

The
SHORT WAVE
Magazine

2/6

VOL. XVI

AUGUST, 1958

NUMBER 6



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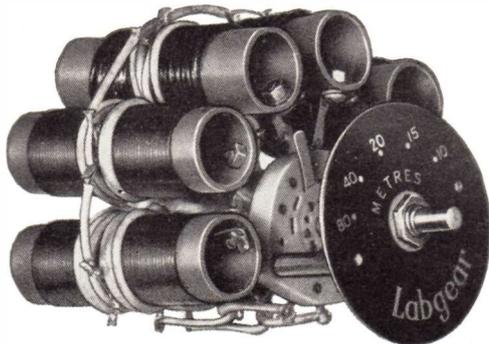
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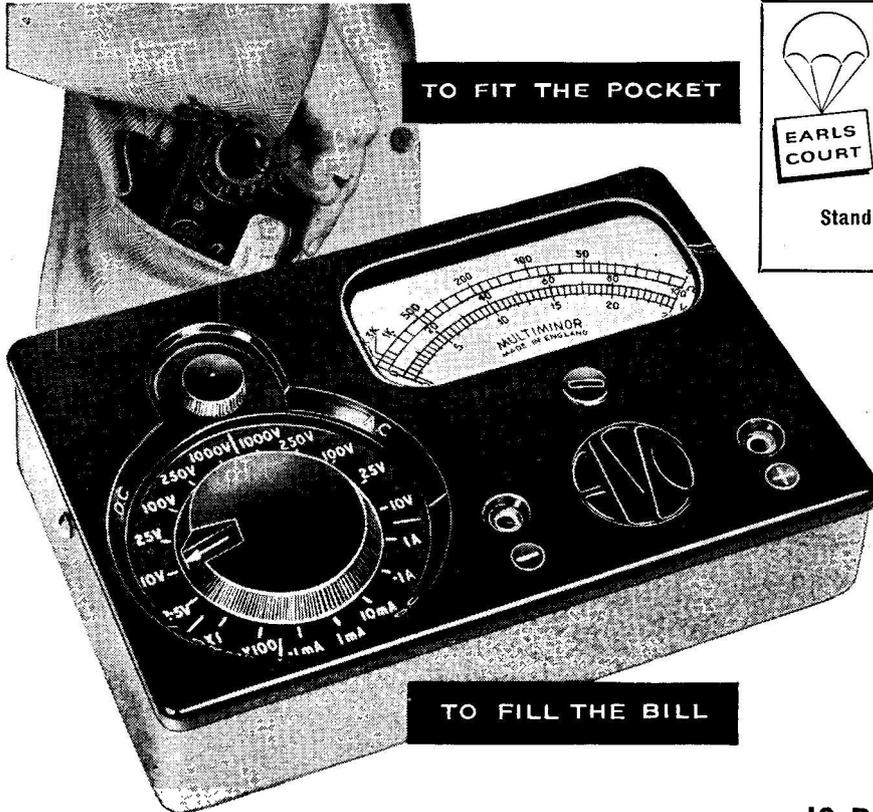
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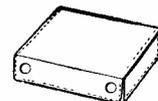
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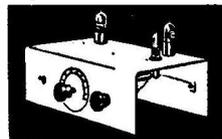
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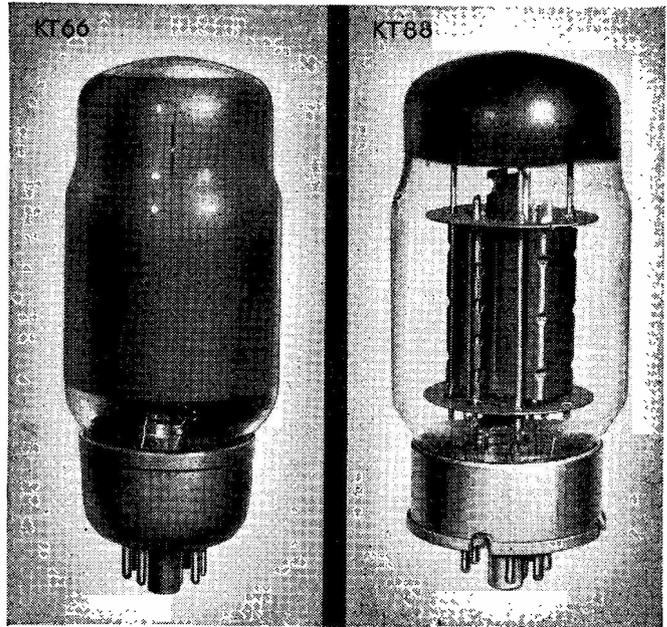
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The SHORT-WAVE Magazine

EDITORIAL

Population *In an idle moment recently, we took out figures for the amateur population of various countries, in terms of licensed operators per 10,000 people in each of those countries. The references used were the 1958 WHITAKER'S ALMANACK and the Summer 1958 issue of the RADIO AMATEUR CALL BOOK. The results are most illuminating!*

For the U.K., we have 1.6 amateurs per 10,000 of the population; in Australia, there are 3.5 per 10,000; in New Zealand, 12.0; in Canada, 5.4; the U.S.A., 11.7; France, 0.46; and Western Germany 1.1.

While the ratios may not be absolutely exact, they are quite near enough for comparative purposes, as between countries. It can be said that the U.K. ratio of licensed amateurs to total population—only one-seventh that of the U.S.A. and not much better than a third that of Canada—is far too low. Moreover, another interesting fact disclosed by these researches is that the actual number of licensed amateurs in Canada and the U.K. is just about the same. For the four Commonwealth countries investigated—G, VE, VK and ZL—the total number of licensed amateurs is approximately 22,000. The figure for the U.S.A. alone is roughly 175,000.

To find any plausible reason for these disparities is difficult. It might be held that the distances between centres of population in Canada, Australia and New Zealand account for their better figures—but that hardly explains the difference between Australia and New Zealand. In these days, the regulations for the control and licensing of radio amateurs in civilised countries are very much the same—all countries have some sort of test and examination system, and it cannot be said that ours is any more rigorous than in these other countries.

As so much in the way of original radio experiment and research has emanated from this country, it is rather surprising (and disappointing) to find that our amateur population ratio is so low. It is, however, some consolation to know that there is a steady upward trend in the figures, the actual total of licensed U.K. amateurs now being about three times what it was in pre-war days.

*Austin Fothergill
G6FO.*

Getting The Most From Your AR88

SERVICING, ADJUSTMENT AND MAINTENANCE

D. M. GILL (4S7MG)

Whether or not you own an AR88, this article is a useful and important contribution to the literature on receivers. If you do run an AR88, it will suggest many ways in which the receiver can be improved—and may also explain why some are not such good performers as they are expected to be. Even if you are not the possessor of an AR88 (and at least you will have heard of it) this article will be worth reading because it deals with many of the finer points on amateur-band communications receivers generally.—Editor.

THE very large number of AR88 receivers to be found in amateur stations all over the world is a testimony to its excellence, but it is not unlikely that some of them are not performing as well as their owners would wish. It is difficult to run a "Servicing Course" in one short article—even on one particular type of receiver. What follows is based on practical knowledge gained over a period during which a great many AR88's have been put into good order. The work entailed is *not* for beginners, so if you are inexperienced in receiver repairs read on by all means, but do not start messing about with your AR88 unless you know what you are doing or have a knowledgeable friend on hand who can help you out of any difficulty.

The first thing to look over when checking any receiver is the power unit. Usually this is all right. The transformer in the AR88 runs hot so do not get alarmed unless it starts to *smell*. The HT should be about 250 volts when the receiver is switched on. If lower try a new rectifier valve. On standby, the HT rises to about 550 volts so do not replace the smoothing condensers with electrolytics unless they are good ones rated 550v. working. The total HT current is 80 milliamps with no signal input and RF gain at maximum. One curious thing about the two smoothing chokes is that one is of 800 ohms resistance and the other 400 ohms. Fig. 1 shows the circuit. L50, of course, should be the 400-ohm choke. Sometimes they are the wrong way round,

resulting in slightly less available HT voltage and the 800-ohm choke getting rather hot.

The audio section is shown in Fig. 2. Though the output transformer has never been known to go faulty, plenty of the coupling condensers, C118, to the grid of the output valve have been found to have low resistance; this results in less negative bias and excessive anode current. It does not seem to hurt anything but it is better to replace this condenser if the old one is showing signs of leaking. Without a valve-voltmeter the only way of checking C118 is to measure the anode current of the 6V6 with and without the condenser connected.

The most likely place for trouble is the anode and screen resistors (R38, R40, R41 in Fig. 2) of the 6SJ7 audio amplifier. These seem to go high very easily and it is recommended that they be replaced as a matter of course. The working voltages on screen and anode of the 6SJ7 are low when functioning correctly; the reading should be about 30 and 60 volts respectively. Replace R38, R40 and R41 with 1 watt resistors and be sure. It is likewise suggested that all the "mica-mold" condensers, in the flat bakelite case, are also replaced; these are all poor quality and usually have low values of insulation. The writer has always used the Hunts midget tubulars with the brown case and found them successful.

The LF Side

The audio signal voltage required at the grid of the 6SJ7 to give a good output level is very small; somewhere about 1 volt r.m.s. The bias to the 6V6GT output valve is about 15 volts negative which is equal to the peak grid input voltage, giving an effective value of about 10 volts r.m.s. Assuming a gain of the 6SJ7 stage of about 100 times without feedback and reduced to about 20 times with the feedback *via* R54 and R39, this makes the input to the grid of the 6SJ7 about 0.5 volt for full output. This calculated figure is within reasonable agreement of the measured value. In passing it should be mentioned that C118 (0.006 μ F) was replaced by a .01 μ F at first and it was found that reproduction was too bassy for communication reception. With this value the low frequency response was well maintained below 100 cycles/second. Both .005 μ F and .0001 μ F were tried and for clarity of speech the latter value was preferred; this is really a personal choice. If you like bass put in .01 and if you are a DX man try .0001

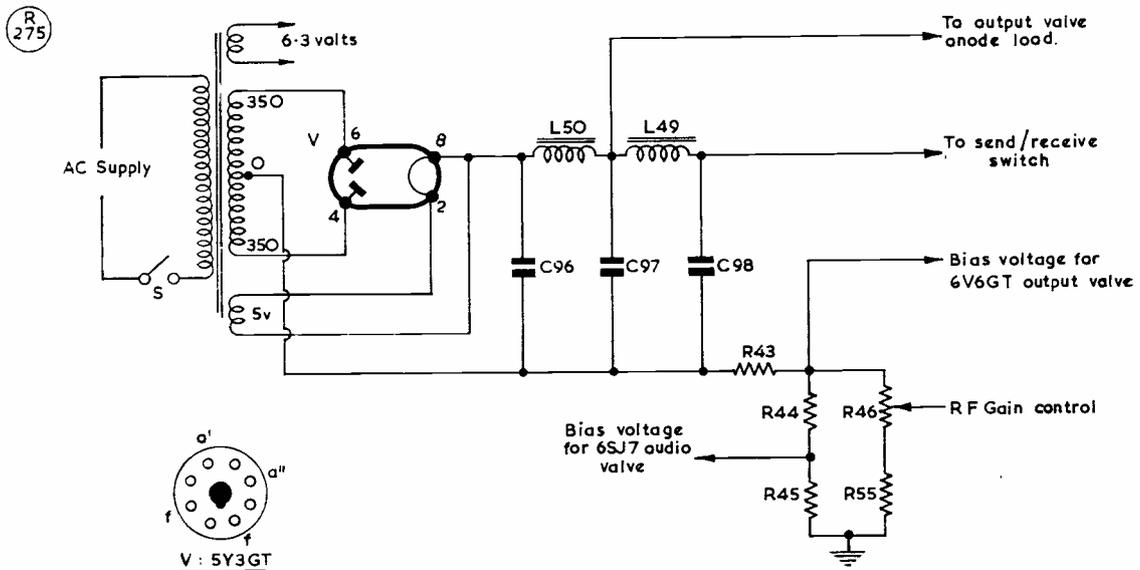


Fig. 1. Power supply section of the AR88, not showing the circuit arrangement for feeding the receiver from batteries (these can be connected through an 8-pin socket on the rear apron of the chassis). The great majority of AR88's will, of course, be operated from a normal AC supply, and it is in connection with the mains power unit that some observations are made in the text.

μ F. Condenser C118 is within the feedback loop and does not change the bass response as much as expected, because, of course, of the negative feedback. Condenser C111 is the best one to change if you wish to experiment with different responses at the low frequency end of the audio range.

The second detector and noise limiter come next, and are shown in Fig. 3. These are nothing very special, although the two diodes in the noise limiter look a little odd at first sight. The circuit as given is shorn of all the fancy switching. Both V8 and V9 are 6H6 valves; the signal diode is internally connected to pins 5 and 8 of V8; the diode load comprises R48 and R49 totalling 99,000 ohms. This feeds the noise limiter diodes in V9. The actual limiter is a simple series acting type but it is very effective in operation, as we all know. This is due to the second diode (pins 5 and 8) which improves weak signal limiting in an indirect way. If a high value of resistance is connected between the plate and cathode of a thermionic diode the anode will build up a negative voltage with respect to the cathode due to electron emission from the cathode. This happens with a series noise limiter diode but for weak signal action the plate should be slightly positive with respect to cathode. It is this self-generated electronic potential that spoils weak-signal limiting. The second diode (pins 5 and 8 of V9) produces

Table of Values

Fig. 1. The AR88 Power Supply Unit

C96, C97,	R55 = 6,800 ohms
C98 = 4 μ F	L49 = 800-ohm 60 mA
R43 = 100 ohms	L50 = 400-ohm 80 mA
R44 = 150 ohms	choke
R45 = 15 ohms	choke
R46 = 66,000 ohms	V = 5Y3GT rectifier

(Note: Circuit element numbering is in accordance with AR88 manual.)

a potential which tends to cancel the potential of the limiter diode and thus improves its action. The heater current of the noise limiter diodes is limited by two 10-ohm resistors connected in parallel, R69 and R70. The reason is to limit the emission of these two diodes and again improve the limiting.

Noise Limiter Action

It may be as well here to give a brief picture of how a series limiter works as it will help in adjusting and finding faults in any limiter. The RF potential at pin 5 of V8 (in Fig. 3) is half the carrier envelope as shown in Fig. 4(A). If noise due to ignition is present the noise appears as large "spiked" peaks on the carrier, as shown in Fig. 5(B). At the top end of the diode load (R48 and R49) the RF has been removed and only the outline of the carrier appears as an alternating audio voltage superimposed upon a steady negative potential. This is shown in Fig. 6. We now have the audio voltage with noise

peaks which we want to remove. It should be noted that theoretically the noise peak cannot become large in the positive direction as the signal diode shorts them to earth. In practice this is not quite true as the signal diode has not zero resistance and small peaks are sometimes present on the positive side, but for our discussion we shall not complicate the explanation by considering these. Fig. 7 shows a simplified diagram of a series noise limiter using the same component designations as in Fig. 3 round V8, but with the potential bucking diode omitted. The cathode of the NL diode takes the potential of the top end of the diode load resistor, R48. In the absence of a carrier it should be slightly negative and it will hold at whatever potential it assumes because of the long time constant of R35 and C109 + C110. The anode of the NL diode is less negative than its cathode because it is tapped down the signal diode load. This is equivalent to saying the NL diode anode is slightly positive and therefore conducting. In this state the NL diode is conducting and most of the audio signal voltage is developed across R50. Should the receiver pick up impulsive noise from a car ignition system the noise "spikes" will appear on the negative side of the audio voltage and if the NL diode is correctly adjusted it will stop conducting on these peaks. This is probably better illustrated by Fig. 8, where the signal developed across the diode load (R48 and R49) is drawn along the line NM with noise peaks out to

the left. When these peaks pass beyond the left of the vertical line O the diode stops conducting and consequently does not pass them on. The audio signal is passed by the NL diode and developed across R50, represented along line PQ. It will be seen that the noise peaks are considerably reduced.

The degree of clipping depends upon the setting of the NL anode along R48, which alters the operating point P along the line OR. The more it is moved to the left (nearer to the top end of the signal diode load) the sooner the clipping takes place. This causes clipping or limiting to start earlier and if adjusted too much it clips the modulation peaks and produces that peculiar distortion with which we are all familiar.

This has been rather a long diversion on the clipper but a complete understanding will help to clear up troubles in this part of the circuit. The writer's experience is that clippers are usually difficult to test without a controlled source of impulse noise and a couple of oscilloscopes to examine the waveform. If the

Table of Values

Fig. 2. Audio Section of the AR88

C99, C112 = 0.25 μ F	R41 = 100,000 ohms
C111 = .003 μ F	R42 = 330,000 ohms
C117, C118 = .006 μ F	R54 = 2,700 ohms
R36 = 2.2 megohm	R56 = 5 ohms
R37 = 1 megohm	Tone = 1 megohm potentiometer
R38 = 1.5 megohm	V1 = 6SJ7
R39 = 100 ohms	V2 = 6VGT
R40 = 270,000 ohms	

(Note: Circuit element numbering is in accordance with AR88 manual.)

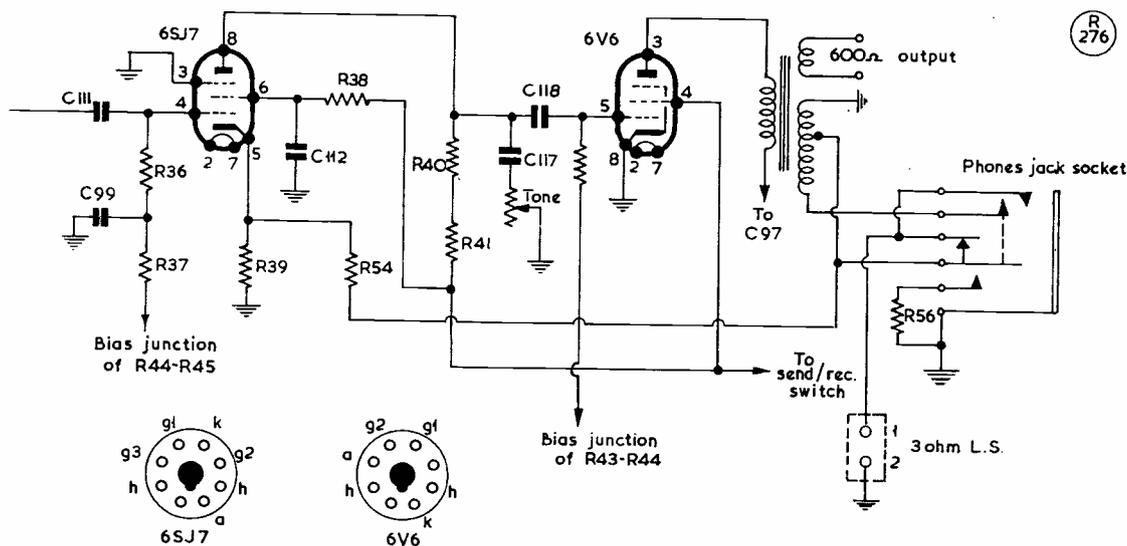


Fig. 2. This is the audio section of the AR88, for which all relevant values are given in the table. The bias resistor in the grid of the 6V6 (unmarked in this diagram) is R42, 330K. The circuit element numbering is as in the AR88 manual.

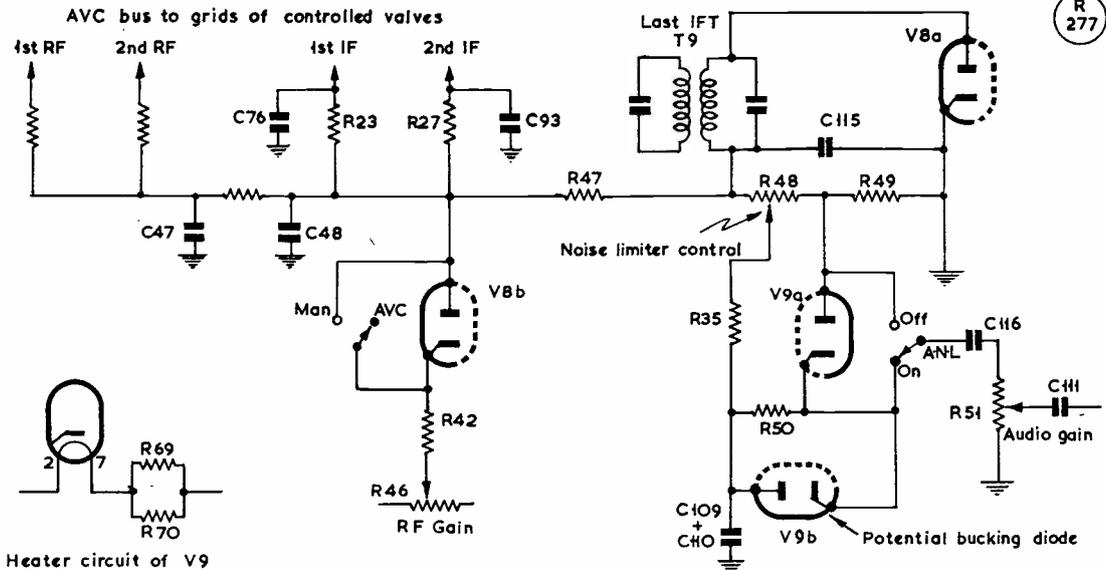


Fig. 3. The signal diode and noise-limiter circuitry of the AR88, as discussed in the text. As all who use one know, the noise-limiter in this receiver is particularly effective.

ANL is not so good and you feel it should be better the easiest and quickest way is to remove all the resistors and replace them with new ones. This may seem extravagant—it is, but some amazing improvements have resulted in a few cases though, of course, in many instances it makes no difference at all. Do not forget to substitute new 6H6's to check if this shows any improvement.

The AVC line is quite ordinary. Here the gain is controlled by setting the actual grids at a certain negative potential dependent upon the setting of the RF gain control R46. This negative voltage is passed through the diode (pins 3 and 4) in V8—see Fig. 3. When the

Table of Values

Fig. 3. Signal Diode and Noise Limiter, AR88

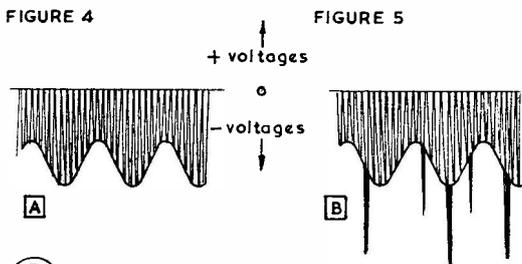
C47 = .006 μ F	R42 = 390,000 ohms
C48 = .005 μ F	R46 = 66,000-ohm potentiometer
C76, C93 = .01 μ F	R47 = 2.2 megohms
C109, C110 = 0.1 μ F together	R48 = 66,000 ohms
C111 = as Fig. 2	R49 = 33,000 ohms
C115 = 180 μ F	R51 = 2 megohms
C116 = .003 μ F	R69, R70 = 10 ohms
R23, R27, R50 = 560,000 ohms	V8, V9 = 6H6
R35 = 680,000 ohms	

(Note: Circuit element numbering is in accordance with AR88 manual.)

AVC develops negative bias it is not shorted to earth through V8 as the diode will not conduct in this direction. When the control is switched to manual this diode is shorted out and any AVC potential is also partially shorted out—only partially because of R42, value 390,000 ohms. If you wish to have true manual control with no AVC action whatsoever, cut out R42 altogether; this resistor is on the "MAN-AVC" switch wafer.

AVC Points

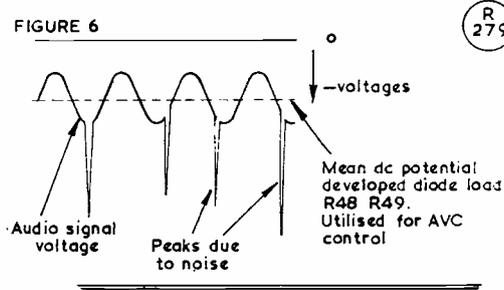
What can go wrong with the AVC? Two things. Resistors can go high and condensers low. R47, which is nominally 2.2 megohms, has on occasions been known to go as high as 5 megohms, and the condensers C48, C76 and C93 as low as 15 to 10 megohms each. Individually, this does not mean very much but when all are taken together it means that the controlled valves are only getting about half the AVC voltage that they should. Such a fault results



Action of the noise limiter in the AR88. In (A) Fig. 4 is shown the RF voltage at the anode of the signal diode, as seen on an oscilloscope. The positive half of the carrier is suppressed, leaving the negative half-cycles of modulated carrier. In (B) Fig. 5 the noise peaks are shown superimposed on the modulated carrier. These pulses would be of varying amplitude and irregularly spaced.

in RF distortion on strong signals and shows up as audio distortion in the output. The simplest way to check the AVC is to measure the value of R47 and if it is over 2.2 megohms replace it. Next, break the AVC line from R47; switch to "AVC" and measure the resistance of the line to earth with either an electronic ohmmeter or a low-voltage megger. The resultant line insulation should not be less

FIGURE 6



R 279

FIGURE 7

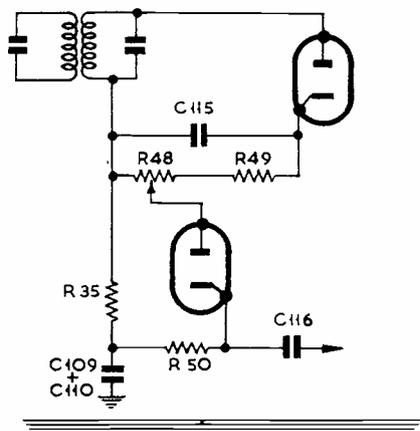
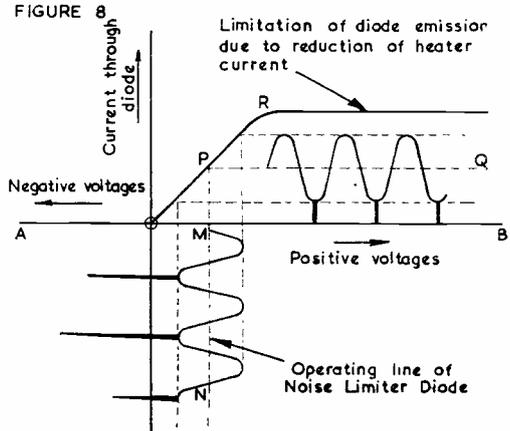


FIGURE 8



Action of the noise limiter in the AR88 — see text and Figs. 4A and 5B.

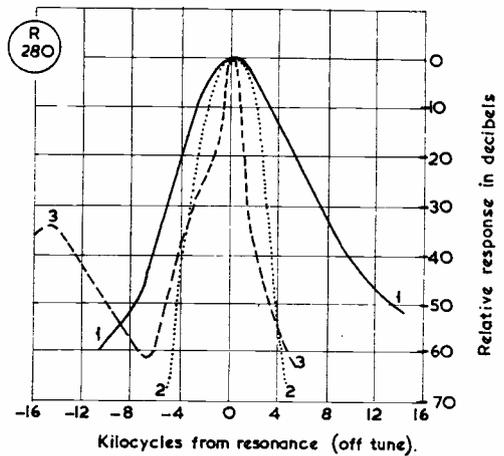


Fig. 9. Selectivity of the AR88. Curve (1) is the response obtained on selectivity position 2; Curve (2) is the makers' published figure for position 2; Curve (3) is the response obtained on position 3 (first crystal position) on an AR88 aligned without a wobulator.

than 50 megohms. If it is less, disconnect each condenser *i.e.* C47, C48, C76, C93, in turn and locate the faulty one. Normally, these metal clad condensers are very good and do not leak, but sometimes the odd receiver is found where they have a low insulation in the order of 10 megohms. A couple of these in parallel soon lowers the insulation of the AVC line and reduces the control voltage.

The IF Section

We now move on to the IF section. This is the heart of any receiver as it gives the major part of the gain or amplification and all the selectivity. If this is not up to scratch the receiver performance will be poor. Without a decent signal generator and some previous experience it is difficult actually to check the performance of this section. For the sake of completeness various measurements will be described.

First, it will probably come as a shock to many to be told that the selectivity of these "surplus" AR88 receivers is not, in fact, very good; the curves come nowhere near the maker's published curves—see Fig. 9. At least that is the writer's experience with a large number of "surplus" models obtained in various ways. At the time of writing, the AR88 receiver is still being manufactured in its original form, with slight modifications, and these new models are vastly superior to any of the old ones handled. The loss in selectivity is due to a gradual deterioration of the IF coils and condensers. The condensers can be replaced by modern "hi-Q" ceramics of the

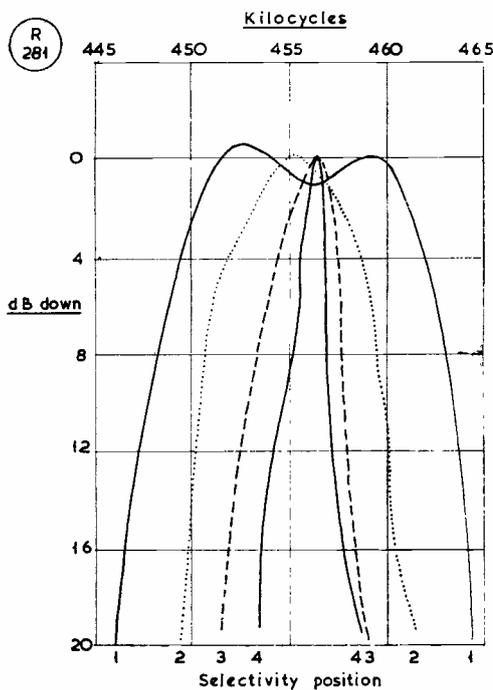


Fig. 9A. Response curves for a carefully adjusted and aligned AR88 — compare with Fig. 9. Maximum response in each selectivity position is called 0 dB so that various curves can be compared.

same value. It will make a little difference but it is hardly worth all the trouble of taking out each IF transformer. (New transformers cost U.S. \$7.50 each.) The “Q” of some IF coils has been measured and found to be between 80 and 110; this is hardly high enough for a receiver of this class. The design figure is not known but is thought to be not less than 140.

If no test gear is available the receiver can be approximately aligned by tuning in a steady signal, switching to AVC and adjusting each trimmer for maximum deflection of the S-meter; selectivity should be on position 3 so that one tunes to the crystal frequency. If not, the IF will be tuned to a frequency different from the crystal and then there will be a big drop in signal strength when switching from posn. 2 to posn. 3. This is the rough method. For alignment the writer prefers a wobulator and an oscilloscope to draw a picture of the selectivity curve. If you wish to double hump the response on posn. 1 of the selectivity switch and get a symmetrical response on posn. 3 (first crystal position) a wobulator is the only quick reliable method. Low wobulator sweep speeds are required

when examining the crystal response curves. Positions 4 and 5 are normally too sharp to obtain a decent picture. The associated trimming condenser can be adjusted for the best response possible and left at that. There is usually a change in gain between the various positions of the selectivity switch. Changing from posn. 2 to posn. 1 results in a 6 dB reduction in gain but it is of no consequence as this position can only be used on strong signals. If the IF circuits are correctly aligned with the crystal frequency there will be a slight increase in gain when switching from posn. 2 to posn. 3. There is a progressive drop in gain when going to posns. 4 and 5.

Figure 9A shows the response of a typical AR88 receiver in selectivity positions 1, 2, 3 and 4. They vary a little from receiver to receiver. On position 2 the curve is about 5 kc wide at 3 dB down. Unfortunately these curves do not tell the whole story as the responses start to bell-out when some considerable kilocycles off-tune, resulting in poor skirt selectivity. To illustrate the enormous improvement that can be made by modern methods, Fig. 10 shows the result with an ordinary AR88 receiver on position 2 compared with the same receiver fitted with a mechanical IF filter of 3 kc bandwidth, Curve 2. As a warning to those who feel inclined to rush out and buy a mechanical filter — *don't!* They are not at all easy to fit as the receiver must have no selectivity of its own around the pass band, otherwise it will distort the “square” response of the mechanical filter. Two other snags are that 3 kc bandwidth is hardly wide enough for intelligible speech and tuning to the side to take one sideband is not always practicable as the

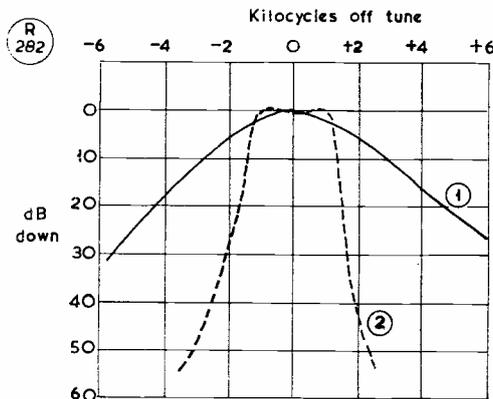


Fig. 10. Curve (1) is the response obtained on an “ordinary” AR88 at selectivity position 2. Curve (2) is the response, on the same receiver, in selectivity position 1 with a 3 kc mechanical IF filter fitted.

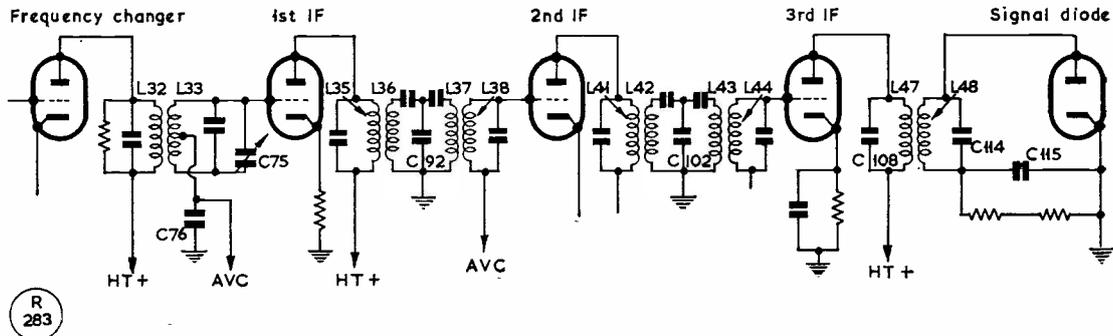


Fig. 11. Essential circuitry of the AR88 when switched to selectivity position 2 — see text and Figs. 9, 9A and 10.

receiver will frequently howl due to acoustic feedback to the oscillator tuning condenser of the gang. You will also find that the oscillator is not as rock steady as you thought!

The IF circuit looks complicated on the diagram with all the valve feeds but it is quite ordinary when stripped to the signal circuit alone. Look at Fig. 11 to see this. When switching to the crystal positions 3, 4 and 5, the circuit following the frequency changer alters slightly and is shown in Fig. 12. As mentioned earlier a wobulator and scope are essential for obtaining symmetrical response on crystal, selectivity position 3. Even with this aid a considerable amount of juggling with C75 and L34 is necessary before the required response is obtained. Sometimes the contacts on the selectivity switch do not "make" properly, which can result in either no signal in some of the positions, or super selectivity in position 3. This switch also brings additional coupling into operation on the transformers between the first and third IF valves for double-humped wide response in position 1. In some receivers the poor skirt selectivity has been traced to this wiring. It allows the IF signal to leak round the tuned circuits. Cutting out the wiring and earthing the coils (not shown in any of the simplified diagrams) direct to chassis sometimes shows an improvement but it is hardly worth spoiling the re-sale value of the receiver for a doubtful improvement, unless you have a standard signal generator on hand to measure the improvement or otherwise.

The next important thing about the IF amplifier is its gain and, of course, this is difficult to measure without our old friend the standard signal generator. If the signal grid of the frequency changer is disconnected from the circuit and returned to earth through the terminating unit of the signal generator the receiver should give a good output when the

signal generator feeds about 500 microvolts to the grid. If it requires an input of 1,000 microvolts you can start looking for a fault. The gain of the IF amplifier from the grid of the frequency changer to signal diode is about 10,000 times. As this figure (10,000) can easily be achieved in a 4-valve receiver you may ask why is it so low? Actually more is not required as it would be unnecessary. If you go much above this figure you require elaborate screening and filtering of the supply leads to prevent regeneration (oscillation). The reason it is not more with all these valves is because the dynamic impedance of the IF transformers is only about 45,000 ohms and there is also a considerable "loss" in the IF transformers due to the many coupled circuits. Some manufacturers design receivers with excessive gain and then reduce it by means of a resistor in a cathode. It gives them an easy means of adjusting all receivers for the same performance.

The stage gains are approximately as follows, from grid to grid:—

Frequency changer to 1st IF	× 0.8 (loss)
1st IF to 2nd IF	× 10
2nd IF to 3rd IF	× 10
3rd IF to Signal Diode	× 125

If the "feel" of the set is that it seems to lack pep the resistor (if there) in the cathode of the 2nd IF valve can be removed. A condenser can be wired across the cathode resistor of the 1st IF valve if one does not already exist. Finally, measure the value of the cathode resistor in the 3rd IF stage. These have been known to go high. Check the voltage across R55 (Fig. 1). It should not be more than 3 volts. This is the standing bias to the controlled valves; if it is greater than 3 volts ascertain why. Reducing the value of R55 to reduce the standing bias will not give any increase in gain worth talking about. If none

of these measures show an improvement you probably have a faulty IF transformer.

Oscillator Stage

The oscillator injects about 4 volts into the heterodyne grid of the frequency changer. The actual figure varies with the waveband in use and the position of the tuning condenser. This cannot be measured unless you have an RF valve-voltmeter with a high-impedance probe. Normally, the oscillator does not give much trouble provided it is fed with an adequate supply of HT and LT. Sometimes the receivers will suddenly start to drift badly. Across each coil is a small condenser with a negative temperature coefficient which holds the frequency of the oscillator relatively steady during the warm-up period. The writer has never known one of these condensers go faulty, but on sets that start to drift the condenser may have broken away from the coil due to vibration or rough handling.

The RF Side

Now we come to the RF stages, a subject on which a great deal has been written, particularly with regard to low noise. It is the writer's opinion that low-noise valves are of very little use below 30 mc—and knows he will immediately be challenged on this statement! But if the receiver is working correctly the thermal noise of the first tuned circuit will completely over-ride valve noise. You cannot ask for more than that. In a general-purpose receiver one considers that the cross-modulation characteristic and the effect the AVC may have on the signal-to-noise ratio are of equal importance to low noise and it is difficult to design all three into an RF valve.

Referring to cross-modulation: This is not easily noticed in a receiver unless it is particularly bad, or if you live close to a transmitting station, but very often the "repeat" signals one hears on the short-wave bands are cross modulation products and not really there at all. Usually this does not worry the average amateur. If you are one of the unfortunates living near a broadcast or other type of transmitter an improvement in the cross-modulation properties of the AR88 can be obtained by replacing the two existing RF valves by a couple of EF89's. The valve holders have to be changed, which means most of the coils have to be removed before the work can be carried out. It is quite a job and should not be undertaken lightly.

Talking of noise: The signal arrives at the

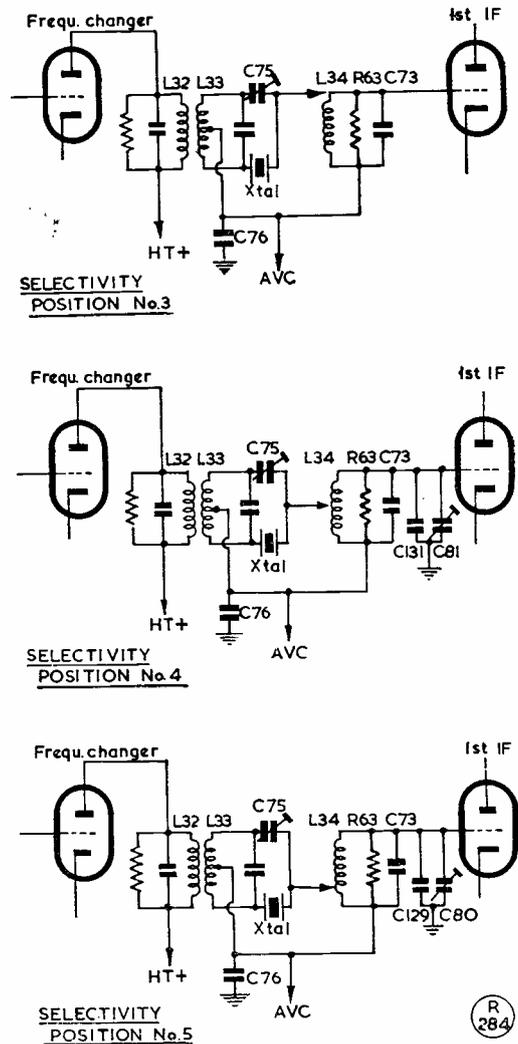


Fig. 12. Circuitry when switching to selectivity positions 3, 4 and 5 on the AR88. Note that the tapping on L34 moves down the coil on the positions of higher selectivity and additional condensers are switched in to tune the circuit.

aerial terminals together with outside noise and at the receiver output you have the signal and noise *plus* the noise added by the receiver. The amount the incoming signal-to-noise ratio is degraded in passing through the receiver is known as the noise factor. This factor is not constant but varies with the AVC bias. In a badly designed receiver, or one with the wrong kind of RF stage, the signal-to-noise ratio will decrease on signals up to a certain strength and then it will improve on stronger signals. This, of course, is wrong as the signal-to-noise ratio should always improve with increasing signals. Fig. 13 shows the result of measurements on an old British-made com-

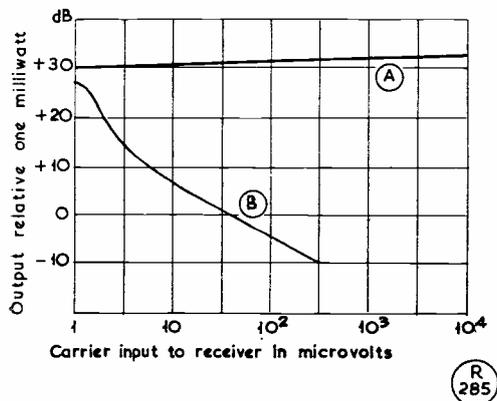


Fig. 13. The AVC performance of a reference British-made receiver - see text for discussion. These readings were taken at 11 mc, and Curve A represents audio output due to a carrier modulated to 40%; Curve B shows the noise output of the receiver for an unmodulated carrier. The difference between the two curves gives the signal-to-noise ratio expressed in dB. The result shown can be regarded as exceptionally good for a standard design.

munications receiver. Notice the wonderful AVC which holds the output constant over such a large range of input signals while the noise generated within the receiver drops as the unmodulated carrier input increases. Such a good performance is not always found in modern receivers. The AR88 when in good condition is quite capable of giving a performance equal to this *i.e.* a 10 dB signal-to-noise ratio for an input of about 2 microvolts, 40% modulated. This figure will usually deteriorate as the received frequency is increased.

The RF stages each have a gain of 10 times at 5 mc and the aerial circuit magnification is about two, giving a total of approximately 200. Nothing much ever seems to go wrong with the RF section of the AR88 except the by-pass condensers, so provided the plates and screens have 250 and 100 volts respectively and the tuned circuits are all properly aligned there is not much one can do to improve this part of the receiver. People have tried adding an extra RF stage ahead of the receiver, in the form of "R9'er." Some are successful but many are not. The reason for this is that it is no use adding a low noise booster ahead of the receiver unless it has high gain and with an additional single valve high gain is not normally obtained. Why? Because the input circuit of the receiver is designed for a 200-ohm feeder and not the high impedance required by a valve anode for high amplification.

This just about concludes the story. There is finally the S-meter which is fitted on some receivers and not others. Many owners have

40-Metre (7 mc) Band

Input, dB above $1\mu\text{V}$.	Developed AVC Bias	S-Meter
No Signal	4v.	6%
0dB $1\mu\text{V}$	5.5v.	28%
5dB	6.0v.	34%
10dB	6.6v.	40%
15dB	7.2v.	44%
20dB $10\mu\text{V}$	8.0v.	52%
25dB	8.5v.	55%
30dB	9.2v.	60%
35dB	10.0v.	64%
40dB $100\mu\text{V}$	11.0v.	70%
50dB	12.5v.	77%
60dB 1mV	14.3v.	82%
70dB	16.0v.	86%
80dB 10mV	17.6v.	88%
90dB	19.0v.	88%
100dB 100mV	20.0v.	88%

20-Metre (14 mc) Band

Input, dB above $1\mu\text{V}$.	Developed AVC Bias	S-Meter
No Signal	2.5v.	0%
0dB $1\mu\text{V}$	5.5v.	30%
5dB	5.7v.	35%
10dB	6.2v.	39%
15dB	6.5v.	44%
20dB $10\mu\text{V}$	7.0v.	48%
25dB	7.7v.	54%
30dB	8.3v.	58%
35dB	9.0v.	62%
40dB $100\mu\text{V}$	9.5v.	66%
50dB	11.4v.	76%
60dB 1mV	13.0v.	82%
70dB	14.5v.	86%
80dB 10mV	14.2v.	88%
90dB	17.6v.	89%
100dB 100mV	20.0v.	89%

fitted them themselves and will obligingly tell you your signal in so many S-points and believe what they say is true. To be anything like the truth they must be calibrated for each waveband used. It all depends on what one means by an "S" unit. Some standards allow the signal to increase 6 dB per S-point while others have only 4 dB between the points. A table is attached showing meter deflection, expressed as a percentage of full scale (100%) for different signal inputs at 7 and 14 mc, the measurements being done on a standard but fully "tee'd up" AR88. It is regretted they are not available for 21 and 28 mc, but the writer was not interested in these frequencies at the time as neither band was open when the measurements were made.

The 14 mc results are plotted in Fig. 14 and it is surprising how linear the readings are for inputs between 1 and 1.000 μV . The snag

is the range of inputs from zero to $1 \mu\text{V}$ which is essentially all noise but accounts for the first 30% deflection. Many amateur signals hardly move the pointer, indicating that they are well below $1 \mu\text{V}$. These are usually difficult to read. When using this scale almost every amateur appears a little hurt at producing such a weak signal and they often assume that the man on the receiver giving the poor report is "a complete clot and absolutely clueless"! Perhaps they are right—but tuning the receiver to broadcast stations in the 15 mc band will produce many 60% deflections and only a few over 80% which leads one to believe the receiver is all right. Possibly something could be done to improve the scale shape at the lower end. By the way, do not assume the same scale holds on either 21 or 28 mc; more than likely it does not, due to a change in overall sensitivity.

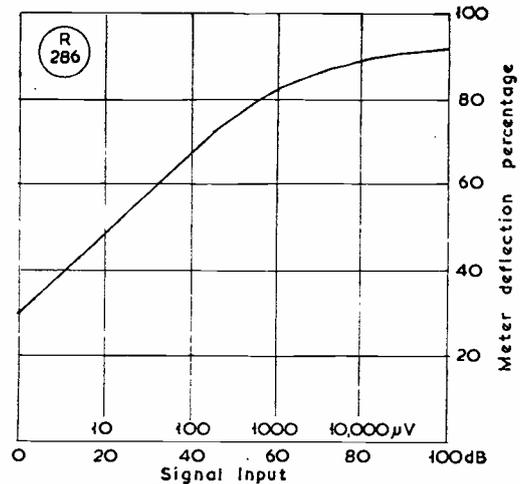


Fig. 14. Plot of the S-meter deflection on the AR88 against actual signal input on the 14 mc band. It should be noted that the shape of the curve will vary from band to band.

New Geloso VFO Unit 4/104

NOTES ON CIRCUIT,
APPLICATION AND
OPERATION

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(K. W. Electronics, Ltd.)

RECENTLY, the well-known Italian firm of Geloso introduced a new VFO Unit to their large range of equipment for the radio amateur. This unit, known as the Model 4/104 "Signal Shifter," was designed primarily to replace the Model 4/101. Model 4/102 is still in current production and should be used as described in *Short Wave Magazine* for March 1957. The main difference between these two models is that the 4/102 is designed to drive a pair of 807's (or similar) valves in parallel, whereas the Model 4/104 will drive a single 807 or 6146. Other comparisons and differences are given in these notes, with details for operating this new VFO Unit, which uses more modern valve types than its predecessors.

The Circuit

The Unit consists of a pentode oscillator-buffer-doubler (6CL6) and a tetrode driver (5763 or QVO3-12). The oscillator embodies a Clapp circuit operating on a fundamental frequency in the 80-metre band for output on

80, 40, 20 and 15 metres, and in the 40-metre band for output on 11 and 10 metres. The actual frequency coverage is:

- 3.5 to 4.0 mc, for the 80-metre band;
- 3.5 to 3.65 mc, for the 40-, 20- and 15-metre bands;
- 6.74 to 7.425 mc, for the 11- and 10-metre bands.

Oscillator-tuning is accomplished by means of a three-gang (straight-line capacity variation) variable condenser. One section of it is used for 80 metres, one for 40, 20 and 15 metres, and one for 11 and 10 metre operation. A fixed capacity and a trimmer condenser connected in parallel with each section provide adjustment for exact coverage of each one of the bands. The signal generated by the oscillator section of the 6CL6 is electron-coupled to the amplifier-doubler section of this same valve, which operates as an un-tuned amplifier for 80-metre operation, and as a doubler for output on the other bands.

The 6CL6 is followed by the 5763 which amplifies for 80- and 40-metre operation, doubles for 20 metres, triples for 15 metres and doubles for 11 and 10 metres.

Switching of the Clapp oscillator circuits is accomplished by means of a single rotary switch. The plate circuits of the 6CL6 are not tuned continuously but are broad-banded and semi-fixed-tuned to a convenient frequency within the various bands. This simplification is made possible by the high C/L ratio of the circuits (which are tuned only by the inter-electrode capacities of the valves) and the small frequency range which has to be covered. The

various plate circuits of the 5763 driver are tuned to maximum output on the desired frequency by means of a variable 25 $\mu\mu\text{F}$ trimmer condenser.

The adjustment of the output amplitude of the 5763 valve is by regulation of the screen voltage, the potentiometer R11 in the circuit at Fig. 2.

For CW, keying may be effected in the cathode circuit of the 5763. The key is connected across a resistance which places the cathode at a potential 85-100 volts positive. This blocks the valve in the key-up condition. Under key-down conditions, the valve restores to normal—that is, the cathode is returned to earth potential.

Alignment of the VFO

All units are tested and aligned before leaving the factory, so that only slight touching up should be necessary.

Before attempting alignment of the VFO the position of the pointer must be checked. With the gang condenser vanes fully in mesh, the pointer should be set to the zero mark of the outer logging scale — see photograph, where the pointer is at 39. Alignment of the oscillator

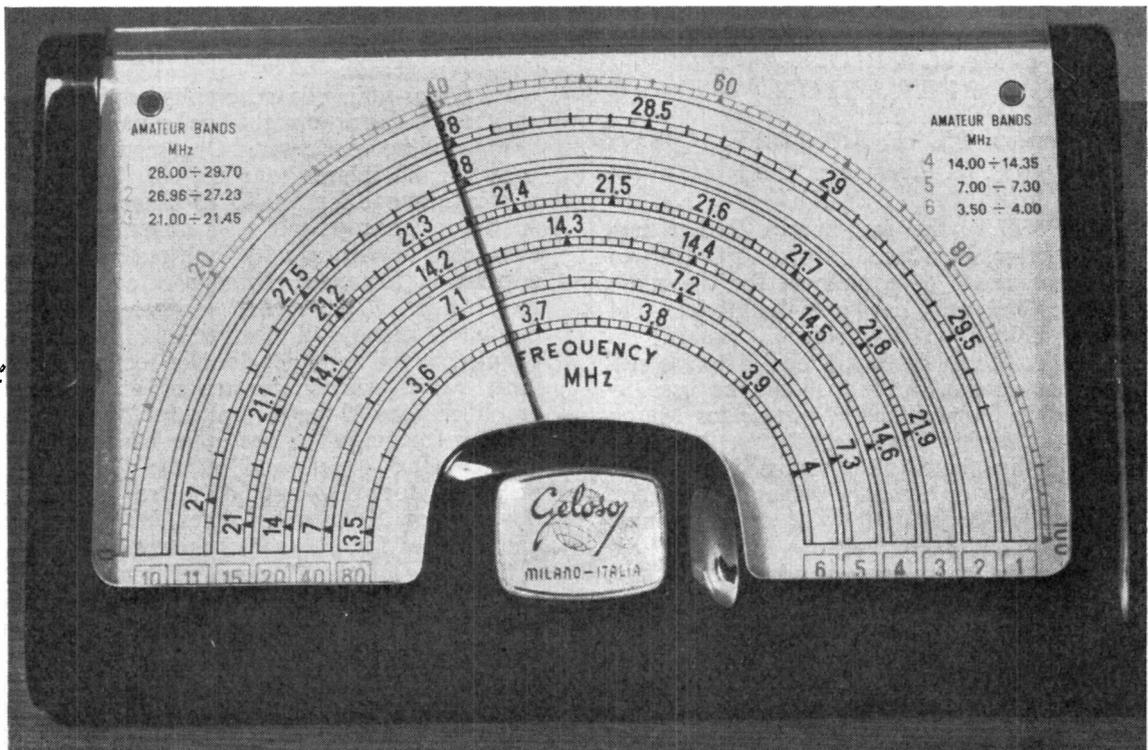
Table 1

OSCILLATOR TUNING POINTS		
Band	Coil	Trimmer
80m. (3.5-4 mc)	L2 at 3.5 mc	C2 at 4.00 mc
20m. (14-14.6 mc)	L1 at 14 mc	C1 at 14.5 mc
10m. (28-29.7 mc)	L3 at 28 mc	C3 at 29.7 mc

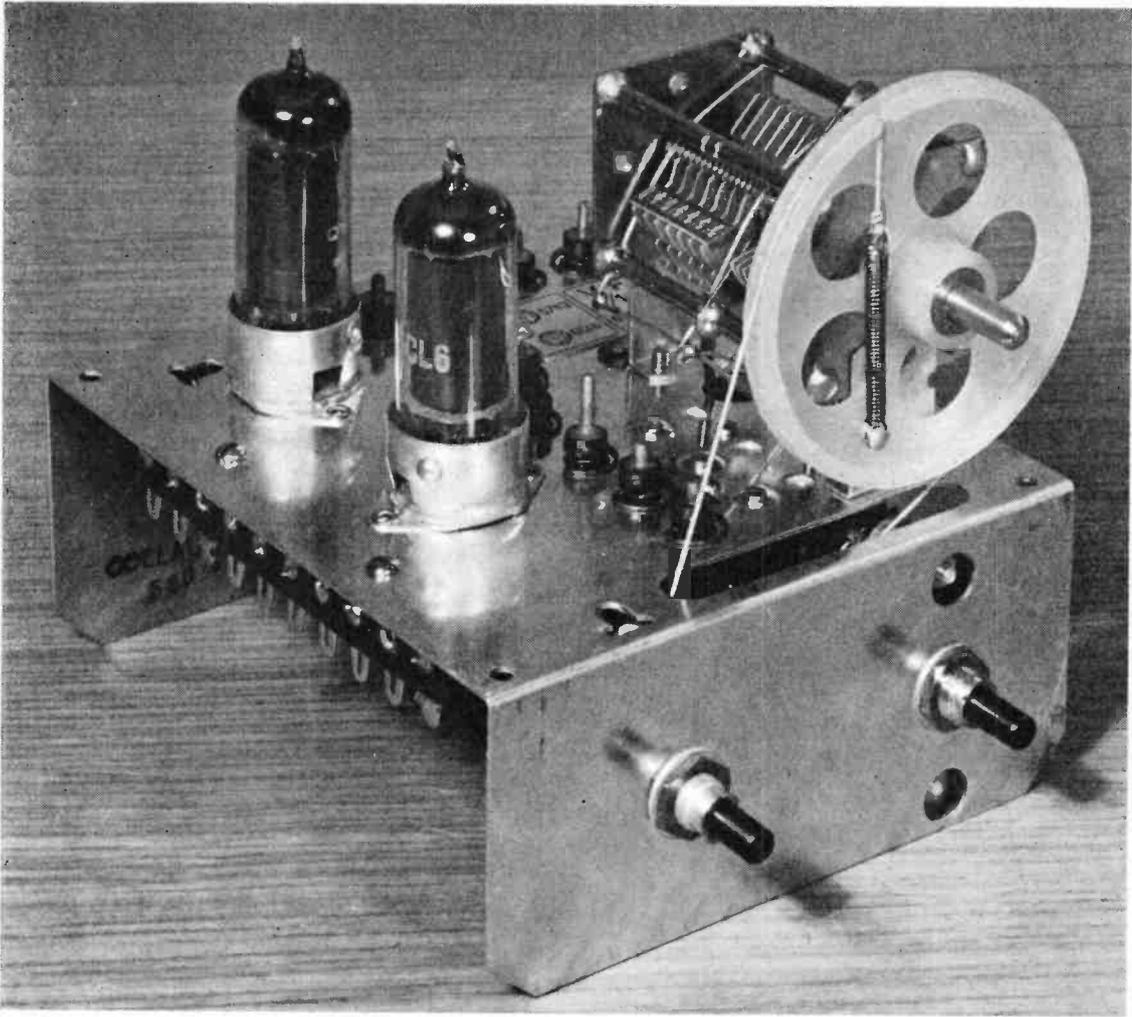
should be carried out with the aid of frequency meter having 100 and 1000 kc crystal check points or with any other reliable frequency checking apparatus.

The inductances are adjusted at the low frequency end of the band and the trimmer condensers at the HF end, which is normal alignment procedure. It suffices to establish alignment on the 80, 20 and 10 metre bands only, as the 40 and 15 metre bands are found on the same circuits as the 20-metre band, and the 11-metre band adjustment is the same as for 10 metres.

The entire procedure may have to be repeated several times on each band to obtain satisfactory tracking with a maximum tolerance of $\frac{1}{2}$ a degree of the outer logging scale.



Neat appearance of the dial assembly for the new Geloso 4/104 VFO, described in the article. As we in the U.K. are not interested in the 27 mc (11-metre) band, it is probable that this switch position could be adapted to give 160-metre coverage, thus making the instrument into a six-band VFO.



The new Geloso 4/104 VFO covers the five bands 10 to 80 metres and incorporates modern valve types — a 6CL6 on the oscillator side with a 5763 (or Mullard QV03-12) doubler-amplifier. Sufficient output is given for full drive into an 807 or 6146 (QV06-20) on all bands

Alignment should be checked if it be necessary to change the 6CL6 valve at any time.

Inductances L4 to L10 should be adjusted at the frequency given in Table 2, for maximum grid current in the stage following the 5763 valve.

The final *Frequency Ranges* are: 3.5 to 4.0 mc; 7.0 to 7.3 mc; 14.0 to 14.6 mc; 21.0 to 21.9 mc; 26.96 to 28 mc; 28.0 to 29.7 mc.

The *Power Requirements* are: Terminal 4, 150v. 4 mA (approx.); Terminal 6, 275v. 15 to 50 mA; Terminal 10, 275v. 0 to 4 mA.

It is therefore necessary to make available a power supply capable of giving 280v. at 60 mA. HT volts may be increased to 310v.

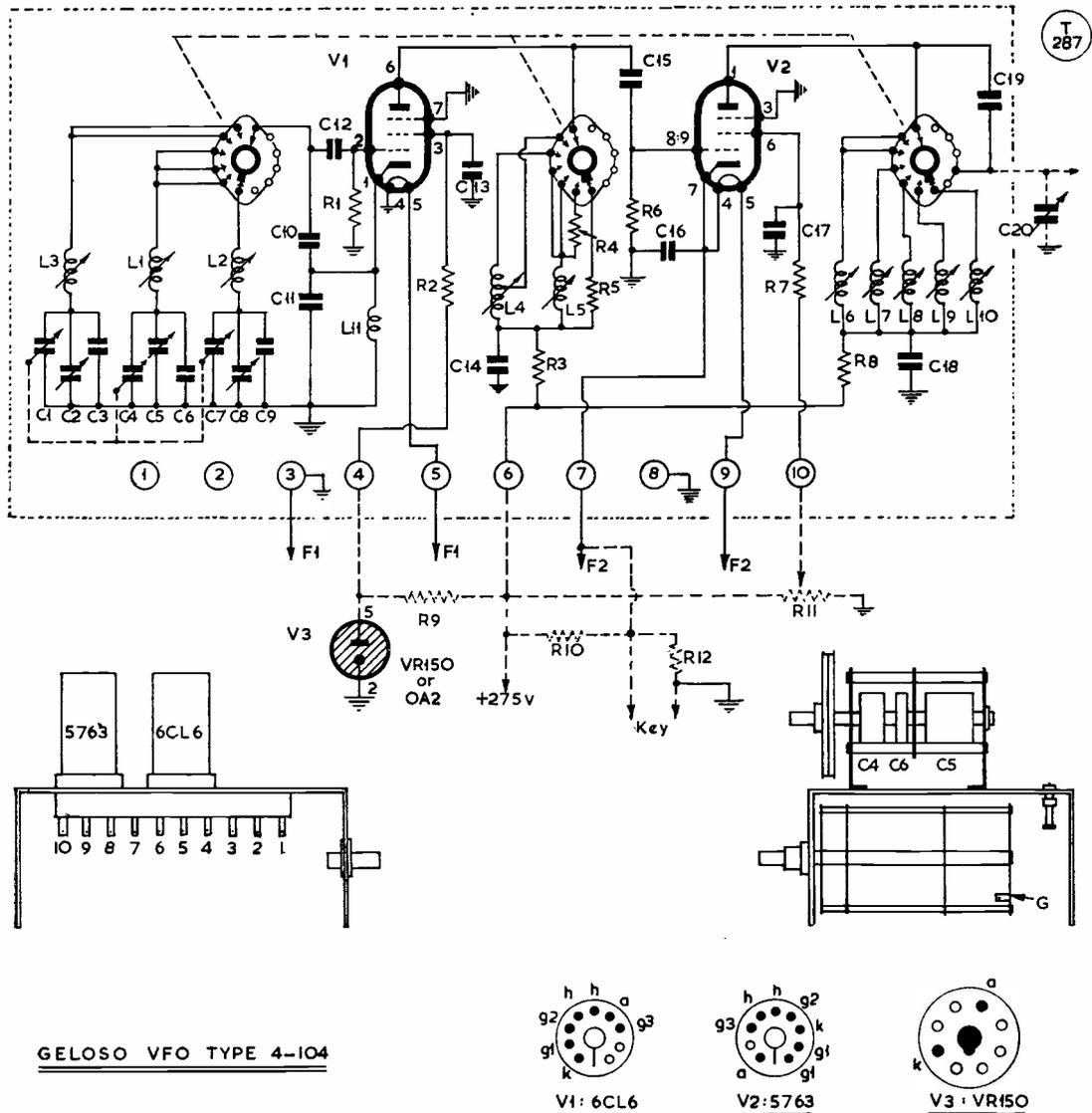
to give more drive. Heater requirement is 6.3 volts at 1.4 amps (*see note later on Keying*).

Connection to Grid of PA following 4/104

This connection must be kept as short as possible and unshielded; a 25 $\mu\mu\text{F}$ trimmer for resonating each output inductance (L6-L10)

Table 2
BUFFER AND DRIVER TUNING POINTS

Band	6CL6 anode	5763 anode
80 m.	Aperiodic	L10 at 3650 kc
40 m.	—	L9 at 7100 kc
20 m.	L5 at 14200 kc	L8 at 14200 kc
15 m.	—	L7 at 21200 kc
11 m.	—	—
10 m.	L4 at 28600 kc	L6 at 28600 kc



GELOSO VFO TYPE 4-104

Fig. 1. Circuit complete of the Geloso 4/104 VFO Unit, as shown in the photographs. The output valve, a 5763 or equivalent Mullard QV03-12, operates as an amplifier or doubler-tripler, depending on the drive frequency. As supplied, the 4/104 is pretuned and calibrated and only small adjustments should be necessary for exact band-edging.

should be connected between the grid of the valve following the unit and chassis. This trimmer should have a very low minimum capacity; it is C20 in the circuit above.

The *Connections to the Unit* are: 1, no connection; 2, no connection; 3, chassis (HT-); 4, screen of 6CL6; 5, heater oscillator (6.3 v.); 6, HT to 6CL6 and 5763; 7, heater of 5763 (6.3 v.); 8, chassis (HT-); 9, heater of 5763 (6.3 v.); 10, screen of 5763.

The chassis of the 4/104 is 5 3/8 in. x 4 3/4 in. x 2 3/16 in. deep, which is same as the 4/101 and

4/102; also the positioning of the spindles is the same as in these latter units, thus making them interchangeable.

The dial and escutcheon assembly (Cat. No. 1646) is also the same size as others; that is, approximately 8 1/4 in. x 5 in.

Keying

The main advantage with the 4/104 over the 4/101 is that the new Unit has facilities for being keyed. This is done in the cathode of the 5763 driver valve, which means that certain

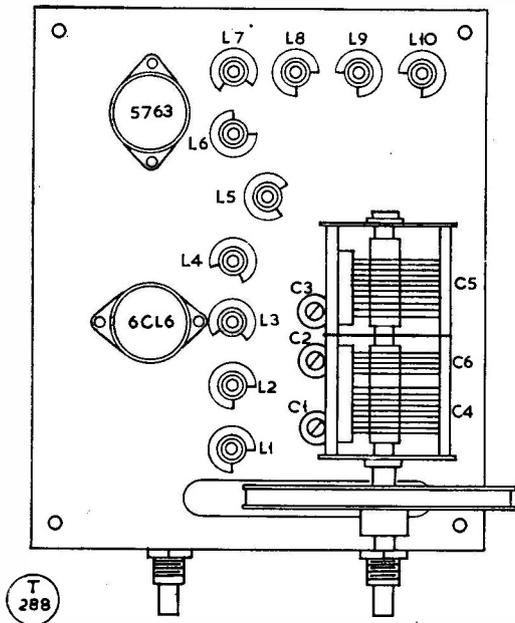


Fig. 2. Plan view of the Gelsono 4/104 VFO, showing adjustment points. As explained in the text, the units are sent out pre-tuned and only slight adjustment should be necessary.

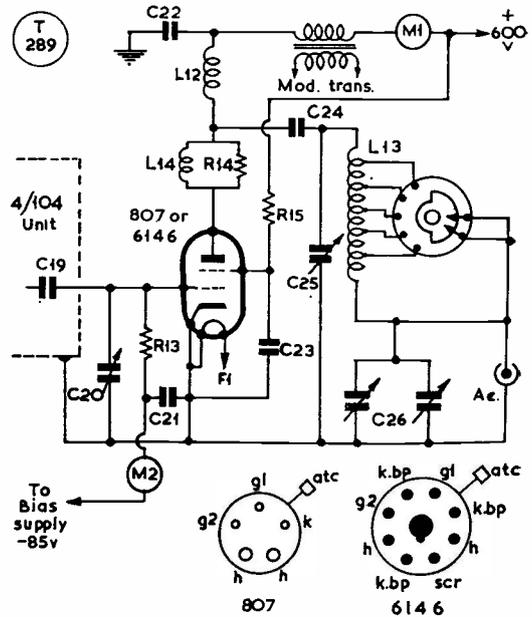


Fig. 3. A suggested PA circuit to work with the Gelsono 4/104, using an 807 or 6146 (QVO6-20) for driving direct from the VFO unit. Inputs up to 50-60 watts are possible, on five bands. All values are given in the table herewith.

requirements have to be met which did not exist with the earlier model.

The heater of the 5763 must be run off a separate heater winding—6.3v. at 0.75 A is required. The 6CL6 can take its LT from a heater winding supplying other valves in the transmitter.

It will be observed from the circuit diagram that when the key is in the "up" position, the positive volts applied to the cathode of the 5763 could cause stress on the cathode-heater insulation, and eventual breakdown. The heater supply for this valve may be taken from a separate 6.3v. transformer, or from an individual 6.3v. winding on a transformer supplying other voltage requirements in the

Table of Values

Fig. 1. Circuit of the Gelsono 4/104

L1-L11 = Standard Gelsono coil pack	C13, C14, C16, C17,
C1, C4, C7 = 28-18-51 μ F, ganged	C18 = .0047 μ F, ceramic mica
C2, C5, C8 = 20 μ F, trimmer	C19 = 470 μ F, silver-mica
C3 = 75 μ F, silver-mica	C20 = 25 μ F, low min. cap.
C6 = 120 μ F, silver-mica	R1 = 100,000 ohms, $\frac{1}{2}$ -w.
C9 = 91 μ F, silver-mica	R2 = 1,000 ohms, $\frac{1}{2}$ -w.
C10, C11 = .001 μ F, silver-mica	R3, R4, R8 = 470 ohms, $\frac{1}{2}$ -w.
C12, C15 = 100 μ F, silver-mica	R5, R7 = 4,700 ohms, $\frac{1}{2}$ -w.
	R6 = 33,000 ohms, $\frac{1}{2}$ -w.
	R9 = 5,600 ohms, 2w.
	R10 = 100,000 ohms, 2w.
	R11 = 3 5, 0 0 0 - o h m pot'meter, 4w.
	R12 = 50,000 ohms, 1w.
	Valves = 6CL6, 5763

Table of Values

Fig. 3. Suggested PA stage for the 4/104 VFO

C19 = 470 μ F (part of 4/104)	C26 = To total .0013 μ F
C20 = 25 μ F, low min. (see text)	R13 = 10,000 ohms, 1w.
C21 = .001 μ F, 350v.	R14 = 33 ohms, 2w.
C22 = .0033 μ F, 1500v.	R15 = 50,000 ohms, 3w.
C23 = .0033 μ F, 1000v.	L12 = RF choke
C24 = .001 μ F, 2500v.	L13 = Gelsono type 4/112 tank assembly
C25 = 186 μ F, low min.	L14 = 5t. 18g. $\frac{1}{2}$ -in. dia.

transmitter. Should a heavy amperage winding only be available, e.g., 3 or 4 amps at 6.3v., it may be necessary to include a small resistance in series with the heater line in order that the volts at the valve base will not rise above 6.3v. Actually the 5763 (QVO3-12) heater is rated at 6.0v. at 0.75 amps., so that 6.3v. should be the absolute maximum.

If the user is not proposing to use CW, but phone only, these precautions need not be observed.

Negative bias must be provided for the stage following the 4/104 Signal Shifter Unit. As no arrangement was made in the earlier model for keying any of the valves, the method usually adopted was cathode keying of the stage following the Unit. This meant that the use of automatic bias voltage developed across a resistor in the grid of the valve (by means of drive from the Unit), was permissible for Class-C operation. With the driver stage keyed, however, fixed negative bias must be provided,

as shown in Fig. 3. Using an 807 PA, for example, with 600 volts on the anode and 260v. on the screen, a negative voltage of -85 volts, in addition to a 10,000 ohm grid resistor producing extra automatic bias, should be used. A grid current figure of about 4 mA can be expected on all bands.

A key click filter can be included in the transmitter if required. This should consist of a 3 Hy. choke rated at 60 mA or more, a resistor and condenser. The DC resistance of the choke should not exceed 50 ohms; the condenser of 0.1-0.5 μ F and resistor of 10-100 ohms, in series, are placed across the key socket and should be adjusted in values for the keying waveform required. The choke is inserted in the cathode lead between pin 7 of the 5763 and tag No. 7 on the Unit. It will be necessary to disconnect the heater pin 4 from pin 7 and reconnect pin 4 direct to the heater supply. This type of filter is suitable for most cathode keying circuits but it should be remembered that if PA cathode keying is used

a choke of appropriate current carrying capacity is necessary. In the "Vanguard" transmitter, for instance, a choke of 120 mA rating must be used.

Conclusion

This Unit upholds the tradition that the Geloso people have established—to provide equipment of good technical and mechanical standards at a reasonable price. The introduction of nylon rotor sections in the wavechange switch, improved L/C ratio in the oscillator section and the attractive dial, will help the amateur of today to build a transmitter of high reliability with an appearance which may even appeal to the XYL.

The writer has noted with interest the possibility of modifying the new 4/104 Unit for Top Band operation, by adapting the 11-metre band (not wanted in the U.K.) position of the wavechange switch for this purpose. Tests are being carried out which, if successful, may form the subject of a later article.

LICENCE EXAMINATIONS — OCTOBER

We are informed that the Post Office will be arranging for a Radio Amateur Examination on October 4, to be held at centres in London, Edinburgh and Cardiff. The fee for taking the examination is 25s. Applications to sit, naming centre desired, with the fee, should be made to: Wireless Telegraphy Section, Radio Services Dept., Post Office Headquarters, London, E.C.1, by not later than *September 6*; time and place for the examination will be notified to applicants.

There is also a comprehensive programme of Morse Tests, arranged for the first week in September, at centres in Birmingham, Cambridge, Cardiff, Derby, Edinburgh, Leeds, London and Manchester. Applications to take this Test should be made forthwith (and in any event not later than *August 20*) to: Radio Services Dept. (Radio Branch), Post Office Headquarters, London, E.C.1. The sitting fee is 10s., to be paid when the completed application form is returned. Candidates will be notified of date, place and time.

SATELLITE VII IN ORBIT

On July 26, the Americans launched their Explorer IV from Cape Canaveral, Florida—a new space vehicle in the shape of a cylinder 6½ft. long, weighing 38½ lbs. This makes the third U.S. satellite maintained in orbit. The main task of Explorer IV is said to be the "investigation of an area of intense radiation lying 600 miles out in space, and disclosed by earlier exploration." From the amateur point of view, Satellite VII is of particular interest for another reason—it has been launched in a north-easterly direction, on the same sort of heading as the Russian Satellite VI. This puts Explorer IV on a polar orbit and means that it

will be regularly audible in the U.K. The perigee (nearest approach) is about 170 miles and the apogee (furthest departure) 1,400 miles. The transmitting frequency is 108.30 mc (in the Band II region) and it is said that the batteries carried by the new American satellite should keep the signal going for about two months. There is also a signal on 108.00 mc, which comes from a very much lower-powered transmitter run from solar batteries.

We shall be most interested to have reports from readers on the reception of Explorer IV, on either 108.00 or 108.30 mc.

THE "NEW QTH" PAGE

Readers who become licensed, or change their address, are reminded that they should notify us immediately for appearance in the "New QTH" page, which has been a regular *Magazine* feature for many years. In any event, as U.K. agents for the *Radio Amateur Call Book* — listing all known amateur stations of the world — we are responsible for keeping the G sections of the *Call Book* up-to-date. All new callsign/addresses received by us are passed automatically to the American publishers of the *Radio Amateur Call Book*, which appears quarterly and is circulated throughout the world. So you need to be sure your own callsign is in it—there is no charge of any sort for this service.

CHANGE OF ADDRESS — Tiger Radio, Ltd.

We are asked to announce that the new registered office address of Tiger Radio, Ltd., is 136 River Way, Christchurch, Hants., to which all correspondence should now be directed. Anyone who may not have received a reply to a letter sent to the old address (15 Verona Avenue, Southbourne) is asked to write again, to the new address.

SSB Topics •

AMERICAN LINEAR AMPLIFIER — DX NOTES
AND NEWS—BC-453 MODIFICATIONS FOR SSB

Conducted by R. L. GLAISHER, G6LX

THROUGH the co-operation of DL4WX, "SSB Topics" has recently had the opportunity to examine and operate the B. & W. model L-1000 linear-amplifier. Using parallel 813 valves, connected as high- μ triodes in grounded-grid configuration, the unit is rated for operation at 1 kW maximum DC input. At this level a drive power of between 50 to 80 watts is required, but, in common with all grounded-grid amplifiers, approximately 80% of this drive appears as useful power in the amplifier output.

The circuit (Fig. 1) is straightforward, the only section likely to require explanation being the filament feed circuit and neutralisation stub. In grounded-grid operation, the RF feed is direct to the cathode or filament circuit of the amplifier valve. No tuned circuit is necessary, as the input impedance is approximately correct to match the usual type of coaxial link-coupling from the exciter. In directly-heated valve types, such as the 813, it is necessary to isolate the filament for RF to prevent earthing the "hot" side of the drive source. In the L-1000 a special high-current, low-resistance choke (RFC1) is used in the filament feed to provide the required RF blocking. Although no specific data are available on the construction of the choke, it is thought to consist of three windings each of $1\frac{1}{2}$ turns of heavy-gauge wire, wound lengthwise on a 3in.-long ferrite tube. (It was not possible to check this on the amplifier at DL4WX, as the choke is mounted in a hermetically-sealed container!) The third winding on the choke is used for neutralisation.

Electronic Pass-Band Tuning

Sideband operators who have experienced the facilities provided in the Collins 75A-4 receiver are usually most enthusiastic about the semi-mechanical pass-band tuning system. This arrangement, in conjunction with the 3.1 kc mechanical filter in the IF strip, permits true SSB reception with provision for moving the pass-band from one side of the received signal to the other. This allows either sideband to be selected without changing the BFO setting or the receiver main tuning.

The Collins system is mechanically complex and requires very accurate ganging of several receiver sub-sections, which includes the partial rotation of the complete main oscillator assembly. The problems of duplicating these mechanical linkages usually rules out the possibilities of incorporating the system in amateur-constructed or existing commercial receivers. Several British SSB workers have overcome the difficulties associated with these awkward mechanical couplings by using electronic methods. Two such designs are in current use, but it has not so far been possible to publish details, as they are the subject of a patent application.

The most recent variation on the theme is the circuit described by W6DMN in the May issue of *QST*. Under the title "A Novel Sideband Selector," the author explains the development of the circuit, which uses a double-mixer arrangement working in conjunction with a common oscillator and low-frequency filter. This circuit provides similar facilities to the mechanical system used in the 75A-4 and has the added advantage that it can be operated with an existing receiver as an outboard unit.

The filter must be of the symmetrical type with equal attenuation on both sides of the pass-band. This rules out the single-sided configurations now so popular with G filter-exciter exponents and favours the mechanical type, or the bulky lumped L-C arrangements. It is possible to construct a sharp symmetrical filter using the 85 kc transformers from the surplus BC-453 receiver. A block diagram of the W6DMN circuit is shown in Fig. 2—for further details see pp.18-20 in the May *QST*.

Cheap and Easy Sideband, 1958

Also in the same issue of *QST*, W2EWL has described the latest modifications to his very popular phasing-transmitter design. Originally described in the March 1956 *QST*, this simple BC-458 conversion has been adopted by many European SSB workers for portable and second-transmitter use.

The present article covers a number of minor modifications to the basic circuit, which the author claims provide considerably improved performance and operating convenience. Pages 28 and 29, May *QST*, are "must" reading for any user of the W2EWL circuit.

AR88 Muting Circuit, Mark II Version

The October 1957 "SSB Topics" mentioned a query from a GW reader who was having trouble muting his AR88 receiver. The method suggested was to grid-block key the AVC controlled stages by a relay which was operated by the exciter VOX circuit. This arrangement required an external source of bias, and G3JKY (Eden Park) recently suggested that it should be possible to obtain the blocking voltage direct from the receiver HT negative rail.

G3BFP (Shirley) firmly caught the ball and cooked up a suitable circuit (Fig. 3). The potentiometer allows the muting level to be adjusted so that monitoring is possible. G3BFP suggests that, in order to save taking the receiver out of its case, the HT negative connection can be made to pin No. 6 on the octal battery socket mounted on the rear chassis apron.

The G6LX simplification of the circuit is to leave out the potentiometer and to connect pin No. 6 to

the diversity terminal *via* the relay.

W8DLD Mobile Receiver

For nearly a year, the "SSB Topics" pending file has contained letters asking for details of the very successful W8DLD BC-453 conversion for mobile SSB operation. With the assistance of G2MF (Sheffield), who has a "W8DLD" in operation, the following notes have been prepared which we hope will satisfy our correspondents.

The general idea is to use the '453 as a tunable IF in conjunction with crystal-controlled converters for multi-band operation. The BC-453 is first reworked along the well-established Q-Fiver lines, but additionally is further modified to improve the performance on single-sideband. SHORT WAVE MAGAZINE for November 1956 contained very full details of the basic Q-Fiver (or Q5'er) alterations, together with a circuit diagram of the receiver. The notes following assume that these modifications have already been carried out and that the '453 is in standard Q5'er trim (*i.e.* filaments re-wired for 12 volts, with RF gain control, BFO switch and phone jack added and the "surplus" surplus removed). The circuit designations used correspond with those shown in the diagram on page 466 of the November 1956 SHORT WAVE MAGAZINE.

Sideband Selector Switch

At this stage it is necessary to fit a further SPST switch on the front panel, which is used to change the frequency of the BFO for sideband-switching.

The 85 kc IF used in the BC-453 can be aligned (all adjustments set for maximum gain and IF slugs fully "out") to give single-sideband tuning with

considerable rejection of the unwanted sideband. This can be made really useful if the BFO injection voltage is increased and "off-set tuning" techniques adopted. The change between upper and lower sidebands is achieved by altering the BFO injection frequency and retuning to a slightly lower frequency, or *vice-versa*. A 30 μF silver-mica condenser is connected from pin No. 6 of the 12SR7 BFO valve (V7) to earth through the SPST switch. This provides the proper frequency change and, with the switch "open," upper-sideband is selected.

The BFO frequency should be adjusted as follows:

With the BFO off, tune in an AM signal (on the nose where it sounds "bassy"). Do not move the tuning dial again during this adjustment procedure. Switch on BFO and select upper-sideband. Adjust the BFO slug (on the right-hand chassis apron looking from the front) until the BFO is operating about 3 kc higher in frequency than the incoming signal. Switch sidebands and check that the beat-note is the same (3 kc lower than the received signal). If the notes are slightly different, it is necessary to obtain a balance by careful adjustment of the BFO slug.

Table of Values

Fig. 1. The B & W L-1000 Linear Amplifier

C1, C7 = .01 μF disc cera-	RFC1 = Special B & W
mic	3-winding RF
C2 = 50 μF ceramic	choke (<i>see text</i>)
C3 = .001 μF ceramic	RFC2,
C4, C5,	RFC5 = 2.5 mH RF choke
C6, C8,	RFC3,
C9 = .001 μF , 5,000v.	RFC4 = 1.5 mH RF choke
C10, C11,	NS = Neutralising stub
C12, L1 = B & W multi-	V1, V2 = 813
band tank unit	

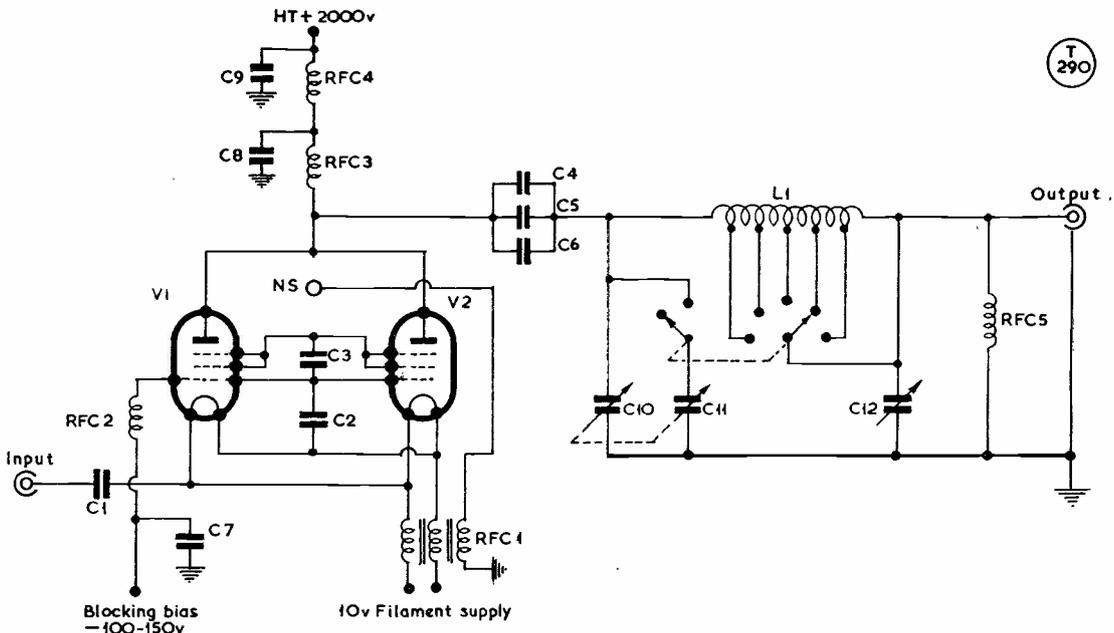
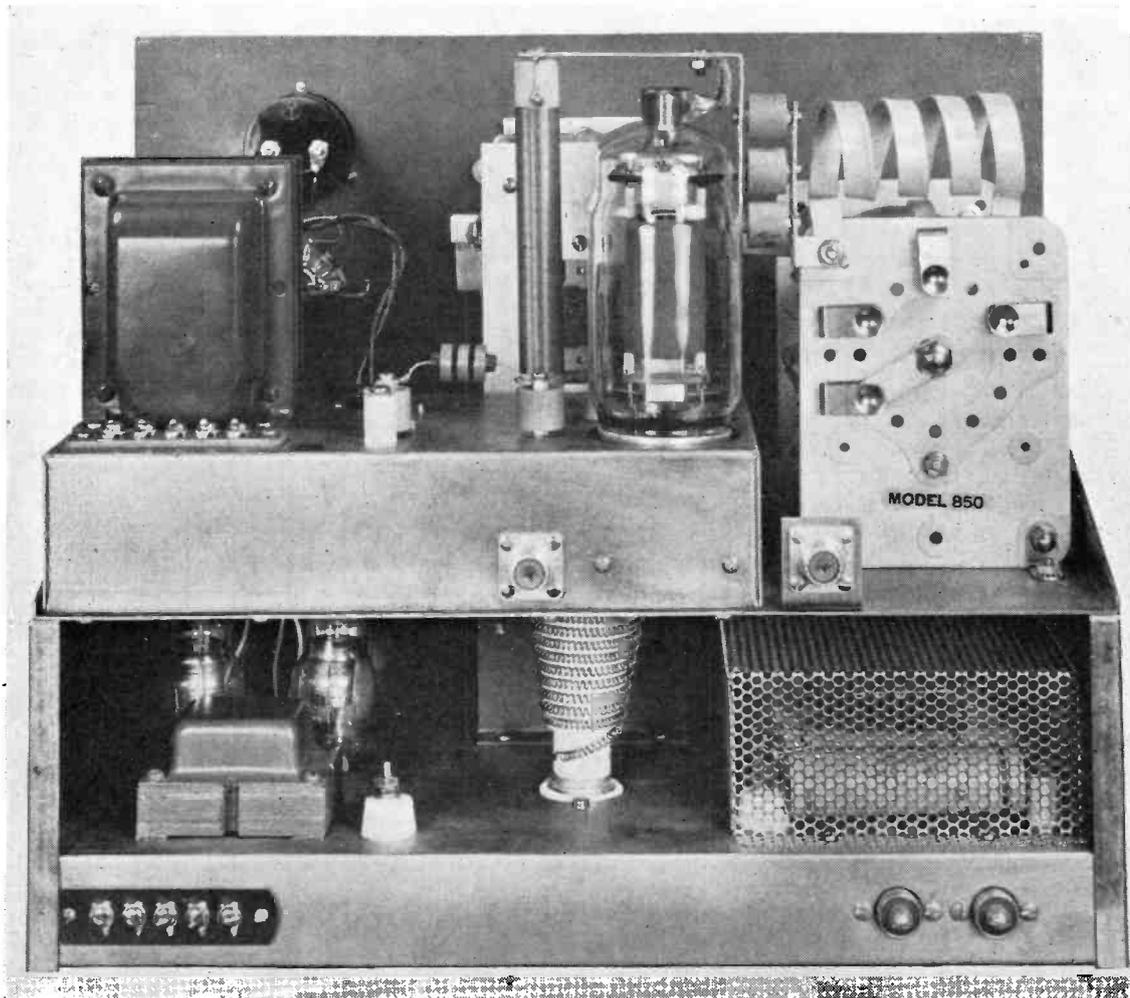


Fig. 1. Circuit of the Barker-Williamson kilowatt linear amplifier, type L-1000, the valves used being 813's in parallel. Some features of the circuit are discussed in the text, and the construction of the unit shown in the photograph opposite.



Interesting example of American commercial construction — the Barker-Williamson L-1000 kilowatt linear amplifier, using 813's. Note the heavy strip-wound tank inductance and the RF chokes in series for the parallel-fed RF stage. The LT and bias supplies are built in and the amplifier covers the 10-15-20-40-80 metre bands, all the coils being round the switch assembly on the right.

Certain BC-453's, after proper alignment, operate better on the lower-sideband, and this is usually due to the BFO (with sideband switch open) not tuning high enough in frequency. To rectify this trouble, it is necessary to change the parallel condenser (C27) which is mounted in the BFO can. The original value is usually $340 \mu\mu\text{F}$, but some models have $330 \mu\mu\text{F}$ or $345 \mu\mu\text{F}$. The new value is $300 \mu\mu\text{F}$, and a zero-temperature high-stability type should be used. This change is seldom necessary, but it is the only way out if the BFO will not tune high enough for good upper-sideband operation. (Altering the IF is *not* recommended.)

Increasing the BFO Output

The BFO output is approximately 12 volts, which limits the operating signal range of the diode detector. If this output is increased to 24 volts, the detector will work over a much larger signal range without

showing lack of BFO voltage.

The change can be made by altering the value of the two 150,000 ohm resistors (R16 and R17) which are located on the tag strip adjacent to the bases of V6, V7 and V8. The new value should be 50,000 ohms for each resistor (or a single 100,000 ohm can be used).

Limitation of HT Voltage

The components in the '453 are rated for a 200-volt supply. For reliable operation it has been found that 150 volts is quite satisfactory and the metal can condensers appear to appreciate this "kindness." It is, therefore, recommended that a VR-150 voltage stabiliser valve be included in the circuit. This has the added advantage of improving the stability characteristics of the '453 oscillator and BFO under mobile conditions and is a worth-while addition. Space can be found for this valve, either

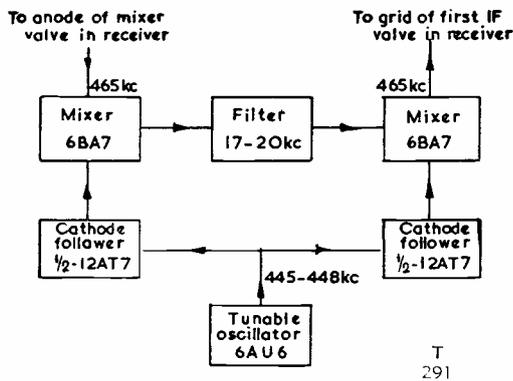


Fig. 2. The W6DMN electronic pass band tuning arrangement, referred to in the text. The frequencies shown here are typical for the system, but the circuit can be adapted to suit most IF's and filter frequencies.

on the power supply sub-chassis (if a 12-volt dynamotor is not available) or on the small shelf used for mounting the AVC circuit and S-meter (described later).

Additional Audio Stage

With these modifications incorporated, some operators will next require more audio output. The simple way to obtain more AF gain is to change the existing 12A6 (V8) for a 12J5 type and add a separate output stage, using the 12A6. This can be built in the power supply space or again on the extra side shelf. (It is not possible to use the existing output transformer for loudspeaker operation, as it has a high-impedance output designed for feeding headphones, or an aircraft intercom. amplifier.) The circuit of a suitable amplifier is shown in Fig. 4. The audio is picked up from the existing output transformer (connection No. 3) or from the power/facilities socket at the rear of the receiver. The audio gain control is mounted on a small additional panel which is bolted (with a right-angle bracket) to the side of the receiver. This panel

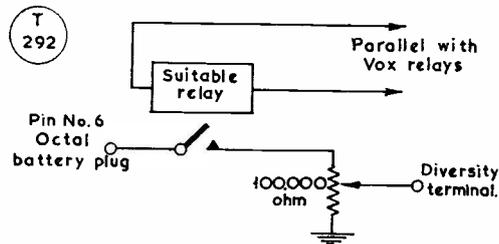


Fig. 3. A muting circuit for the AR88, devised by G3BFP — see text for discussion.

is also used to mount the S-meter, S-meter switch, zero adjustment control, etc.

Well, so much for the basic modifications, but W8DLD has gone several stages further. As mentioned previously, he has added a fast-acting AVC system (which G2MF says must be heard in operation to appreciate its worth), a simple valve-voltmeter type S-meter and an amplifier for feeding a

monitoring oscilloscope (not used for mobile operation!).

The AVC and S-meter circuit is shown in Fig. 5. The AVC drive is picked up from the grid of the first IF valve (V5) so as to ensure that there is no BFO voltage present. The selectivity of the amplifier must be broader than the signal channel, otherwise AVC operation would be better on one sideband than the other. For this reason, the "Q" of the 12BA6 anode circuit must be limited and some cut-and-try is usually necessary. W8DLD suggests that an air-cored choke having a value between 6-8 mH. is a good starting point. The tuning capacity will be approximately 250 $\mu\mu\text{F}$, and here a trimmer with zero or low temperatures coefficient is a "must," otherwise drift troubles will be experienced (see Fig. 5 for details).

The S-meter circuit has been designed around a stable-zero valve-voltmeter arrangement. A micro-

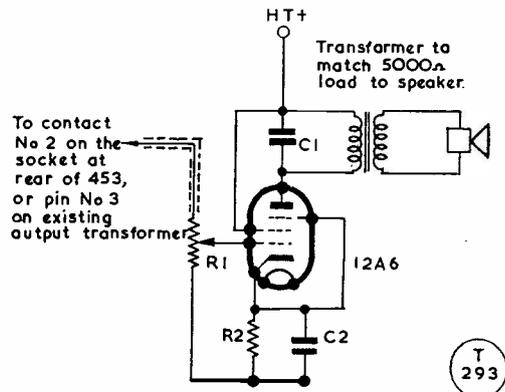


Fig. 4. A loudspeaker amplifier for the BC-453, modified for SSB reception. Values are: C1, .005 μF ; C2, 25 μF ; R1, 25,000 ohms; R2, 390 ohms. The valve is a 12A6.

ammeter can be used in place of the 0-1 mA meter provided that a limiting resistor is included in series with the meter. An SPDT switch is included to limit the meter swing on strong signals.

The crystal-controlled converter design is straightforward and should not cause any great difficulty. Four tuned circuits are recommended in band-pass configuration so as to provide adequate image rejection. A suitable design for mobile use is at present being worked on by G6LX and, time permitting, details will be published in the next "SSB Topics." The BC-453 modifications are already completed and the receiver is in use as a second IF strip (Q5'er fashion) following a small tunable front-end and 465 kc IF amplifier. Sideband results are excellent and well worth the hours spent on reworking the '453. Thanks to W8DLD and G2MF for these most interesting notes.

News and Views

W2CFT has just completed a three weeks' whistle-stop tour of a few of his European sideband friends. From London he travelled North to see G2MF, G2MA and G3MY; then to Benelux and

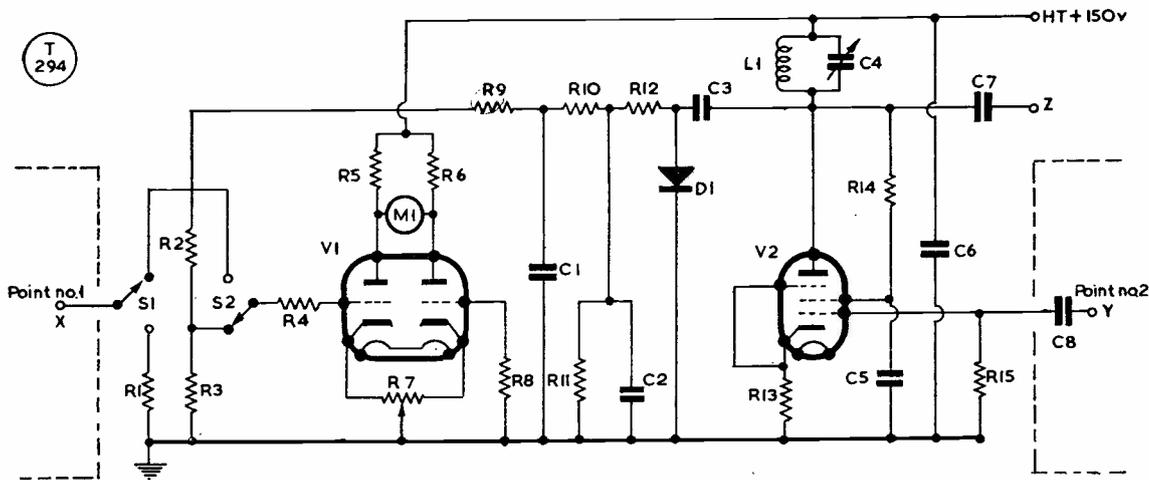


Fig. 5. An AVC and S-meter circuit for the BC-453, used as a Sideband receiver, as described in the text. Point 1 (X) connects to the junction of C15A, R11 and L9, with R11 disconnected on the earth side; a small hole is taken through the BC-453 chassis, near R11. Point 2 (Y) goes to pin 4 of V5, with other circuit elements unchanged, and a hole is made in the chassis near the grid pin of V5. Point Z is the oscilloscope monitoring connection. Good results are being obtained with the BC-453 used in this way.

PA0IF, ON4CC and the Brussels Exhibition. Switzerland was next, followed by a one-night stop in Munich with DL4WX (and your conductor); Belgrade with YU1AD and on to Denmark, where OZ3EA, OZ5KQ, OZ7BO and OZ7T did the honours. From Copenhagen, the final stop was Paris with F8RQ and the F7's, en route for Long Island and home. W2CFT sends his thanks to all the Sidebanders who made his trip so enjoyable.

From G3COJ, we learn that another recent visitor to the U.K. was K2KGI. He was responsible for one of the longest phone-patch connections ever made by amateur SSB: New York to the B.B.C. during the Hillary-Fuchs meeting at the South Pole. During his visit he was interviewed by the B.B.C. for "Radio Newsreel," and the recording, which was later broadcast on the Light Programme, included an extract from a contact between G3AYC and K2KGI's brother, who is licensed as K2KGH.

Welcome to newcomers, G3MDB (Liverpool) and G18DV (Londonderry). G3MDB has recently got going on 3.8 mc with a modified G2NH Exciter, whilst G18DV is on 14 mc using a W2EWL Exciter. Welcome back to G8HB (Gt. Malvern), who, after an absence of nearly eight years, has again caught the bug and is now operating sideband on 14 mc with an excellent signal from a new transmitter.

GD3GMH has recently changed QTH, but is again active, so that should please the country chasers.

DL4SV, who has collaborated in the preparation of information for past "SSB Topics," recently had to spend a period in hospital with eye trouble. Many of our readers will be glad to hear that he is out and about again and active on the bands.

We hear that VE1BZ has recently been appointed the Lieutenant-Governor of Prince Edward Island. One of the first VE's to use SSB, he is planning

Table of Values

Fig. 5. AVC and S-meter for BC-453

C1 = .005 μ F	R7 = 3,000-ohm potentiometer (S-meter zero adjust)
C2, C3 = .001 μ F	R11 = 1 megohm
C4 = Zero temp. coeff. trimmer, min. less than 200 μ F, max. 500-700 μ F	R13 = 100 ohms
C5, C6 = .01 μ F	R14 = 82,000 ohms
C7 = 50 μ F	D1 = Detector xtal diode
C8 = 10 μ F	L1 = See text
R1, R12 = 100,000 ohms	M1 = 0-1 mA m/c meter
R2, R3 = 5 megohms	S1 = SPDT toggle (AVC off)
R4, R8, R9, R10, R15 = 560,000 ohms	S2 = SPDT toggle (S-meter desensitize)
R5, R6 = 10,000 ohms	V1 = 12AU7
	V2 = 12BA6, or 12SK7

operation from Government House.

G3WW (March) is off on a holiday visit to the States. He hopes to meet some of the East Coast sideband group and is planning to visit the ARRL Convention in Washington, D.C. W6SAI is at present in Europe and expects to spend the next twelve months in Lugano. Operation from 3A2 is on the books, as he is licensed as 3A2AF, but this is subject to availability of SSB equipment.

G5US (Aldershot) and a well-known old-timer, is up to 72C worked on SSB, running three bands.

In Conclusion

The writer wishes to thank the many G and European sideband operators who have helped prepare the material for this month's "SSB Topics." For G6LX, the lack of receiving equipment on the Continent has made it difficult to keep in touch with current activities, so without such help this would have been a very thin offering. Business still keeps the writer abroad a good deal, so all correspondence should be addressed via The Editor. 73 de G6LX.

DX COMMENTARY

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

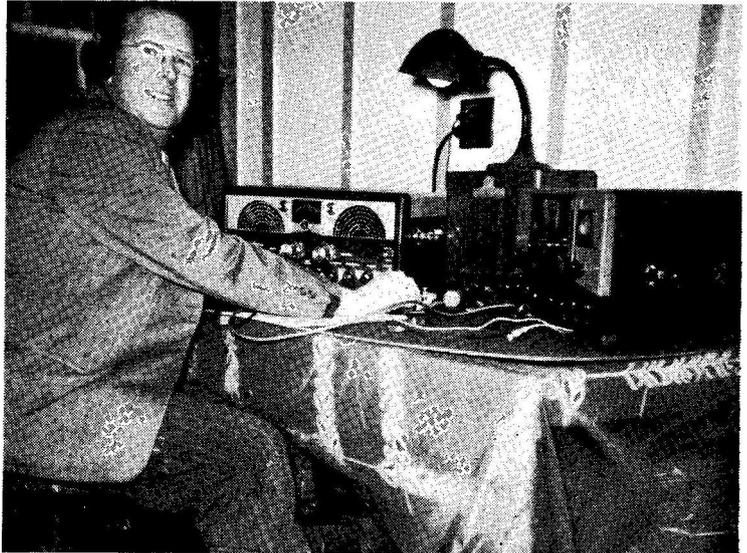
SUMMER—sun-spots—static—short-skip—sundry Slavonic satellite states sending satanic sizzling sounds . . . sensible stations' sapient sayings seriously sabotaged . . . sedulous scrutiny seldom shows seductive signals . . . several sessions simulate shambles . . . situation shocking . . . suggest slumber . . . *ssh!* . . . snoring.

Sorry! But that's about the shape of things this month. There has been no real shortage of DX, but it has only been there from time to time, and some of the interim periods have been pretty bad. (No worse, we feel, than they were around the last sun-spot maximum in 1947-48.) However touchy things may get, at least we know (or hope) that there's a Good Time Coming—and it won't be long now.

DX-peditions

Suggestions, possibilities, rumours—all these you will find further on under the heading of "DX Strays." Meanwhile, Danny Weil, VP2VB, has been in full operation. G2DC (Ringwood), who is in regular sked-contact with him, reports the following: The Aves Island jaunt duly took place, with team-mates YV3BS, YV5GO and KP4AIO. They signed YVØAB for the first time on July 7, using mostly 21 and 14 mc, closing late on Sunday, July 13, and arriving back in KV4 on the 15th.

On July 18 a team consisting of VP2VB, W3BSF, W3CXX and two local VP2's were working from the British Virgin Islands, using 1 kW. By August 2 or 3 they should have been starting up from St. Kitts, whence they hope to operate for about ten days, so



W1BB/1

CALLS HEARD, WORKED and QSL'd

you should find them still there and in action by the time you read this.

The Lord Howe Island position is that VK2AYY/LH did operate as promised, but closed on July 15. Those who missed him (and who didn't?) should now look for VK2FR, 14045 kc, 0700-0800 GMT.

Ten Metres

Precious little doing on 28 mc these days except for short-skip, which at least helps the Five-band boys to fill some of the European gaps in their score.

GW3AHN (Cardiff) managed to raise ZD7SA on both phone and CW, plus OQ5, VQ3, ZS5 and 4X on phone. G3FXB (Southwick) collected ZD7SA and ZD8JP on phone. G3DNF (Wembley) roped in the short-skippers, and is spending his time getting the 28 mc rig going really well for the autumn. G6TC (Wolverhampton) raised VQ3SS.

Best DX of the month is reported by G3LVC (Weymouth),

who worked G3BID (five miles away as the crow flies) *via* the long path—signals that way round were much stronger than the ground wave!

Fifteen Metres

This has probably been the best band for the month, especially as most of the current DX-peditions now use 21 mc just as much as 14 mc. G3DNR (Broadstairs) worked SVØWN for an all-time new one, also HB9, VE8 and the usual W's. G3JLB (Gravesend) collected CR4AS, KG4AL, DU6IV and CR5ST; he still uses the "Versatile Long Wire" described by G6AS in our November, 1954, issue.

G3ABG (Cannock) worked ZB2A on phone; CW fetched in 9K2AQ, HE9LAC, VS9AS, VP7, CX, ZD2, KP4 and the like, also a W7 in Nevada, whose QSL is badly needed.

A colossal list from GW3AHN includes DU6IV, HL9KT, HS1E, OA's, OQØPD, PYØNA, SVØ's, VK9LE (Cocos), VP2LB, VR2AZ,

YVØAB, ZD7SA and 9G1AA, all on phone. On the CW side are ET2TO, FP8AV, HC1LE, VK9RR, VP8CV, VS9AS, YVØAB and ZD7SA.

G3DO (Sutton Coldfield) collected ZD7SA on phone. G3FXB winkled out VKØKT on CW, with VP3VN, VS9O and XE1WP on phone.

G3JZK (Cambridge) found FE8AH (0840), FQ8AP (1620), KM6BK (0615), PZ1AQ (2000) and remarks on a whole bunch of ZP5's who showed up on CW one night.

New ones for G2DC were FM7WU and YVØAB; also worked, CE, CX, KH6, MP4, PJ2AF and 2CJ, OA's, OQ's, VS1FJ, VS9AD, VP8CV and ZD1EO.

G5BZ (Croydon) worked 9G1CS, PJ2ME, VP8CR, VE8's, UAØKCO, YV5GY, VS1FZ and many others. G3DNF added ZC4 to his total, and G6VC (Northfleet) worked ZS6CR.

G6TC collected CE, CX, EL1K, 1J and 1X, FP8AV, OA7I, PZ1AQ, VQ2, VS9 and ZS. G3LVC worked HS1E on phone (1920), who told him that HS1A has returned Stateswards, leaving HS1E and HS1B, who is on 21 mc CW only.

Twenty Metres

Still pretty good for all-round DX, this band is gradually losing its pride of place to 21 mc, chiefly because of short-skip and the antics of the creatures that it reveals. However, no one can afford to neglect 14 mc if he is really DX-conscious.

G3DNR worked HE9LAC for a new one, also FF8AC and the more usual stuff. G3JLB's bag included YVØAB, I1FP/M1, SVØWN, UH8KAA and KW6CE. G3ABG stuck to CW and worked VQ8AQ, ST2AR, VS9O, SVØWN, CR6AI and VQ3CF.

GW3AHN used this band very little, but raised PJ2CK on phone, plus KV4AA and YVØAB on CW. G3DO managed to find an all-time new one in VP2LB (St. Lucia) on phone. He has just received his W.A.P. (Worked All Pacific) certificate—the first issued to a G station for Phone Only.

G3FXB raised FO8AG, DU1OR,

JZØHA and OR4VN on CW. G3JZK found the band pretty horrid except early in the morning and late at night. He worked VE8AY and was all ready to claim WNACA when he got the QTH as Aklavik, N.W.T.! (When we worked VE8AY and got his card he was in the Yukon—apparently they can move without a change of call-sign.) Also worked were KG1DL, OR4VN, FL8AC, HE9LAC and others.

G2DC found ZK1AK for a new one on the band (he is said to be thirteen years old!) plus YVØAB, OY7ML, ZP, LU, PY and "the usual hordes of W6 and 7 in the early mornings." G6VC finally caught up with UH8KAA, but FB8ZZ was a gotaway.

G6TC raised CE3DZ and 5AW, PJ3AB, UL7, VE8 and VS6. G5BZ sends a long list, from which we extract VS8AQ (?), CP3CD, OA4BW/8 (in Iquitos Forest), FP8AU, VQ3JO/P and 4JO/P, I5AAW, VS9O, YVØAB, OR4VN, FF8BX and ZK1AK. He found conditions very queer on the afternoon of June 1, with CE

coming in from the NE, as well as W6, JA, VE8 and UAØ.

Forty Metres

Our regular gen-man for 7 mc is G3LPS (Blackburn). This month he worked VO, UO5, UF6, VP3YG, UQ2 and many PY's. He finds the latter very prolific but W's scarce.

G3LVC raised AP5B at 1715 on July 4 (7006 kc). G6TC worked the same station. And G3JZK, after hearing OR4VN several times, finally worked him at 2215 GMT.

That's all the news on 7 mc this month—and no one even mentions 3-5!

Miscellany

GM3IBU (Paisley) nominates for Clots' Corner the character heard calling "Charlie Queen Uncle Sugar Able" for about five minutes on 21 mc. G3IBU never did find out his call-sign—he just couldn't spare the time to wait any longer!

G3FXB mentions "a highly dubious character" signing

FIVE BAND DX TABLE
(POST-WAR)

Station	Points	3.5 mc	7 mc	14 mc	21 mc	28 mc	Countries	Station	Points	3.5 mc	7 mc	14 mc	21 mc	28 mc	Countries
DL7AA	884	113	170	238	190	173	254	G3IGW	311	44	65	88	66	48	121
W8KIA	802	68	148	271	171	144	271	G3FPK	311	30	69	115	67	30	137
G3FXB	766	73	131	215	197	150	245	G6TC	302	17	67	127	59	32	143
G5BZ	737	64	118	253	181	121	259	G2BLA	267	32	48	66	67	54	110
G3FPQ	695	70	101	201	189	134	223	G2YV (Phone)	267	12	26	83	93	53	137
G2DC	676	77	101	206	154	138	223	G3JJG	265	38	45	94	53	35	113
G3DO	643	24	46	239	165	169	259	MP4BBW (Phone)	261	1	5	81	109	65	134
GW3AHN	603	16	55	185	215	132	237	G8DI	256	25	56	71	60	44	109
G3WL	517	41	90	172	123	91	199	G3LET	252	11	49	125	50	17	135
W6AM	511	30	58	280	86	57	280	G3HQX	242	15	37	74	52	64	109
G2YS	489	71	87	160	109	62	178	G3DNR	231	10	21	86	53	61	110
G3ABG	485	45	83	167	104	86	190	G2DVH	231	21	27	126	42	15	135
GM2DBX (Phone)	425	34	31	160	102	98	176	UR2BU	217	12	24	71	50	60	?
G6VC	389	34	49	147	91	68	165	VO2NA	169	13	17	85	40	14	91
W6AM (Phone)	359	13	32	254	39	21	254	W3HQO	139	3	5	18	71	22	86
G3JLB	358	43	50	88	87	90	156	G3DNF	109	5	29	38	27	10	49
G3JZK	316	16	55	73	110	62	154	G3IDG	109	11	15	27	24	32	47

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

YA2AC on 21 mc, and claiming to be a Pakistan expedition. The beam bearing was OK, but that would still be OK for East Europe (or even East Sussex) . . .

G3JZK asks "How about a WATP Certificate — for Worked Antarctica with Ten Prefixes? There are KC4, CE7Z, LU/Z, JA, UA, VP8, VKØ, ZL5, LA/P, OR and FB8 to choose from, and probably a few more to come."

G5BZ suggests that as Alaska is now the 49th State of the Union, presumably it will count as U.S.A. and not a separate country. (We shall be interested to see what happens here . . . a lot of effort goes into discovering new countries, but there must be a very large reluctance-coefficient concerning the suppression of old ones!)

"CQ" World-Wide DX Contest

Rules are out for this event, and remain as before, except that single-operator contestants must now show a *minimum* time of 12 hours' operating to be eligible.

Phone : 0200 GMT October
25 to 0200 October 27
CW : 0200 GMT November
29 to 0200 December 1

Deadline for logs is a postmark of December 1 for the Phone section, and January 15 for the CW. All to be sent to *CQ* Magazine, 300 West 43rd Street, New York 36, N.Y., and marked "Attn. Contest Committee."

Points (3 for different continents, 1 for different countries on the same continent, and zero for same country) are scored as usual, with the well-known multiplier system for both Zones and Countries.

Trip to VP8

G3LWS/VP8CZ sends a most interesting letter about his recent movements. The trip south was relieved of boredom by sessions on ZDLA (RRS *Shackleton*), and by teaching some of the met-types Morse. A week was spent in CX-land without much radio, although CX3AA was contacted at a later date; thence to the Falklands. G3LWS/VP8 and VP8CZ were both active from the South Shetlands, and VP8CZ also from the

Falklands.

Christmas Day was spent "four on and eight off" on ZDLA, the South Shetlands being reached on January 3. Trips on to 14 mc with 350 watts CW and 300 phone were pretty scarce, and the receiver was not up to scratch—so many G's were lost underneath the 599 W's; contacts were mostly contest-style, although some 3.5 mc ragchews with VP8CO, Graham Land, were possible.

VP8CZ wants to thank VP8BN and his family for their hospitality; VP8BN works 7 mc phone only. Many of the VP8's are non-amateurs—in the sense that equipment and call-signs are issued them for inter-Antarctic-base traffic working only, any DX operation being incidental and accidental—and don't go in for QSL'ing (cards are non-existent, anyway!) Certain calls are issued to the Bases and used by all and sundry—this applies to VP8AE, 8AJ, 8AK, 8AL and 8AM. VP8BI and 8BK were both Norwegians and whalers, and their licences have been cancelled. Unhappily, VP8BU was drowned just before Easter, but the cards have been made out. VP8CC is active from Graham Land.

Finally, G3LWS, although he used to be ZC4FB, is *not* the present holder of that call.

Trips to Leningrad

SWL Alec Foxall (an officer on the m.v. *Baltic Merchant*) has been regularly running to Leningrad, where he has been listening on 14 mc phone and CW, mostly between midnight and 0500. The local UA1's wreck the CW band, and the phone section is crammed full of Italians, of all people! The best DX heard came from Central and South America; SWL Foxall has now graduated from a very poor receiver to a Hallicrafters S-77A, and hopes to send some interesting reports to us in future.

DX Strays

DX'ers the world over will be sad to learn of the death of EA4BH, who, apart from being an outstanding DX operator himself, was responsible for the very successful EA9DD expedition to Rio de Oro. We understand that

his son Alberto is studying to become a radio operator and that the call EA4BH will be reserved for him.

Another trip to Trinidad Island is promised for September, call-sign PYØNB and operators PY1CK, 2CK and others . . . The PX1FC expedition is *off*—for this year at least . . . FB8YY has been taken off the air *pro tem* owing to QRM with other local activities . . . A large crop of VP2's, representing most of the islands now accorded "country status" are said to be active, mostly on 21 mc phone; VP2DA (Dominica) and VP2KM (St. Kitts) are on 14 mc phone; and VP2VB (Danny Weil) will be working round the various islands from now until November.

Look for 3A2CF from Monaco, between August 5 and 17, on the three HF bands, mostly late evenings . . . VS1BB/V59 is busy sending out his cards, and there is talk of plenty more activity not only from the Maldives, but possibly from Car Nicobar and Andaman. VS9FUB is one projected call from the Maldives, operated by G3FUB. Another possible one will be signing either VS9MI or VS9XX—this one is due on Gan around July 29; the operator expects to be there for twelve months at least, so there will be no need for hurry, or pile-ups.

All AP licences in Pakistan appear to have been cancelled, and now we hear that the 4S7's in Ceylon were also ordered to close down and turn in their gear to the nearest police station. The unlicensed and therefore untraceable operator continues as before . . . Iraq is another country which is, not unnaturally, off the air at present.

Don't pass up UAØGP/Ø as just another wierdie—he is said to be in Zone 23 and therefore worth investigating if you hear him . . . VR4JB is on 14 mc phone from Guadalcanal, and ZC5VZ on CW from North Borneo . . . VS9O was in Oman all right, but is now QRT.

Trips to Wallis Islands (FW8) by operators from FK8-land are said to be a possibility . . . HS1A has left, but HS1E remains active



This happy-looking lot were those who attended the annual meeting of the Radio Society of Southern Rhodesia at Que-Que, S. Rhodesia, on June 8. There are 35 licensed ZE's in the group, including ZE1JE, the YL standing at centre in the back row. Total membership of the S. Rhodesian Society is now 133 amateurs. The photograph is a "self-take" by ZE5JU, who is fourth from the left in the front row.

. . . ZK2AB is on 14 mc phone.

The only station on Chagos, formerly VQ8AJC, is now said to be signing VQ8AJ/C . . . ZL1ABZ (Kermadecs) hopes to be active on 14 mc soon. Meanwhile we hear that the ARRL have disallowed the many cross-band contacts that took place when he was on 3·8 mc only!

All the gen. from VS1, thanks to VS1HU's monthly bulletin: VS1FJ (G31DC) has worked his 200 countries from VS1 in less than a year—very nice going . . . VK9JF (Cocos Keeling) closed down, and after a brief stay in VS1 disappeared towards Penang, whence another VS2 may shortly show up . . . ZC3AC now has a crystal on 14043 kc—look for him there, but he scares easily and just vanishes.

VS1HU has been almost entirely on 14 mc CW, and the score now stands at 183, new ones being VS9O, KS6AD, PJ2AL, ZS2MI, YS1O and others. However, a 40-watt Gelsono rig is now under way and will be used on 21 and 28 mc.

KR6HP is on the island of Miyako-Jima, 175 miles south of Okinawa—another new one? He runs 500 watts to a BC-610 and a 14 mc beam . . . K2IVJ/VE8 and K8JTI/VE8 are both at Frobisher Bay, Zone 2 . . . ZL5AC, 5AD and 5AE are all

active from the other end of the world.

VQ8AQ is said to be in the Seychelles now, so look for some VQ9AQ activity . . . The HA5AM/ZA programme has collapsed, as the ZA authorities no longer permit activity by foreign amateurs, and no ZA nationals are licensed.

Certain EA9's at Tetuan have changed their prefix to CN9; whether this makes them "new" or not we have no idea . . . KB6BK (Canton Is.) plans to work SSB only. His XYL expects the call KB6BL . . . YA1AA is said to have an official permit to operate from Afghanistan . . . XV5A says there is no amateur activity in Cambodia, but we might see some before the end of the year. His own call has now been changed and he is signing W3ZA/XV. Visits to Laos are also on the cards.

LA3YFJ was heard operating from the Viking Ship bound from Norway to the USA (7 and 14 mc) . . . YVØAB was on as promised in July, 14 and 21 mc, mostly phone and SSB . . . UM8KAB is on 7 mc CW around midnight, and I5AAW earlier in the evenings . . . HC1FS is occasionally on 7050 kc CW, after midnight . . . 9K2AQ is now home at G3FJU.

9K2AP will be spending a few days with G3ABG, and hopes to raise his CW speed somewhat before returning . . . 9G1CM is expected to be a visitor at the "Topsfest" at Lichfield . . . ZB1SS is home on leave, and ZB1GUH returns in the autumn.

G3ABG, who supplied the last four items, heard OK1MB asking a W6 to tell W6UOU to hurry up the two KWM-1's needed by the Czech DX-pedition, "the greatest in history," which will last for *five years!* Apparently the intention is that OK2HZ and OK2ZH will cover the Middle East, YA, AP, VU, AC3, AC4, AC5, Nepal, JT1, China, PK2 and PK4.

ZL3VM is said to be coming on shortly from the Chatham Is. . . VK9AD, on Norfolk Island, will be using the SSB rig recently operated by VR2AP . . . ZS61F will be signing ZS61F/7 from Swaziland during August, probably CW only on 14 and 7 mc . . . KS6AG is a new station, operated by a YL—14 mc CW and QRS . . . HC8JG has been on from Galapagos Is. . . HR3HH/9 gave his QTH as Utila Island—nothing more known about this one.

And now news of two other expeditions, much nearer home: If you hear G8QI, he is on the remote Island of St. Kilda, out in

the Atlantic beyond the Hebrides; he runs a Panda Cub on all bands, CW and phone. It is understood that G8QI will be there for a few weeks longer—this news from G5WW, who was himself on St. Kilda in June, 1956.

On Sunday, August 24, the Yarmouth group hope — wind, weather and circumstances permitting—to reach Scroby Sands, the half-tide bank 1½ miles off Great Yarmouth. They will be on 7 and 3.5 mc between 0900 and 1300 BST, after which the tide will again submerge the island! Special cards for all QSO's, call G6ZG/P.

The Overseas Mail

From VS2DQ (Kedah) we hear that the "VS3R" mentioned in the May issue certainly doesn't exist out there, and must be presumed one of the funny gang, probably in Europe. This VS3R type was said to be on Langkawi Island, which is where VS2DQ himself is now situated — see "Other Man's Station," this issue. His DX news includes notes on activity from XW8AL (very busy, 14 mc); VKØAT (14 phone); FB8XX (Kerguelen), 14 and 21 CW and phone; and "good activity" from the Solomons, Norfolk and Macquarie Is. Jim says "Heaven forbid that Langkawi Is. should take on a 'separate country' status—I have enough work chugging out QSL cards as it is." Incidentally, he works G-land via the long path (over VK/ZL) around 1030 GMT. There's not much short-path working, so he goes to bed early.

ZB1CR (RAF Luqa) suggests that under present rules the island of Gozo should count as a separate country! Activity in ZB1 is quite high, but ZBIHKO is back in the U.K. Some new calls should soon show up on 7 mc; most popular band is 21 mc. ZB1CR himself has just sent off for his DXCC, but he hasn't worked, or even heard, JT1 as yet.

DJØBF (Altena) is one of the first resident British civilians (possibly the first) to be granted a German civilian call-sign, by local examination. (G6LX used to have a DLØ call, but this was issued on the strength of his UK licence.)

DJØBF is living there and working as a technical translator; at present he runs 35 watts on 7, 14 and 21 mc CW, and the receiver is a six-valve superhet with two converters.

MP4BBW (Awali) is active once more, mostly on SSB, and since he started up again on May 9 he has had over 600 QSO's with 84 countries. Recent new ones have been XV5A, OHØ, 9GI, JA and VS4 on 14 mc; CP, I5, VS9O, HS, EAØ, ZS8, OA, OR4 and KB6BH on 21 mc; and KR6 and ZD2 on 28 mc. Referring to VS9O, he says that the wolf-pack tactics were pretty clueless, and that more listening and less calling would have made twice as many contacts possible. In Bahrein there are now MP4BBE and 4BCK on CW, with 'BBW, BCI, BCJ and BCL providing phone contacts. MP4BBL will soon be back on CW and SSB, and 'BCC is also due to return soon.

9K2AM/M has been operating 14 mc SSB from the Tehran area and hopes to get an EP call shortly; band conditions out there have only been "fair to poor" with far too much static.

ZE5JU (Umniate) writes that his GM3BQA Cubical Quad — as described in our December 1957 issue—is still giving excellent results; he reports a "round table" involving KA2NA, KR6EC, KR6QW, KR 6LP, 4X4FV, CR5SP and himself, which, says ZE5JU, would for him not have been possible without the Quad.

Sheepskin Dept.

The WACAN (don't confuse it with our WNACA!) is run by the Nortown Amateur Radio Club (VE3NAR), Toronto, and is awarded for contacts with all Canadian Provinces and Territories (*two* cards wanted from *each* of the eleven). VO now counts (whether Labrador or Newfoundland) and VE1 covers Prince Edward Island, Nova Scotia and New Brunswick—two cards from each Province. Send the cards to Box 356, Adelaide Street Postal Station, Toronto, with ten IRC's. (Present holders of the WAVE Award may qualify by sending the four additional cards required.)

The WALA ("Worked All LA")

is issued by the NRRL for proof of contacts with the twenty different counties (*fylker*) of Norway on the part of stations in OZ, SM, OH and LA; or with twenty different Norwegian stations, including at least six north of the Arctic Circle, for the rest of the world. LF, LH and LJ contacts do not count. Twenty cards, 10 IRC's, to NRRL, Box 898, Oslo.

Country-Counting

We find that the sympathies of our correspondents are very much with us on the confused subject of when-is-a-country-not-a-country and its inversion (when is a non-country a "country"!) Several people suggest that a good basis to work on is "Does it issue its own stamps?"—in which case a country list is available from any reputable philatelic catalogue. Others maintain that we should take one or other of the standard atlases and work from that.

G3JZK suggests that CQ's "WPX"—for all different prefixes—might be the best, with the alternative idea that the unit should be the Call Area, such call area being defined as that in which amateur prefixes are distinguishable from other prefixes. Intensive and painful researches on his part, covering large areas of paper, reveal that the complexity of the call-sign system is inversely proportional to the number of amateurs in the country and also to the area and importance of the country!

G3MMW (Malvern) asks us to publish all information about new prefixes which suddenly appear from nowhere. This, of course, we do try to do, but sometimes they sneak up on us! He quotes, for a start, 4Q2, 9K2 and OR4. The first we don't know a thing about, as it has not been heard of before. 9K2 we really should have mentioned (and we believe that we did) when it was first used in Kuwait. OR4 refers only to OR4VN, the Belgian Antarctic station, and does not in any way constitute a "new country" (unless you have never worked any of the other multifarious Antarctic prefixes before).

The recently-published SHORT

WAVE MAGAZINE List of Prefixes (p.80, April issue) is just about the most up-to-date that has yet appeared, and we will come out with a full list of amendments from time to time.

SWL Offerings

There's only room this month for those with something really unusual to report, common-or-garden DX being too plentiful again. Nice ones from S. R. Smith (Crewe) are HKØAI and YS1MM on 14 mc phone; CR5SP, FB8BX, HS1E and ZD1EO on 21 mc phone; and VK9DB on 21 mc CW.

M. Healey (Horsham) covered 21 mc phone and logged CR5SP, OA4IGY, YN1MA and ZP5CG; on 28 mc he heard XQ8AB. SVØWN was heard from both Rhodes and Crete (14 mc phone) by J. Geraghty (Farnborough).

Referring to the radio blackout around July 10/11, V. Porter (Loughton) heard K1DAN/MM saying that they had been unable to raise the States for two or three weeks! Conditions came back very quickly, though, and by the evening of the 11th were quite excellent. I1FP/M1, HI8BE and OQØPB were new ones on 21 mc phone, others on the same band including YN1FX, EAØAB, VP1DS, VS9O, PYØNA and VP2DJ (Dominica).

R. Baines (Gillingham), with 147 countries in 39 Zones to his credit this year, mentions SVØWB, ØWN and ØWQ on 14; YN1CJ OA4IGY, VP9DU and HC1LF on 21; and 9G1CH, 9K2AP, ZD7SA and CR6's on 28.

L. D. Strange (Sutton Coldfield) scores 184 in 39 Zones, and the first 173 were heard on his 0-V-1 . . . From a ZL friend he quotes that ZL1ABZ is on Raoul Island and ZL5AA at Scott Base. Eighty, in ZL-land, extends from 3.5 to 4.0 mc, and there are no commercials; on that band ZL's work VK's on phone at night—a contact similar to London-Moscow or London-Libya. A VR3 was recently on phone up there, too. New ones for L.D.S. during the month were CR7DQ (CW), and HL9KT, XZ2SY and ZS9G (all phone). 21 mc was the band.

P. Day (Sheffield) with a score of 214 in 40 Zones, found things



When Mr. C. I. Orr-Ewing, M.P., G5OG, visited R.A.F. Station Locking, Somerset, on June 16, in his official capacity as Under-Secretary of State for Air, he was interested in the operating console for G8FC, the Hq. station of the R.A.F. Amateur Radio Society. Here G5OG is talking to Sgt. Dannatt, G3MBD, one of the operators on G8FC. A note regarding G5OG's resumption of his own amateur activity appeared on p. 205 of the June issue of "Short Wave Magazine."

good on 7 mc and logged VP8CC, FB8TK, CO 2 QR, UM8KAB, LU1NE and heaps of PY's and W's. On 14 mc CW he caught YVØAB, XW8AI and UAØOM; on 21 mc phone VS9O, VK9LE, HL9KT and OR4VN. Finally, on 50 mc (6-metre) phone he heard two HB9's and on CW OH2HK and CT1CO. SWL Day has found this band open nearly every night for six weeks, with much strange TV video and sound audible between 48 and 60 mc.

J. W. Bluff (Kenton) logged ZD7SA, ZS9G, HL9KT and JZØPB on Fifteen phone; best on Twenty were EL2A, VQ5FS and OQ51P; many W's, PY's and LU's were logged on Forty. M. Domoney (Ryde, I.o.W.) searched mostly on Fifteen and found HS1E, I1FP/M1, DU61V, VK9DB and 9LE, XZ2SY, VP2LB and OR4VN—all phone. CW gave him JT1AA. He has also heard several Europeans and W's on six metres.

C. N. Rafarel (Birmingham) also covered Fifteen, where he

logged HC5MT, VKØKT, XE1BT, VK9NT, VR2AZ, CR5SP, VK5NE (Darwin), OR4VN, HL9KT, ZD7SA and KZØPB (yes, KZ), reputed to be an American Expedition in Dutch New Guinea. On Twenty he heard ZK1BS, VKØTC, FB8BX, VU2RK and VK7CK. All the above loggings on phone. M. J. Prestidge (Birmingham) heard VK9LE, JZØPB and VS9O on Fifteen, and says that FB8CD is returning to Comoro in September or October.

Five-Band Facts

Just for the record, a few interesting facts from the current Five-Band DX table: The only station with three-figure scores in all five columns is DL7AA, who heads the whole table. (We know at least two G stations who could top his score, but they are too modest, or something . . .)

DL7AA also has the highest scores on 3.5, 7 and 28 mc. Top scorer on 21 mc is GW3AHN with his total of 215—until he joined the table this month that honour

went to G3FXB, now 197.

Top scorer on 14 mc is, of course, W6AM with his fabulous figure of 280, but his scores on the other bands are quite small. Highest G score on 14 mc comes from G5BZ (253); on 28 mc from G3DO (169); on 7 mc from G3FXB (131); and on 3.5 mc from G2DC (77). Highest number of countries worked (all bands) goes, of course, to W6AM with his 280, but the highest G's are G5BZ and G3DO, each with 259. This Five-Band Table is worth watching—and we would like to see some more entries for it.

VP2VB (British Virgin Islands)

was going great guns on July 21. Around 2200 GMT he was peeling off stations on 14080 kc CW (mostly W's) at nearly four a minute . . . On the same day VS9MA was on 21050 kc CW, about 1600 GMT, also working W's; we don't yet know which of the promised Maldives stations this one is . . . Talk has been heard of VS9MI, VS9MM and VS1JF/VS9. At all events, VS9MA is active and has a good signal.

American Samoa operation is promised by W6BYB and W6CLS, probably signing W6BYB/KS6—this one should be up just around

publication date.

That concludes it for this month; next time we are up against the calendar again, and you only have until **first post on Friday, August 15**, to get your news in for the September issue. Never mind if it's only a short note—please let us know what you are up to, and what you have been working. The deadline after that (overseas readers, please note) will be *Friday, September 12*. Address everything to "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. Until next month, then, Good Hunting and 73. BCNU.

MOBILE ACTIVITY REPORT

RECENT RALLY EVENTS— SECOND LIST FOR THE REGISTER

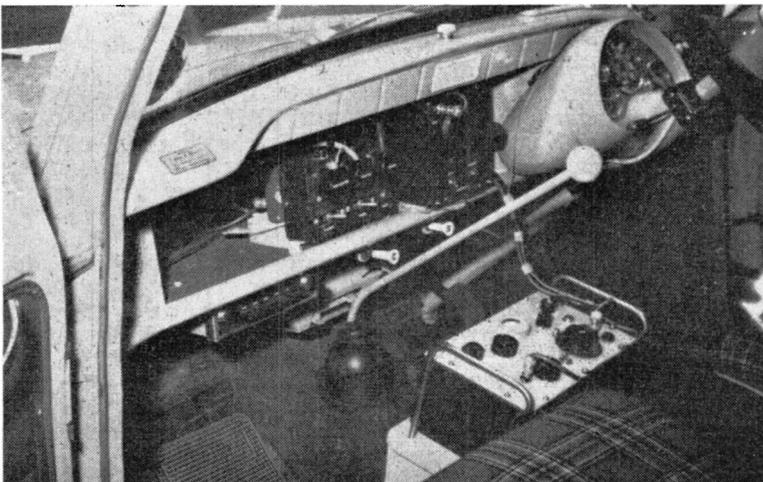
NOT surprisingly, the weather was an adverse factor over the last Rally period, and undoubtedly affected attendances.

The second Mobile Rally held by the **Harlow** and District Radio Society on Sunday, June 22, was marred by heavy rain squalls, and a high static level made talk-in operation very difficult at times. A further complication was the failure of the electricity supply, necessitating a last-minute conversion to battery power to get G3ERN/A (Top Band) and G3JMA/A (Two Metres) on the air. In spite of these

frustrations, no less than 144 visitors were signed in. They were welcomed by G6UT, as president of the Society, and later saw a demonstration of amateur TV by G3KOK/T and his helpers; G2DUS had also laid on a demonstration, this time of stereophonic sound. Other events were a prize draw and a treasure hunt, and prizes were also presented to G3ATL and the Hastings club group as the mobiles who had travelled the greatest distance to the Rally. And we are told that one of the more impressive sights in the car park was an ancient Austin 7 with a chimney-sweep's brush as aerial, bearing the pennant of G9BF.

For the Rally at **Capesthorpe** on Sunday, July 13—organised jointly by the Stockport Radio Society and the South Manchester Radio Club—over 100 cars were checked into the park, with a total attendance of some 300 visitors. For the "Mobile Merit" competition, 35 cars fitted /M were entered; the awards were made on the basis of safe operating under mobile conditions, appearance, the neatness and general efficiency of the installation, and its convenience from the point of view of driver and passengers; the fire hazard was also taken into consideration. First prize in this exacting contest was won by G2AUC/M, Manchester, for a Top Band installation in his smart Ford Escort; second and third prizes went to G3DDO/M and G3IJC/M respectively.

Another event was a D/F contest, for which G2AUC/M provided the hidden transmitter. This was won by the BTH Radio Club of Rugby, with Slade Radio Society second, and South Manchester Radio Club third, these club groups being represented by members who specialise in the interesting activity of portable D/F work. It should be noted that no less



Layout in Ford Escort UVM-895, operated by G2AUC/M of Manchester, winner of the "Mobile Merit Competition" at the Capesthorpe Mobile Rally on July 13. The transmitter is EF80 VFO into 6BW6 PA, modulated by 12AX7-6BW6, and the receiver is a modified Command set tuning 1.5-3.0 mc. Change-over is by relay, controlled by a trafficator-type switch on the steering column.

THE DERBY MOBILE RALLY

Derby and District Amateur Radio Society will be the hosts at a Mobile Rally to be held at Rykneld School, St. Albans Road, off the Derby Ring Road, near Markeaton Park, on Sunday, August 17. Talk-in stations will operate from 11.30 a.m. until 2.30 p.m.—G3ERD on Top Band, G3LTL on Eighty and G3EEO on Two. The same stations will operate again from 6 until 8 p.m.

The programme between 2.30 and 5.30 will include Competitions, an Exhibition, Raffles, Demonstrations and, of course, light refreshments. Admission is free.

than ten teams entered for the D/F event, and the hidden transmitter was placed about 10 miles from the start point—yet J. J. Grant of BTH got there in just an hour.

The talk-in stations were G3KMS/A for Top Band, and G3AYT/A for two metres; the latter made about 20 contacts, one of the best being with GW3GWA/M while he was in Wrexham. In spite of "heavy showers and general rain," the Rally was adjudged a great success, and much credit is due to G3FYE and G6DN, who were joint-secretaries of the committee formed, from members of the South Manchester and Stockport Clubs, to organise it.

THE MOBILE REGISTER — Second List

Since the appearance of the First List, on p.258 of the July issue of SHORT WAVE MAGAZINE, further entries have been received for the Mobile Register. If you are active /M, all that is required is your QSL card, endorsed "Mobile," stating the band(s) worked and the make and registration number of your vehicle. With those shown below, the total now identified is 71—and there must be at least another 100 to come!

<i>Call sign & Home QTH</i>	<i>Band(s) Worked</i>	<i>Vehicle & Regn. No.</i>
G2DTO, London, S.W.17	160m.	?
G2HCJ, Nr. Warrington, Lancs.	2m.	Morris Traveller NED-816
G2QL, London, E.4	160, 80, 14m.	Morris Minor 189-CMG
G2VO, Keighley, Yorks.	160m.	Singer Hunter OWU-365
G3AEF, Formby, Liverpool	160m.	Morris UNA-335
G3AKU, Nottingham	160m.	Austin A40 LEW-377
G3APY, Kirkby-in-Ashfield, Notts.	2m.	Standard 8 WRR-519
G3AYT, Hyde, Cheshire	2m.	Ford Thames KJA-439
G3CBE, South Ockendon, Essex	160m.	Lambretta 150 LHV-228

G3CHN, Kingsbridge, Devon	160, 80m.	Chevrolet JYO-53
G3FW, Dingley, Northants.	160, 80m.	Austin 10 JU-8079
G3IPR, Newbury, Berks.	160m.	Ford Consul XMY-457
G3JLA, Stevenage, Herts.	160m.	Morris 10 JWA-417
G3JOO, Middlesbrough, Yorks.	160, 80m.	Rover HPC-792
G3KCJ, Stansted Airport, Essex	160, 2m.	Bedford Van MPU-417
G3KSW, Cheshunt, Herts.	160, 80, 40m.	Vauxhall Wyvern KNY-109
G3LIL, Highclere, Hants.	160m.	Wolsey JGP-415
G3LLK, Crookham Common, Berks.	160m.	Ford Consul XMY-457
G3MCS, Margate, Kent	160m.	Vanguard GJN-678
G3MOE, Cheltenham	160, 80m.	Vauxhall Ten HWL-695
G3VK, New Malden, Surrey	160, 80, 40m.	Austin A30 WPC-628
G5WZ, Newcastle-on-Tyne	160, 80, 40m.	Standard Ten 31-CTN
G6AS, Solihull, Warks.	40, 20, 15, 10m.	Vauxhall Velox UUF-894

NOTE: When a sufficient number of cards has been received, the Third List will be published.

"CONVERSIONS FOR THE BC-312/342 RECEIVERS"

Arising from this article, in the July issue of SHORT WAVE MAGAZINE, G3IHI (Swindon) writes as follows:

"If a 6B8 is used to replace the 6R7, screen voltage must be provided; a 1-megohm ½-watt resistor should be connected between HT and pin 6 of the valve base, with a 0.1 µF condenser from that point to earth. If a 6V6 is used as audio output valve, in addition to removing the 60-ohm resistor R47, a 39-ohm 1-watt resistor should be connected across the 6V6 heater to equalise the current load." G3IHI also makes some interesting suggestions, which will be dealt with in a later issue, about improving the selectivity of the BC-312/342 receivers by the use of a band-pass crystal filter.

CORRECTION — G.P.O. LICENCE ADDRESS

Further to that note on p.272 of the July issue of SHORT WAVE MAGAZINE, we are informed by the Post Office that the address for radio amateur licensing information is now: Radio Services Dept. (Radio Branch), Post Office Headquarters, London, E.C.1. All those entering for the next Radio Amateur Examinations should get the leaflets.

AT last, we've had that long-expected break on VHF, when everybody who could get on found the band full of signals and the EDX coming through again. We have also experienced the most unusual circumstance yet reported in these columns (there's still scope for something new on VHF!), and that is the combination of an effective Aurora manifestation with, simultaneously, good tropospheric conditions.

This remarkable occurrence was during the evening of Tuesday, July 8, when the glass was high and a number of stations had come on after finding the band lively over the previous two days, starting with the field day on July 6. An Aurora effect had already been noticed (and reported by PE1PL) between about 1530 and 1630 BST, though only one U.K. station was on at that time. Later in the evening, more G's came up to take advantage of the very good tropospheric conditions, and by 2230 BST they found an Aurora condition developing; this lasted until about 2310, after which tropospheric working remained good till 2330 or so, when another Auroral curtain built up and remained effective till about midnight BST.

For Sunday, July 6, field day, conditions were good and the activity high, in the sense that because contacts were possible over 200-mile distances, there seemed to be many more stations on; in fact, on such occasions there is always activity, but unless conditions are well above average, not so much can be heard of it. However, with northerly stations getting into the London area during the morning, activity built up well. It was a warm, though dullish day, with a rising glass, and temperatures in the low 70's. As so often happens when there is a certain amount of cloud cover with the Wx conditions otherwise right, a good deal of QSB was evident on distant signals. By the late afternoon, there was a further improvement, with the DX getting louder and steadier—and, seemingly, more interesting.

Among the more sought-after stations were EI2W, GD3UB and GI3GXP, all good signals and

VHF BANDS

A. J. DEVON

Good Conditions and High Activity—

July Aurora Openings—

New Four-Metre Record, FA9VN/G5KW—

Much Interesting News—

making plenty of QSO's. There were also several GW /P's on offer, including GW3MED/P, cunningly sited 7 miles west of Conway, giving Caernarvonshire, coming through very well and working just about everybody; he should have a very good place when the results are sorted out. Other /P's to do well were G2HCJ/P, near Church Stretton, Salop, who worked 103 stations, including two GM portables, and G6XM/P, who accounted for GD, GI, GM and GW. Several mobiles were out, those noted by your A.J.D. being G2DUS/M, G2HCG/M, G3AYT/M, G3BOC/M and G5CP/M.

In the course of this contest, a good deal of frequency-dodging was going on; QRM does justify a change *within one's own zone*, but to go outside is not fair to others. On the amateur bands, interference is something we have to learn to live with, and for this the answer, on two metres as on the other bands, is more and better receiver selectivity, and not jumping about "looking for a clear spot." When conditions are good and activity is high, there are no clear spots—except, perhaps, between 145.5 and 146 mc!

One gathers that the QRM in the Peak District was pretty fierce, and some of the /P's up north were finding it rather tough going—but that's all part of the fun! There was not much CW to be heard (which would greatly have eased the QRM), though G3CCH (Scunthorpe), who badly wanted Oxon., called G3JXN/P patiently on the key for a very long time—we were glad to hear him make that QSO at last! More field day experiences are covered in the individual reports, further on, though one other by-product of the contest remains to be mentioned here: After it was over, at 1910 GMT, G3KBA/T (Birmingham) was giving a video signal on 70 cm to G3KMT/P in the Clee Hills.

Conditions remained good for the next evening, July 7; it was warm and humid, with a high glass, and the indoor temperature was still over 70° at ten o'clock, p.m. The near-EU's were getting well into the Midlands, EI2W was on again with a very good signal all over the country, and GD3UB was getting S6 from G5MA. G5YV worked GM2FHH (Aberdeen) at 2345 BST, and another good GDx contact was that between G3KEQ (Sanderstead, Sy.) and GW2HIY, now giving Anglesey as a regular thing, and probably wanted by nearly everybody; in case you may not have realised it, Anglesey is one of the rarest Welsh counties, from which there has only been /P activity in the past, and difficult to work at that. During the evening of July 7, there was again considerable QSB on all signals, particularly in the east-west direction.

The Aurora Opening

With the two-metre band continuing open, there was plenty going on during the evening of July 8 when the Aurora condition started to develop. Earlier in the evening, ON's and PA's had been workable under good tropospheric conditions, so that when DL9ARA suddenly appeared at 2225 BST, calling CQ-DX with a very dirty T3 note, it was obvious what was happening. A minute or two later, he was in QSO with SM7BE. Then, at 2240, DL6WUA and

G5BM were calling CQ together, both with RST-573 signals. A few minutes later, GM3DIQ appeared, under EI2W, with a 553 signal; the interesting thing here was that EI2W, probably on a south-easterly beam heading, was a normal phone signal, showing that tropospheric conditions were good at the same time. During the next half-hour or so, some of the auroral-reflection calling noted (on A.J.D.'s apparatus, that is) was G5BM/G3ATM, OZ9NI/G5YV, GM3FGJ / G3BA, GM3LAV/G3HBW, GM2FHH/G5MA, and (a nice one, this!) DL3YBA/SM4BIU; the latter is at a place called Skollersta, on about the latitude of Stockholm. SM4BIU was also heard by DL3VJ.

Though these interesting European stations were on, and coming in quite strongly on a north to north-easterly beam heading, most of the G's seemed to be more anxious about the Scottish stations, and the GM's were kept very busy while the Aurora lasted; as soon as it cleared, the GM's went out, too, the tropospheric conditions not being good enough to bring them down south very far.

G3HBW (Bushey Heath, Herts.) reports that by hanging on until 0100 BST/9th, he caught another Auroral opening, with GM2FHH and GM3EGW both worked; Arnold says that by that time everyone else had gone to bed. G3LTF (Mill Hill, N.W.7) gives DL3YBA as his best DX heard, and remarks that he spent most of his time listening during the Aurora, "as conditions were so interesting." G2RY (Bridport) lists a number of G's heard at various times during the opening, all with "fuzzy" notes and on a northerly beam heading.

G3ATM (Huddersfield), reporting on July 8 results, also mentions a much earlier Aur. opening, after midnight on June 28/29, when he worked GM2FHH and GM3EGW, at 332/562 and 552/552 respectively. On the 8th, G3ATM heard DL4WW at 552, as well as various G's. G3CCH made tape recordings of signals received under Aur. conditions, and also found time to work DL6WUA during the opening. G2HDR (Bristol) says that the

outstanding fact for him about this Aurora business is that he always misses them—he has never been in on an opening yet!

After these excitements, conditions remained quite good until towards the end of the week of July 7. On the 9th, there was more Aurora working, when G5MA raised GM2FHH, and heard both DL3YBA and GM3EGW. On the 10th, EI2W/G2XV had a very good phone QSO, and on the 11th northerly stations, including GD3UB, GI3GXP and GW2HIY, were coming in well in the London area.

New 4-Metre Record

G5KW has now had his card from FA9VN, confirming their QSO of June 22, 1206 BST, on 70 mc. The distance is 1,116 miles, which makes it a new EU record for the band—and as four metres is now to be on a permanent basis, it is to be hoped that there will be a lot more activity on it. About this we shall have more to say in a future issue.

Reports and Tables

Of course, another very gratifying result (to your A.J.D.) of all this activity is a heavy mail; people we've not heard from for years have written in, just as if they were picking up the threads from the month before last, and a large number of quite new stations are reported on. There have been big claims for, and movements in, the Tables, which we hope are now more up-to-date.

And pipe that Activity Report! There are well over 200 different call-signs in that lot, which alone represents a very good level of activity over the period.

Coming to the individual reports, G3HBW mentions an interesting check-schedule with G6JY (Newcastle), as well as checks on the frequent contacts G5MA has with GD3UB and GW2HIY. The path distances from G3HBW are: G6JY, 240 miles; GD3UB, 250m.; GW2HIY, 215m.; and, another regular GDX signal, GI3GXP, who is 290 miles away. Broadly, results are that Arnold can hear these stations quite consistently, even if no actual QSO is made. The inference

is that even under what are usually described as "average" conditions, stations at well over 200 miles are workable if only one tries; as he says, these results tie up well with the work being done by PE1PL, over the same sort of distance. On the theme of GDX, G3HBW also mentions hearing GM3FGJ/P (believed to be in Peebles-shire) on July 6; G3BW, away up in Whitehaven, Cumb., was another one received, and coming in at RST-589 at one time.

G3LTF runs two stations—one at Mill Hill, London, N.W.7, and G3LTF/A at Chelmsford—with separate and largely different equipment. At G3LTF, the weekend station at home, he has a preamp-Cascade receiver, a 100w. transmitter (with 150w. projected), and a 6-over-6 T-matched Yagi array at 43 ft.; at G3LTF/A, operated most evenings from Mondays to Thursdays, the Tx runs 75w., the Rx is a G2IQ-type converter, and the beam a slot-fed 4/4 at 30 ft. After just over a year's activity, G3LTF has worked

TWO METRES COUNTIES WORKED SINCE SEPTEMBER 1, 1957 Starting Figure, 14 From Home QTH Only

Worked	Station
58	G5MA
57	G3HBW, G3KEQ
45	G8VZ
41	G3GHO
38	G3JWQ
35	G2CIW
28	G3GSO
27	G3KUH, GM3DIQ
26	G3KPT, G3KQF
25	G3KHA
24	G2AHY, G3MAX
18	G2HDR
17	G3DLU
15	G3CKQ, G3GJ, G3MLS

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. Final placings for the year will appear in October.

six countries and 36 counties, and G3LTF/A five countries and 22 counties. At Mill Hill—where, incidentally, many years ago there was a very famous amateur station, from which some of the very first DX ever was worked—G3LTF also has 70 cm gear, consisting of a QQVO3-20A tripling into quarter-wave lines and running 20w., a G2DD-type converter, and a 12-ele stack backed by a wire-netting reflector. G3LTF explains that by March next he may be “amalgamated /A, or QRT, or something”—he’s getting married then! The only thing G3LTF is not so happy about is his QSL position; for 330 cards sent out, he’s only had 80 back . . .

Also on 70 cm now is G3JWQ (Ripley, Derbys.) who is running a G3BKQ-type converter (another design first published in *SHORT WAVE MAGAZINE*) into an AR88, with a QQVO3-20 tripler, soon to be fortified by a straight PA, the beam being a 4/4/4. Four counties were worked on Seventycems in about two weeks, so G3JWQ makes a start in that Table, in addition to all his two-metre activity—which, we gather, now includes an almost twice-daily schedule with PEIPL.

New Hands

With the mail this month are several first-reports to this feature; here are two of them:

G3BDQ (St. Leonards) has for long been a keen DX man on the HF bands, but with 200C worked, had begun to find them a bit monotonous. So he has started on VHF, and since June 8 has found it “all so different and really fascinating”; his receiver is the ON4BZ-type CC job (as described in *SHORT WAVE MAGAZINE* some time ago) tuning 24-26 mc on an HRO; the PA is at present a 6146 run at reduced power, giving about 10w. RF out, into a 4-ele flat top. As the Activity Report shows, G3BDQ has been having some interesting contacts across the Channel—for which the South Coast stations are well placed, of course—and it is worth noting that F8YG/M when worked was not far from Paris and using just the one watt.

Another who has been on only

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.

G3JWQ, Ripley, Derbys.
WORKED: EI2W, G2AIH, 2LG, 3AKU, 3ALA, 3CNF, 3ESW, 3EYV, 3FIB, 3FMZ, 3GSI, 3HMH, 3HRI, 3IXV, 3KKI, 3KLI, 3LIA, 3LKV, 3LNM, 3LSA, 3MAX, 3MEO, 3MNO, 3MPS, 4BD, 4GZ, 4LU, 4OF, 4PS, 5DT, 5DF, 5GN, 5LJ, 6JS, 6JY, 6NF, 8CB. (All new stations worked recently).

G3GPW, Cheltenham, Glos.
WORKED: G3IER, 3JZG/P, 3KMT/P, 3MA/P, 3MAR/P, 3MGR, 5BM, 8SB/P, GW3JGA/P, 3YZ/P.
HEARD: G2HCJ/P, 3ERD/P, 3FKO/P, 3IRA/P, 5YV, 6VX/P. (During July 6 only).

G8VZ, Princes Risboro', Bucks.
WORKED: EI2W, G2HCJ/P, 2XV, 3BNL/P, 3DIV/P, 3DKE, 3ENY, 3GGR/P, 3HWC, 3HWS/P, 3HYH, 3IRS, 3JAZ, 3JGJ, 3JWQ, 3JZG/P, 3KHA, 3LHA, 3MAR/P, 4IJ/A, 5BM, 5YV, 6TD/P, 6XM/A, 8SB/P, GC3EBK, GD3UB, GI3GXP, G W2H1Y, 3JGA/P, 3MED/P, 5SA/P. (All over 50 miles; June 16 to July 20).

PEIPL, The Hague.
WORKED: G2HCG, 2NY, 3EVV, 3IRS, 3JWQ, 3KHA, 3LCK/A, 3LTF, 3MNR, 5WW, 5YV, 6FO. (June 18 to July 19).

G3BDQ, St. Leonards, Sussex.
WORKED: F3LP, 3ND, 8GH, 8MX, 8YG/M, 9CQ, 9DQ, G2JF, 3AXL, 3BOC/M, 3DIV/A, 3DIV/P, 3EKK/M, 3FCQ, 3FXA, 3HRI, 3MIY/P, 4DC, 5MR, 5NF, 6HH/M, PEIPL.
HEARD: F8LO, 8OL, G3HRH, 3KMD, 3YK, 6NB, 6RH, ON4DW. (June 6 to July 19).

GW2HCJ/P, Pembroke.
WORKED: EI2W, G3HYS, 3IRS, 5MA, GW3HKT/P. (July 12 and 14).

GW2HCJ/P, Carmarthen.
WORKED: EI2W, 3HBW, 3KHA, 5MA, 6NB, GW3MFY. (July 13).

EI2W, Dublin.
WORKED: G2NY, 2XV, 3AGS, 3AYT/P, 3BNK, 3BVV, 3EKP, 3ERD/P, 3GFD/P, 3GSO, 3GTN, 3HBW, 3HII/P, 3HWS/P, 3HXN, 3ILX, 3IWI, 3JAZ, 3JWQ/P, 3KEQ, 3KFT/P, 3KUH, 3LGT, 3LHA, 3MAR/P, 3ZM, 4DC, 5BM, 5MA, 5YV, 6NB, 6TD/P, 6XT, 6YU, 8SB/P, 8VZ, GI3AXD, 3GOB, 3GXP, 3IJM, GM3DIQ, 3EGW, 3IWA/P, 3NG, 4HR, 6WL, GW2HCJ/P, 2HIY, 2HIY/P, 3JGA/P, 3MED/P, 8SU. (July 6 to 13).

G3JGJ, Paignton, S. Devon.
WORKED: G2AHP, 2MV, 2RY, 3EYV, 3FIH, 3FKO/P, 3GOP/P, 3HBW, 3HTA, 3ICO, 3IER, 3ION/P, 3KEQ,

3KHA, 3LHA, 3LHA/M, 3LTF, 3MAR/P, 4DC, 5BM, 5BW, 5MF, 6XM, 8DA, 8DR, 8VZ, GC2FZC, GW3MFY, 8SU.
HEARD: EI2W, F8MX, G2DTP/P, 2FM, 2HCJ/P, 3DIV/P, 3ERD/P, 3IRS, 3JMA, 3LTS, 4PS, 5MA, 5MR, 5WW, 6AG/P, GB2RS, 3IGY. (June 18 to July 22).

G3LTF, Mill Hill, London, N.W.7.
WORKED: F3LP, G2ANT/P, 2DUS/M, 2FNW, 2HCJ/P, 3DVK, 3EEO/P, 3ENS, 3ERD/P, 3FKO/P, 3GGR/P, 3GNR/P, 3GOP/P, 3GZJ/M, 3HGE/P, 3HWR, 3HZJ/P, 3ION/P, 3JGJ, 3JR, 3JWQ/P, 3JXN/M, 3JZG, 3KHA, 3KMT/P, 3KPT, 3KUH, 3LYD/M, 3LZP, 3MAR/P, 3MED, 3MLS, 3MNR, 3MPS, 5BM, 5CP/M, 5YV, 6ON, 6TD/P, 6XM/P, 8CK, 8SB/P, GW3JGA/P, 3YZ/P, ON4ZK, PAØLQ, ØTP/A, PEIPL.

G3LTF/A, Chelmsford, Essex.
WORKED: F8MX, G2CZS, 2DTP/P, 2JF, 3ANB, 3BVU/A, 3EJO, 3EVV, 3GEC, 3GGJ, 3GNR, 3GOZ, 3HRH, 3IIT, 3INU, 3IRS, 3JMA, 3KMD, 3LHA, 3MPS, 3PV, 3VI, 3YZ/P, 4IB, 5OX, 8SK, ON4CP, 4DW, 4OZ, 4UD, 4ZH, PAØCML, ØLQ, ØWAR.
HEARD: DL3YBA, F3LP, F8GH.

SWL Tomlin, Malvern, Worcs.
HEARD: G2FMO, 2HCJ/P, 2JF, 2MV, 2NY, 3AGS, 3APY/P, 3ATZ, 3AYC, 3BJF, 3BNL, 3DIV/P, 3DVK, 3EEO/P, 3ENY/M, 3ERD/P, 3FD, 3FKO/P, 3FNW, 3GFD, 3GGR/P, 3GNR/P, 3GOP/P, 3GPW, 3GTN, 3GZJ/M, 3HA, 3HBW, 3HII/P, 3HXN, 3IER, 3ION/P, 3IRA, 3IRA/P, 3IRS, 3JAH, 3JAZ/P, 3JQN/P, 3JWQ/P, 3JXN/P, 3JZG, 3JZG/P, 3KBA, 3KEQ, 3KMT/P, 3LGP/P, 3LTF, 3MA, 3MAR/P, 3MGR, 4DC, 4JJ/P, 5BM, 5BM/P, 5CP/M, 5DF, 5YV, 6NB, 6TD/P, 6VX/P, 8SB/P, GI3GXP, GW3GWA/P, 3JGA/P, 3MED/P, 3YZ/P, 4LU/M. (July 6 only).

SWL Woodhouse, Storrington West Sussex.
HEARD: DL3NQ, 4WW, EI2W, F3LP, 8MX/A, 9CQ, G2ABD, 2AHL, 2AHL/P, 2AHP, 2AHY, 2ANS, 2AUD, 2BDP, 2BVW, 2CDB, 2DD, 2DSP, 2DTP/P, 2DUS/M, 2FM, 2FMI, 2FMO, 2FNW, 2HCG, 2HCJ/P, 2HDI, 2HGR, 2JF, 2JM, 2MV, 2NM/P, 2OY/P, 2XV, 2YC, 3ADS, 3AGS, 3APY/P, 3AYC, 3AYJ, 3BII, 3BOC/P, 3BNL/P, 3BRO, 3BVU/A, 3CCH, 3DIV/P, 3DVK, 3DVK/P, 3EEO/P, 3EJO, 3EKK, 3ENY, 3ENY/M, 3ERD/P, 3EYV, 3FAN, 3FCQ, 3FD/P, 3FIH,

3FKO/P, 3FP, 3FQS, 3FRG/P, 3GEC, 3GGJ, 3GHO, 3GNR, 3GNR/P, 3GOP/P, 3GOZ, 3GSE, 3GSO, 3GZJ/M, 3HAZ, 3HBW, 3HCU, 3HGE/M, 3HHD, 3HRH, 3HWC, 3HWS/P, 3HXS, 3HYH, 3HZJ, 3IAM, 3IBL, 3IIT, 3IKV, 3ILX, 3ION/P, 3IRA, 3IRS, 3IUL, 3JAZ, 3KAZ/P, 3JEO, 3JGJ, 3JQN/P, 3JWQ, 3JWQ/P, 3JXN/M, 3JZG, 3JZG/P, 3KEF, 3KEQ, 3KGC, 3KHA, 3KMT/P, 3KPT, 3KRR, 3KSR, 3KUH, 3LBM, 3LCH/P, 3LGI, 3LHA, 3LOK, 3LTF, 3LTF/A, 3MAR/P, 3MED, 3MGR, 3MLS, 3MNO, 3MPS, 3MU, 3NR, 3PD, 3PV, 3YZ/P, 4DC, 4JJ/A, 4MK, 4PS, 5BM, 5CP/M, 5DF, 5DS, 5HN, 5KG, 5MA, 5MR, 5NF, 5SK, 5UM, 5WW, 5YV, 6FO, 6JP, 6NB, 6OX, 6OX/M, 6SC, 6SC/P, 6TD/P, 6UJ, 6XM, 6XM/P, 6XT, 6XX, 8AL, 8CB, 8CK, 8DR, 8SB/P, 8SC, 8SM, 8VZ, GB2RS, GC3EBK, GD3UB, GM2FHH, 3DIQ, 3EGW, 3FGJ, 3LAV, GW3JGA/P, 3MED/P, 3MFY, 3YZ/P, 8SU, 8UH, ON4CP, 4DW, 4ZK, PAØEZ, ØEZA, PEIPL, SM6BT. (June 18 to July 19).

SWL Winters, Melton Mowbray, Leics.
PHONE: G2BVW, 2CDB, 2FMO, 2FNW, 2HCG, 3APY/M, 3BA, 3DJJ, 3DVK, 3EKK, 3FAN, 3GSO, 3HYH, 3JWQ, 3JWQ/M, 3KQF, 3KUH, 3LVC, 3MNO, 4MK, 5CP/M, 5KG, 5YV, 6XM, 6YU, 8CZ, 8VZ, GB2RS. CW: G2FNW, 3ENS, 3GSO, 5YV, 6XM. (June 16 to July 3).

G5C5P/M, Devil's Dyke, Sussex.
WORKED: G2ANT, 2JF, G3FAN, 3FCQ, 3IBI, 3KQC, 3MPS, 5MA, 5NF, 6HH/M, 8DR. (June 3-4).

G5C5P/M, Around Chesterfield, N. Derbys.
WORKED: G2HQ, 2NY, 3AGS, 3APY/M, 3BA, 3CCH, 3DVK, 3GFD, 3HA, 3HWC, 3JWQ/M, 3KUH, 3LVC, 3LSA, 3MNO, 4DC, 4GZ, 4OF, 5YV, 6JS, 6XM, 6XT, 8CZ. (During June).

G5C5P/M, Around Chesterfield, Derbys.
WORKED: G2DCI, 2HQ, 2JF, 3ANB, 3APY/P, 3ATM/P, 3AYT/M, 3BNL/P, 3CCH, 3DIV/P, 3DVK/P, 3EEO/P, 3EKK, 3ENS, 3ERD/P, 3ESW, 3FKO/P, 3GFD, 3GGR/P, 3GHI, 3GNR/P, 3GOP/P, 3HA, 3IRS, 3JMA/P, 3JQN/P, 3JWQ/P, 3JZG/P, 3KMT/P, 3KSR/P, 3LLE, 3LTF, 3MAR/P, 3MNO, 4DC, 4JJ/A, 5YV, 6FO, 6TD/P, 6XM/P, 8SB/P, GW3MED/P, 3JGA/P. (Sunday, July 6 only).

G2HDR, Stoke Bishop, Bristol.

WORKED: G2ADZ, 2HCJ/P (Cheshire), 3ARK, 3EHY, 3FKO/P (Dunkery Beacon), 3HXN, 3HZK/P (Salop), 3IER, 3KHA, 5DW, G W 3 Y Z / P (Brecon), GW3MFY, 8SC/P (Monmouth), 8SU.

HEARD: G2FQP, 3BA, 3FKO/A, 3HAZ, 3HWC, 3IRS, 3LAY, 3LHA, 5BM, 5YV, 6AG/P (Cornwall), 8SB/P.

G5MA, Great Bookham, Surrey.

WORKED: EI2W, F8MX/A, G2ADZ, 2GG, 2HCJ/P (Salop), 2HGR, 2YC, 3AGS, 3ARX, 3BGL, 3BW, 3EKX,

3ERD/P (Derbys), 3GSR, 3HII/P (Westmorland), 3HWS/P (Lancs), 3HYH, 3KJ, 3IUD/M (Staffs), 3IWI, 3JGJ, 3JQN/P (Surrey), 3JWQ/P (Staffs), 3JZG, 3KHA, 3KPT, 3KUH, 3LLE, 3MED, 5CF/M (Sussex), 5DF, 5NF, 5YV, 6AG/P (Cornwall), 6JS, 6UJ, 6XM, 6XM/A (Co. Durham), 8SB/P (Derbys), GC3EBK, GD3UB, G13GXP, GM2FHH, GW2HCJ/P (Carmarthen), 2HCJ/P (Pembroke), 2HIY, 3GWA, 3JGA/P (Flints), 3MED/P (Caernarvon), 8UH, ON4DW.

HEARD: D L 3 Y B A, GM3EGW, 3FGJ, 3FGJ/P (Midlothian), (June 4 to July 19).

G3IDG, London, S.W.12.

WORKED: G3EYV, 3FP, 3JR.

HEARD: G2AHL/P, 2AHP, 2AIH, 2BDP, 2DD, 2DTP/P, 2DZH, 2FM, 2HDY, 2MV, 2RD, 3AYC, 3BII, 3CNF, 3ECA, 3EVV, 3FD, 3GHI, 3GNR, 3GOZ, 3GZI, 3GZJ/M, 3HBW, 3HCU, 3HWJ, 3IRW, 3JQN/P, 3KEQ, 3KQC, 3KQR, 3LCH, 3LCH/P, 3LZP, 3MEO, 3MLS, 3MNR, 4DC, 4KD, 5DS, 5KW, 5LK, 5MA, 5NF, 5WW, 5YH, 6AG/M, 6QN, 6SC/P, 6YP, 8DR, GB2RS, 3IGY. (June 19 to July 15)

a few weeks is G3IDG (Balham, London), who has a Labgear Conv./HRO Rx set-up, with a QRP Tx and a simple aerial; G3IDG says that he is CW-only because he likes it, and *not* because he wants to "make it as difficult as possible for everyone"! As time goes on, he will be improving the transmitter and aerial, and should get out much better.

G3ATM (Huddersfield) was on his own up there until he was joined by G3AYQ, G3LJU and G3LSA, with G2BMC getting gear together. G3ATM says the activity in the Bradford, Leeds, Rotherham and Sheffield area is quite high, and increasing. He also mentions those "loud-noise" signals which are being heard at odd times all over the country; the effect is of a strong hiss-modulated carrier, appearing to come from a northerly direction, but not connected in any way with Aurora reflection. (Your A.J.D. is interested in this phenomenon, too, and has been checking it for some time; the origin of the signals is still unknown.)

Bob of G5MA (Great Bookham, Sy.) now has all English counties worked; he finally accounted for Westmorland on July 6 with G3HII/P, and on the same day had a solid contact with G3BW (Whitehaven, Cumb.). Other interesting GDX in Bob's log for the period includes GW2HCJ/P for Carmarthen and Pembroke, GW2HIY for Anglesey, G3MED/P for Caernarvon, G6AG/P for Cornwall, and G6XM/A for Co. Durham.

G3MAX (Manchester), having improved his aerial to a 6/6, was

able to take full advantage of the good spell and adds eight new counties to his score—but he still wants EI2W and GD3UB, both strong signals with him. G3CCH (Scunthorpe) now only needs Cornwall for all-England, as he got Oxon. on July 6; another interesting QSO for him was GM3IWA/P in Berwickshire. G3GSO (Derby) makes claims for the Tables, and gets into Countries Worked with 9C, including DL and OZ. G2HDR (Bristol) continues to make progress, with 18 counties for both tables, and G3KEQ (Sanderstead, Sy.) likewise stakes his claims—Jack now stands at 64C in the All-Time and has 57C in the Annual.

G3IOE (Newcastle) says he is "still active, but in a negative sort of way"—his trouble is a poor and noisy location, but even at that he is surprised at the regularity with which he can hear G5MA. The locals for G3IOE are G4LX, who "puts out a CQ now and again," and G6JY, whose QTH "seems to be 7 or 8 S-pts. better" than G3IOE's!

G3KQF (Derby) gets into Countries Worked with GD3UB for the 8th, and finds G6XM/A, in Co. Durham, a consistent CW signal at any time. GD3UB (Ramsey, I.o.M.) reports himself as "active every night at 2300 BST regardless of conditions"—those who want a new county and a new country (ON4BZ, for instance!) might like to note this.

G3JGJ (Paignton) runs regular daily schedules with the following: G4DC, 0630; G6XM, 0645; G8DA, 0700; G5BM, 0830; G2RY, 1800; GC2FZC, 1830; G3KHA, 1900; and GW3MFY,

1910. (Though he doesn't say so, times are presumed to be BST.) The most difficult paths are to G4DC, G5BM and G6XM; nevertheless, consistent results are being obtained with the two former, and G6XM has been worked several times. G3JGJ only runs 15w. input, with a 6J6 Conv./HRO Rx, and the beam is a 4-ele flat top.

G3KPT is now at 26C worked from West Bromwich, a good QSO for him recently being with G2ADZ for Devon. G8VZ (Princes Risboro') had a phone contact with EI2W on July 8, and on the 9th worked GC3EBK for Guernsey; for the 11th, the log records GD3UB for a new county and country, GW2HIY for Anglesey and worked-all-Wales, and G13GXP. On July 12, G6XM/A was heard, and worked on the 18th, for another county; on the 20th, Jack had a first QSO with G3JGJ. It all adds up to two more for the All-Time, another 9C for the Annual, and a foot on the bottom rung of Countries Worked — nice going with QRP. SWL Bozzard, of the Cheltenham Club, reports on

TWO METRES	
COUNTRIES WORKED	
Starting Figure, 8	
16	ON4BZ (DL, EI, F, G, GC, GI, GM, GW, HB, LA, LX, ON, OZ, PA, SM, 9S4)
16	G3GHO, G5YV, G6NB (DL, EI, F, G, GC, GD, GI, GM, GW, HB, LA, LX, ON, OZ, PA, SM)
15	G4MW
14	G2FJR, G2HDZ, G3IOO, G5BD, G5MA, G8OU
13	G2XV, G3BLP, G3CCH, G3DMU, G3GPT, G3JWQ, G5DS, G6XM, G6XX, PA0FB
12	F8MX, G2HIF, G3FAN, G3GHI, G3KEQ, G3WW, G6LI, G6RH
11	EI2W, G2AJ, G3ABA, G3DVK, G3GFD, G3HAZ, G4RO, G4SA, G5UD, GM3EGW
10	G2AHP, G2FQP, G2HOP, G3BK, G3BNC, G3DLU, G3EHY, G3GSE, G3JZN, G3KUH, G3WS, G5MR, G8IC, G5W5MQ
9	G2CZS, G2DVD, G3DKF, G3FIJ, G3FUR, G3GSO, G3IUD, G3LHA, G5ML, GC3EBK
8	G2CIW, G2DDD, G2XC, G3AEP, G3AGS, G3BOC, G3GBO, G3HCU, G3HWJ, G3KHA, G3KQF, G3VM, G5BM, G5BY, G8SB, G8VZ, GC2FZC

TWO METRES

ALL-TIME COUNTIES WORKED LIST

Starting Figure, 14

From Fixed QTH Only

Worked	Station
78	G5YV (787)
73	G3CCH, G6NB
70	EI2W (316), G6XM
68	G3BW, G3GHO
66	G3IUD (302), G5BD, G5MA
64	G3BLP, G3KEQ
63	G2FJR (542), G3H BW
60	G2OI (402), G3DMU
59	G3EHY, G4SA
58	G3FAN (637), G3IOO, G8OU
57	G8SB
56	G3WW (770), G5DS (654)
55	G2HDZ (495), G2HIF, G5BM, GW5MQ
54	G8VZ
53	G2AJ (519), G4CI, GM3EGW (196)
52	G2NH, G6RH, G6XX, GW2ADZ
51	G3JWQ (395)
50	G3ABA, G3GSE (518)
49	G3HAZ (358)
48	G3FIH, G5ML, G6TA (487)
47	G2CIW (264)*, G3DKF, G5WP
46	G3LHA, G4HT (476), G5BY, G6YU (205)
45	G2AHP (647), G2DVD (362), G2XC, G3BJQ, G5JU
44	G3BK, G8DA
43	G2DDD, G3BA, G3COJ, G3DLU,* G3HWJ, G3KHA (262), G4RO, G5DF
42	G2HOP, G3BNC, G3IER, G6CI (220)
41	G2CZS (282), G2FQP, G3DO, G3WS (255)
40	G3CGQ, G3KUH, G8KL
39	G2IQ, G3DVK (208), G3GBO (434), G3VM, G5MR (358), G8IL (325)
38	G2FCL (234), G3APY, G3CKQ, G3HTY, G8VN (190)
37	G3FNW, G2FZU (180), G3DLU, GC3EBK (260)
36	G2DCI (155), G3CXD, G3DLU,* G3IIT, G6CB (312), G8IP
35	G3FZL, G3FYY (235), G3HCU (224)

G3GPW activity, 10S having been worked from the club-room on July 6, on gear supplied by members and operated by G3CGD, G3CWV, G3LDA and SWL's Burford and Bozzard.

G5CP is now /M around Derbyshire, running a Hamobile Tx/Rx and a 1/1 halo on the car; regular contacts have been made at up to 50m., with GDX in the shape of G4DC for Essex and G2NY and G3HWC in Lancs. G5CP/M expects to be in North Wales for

Worked	Station
34	G3AEP, G3CKQ (162), G8IC
33	G3FUR, G3GFD, G3GSO, G3HHY (125), G3KQF
32	G3HIL, G8QY, G8VR, GC2FZC
31	G3HXO, G3KPT (108), G5RP, GM3DIQ
30	G2AHY, G3FRY, G3GOP (208), G3GVF (129), G3IRA, G3KEF (110), G5NF, GW8UH
29	G3AGS, G3AKU, G3FIJ (194)
28	G3ITF, G8DL, GM3BDA
27	G3CVO (231), G3DAH, G3ISA (160), G6GR, G13GQB, GW3GWA
26	G2BRR, G3CFR (125), G3KPT,* G3SM (211), G3YH, G4LX, G4MR (189)
25	G3JMA, G3JXN (220), G5SK, G6PJ
24	G3FD, G3FXG, G3FXR, G3JHM
23	G3CWW (260), G3HSD, G3LTF, G4JJ/A, G5PY
22	G2DRA, G3AGR (135), G3ASG (150), G3BPM, G3IOE, G5AM, G8NM
21	G2AOL (110), G3DVQ, G3IWI, G6XY
20	G3EYV
19	G3FEX (118), G3GCX, G5LQ (176)
18	G2HDR, G3DBP, G3JGY, GC2CNC
17	G3EGG
16	G3FRE, G3MAX, G3MLS
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 accrue.

* New QTH

late August and early September, on 144.45 mc, and hopes for some DX contacts.

From EI2W (Dublin) an interesting list for the Activity Report, many being first-time contacts with stations new on the two-metre air—as Harry says, a good augury for the future of VHF. (We have already remarked on the number of new calls to be heard round the band these days.) The EI2W frequency is now 144.084 mc (Harry has mended that cracked xtal!) and regular activity is promised with the new 16-element stack, which is giving excellent results. GW2HCJ/P gave EI2W two new counties—with Angus and Berwick also worked, he is now up to 70C in the All-Time. And Harry also keeps it up on 70-622 mc; he calls nightly, but has no takers!

In addition to the U.K. contacts shown in the Activity Report, PE1PL has worked HB9RG twice (June 25 and July 7) as well as several other EU's, mainly on regular schedule. G3IRS (R.A.F. Locking), at over 300 miles, is always heard whenever he is on, and the G2NY (Preston, Lancs.) schedule has been pretty consistent, too. And will those interested please note: PE1PL will be shut down for holidays during August 7-17.

With space running out, we can now only acknowledge, with our thanks for their help and patience, reports from SWL's Woodhouse (who seems to hear just about everything), Winters (who was away for the real openings), Tomlin (Malvern), Healey (Horsham) and Uden (Aylesbury).

Some other quick items: If you hear G3AYC, it is the station of the BBC Radio Club; and G3GEC, also on two metres, is the club station of the G.E.C. Annual Counties, for 1957-'58, closes on August 31; final claims must reach us with the September report.

Dead-Line—

This is **Wednesday, August 20**, for the September issue—send it all to: A. J. Devon, "VHF Bands," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. And let us hope there will be some big news for it.

Simple Aerial Tuning Unit

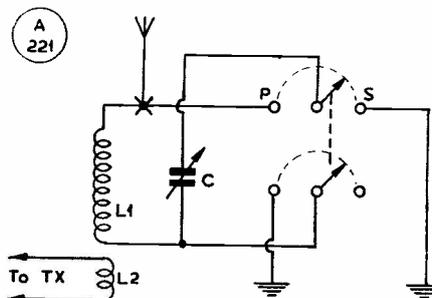
FOR A 67-FT. FOUR-BAND
SYSTEM

S. G. Wood (G5UJ)

SIMPLE aerials often work well. The writer used successfully, for several years, a 67ft. end-on. With the aid of a simple ATU (see sketch) and DPDT switch, four-band working was easily accomplished. A glance at this will give an idea of how it works. The coil L1 consists of 16 turns of 18 SWG wire, close wound on a 3in. diameter former. Condenser C is an ordinary (BC type) of about 500 $\mu\mu\text{F}$. L2 is a four-turn link to the PA tank coil. On 160 metres the switch is placed in the "parallel" position, and in "series" for 80 metres. It was found possible to load up satisfactorily, without any change of coil, on both LF bands.

For Twenty and Forty the ATU as such is discarded. The aerial is connected through a .002 μF (mica) condenser straight into the tank circuit.

The general idea lends itself especially to



The aerial tuner described by G5UJ. As explained in the text, a 67-ft. wire can be made to give four-band operation using this tuner.

QRP work as, of course, the condenser in the ATU would be unsuitable for high voltages. If QRO were contemplated, this would need changing to a type with a flash-over voltage rating of at least twice the HT used on the PA. With quite a modest QRP transmitter and inputs between 8 and 10 watts, satisfactory reports were obtained from all over Europe and the East Coast U.S.A. on 80-metre phone. No snags were encountered as regards loading or tuning.

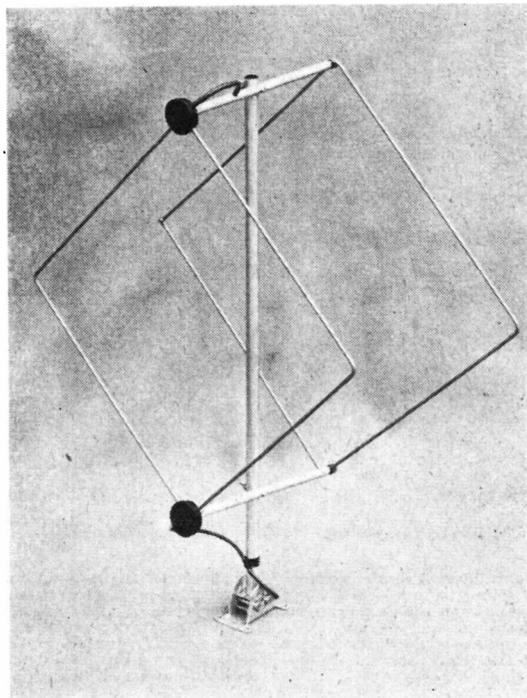
For the beginner wishing for something easy to get going, perhaps this arrangement commends itself as well as any.

LABGEAR "DOUBLE DIAMOND" AERIAL

The Labgear "Double Diamond" aerial represents a complete break away from orthodox multi-element Yagi design. As its name implies, it consists of two diamond-shaped loops, parallel to one another, and it is uni-directional along an axis at right-angles to the planes of the loops—see photograph. The larger of the two loops acts as a reflector, and the feeder is connected to the smaller loop at an appropriate corner (top or bottom for horizontal polarisation or either side for vertical polarisation). The loops are dimensioned for resonance in Band III, the band width being about 10 mc, *i.e.* suitable for two adjacent channels. Accordingly, models are available for channels 8/9 and 10/11 to cover present requirements.

The gain of the "Double Diamond" is quite exceptional for an aerial of its size. Many practical tests in a variety of locations have proved that it will out-perform the average five- or six-element Yagi and the acceptance angle of the "Double Diamond" (110°) is wider than that of the average eight-element Yagi (50°). Nevertheless, the front-to-back ratio of the new Labgear aerial is given as 35 dB, which compares favourably with the best Band III aerials commercially available.

Approximate overall dimensions are 17 ins. x 17 ins. x 12 ins., and the aerial head weighs only $\frac{3}{4}$ lb. Various models of the "Double Diamond" are available, ranging in price from 39s. 6d. to 62s. 6d.



NATIONAL RADIO EXHIBITION

This year's Radio Show—the 25th in the series—takes place at Earls Court, London, during the period August 27 to September 6.

READING FOR THE R.A.E.

The Radio Amateurs' Examination is Subject No. 55 in the City and Guilds examination list. The syllabus can be obtained, price 9d., together with copies of the last three years' question papers, at 6d. each, from the City and Guilds of London Institute, Gresham College, Basinghall Street, London, E.C.2. When applying, be sure to quote "Radio Amateurs' Examination, Subject No. 55." The City and Guilds will also give a list of recommended books for the R.A.E., but they do *not* supply the books themselves; these must be obtained through a library or bookseller. For the list of books only, send a stamped addressed envelope to the College, as above. The G.P.O. also issues a list of the subjects covered by the ten questions set for the R.A.E. This, with their pamphlet *How to Become a Radio Amateur*, can be

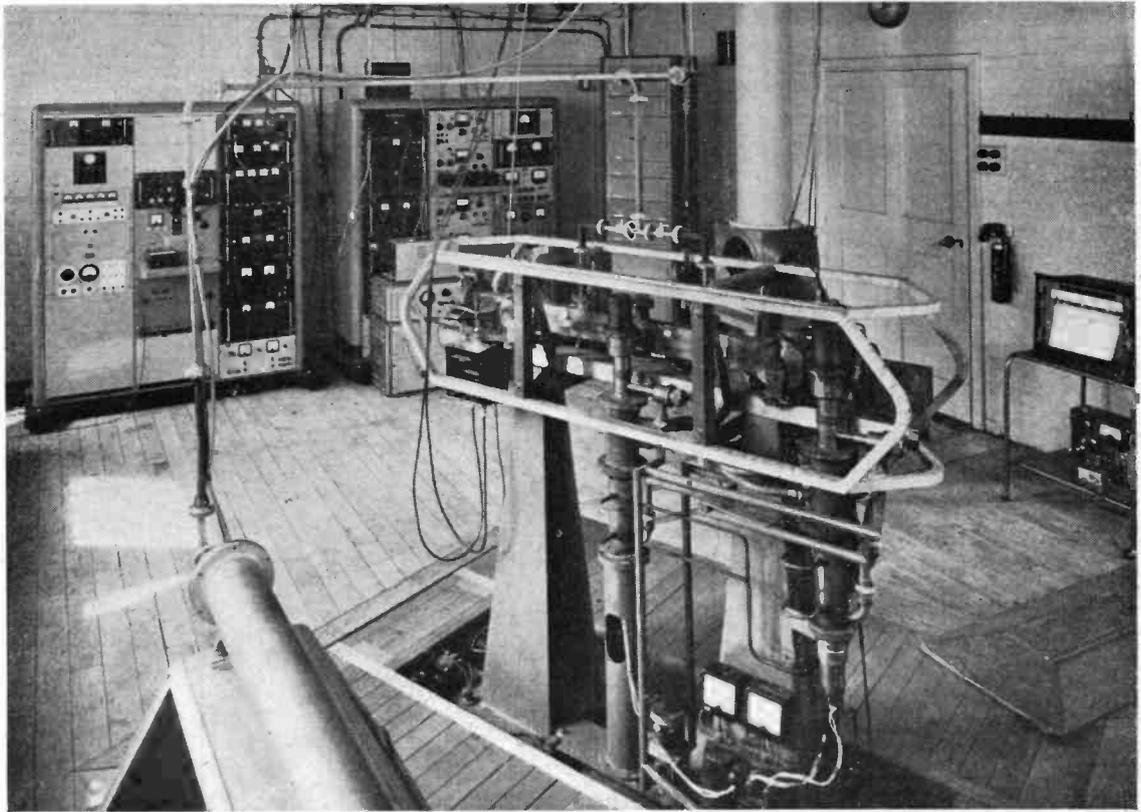
obtained on application to: Radio Services Dept. (Radio Branch), Post Office Headquarters, London, E.C.1.

POSTAGE — PLEASE NOTE!

Again, we have to remind readers sending in general queries that either a stamped addressed envelope (preferably) or return postage *must* be enclosed. While we do not run anything in the nature of a Technical Enquiry Bureau, charging a fee for advice given, we do attempt to reply in due course to all reasonable queries. It is for these that return postage is required.

ABROAD ON HOLIDAY?

Readers who are going, or have been, abroad on holiday are asked to send in brief notes, with call-signs and (if possible) photographs, of any Amateur Radio experiences and personal contacts they may have made. If enough of these are received, an account covering them all will be written up for an early issue.



Four different versions of the "atomic clock" can be seen in this photograph. They are installed at the National Physical Laboratory, Teddington, and are of considerable technical interest. In the centre foreground is the N.P.L.'s original caesium resonator, with which extremely accurate results have been obtained. From this experimental model a finalised design is being produced; this is the apparatus, looking rather like a vertical stove-pipe, immediately behind the caesium resonator. In the background, along the wall, is the American "Atomichron" equipment, manufactured by the National Co., Inc., of Malden, Mass., which has been brought over to the N.P.L. for side-by-side comparisons with the caesium resonator because it was found that checking by radio transmission was no longer good enough for the very high accuracies obtainable.

Crown Copyright photograph.

FREEDOM OF THE AIR!

CONFESSION OF A CONVERT

S. G. MERCER (G2DPY)

This is, in its way, as important as any technical or DX operating article ever published in SHORT WAVE MAGAZINE. All who take Amateur Radio seriously, or perhaps too seriously, should read it—and break their own shackles.—Editor.

IT suddenly came to me that I did not at that moment know what to do with myself! Since 1948 this situation had never arisen and it warranted, I felt, some serious introspection. The time was 0900—on 21 mc I had heard some really good Pacific DX coming through, and on 14 mc the conditions were similar. I had, under my control, 100 watts of phone or CW efficiently channelled into a DX aerial system. The receiver was well proven. Absolutely nothing to stop me spending an hour or two with my hitherto all-absorbing DX'ing. But the inclination was just not there!

Ten years. What was there to show for it? I tried to catalogue my thoughts into sensible order. Yes—about 400 square feet of roof space packed with “unmissable bargains”; half-completed rigs; completed rigs that just never turned out as expected; pieces of gear that were of little use when originally acquired, and of still less use to anyone now in any conceivable event. In fact, about £50 worth—well, worth? No, a better description would be, “original cost” of sundry equipment that would (and might as well) lie up among the rafters for ever and a day.

My eyes and thoughts then turned to the unsightly stack of large cardboard boxes containing some fifteen thousand cards from all over the world. Surely these would arouse *some* enthusiasm—but no, they merely brought to mind laborious “catching up,” frenzied posting and the artifices that went into obtaining some of the rarer ones. Two hundred odd countries confirmed there—cards for DXCC on four bands. Cards for WAZ, ABC, DEF, GHK, etc., etc.—heck, what did it mean to me! Who looked at them? Over the past ten years not more than a dozen people had ever professed any real interest in them. My fellow-amateurs were either secretly contemptuous or envious, according to their status, when they saw them. In fact, a huge heap of pretty postcards that had now become so out of hand that they were not even in any kind of order or system, being heaped any-old-how into those ugly cardboard boxes. No doubt the best thing would be to stow them away in the roof for some years until the children grew up, when they could re-discover them and remove the stamps.

Now—to look with new vision out of the window that has shed light on my operating table for so long. A rotary beam for ten metres sitting on a shaky pole; two equally shaky 40-foot masts; a mass of wires spewing across the back garden, so numerous that even now I had to stop and think what purpose each snarling tendon served.

Realisation—

My eyes shut in inward reflection on other things. My three boys. “Dad, come and show me how to get this tyre on.” “Hey, Dad, coming down for a swim?” “Dad, the circus is here today; Mummy says we can go if you will take us.” Horror! To think of all the simple childlike requests that I had answered with a snorted “Shurrup! I am listening to someone,” or some similar abrupt refusal. I could not imagine how the children could even bother to speak to me now, after such treatment that had been handed out to them. The XYL. However could I have thought that bringing her in on a distant phone contact could compensate for the once-weekly visit to the cinema or theatre we used to have. When had I in recent years ever got the family together and said, “Away we go today for a real day out together”?

What had happened to my sense of values? I saw, for the first time in years, the river meandering its leisurely course outside my window, with all the wild life on it. The unruffled water shone with invitation. Things that had for a long time escaped my observation. Just then, Betty looked in at the door of the radio room; I noticed the desperate look of resignation on her face after confirming that I was in the usual position! I took in the dilapidated appearance of the paper, ceilings, paint—all neglected responsibilities. The children came in, not even bothering to look in to see me to say hello. What was the use when they would at most be rewarded with a grunt!

The savoury breakfast aroma from the kitchen stirred new life in me and—I had an appetite! I had not regarded meal-times for years as anything but a darned nuisance that interfered with my QSO's.

I had awakened to the realisation that a complete revision of my life was necessary. First, I would keep the rig on the air and use it only on such occasions when it was not going to interfere with any other person's activities. I would not get hot under the collar any more, whether or not there was some expedition belting through at S8, or even S2! I would use the rig in a *friendly* manner and cultivate some of those chaps that I had brushed off with “*Won't hold u nw om—cul 73 VA.*” Betty would be taken out at least once a week, with no strings! All reasonable requests from the boys would be dealt with; I would see them to bed each night, with a fatherly word. I would take walks with the family, or by myself, and catch up with things that I had almost forgotten. I would reply to QSL's as a courtesy but otherwise would not send them out. I would be content with modest power and a less all-embracing and unsightly aerial system. In short, I would make by hobby *into* a hobby and not an all-enveloping, inconsiderate tyrant.

—And the Result

These were my thoughts, and what, might you ask, actually came out of it all? I will tell you.

I now have a medium-powered rig and a medium-sized aerial system. I go on the air during some weeks as much as twelve hours; other weeks

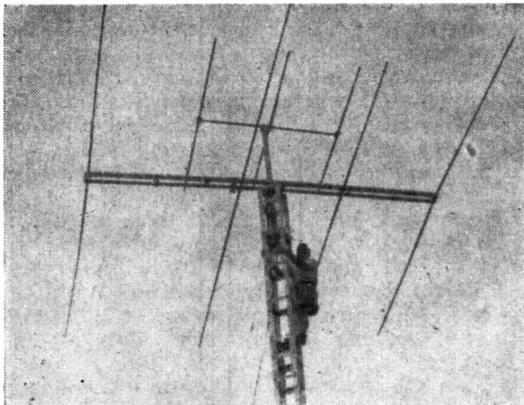
not at all. In the summer my main activities are out of doors and time spent on the air is correspondingly reduced. I reply to cards received but do not send them unless requested. (There must be thousands who, though they may or may not admit it, kept going a QSL system similar to that which I maintained and which involved many people in extra work and expense absolutely unnecessarily.) When the gales lash around my garden I do not have to rush out trying to save over-ambitious masts. The house is tidier and cleaner. I have found that the children are really good lads who do appreciate having Dad around sometimes. My XYL appears as a new woman and is still wondering whatever suddenly happened! I enjoy my home, my hobby and life in

general.

The moral is obvious: Do not let yourself become a slave to your hobby. This Amateur Radio is the grandest *spare-time* occupation that has ever been known. Keep it like that. Treat it with consideration and take it in doses that will not draw you too much out of ordinary everyday life, and it (and you) will be the more appreciated. It nearly made me into an "eccentric," to say the least. I hope that these reflections will make some who read them think a little and realise that there is a big world outside Amateur Radio worthy of attention, and that there are people round you who are not interested in it. The watchword, as in most things, is—*Moderation.*

The Other Man's Station

VS2DQ

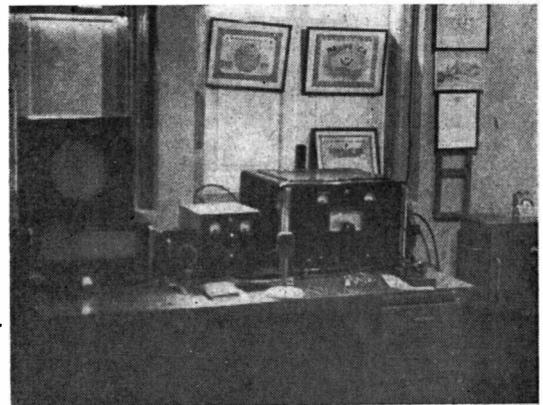


STATION VS2DQ is owned and operated by J. C. Pershouse, who is manager of Sungei Raya Estate (a rubber estate) on Langkawi Islands, Kedah, Malaya. Previously in the Middle East, VS2DQ was on the air for several years as ZC1AL in the Hashemite Kingdom of Jordan; he is also licensed as G3KPY.

The Langkawi Islands are located off the north-west coast of Malaya, about 20 miles from the mainland, 3-4 miles south of the Thailand sea border, and 500 miles north of Singapore. Although this Island Group is moderately large (more than twice the size of Penang), it is not well known; it is very hilly, mainly jungle country, with a population of about 17,000, who are mostly Malay. VS2DQ is the only European resident on the Islands.

Power for the bungalow is obtained from a 3-kW AC generator driven by an old (but excellent) single-cylinder Lister diesel engine. It has been a great relief to change over recently to AC after many years' operation with DC on various estates.

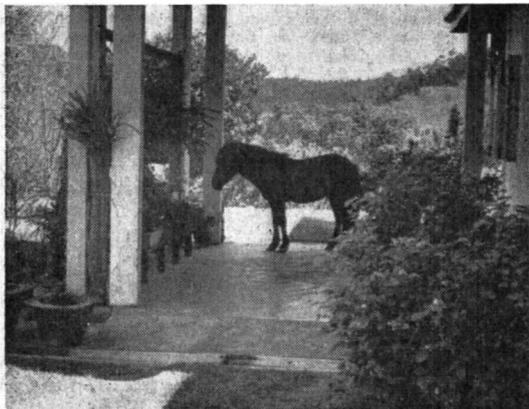
The main receiver is an Eddystone 888, which is standing up very well to the tropical climate.



Average indoor temperature all the year round is 85-90°F., perhaps falling to a minimum of 75°F. during the early hours of the morning. Humidity of 95% is quite usual; this can be compared, in the U.K., with a warmed cellar with water dripping down the walls! The local rainfall is about 120 inches a year. This sort of climate does not suit radio equipment and any untropicalised "surplus" gear soon goes wrong.

The transmitter is a Panda PR-120-V, which has been out in Malaya for four years with only minor faults developing. Also available is a 6-metre transmitter, with which contacts have been made with Japan and Australia on the 50 mc band—but so far only one unidentified signal has been heard from the West, coming in at 1630 GMT.

It is hoped soon to make many more contacts with the U.K., but the difficulty is the time difference. Malaya is 7½ hours ahead of GMT. Since VS2DQ has to start his work at 6 a.m. every morning (and they say a good planter should walk ten miles before breakfast), conditions are not suitable for staying up late, so operation usually ceases around 10.0 p.m.



(1500 GMT). However, it is often possible to have 15-metre phone contacts with G over the long path via VK/ZL, around 1030 GMT.

As the estate is four miles inland, it is not possible to see the sea, and the location is badly screened, especially in the direction of the U.K., where there is a nice little hill going up to 3,000 ft. only two miles away! Over the long path it is more open, and this is shown in the photograph above.

Main interest at VS2DQ is in aerials and propagation. A tower made of Dexion carries a four-element much-modified "G4ZU" beam with a three-element 6-metre beam on top—see photograph. The

three-band beam is partly to a modified design by VK6GU and works extremely well. On 15m. the back/front ratio is repeatedly stated to be better than 45 dB. The twin boom is of Dexion 140 aluminium, and the 1-in. corrugated aluminium elements are clamped to the boom by "Fringevision" universal clamps. There are no stand-off insulators, and solid perspex $\frac{3}{4}$ -in. tubings are inserted between the elements at the centre. The driven element and first director are insulated from the boom by polythene piping; the first director is loaded by twin wires and the second director and reflector by the twin boom. Open wire feeder is used, as it has been found much superior to any 300-ohm ribbon.

Phone working is carried out on 80, 40, 20, 15, 10 and 6 metres, with occasional operation on CW. Eighty is an unsuitable band for most of the year, due to the high noise level and intense electrical storms. But 40 metres is most useful for local contacts, such as the Sunday morning net with Singapore at 0330 GMT. In remote areas such as this, Amateur Radio is a wonderful hobby and, due to the isolation of VS2DQ, the emphasis is on operation. The best band for phone working to the U.K. is 15 metres, and VS2DQ looks forward to making G contacts.

The station QSL's 100% via the Bureau and, in addition, cards will be sent airmail if sufficient International Reply Coupons are provided. SWL's please note: sufficient IRC's! Certificates held include DXCC. WAVKCA and WBE.

INSTRUCTION FOR R.A.E. — MAY, 1959

Courses of instruction for the Radio Amateurs' Examination, to be held by the City and Guilds of London Institute in May, 1959, have been arranged in various parts of the country, and are summarised briefly below. These courses are taken by experienced teachers, who are often radio amateurs themselves, and are intended to get you through the Examination; since most are organised by arrangement with the local Education Authority, fees are purely nominal. In nearly every case they are evening classes, held out of normal working hours.

Brentford and Chiswick Evening Institutes: The course commences on September 22, and full details can be obtained from the Education Office, Town Hall, Chiswick, London, W.4.

Cannock (Staffs): At Cannock Chase Mining and Technical College, starting on September 16. Apply to C. J. Morris, 24 Walhouse Street, Cannock, who is G3ABG and will be taking the course.

Glasgow: Dept. of Further Education, Allan Glen's School, Montrose Street, starting on September 16. Enrolment at the School during September 8-10.

Holloway (London): Commencing on September 22, and held under arrangements made by the Grafton Radio Society; apply in the first instance to A. W. H. Wennell, G2CJN, 145 Uxendon Hill, Wembley Park, Middlesex. Enrolment during September 15-19. Over the last five years, this course has produced 85 passes in the R.A.E., 26 out of the

36 entered having succeeded in the last Examination.

Ilford (London): Starting during the week of September 22, at the Ilford Literary Institute, Cranbrook Road, Ilford, Essex. Enrolment during evenings September 8-12, but apply in the first instance to C. H. L. Edwards, G8TL, 28 Morgan Crescent, Theydon Bois, Near Epping, Essex.

Manchester: Beginning on September 23, at the Openshaw Technical College, Whitworth Street, Openshaw, and arranged in co-operation with the South Manchester Radio Club. Enrolment September 15-16, with applications in the first instance to the Registrar of the College, or to: M. Barnsley, hon. secretary. S.M.R.C., 11 Cemetery Road, Denton, Manchester.

Northwood (London): Opening on September 23, at Northwood Evening Institute, Potter Street, Northwood Hills, Middlesex; enrolment during evenings, September 15-17. Apply G. P. Anderson, G2QY, 16 Warrender Way, Ruislip, Middlesex.

Wigan: At the Wigan and District Mining and Technical College, Library Street, Wigan. Apply to the Head of the Dept. of Physics, at the College.

The foregoing is the preliminary list, covering all those so far notified. We shall be glad to have details, as soon as possible, of other authorised R.A.E. courses, for publication in the September issue of SHORT WAVE MAGAZINE.

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.

EI2AD, R. Savage, Tory Island, Letterkenny, Co. Donegal.

GW3MLU, J. S. Jones, 19 Grove Road, Colwyn Bay, Denbighshire.

G3MPJ, F/Lt. K. A. Bennett. B.E.M., 2 North Close, R.A.F. Station, Medmenham, Marlow, Bucks.

G3MRR, M. B. Cox. 138 The Downs, Harlow, Essex.

GM3MUQ, J. Bradford, 7 Wellpark Place, Kilmarnock, Ayrshire.

G3MUU, G. E. Hathaway. Yolander, The Street, Kennington, Ashford, Kent.

G3MUV, J. E. MacDonald, Jun., The Bungalow, Greengarth Hall, Hôlmrook, Cumberland.

G3MVB, S. T. Marr, 69 Cobnar Road, Woodseats, Sheffield, 8, Yorkshire.

G3MVD, A. Redferns, 26 Lancaster Street, Dalton-in-Furness, Lancs.

G3MVG, J. N. Horton. The Cottage, Burland Road, Brentwood, Essex. (Tel.: Brentwood 1668.)

GM3MYL, W. Campbell, 22 Burnmouth Road, Barlanark, Glasgow, E.3.

CHANGE OF ADDRESS

G2BYM, C. H. Williams, 43 Greyfriars Road, Reading, Berks.

G2FSJ, E. Thorne, 67 Wolversdene Road, Andover, Hants.

G3FHG, K. S. Martin, The Stores, Sandford, nr. Crediton, Devon. (Tel.: Crediton 295.)

G3GEJ, L. M. Airey, West Winds, Dalton-on-Tees, nr. Darlington, Co. Durham.

G3HKO, D. A. Wood, 28 Hillcrest Avenue, Scarborough, Yorkshire.

G3IEP, F. Harrison, 34 Thomas Lane, Knotty Ash, Liverpool, 14, Lancs.

G3IJU, Sgt. E. Briggs (ex-ZB1EB), 21 Newall Avenue, R.A.F. Station, Watton, Norfolk.

G3ILO, T. G. Spencer, 1 Field Lane, The Quarry, Cam, Glos.

G3IVT, W. K. Dodgson, 1 Old Thomas Lane, Liverpool, 14, Lancs.

G3JKF, K. V. Franklin, 67 The Avenue, West Ealing, London, W.13.

G3JOO, E. Bennington, 9 Glamis Grove, Middlesbrough, Yorks.

G3JPS, S. J. Dawson, 87 Franklin Avenue, Tadley, Hants.

G3LJC, D. J. Hinds, Windmill Orchard, Stebbing, Great Dunmow, Essex. (Tel.: Stebbing 293.)

GM3LQZ, F/S Phillips, D. Sgts.' Mess, R.A.F. Little Sai Wan, B.F.P.O.1.

G3LWS, E. H. Ross (ex-VP8CZ/ZC4FB), c/o War Office Wireless Station, Beaumanor Park, Loughborough, Leics.

G8LWS/A, E. H. Ross, 18 Abbey Grove, Abbey Wood, London, S.E.2.

G8FF, S. Southgate, Robin Hill, Kingsmill Lane, Painswick, Stroud, Glos.

G8QQ, E. P. Jones, 39 The Ride, Kingswood, nr. Bristol, Glos.

RESULTS — MAY, 1958, R.A.E.

In a preliminary report on the last Radio Amateurs' Examination, the City and Guilds of London Institute gives the number of candidates who sat as 715, of whom 518 passed, the failure rate being 27.6%. This is one of the highest entries yet, with the percentage of failures a little lower than last year (32.9%).

Comparative figures for the last three City and Guilds R.A.E.'s are: 1956, 518 sat, 458 passed (11.9% failed); 1957, 562 sat, 377 passed (32.9% failed); 1958, 716 sat, 518 passed (27.6% failed). These statistics are interesting. They show a steady increase in the number of candidates taking the Examination—those who passed this year are as many as the total sitting for 1956—but in the last two years, the failure rate has been too high. With proper preparation and a fair paper (and nobody could say that the R.A.E. as set by the City and Guilds is anything but fair) the pass rate should always be around 80%. According to the City and Guild's own analysis, the high proportion of failures in the last two years is accounted for by those who have simply "had a go" without proper instruction or preparation.

AMATEUR TELEVISION CONVENTION

We are asked to announce that the fourth annual convention of the British Amateur Television Club will be held on Saturday, September 6, at the Conway Hall, Red Lion Square, London, W.C.1 (off Holborn, nearest Tube, Holborn - Kingsway) from 10.00 a.m. to 6.00 p.m. Working amateur TV equipment will be exhibited by members of the B.A.T.C., and the demonstrations will include amateur colour TV and picture relays from the Club's own OB van. Non-members are welcome, tickets being 5s. at the door, 2s. 6d. after 2.00 p.m. Further details can be obtained from: J. E. Tanner, 16 Norfolk Drive, Chelmsford, Essex.

BELIEVE IT OR NOT

An Essex farmer who had invested in some "surplus" walkie-talkies to keep in touch with outlying workers on his farm complained that they were being jammed by other stations, and wanted to know how he could get the interference stopped. He was surprised beyond measure when told he was liable to prosecution for using unlicensed apparatus on reserved frequencies.

THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for September Issue : AUGUST 15)

LAST month's tentative enquiry (triggered off by Pontefract) about the possible support for a Club Field Day has produced a very gratifying response, at least twenty-five Clubs having commented on the idea.

Opinion is, in general, somewhat in favour of such an event, but it is felt that this September would be too early—and we agree. Several interesting suggestions have been made, and most Clubs feel that such a Field Day should be run on the lines of MCC—in other words the competing Clubs should work each other in preference to merely mopping up all the stations they can hear or work.

Some Clubs favour a "Top Band Only" event for that reason; others think it should be spread over Eighty and Forty; and one or two want a purely DX contest on the HF bands.

We will reconsider the whole situation next Spring and ask Clubs to let us have their answers to a simple questionnaire on the lines of (a) Which bands?; (b) How much power?; and (c) Which stations to be worked? In the light of replies and support promised, we will certainly do our best to organise such an event for next Summer—probably in September.

Meanwhile, please note that this year's MCC (Magazine Club Contest) will take place on **November 15, 16, 22 and 23** between the hours of 1600 and 1900 GMT. Rules will be exactly the same as for last year's event, and will be printed in full in the **October** issue of SHORT WAVE MAGAZINE. There will be no need for prior notification of entry.

And so to this month's Activity Reports, rather more numerous than usual . . .

Bradford are due to hold an Informal Meeting on August 26, after which their new season's activities will begin with the First Meeting of New Session, September 9—both meetings at 66 Little Horton Lane, Bradford.

Cornish held their July meeting at Redruth, where a gathering from all over the county heard G3CZZ lecture on Transistors. The subject will be re-opened at another meeting. The August gathering (before publication) was arranged to take place in Falmouth, when the subject was SSB. The next meeting, also at Falmouth, will be on September 3 and will include either a lecture or a tape from G2FQD. All visitors will be welcome.

Cray Valley met on July 22 for a talk by G3GGO on Valve Applications. **Flintshire** do not meet in August, but on September 1 they will have a talk by two members on Getting on Two Metres.

Liverpool were busy at the Oddfellows' Garden Fete on August 4, and are already talking of

organising a Mobile Rally in 1959. **Midland** announce the following events: August 19, Informal Discussion; September 16, AGM; and October 3, Annual Dinner at the Roebuck Hotel, Erdington.

North Kent send along their voluminous *News Letter*, from which we gather that a Film Show was held on July 10, including a 40-minute film on the erection of the 708-ft. TV tower at the Crystal Palace! On July 24 members were invited to take along small items of equipment and talk about them. For August 14 and 28, only informal meetings are planned, but the new season opens on September 11.

Plymouth will be displaying home-built equipment at the Model Engineering Exhibition in the Royal Assembly Rooms, August 4-16, and continues to meet every Tuesday, 7.30 p.m., at the Virginia House Settlement, The Barbican.

Purley were busy at the Summer Fair in the Rotary Field on July 12, from which G3DPW/A was operating. On July 18 they had a talk on Tape Recorders, "with demonstrations of their unusual uses"—which sounds rather intriguing. On August 15 (8 p.m.) the subject will be A Guide to the Newcomer.

Ravensbourne are not meeting during August, on account of the holiday season and the closure of evening classes.

Slade are paying a visit to the Birmingham City Police Radio Room at Steelhouse Lane on August 15. On the 29th they are holding a Display of Members' Apparatus, in conjunction with the competition for the Enterprise Trophy. Meanwhile, the clubroom is always available to members for constructional purposes, and the club station G3JBN is installed therein.

Tees-Side recently held a "country week-end" near Swainby, Yorks., with three transmitters on the air for 48 hours—sounds a nice idea for a "jolly." Eight or nine mobiles turned up on the Sunday and filled the main street of the village. On August 15 there will be a meeting at the secretary's QTH (see panel), and on the 29th the time will be spent putting

All reports for this space, which is made available to any radio club or group wishing to publicise its activities, should be addressed only: "Club Secretary," Short Wave Magazine, 55 Victoria Street, London, S.W.1, and must be received by the date given each month at the head of the article. The club honorary secretary's name (with call sign, if any) and address in full must be included, irrespective of the member who may be responsible for compiling and sending in the report; this is necessary for the name-and-address panel. Reports should give as much information as possible about future meetings, as well as a brief summary of current activities. Good photographs of club interest are always welcome to illustrate this feature.

a station into action for the Middlesbrough Show, which takes place the next day. Normally the Club meets at the Middlesbrough Settlement, where there is a canteen but no facilities for installing gear. The members, however, put the comfort of their surroundings first, as they have plenty of gear of their own!

Worthing are not meeting in August, but will be holding their AGM on September 8, 8 p.m., at the Adult Education Centre, Union Place. **Reading** meet at the Palmer Hall, West Street, on the last Saturday of the month, when they hold Morse and technical classes from 6.30 to 7.30 p.m., followed by the meeting proper.

New members of the **British Two-Call Club** include 9G1CM, VQ3SS, ZC4FL, DL2YU and several G's. Application forms are available from the hon. secretary (see panel).

The **Radio Amateur Invalid and Bedfast Club** continues to publish its monthly news-sheet, *Radial*, full of news of individual members. Anyone who feels that he can help the Club, either by gear or

unwanted publications, should contact the hon. secretary (see panel) for details. Periodicals are always welcome, and this includes practically everything containing news concerning Amateur Radio.

Bury are meeting, as usual, at the George Hotel, Kay Gardens, at 8 p.m. on the second Tuesday. On August 12 G3JAG will be talking on Gimmicks, and on September 9 they will hold a Technical Forum on TV Receiver Faults.

Derby meet on August 13 for a talk on Ultra Linear Modulation, by G3JXL; on the 20th for a Grand Draw for an electric spin dryer, an electric steam iron and a portable radio; and on the 27th for a Film Show. September 3 is booked for a Junk Sale. For details of their Mobile Rally on August 17, see separate panel.

East Kent meet every Tuesday, 7 p.m., at 10 Lesley Avenue, Canterbury. RAE instruction is being given by G3MDO, and Morse classes are held by G3LIG and G3MDT. A new transmitter is being built and will be on the air in September.

South Shields will be operating under the call GB3SFS from the Flower Show, Friday, August 15, to Sunday, August 17, and QSL cards should be sent to GB3SFS, South Shields Flower Show, Bents Park, South Shields. On August 27 there will be a talk by G3KZZ on the birth and preparation of *Spectrum*—which is the Club's monthly bulletin. In September the AGM will be held.

Acton, Brentford and Chiswick continue their Morse practice sessions every Tuesday at the Clubroom, 66 High Road, Chiswick. On August 19 G2CAJ/M will be talking on Mobile Operation with especial reference to his own 100-watt rig.

Bailleul continue to meet on the first Tuesday, and after the meeting they go on Top Band phone and CW. **Clifton** held a D-F Contest on June 29, which was won by SWL E. Strong; the other two teams failed to qualify. The July Junk Sale was well attended. The AGM will be held on September 18, and normal meetings continue every Friday at 225 New Cross Road, London, S.E.14.

Grafton had an excellent Field Day on June 14-15, many local amateurs and friends visiting the site on Hampstead Heath. They are now closed for summer recess, and will re-open on September 5. The AGM will be held on the 12th.

Leicester are putting on an exhibition at the Abbey Park Show, but the date (August 5-6) is just prior to publication. During August the Club will meet on Mondays. August 18 and 25 will be devoted to work on the new Club premises.

Mitcham recently enjoyed a lecture by G4ZU; the July 18 meeting was devoted to the sad duty of selling the property of their late chairman, G5UX. On August 29 they will be setting up the Club station, and on September 12 there is a talk on Oscilloscopes.

Norwich propose to run a "Bucket and Spade Party" at Hunstanton on August 31. G3HRE/M and G3HRK/M will be operating mobiles on 160, 80 and 10 metres. All visitors will be welcomed. They also hope to organise another expedition to Scroby Sandbank early in September, wind and waves permitting—see "DX Commentary," this issue. The Club meets every Friday, 7.30 p.m., at The Golden

NAMES AND ADDRESSES OF CLUB SECRETARIES REPORTING IN THE ISSUE:

ABERDEEN: W. K. Heggie, 80 Leslie Terrace, Aberdeen.
ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, London, W.3.
BAILLEUL: G. Seeney, G3HDD, B.R.S., Bailleul Camp, Arborfield, Berks.
BRADFORD: D. M. Pratt, G3KEP, 27 Woodlands Grove, Cottingley, Bingley.
BRITISH TWO-CALL CLUB: G. V. Haylock, G2DHV, 63 Lewisham Hill London, S.E.13.
BURY: L. Robinson, 56 Avondale Avenue, Bury.
CAMBRIDGE: F. A. E. Porter, 38 Montague Road, Cambridge.
CANNOCK CHASE: C. J. Morris, G3ABG, 24 Walhouse Street, Cannock.
CHELTENHAM: C. Wallis, G3CWW, 147 Hales Road, Cheltenham.
CLIFTON: C. H. Bullivant, G3DIC, 25 St. Fillans Road, London, S.E.6.
CORNISH: J. Brown, G3LPB, Marlborough Farm, Falmouth.
CRAY VALLEY: W. Sutton, G3FWI, 30 Sherwood Park Avenue, Sidcup, Kent.
DERBY: F. C. Ward, G2CVV, 5 Uplands Road, Littleover, Derby.
EAST KENT: D. Williams, Llandogo, Bridge, near Canterbury.
FLINTSHIRE: J. Thornton Lawrence, GW3JGA, Perranporth, East Avenue, Bryn Newydd, Prestatyn.
GRAFTON: A. W. H. Wennell, G2CJN, 145 Uxendon Hill, Wembley Park, Middx.
LEICESTER: P. G. Goadby, G3MCP, 535 Welford Road, Leicester.
LIVERPOOL: W. D. Wardle, G3EWZ, 16 Mendip Road, Liverpool 15.
MIDLAND: C. J. Haycock, G3JDJ, 360 Portland Road, Birmingham 17.
MITCHAM: D. Johnston, 23 Woodland Way, Mitcham.
NORTH KENT: D. W. Wooderson, G3HKX, 39 Woolwich Road, Bexleyheath.
NORWICH: O. F. Simkin, G3HYJ, 15 Hillside Road, Thorpe, Norwich.
PLYMOUTH: H. Dean, G3KDK, Chaddlewood House, Plympton, Plymouth.
PURLEY: E. R. Honeywood, G3GKF, 105 Whytecliffe Road, Purley.
RADIO AMATEUR INVALID AND BEDFAST CLUB: W. Harris, 25 Playford Lane, Rushmere, Ipswich.
READING: C. H. Williams, G2BYM, 43 Greyfriars Road, Reading.
SLADE: C. N. Smart, 110 Woolmore Road, Birmingham 23.
SOUTHGATE, FINCHLEY & DISTRICT: A. G. Edwards, G3MBL, 244 Ballards Lane, North Finchley, London, N.12.
SOUTH SHIELDS: K. Sketheway, 51 Baret Road, Walkergate, Newcastle-on-Tyne 6.
SURREY (CROYDON): S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon.
SUTTON COLDFIELD: A. C. Phillips, G3JFZ, 23 Plantsbrook Road, Walmley, Sutton Coldfield.
TEES SIDE: A. L. Taylor, G3JMO, 12 Endsleigh Drive, Middlesbrough.
THAMES VALLEY: K. A. H. Rogers, G3AIU, 21 Links Road, Epsom.
WIRRAL: H. V. Young, G3LCL, 9 Eastcroft Road, Wallasey.
WORTHING: J. R. Tootill, 113 Kings Road, Lancing.



For the recent Model Engineering exhibition in Belfast, the City of Belfast Y.M.C.A. Radio Club set up G16YM/A. The bench equipment included an Eddystone 888 receiver, with Minimitter and Panda Cub transmitters. This photograph shows G12DZG operating, with G13MBB (back to camera). Using a sloping aerial about 200-ft. long, numerous contacts were made, all over the world.

Lion, St. John, Maddermarket, Norwich (near the City Hall).

Wirral are meeting on August 15, September 5 and 19, with their AGM fixed for October 3. Their membership is growing at a satisfactory rate. Morse classes are to be arranged.

Aberdeen continues to meet every Friday, 7.30 p.m., at 6 Blenheim Lane, Aberdeen. On August 8 there is a visit to the Coast Radio Station at Stonehaven—gather at the Clubroom; on August 15 there will be a Mullard Film Show; on the 22nd the judging of the entries for the Davidson Trophy; and on the 29th a talk on Mathematics and the RAE, by GM3FKS.

Cambridge will be meeting on August 25, for a Film Show. **Cheltenham** continues weekly meetings, at which a goodly number of mobiles usually turn up. All the Club's licensed members operate on Top Band—eighteen in all, including six mobiles.

At **Cannock**, G3ABG will be running another RAE Course, starting on September 16, 7 p.m., at the Cannock Chase Mining and Technical College.

Southgate, Finchley and District will not be meeting in August, but they will be operating GB3SRA from the Friern Barnet Summer Show on August 22 and 23—visitors welcomed, including mobile stations. They also expect to be running a Club station at the Borough of Wood Green Horticultural Society Show, September 12 and 13. Their last meeting of the season for Mobiles and Portables will be held on August 10 at the rear of the Cross Keys Inn, Gustard-

Wood. Wheathampstead, Herts., beginning at 12 noon. The site is 400 ft. a.s.l. and is located about 1½ miles north of Wheathampstead Railway Station on B.651.

Surrey (Croydon) assemble on August 12, 7.30 p.m., for the "Chairman's Night," when the evening is placed at the disposal of G8TB.

Thames Valley (TVARTS) are celebrating their silver jubilee this year, and members have enjoyed especially interesting lectures at recent meetings, one subject, appropriately, being "Development of Amateur Radio over the past 25 years." Members recently visited the Quartz Crystal Co. at New Malden, and in June they had a river trip from Windsor to Marlow and back. Next meeting is on September 3, when G3FZL and G2FKZ will talk on IGY Matters—8 p.m. at the Carnarvon Castle Hotel, Hampton Court. On September 21 the society will be holding its own Field Day, when portables will operate from noon until 6 p.m., after which an informal supper and get-together will be held.

"Buckets and Spades" at Worthing

ANOTHER SUCCESSFUL EVENT

THE "Bucket and Spade Party" this year was a great success, and despite the weather (which was not, of course, as bad as forecast), almost 100 amateurs with their families and friends made the trip to Worthing on Sunday, June 22.

It was very encouraging to see so many mobile stations this year, and G3GVM/A was kept busy throughout the afternoon giving directions.

The photograph (*over*) shows the 160m. control station with G3GVM operating, and from left to right the equipment is as follows: Receiver, Bendix RA1B; Transmitter, home-built miniature 10-watt rig with EF91 VFO, EF91 BA, EL81 PA; Modulator, 6AU6-6AT6-6AT6-P/P6AQ5's. The aerial was a 40-metre Zepp used as a "T," 60 feet high. For phone operation, a Cadenza ribbon microphone was used (but temporarily abandoned at the time the photograph was taken). G3GVM/A's best contact on 160 metres was with G3FXA/M at a range of about 50 miles.

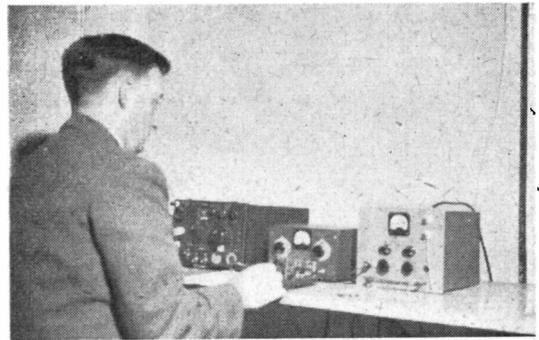
A new feature of the "Bucket and Spade Party" this year was the raffle which had been included,

following suggestions made by visitors in the past. There is no doubt that this was a major contribution towards the success of the event. It must surely have been one of the few raffles in which every person present received at least one prize, and several were even more fortunate!

The organisers would like to thank all those who made the journey to Worthing, and those who have since written, for their interest and support, and would also like to thank in particular those who previously helped to spread information concerning the event.

In conclusion, as the "Party" is organised solely for the enjoyment of visitors, if anyone has any comment or criticism to make, the honorary secretary of the Worthing and District Amateur Radio Club will be very pleased to hear from them.

J.R.T.



Neat Top Band outfit operated as G3GVM/A for the Worthing and District Amateur Radio Club's "Buckets and Spades" party on June 22.

POINT OF OPERATING PROCEDURE

When calling CQ on phone on the LF bands, it is good procedure to add the location, e.g. "Calling CQ Top Band from G3XYZ, Brummapool." With the numbers of new stations coming on the air every month, to know the location of a station calling is always of interest to other amateurs, and to those who may just be listening round—for one thing, it helps in the assessment of band conditions, which we all subconsciously make when switching on the receiver.

BBC's TV TRANSMITTER AT FOLKESTONE

The Corporation is now running a new type of automatic unattended slave TV transmitter at Crete-way Down, Folkestone. This is by way of being an experimental design, on low power, and has been developed by the BBC for "filling the gaps" in areas where normal TV reception is indifferent and the size of the local population justifies an improved signal. Folkestone is on Channel 4 (vision 61.75 mc. sound 58.25 mc) and is horizontally polarised, with a directional aerial system to cover the town.



- Illustrated above is a Type SJ Crystal Unit from a range covering 3-20 mc/s and on the right is a Type SM Crystal Unit from a range covering 3-20 mc/s.

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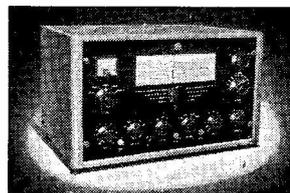
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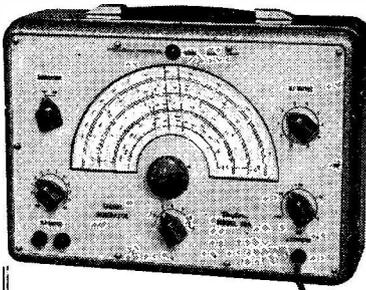
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FOR SALE: Grayshaw SG50 Signal Gen., 100 kc-80 mc on fundamentals; new; £7. Crystal Calibrator No. 7, Mk. I, 1000, 100, 10 kc, with power pack, as new, £6. Philips Communication Rx, Type P.C.R., v.g. condition, £6. Minimitter all-band converter, new, £13. Ekco Car Radio, press-button CR181/F, as new, £15.—R. L. Cutler, Barn Cottage, Walberton, Arundel, Sussex.

FOR SALE: G5RV Type Table-Topper, 80/40 CW, 807, with power unit, £25. Rack holding separate 20- and 80-metre transmitters, CC, 80 watt, plus modulator, plus power unit, £40. Recordon Dictating Machines, complete, cost £50 each, £10 the pair. De-Luxe Top Band transmitter (as *Short Wave Magazine*), £10.—Box No. 2016, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Beginner's Morse Course, 7½ or 3½ tapes, or record for 3-speed player, or any other method. — Clay, 8 Towngate, Southowram, Halifax, Yorks.

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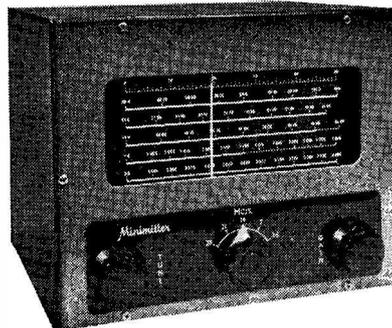
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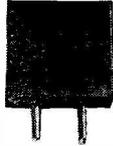
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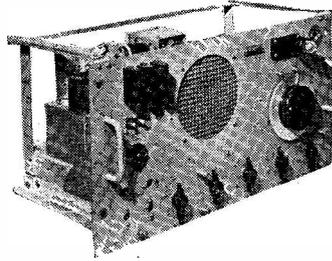
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1550.62	1680.5	2087.5	10,511	11,587
1554.4	1700	2039	10,534	11,751
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