The November lectures will be on Modern Tx Exciters (GM3EQY) and "Magazine Review" (GM3DVX). In December there will be a talk on TV Cameras.

Newbury held their Annual Hamfest on October 13, and welcomed many visitors from long distances. There was a demonstration by Panda Radio, films, competitions, and a draw—as well as the personal appearance of Johnny Morris. On November 29 G2UJ will be talking on Receiver Design, and on December 20 G3IPR will demonstrate a home-made tape recorder and Mr. John Henderson will start a series on Transistors.

Wanstead and Woodford have had a change of committee and hope to introduce many new ideas, and also to move into a new shack. Radio theory classes are being considered, and it is hoped to participate in contests, exhibitions and the like. More members would be welcomed.

Worthing meets on the second Monday of the month, 8 p.m. at the Adult Education Centre, Union Place. The meeting on November 11 will take the form of a Junk Sale.

Wellingborough have a Junk Sale on November 14, and on the 28th G3CGQ will talk on The IGY and the Radio Amateur. The subject of the debate for December 12 is "That the days of Radio are numbered"! The Annual Christmas Party follows on December 19, at the Party Room, Peacock Inn, Wellingborough.

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SMALL ADVERTISEMENTS, READERS—*continued*

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FOR SALE: ET4336 Transmitter, partly constructed, ATU and VFO missing, £12. Buyer arranges collection.—G3BHK, 965 Oxford Road, Reading, Berks.

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BC-348 M, 200 kc-18 mc, AC mains, self-contained, £10. National "1-10", with coils, £8.—51 Rusthall Avenue, Chiswick, London, W.4.

RECEIVER BC-342-N, converted 240v. mains, and Class-D Wavemeter, for sale. Best offer.—Cobden, 53 Brampton Road, South Tottenham, London, N.15.

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EXCELLENT AR88, with manual. Offers? **WANTED** (exchange or cash adjustment): Lightweight Commercial Table-topper and Receiver, or Minimitter cabinet, Minimod and Minipower; or hi-fi Radiogram equipment if top quality, with contemporary cabinet. — Box No. 1932, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

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WANTED: P/Pack 247, 19 Set Manual, 10/80-metre VFO, 21-28 mc Converter. W.H.U.?—G3KYR, 3 Queen's Road, Oldfield Park, Westbury, Wilts.

SALE: TU8B, BC306A. Tuners, R1147, R1132A, Receivers, LS3 Speaker, HB7 Phones, BC450A control for Bendix Receiver, £8. — BRS-14996, 7 Boldmere Drive, Sutton Coldfield, Warks.

R, 1155, 160 to 20 metres. PU, output stage, and 8-in. speaker, exchange for 160-metre Tx, VFO Mod.—Box No. 1924, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Two 750-0-750 volt 200 mA mains transformers, 230-250 volts in.—State price to Box No. 1925, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

CR 100/7, nice condition and appearance. £14; Pye signal generator with level meter and crystal check, £4; Class-D wavemeter, 6v. AC, £3; Valve-tester, Type 4, £3; TBY Transreceiver, £3; Tx, Type S440C, 65-85 mc, £3; ATU, 1.5-24 mc, unit of Type 5AB Tx, £3; Test Set 210, 20-88 mc and noise, £4; Parmeko Transformer, 375, 550 and 620v, at 250 mA, £2; Crystal Oven with 100 or 1000 kc crystal, 30/-; Tinsley Mirror Galvo, £1; 832, TT15, 7/6; QVO4/7, 5/-; CV136, CV137, 2/6.—Luckham, 95 Priorswood Road, Taunton, Somerset.

WANTED: Panda Cub Xmitter, Minimitter ATU; both must be in mint condition. FOR SALE: Ferrograph Z/AN tape recorder, fitted latest tape counter and tape guides, perfect, as new; best offer over £65 secures.—Box No. 1928, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

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150-WATT Tx, WAC and 200 stateside QSO's since February. 6J5 Clapp VFO stabilised, Labgear wideband multiplier, 813 PA and 6L6 Clamper, Pi-output 75-ohm, 100w, Modulator, Five P/packs for above, 257v., 2-350v., 700v. and 1000v.; nearest £45. Top Band Tx, phone and CW, plus P/pack; nearest £8. HRO, S-meter, xtal filter, modernised front end, P/pack, coil box; all in 4-foot National rack; nearest £23. WANTED: Good AR88, S.750 or similar Rx.—G3LHQ, 5 Granny Hall Park, Brighouse, Yorkshire. (Tel.: 1923).

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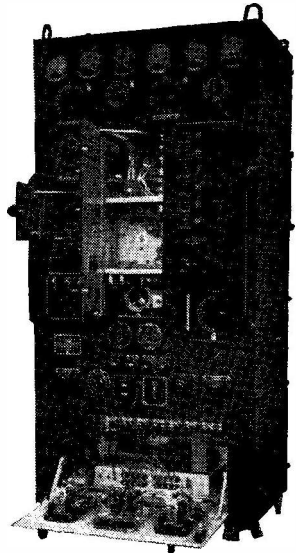
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