The SHORT WAVE Magazine

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FOR THE EXPERIMENTER AND THE RADIO ENGINEER

The SHORT-WAVE Magazine

EDITORIAL

Statistics

With the appearance of this issue, a new band will have been opened to British amateurs. It may be expected that to start with there will be a high level of activity on 21 mc, if only to test its potentialities.

There is every possibility, and a great deal of hope, that eventually 21 mc will help to relieve much of the transmitter congestion on Twenty. As we in this country are starting from scratch as regards the occupancy of the new band, those interested in statistics could perform a valuable service by noting the degree of activity as between the two bands, and in particular whether established DX stations (home or overseas) are tending to move from 14 to 21 mc. Of course, the main factor governing any migratory tendency will be Conditions, and, for the immediate future, they do not look too hopeful.

The point here is that in due course it will be most useful to be able to say, with the certainty that can only be backed by figures, what is the distribution of activity as between 14 and 21 mc having regard to conditions.

It will not be readily apparent why information of this kind would be useful. Briefly, it is that reliable estimations of amateur-band occupancy have never been available—though the means to make detailed surveys have always been to hand. Without positive information of this kind it is difficult to prove need and to undertake many of the planning activities that are called for from time to time.

Indeed, one of the most remarkable facts about the Amateur Radio movement is its lack of detailed statistical information about itself!

Austin Forbes G6FO.

Aerial Coupling and Loading

IMPEDANCE MATCHING, TRANSMITTER ADJUSTMENT AND THE EARTH CONNECTION

PART II

J. N. WALKER (G5JU)

The first part of this excellent treatment of an important subject appeared in our June issue, to which reference should be made for the discussion on indicating devices and various methods of coupling. All who have any practical aerial problem, or who are putting up an aerial for one of our communication bands for the first time, will find here ideas and suggestions which will provide a working solution.—Editor.

A LONG wire end-on aerial is generally made an exact multiple of a half-wavelength and the end presents a high impedance, calling for voltage feeding. On the higher frequencies, however, it is quite possible for the aerial to become out of resonance as the frequency is changed from one end of a band to the other.

To divert for a moment, there is no real reason why the aerial should be made a resonant length since, as explained later, it is by no means a difficult matter to make the aerial load up properly whatever the length. If the aerial is made exactly a half-wavelength (or a number of half-wavelengths), much of the useful part is near the house and all its associated metal-work (electric wiring, plumbing, guttering, etc.) causing undoubted losses and causing the radiation pattern to be altered. A strong electric field exists near the house and interference to broadcast or television receivers is then more likely.

It is better (in the writer's opinion, at least) to extend the aerial—circumstances permitting—making the total length such that it is not resonant anywhere in the bands from 14 mc downwards; but it will be difficult to avoid a resonance appearing somewhere in the 28 mc band. The end impedance, and therefore the voltage and local electric field, is then less than in the former case.

The far end of the aerial must be a point of high voltage (usually called a voltage antinode or a current node) and the aerial automatically takes up a half-wave (or a number thereof) along its length. Better radiation, and radiation in the right directions, result.

A parallel tuned circuit, as in Fig. 9, with one end held down to earth may be considered as an RF potential divider—zero volts exist at one end and a comparatively high voltage at the other. By providing taps on the turns, any length of aerial may be matched in, excepting when a very low impedance is presented. If the aerial is resonant or nearly so and calls for maximum voltage, it is tapped well up towards the hot end of the coil. If the length is such as to present a medium or low impedance, the aerial is tapped on near the earth side of the coil. By adjustment of the tapping and of the degree of coupling between the two tuned circuits, a very good balance can be struck and the transmitter loaded to just the right amount. (That this system works well and can give fine results on all bands is proved by the Four Band Marathon Score made by G5JU in 1951.)

In effect, this system is similar to a "Pi" coupler in that any impedance (excepting perhaps a very low one), as formed by any odd length of wire can be matched without difficulty. Also it is well applicable to a single-ended or balanced PA circuit.

Occasionally the method of coupling shown in Fig. 10 is recommended, the aerial being connected to the end of a parallel tuned circuit, which is not earthed at any point. In the writer's opinion, this is wrong. The tuned circuit tends to take up too high a voltage, the circulating current is unduly high, adjustment is difficult because both sides of the tuning condenser are at high RF potential and finally there is no certainty that the aerial is accepting a proper load. It is far better to earth the rotor of the variable condenser and tap on the

aerial according to its impedance—it should *never* be necessary to connect it to the extreme end of the circuit.

Matching Into a Low Impedance

A low impedance, of say 50 ohms or less, entails a current on the high side, with a correspondingly low RF voltage. The circuit in Fig. 9 will cope in many cases but adjustment of the tap becomes unduly critical, particularly when the coil possesses only a few turns. A method which can be used is simply to open the junction between coil and tuning condenser on the earthy side and connect the aerial to the free end of the coil, as shown in Fig. 11(a), so that the current flowing through the tuned circuit is compelled also to flow through the load, which can be considered as part of the tuned circuit. Regrouping the components in Fig. 11(a) so that the circuit becomes as in Fig. 11(b) makes it clear that it has simply become the well-known series type with inductive loading.

With a series tuned aerial, it might appear that the loading should remain reasonably constant over the whole band since the aerial resonance can be adjusted to suit, but it will be found in practice that the loading will vary considerably with change of frequency. The reason for this is the change in current distribution along the lower section of the aerial, including that part which is inside the room. If the coupling loop is actually at a current antinode (the point at which maximum current flows) then the number of turns need be few and the coupling can be quite loose. On the other hand, if the current antinode is well removed from the point at which the coupling loop is inserted more turns will be required, or alternatively tighter coupling. The loop can only be at a current antinode over a narrow band of frequencies and the aerial will always load better within this band. Obviously the circuit as a whole, and the length of aerial in particular, should be arranged so that conditions are right for the frequency most used. The loading coil is an artificial way of increasing the electrical length of the aerial and often adjustment to the number of turns in it will improve results noticeably.

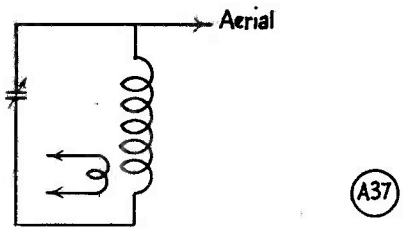


Fig. 10. The wrong way to arrange the aerial coupling circuit. The aerial is taken to one end and the whole circuit is isolated from earth.

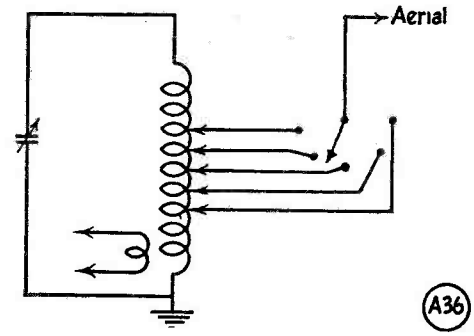


Fig. 9. By using a tapped coil, with one end earthed, practically any voltage-current ratio (impedance) can be accommodated, and matching achieved into aerials of varying length.

In the foregoing paragraph, by loading is meant the total watts input to the final valve and the indications should be taken from the anode current meter. The reading of an RF ammeter will vary as the frequency is changed. The highest RF current will be registered when the meter itself is situated at a current antinode and, depending on the point at which the meter is inserted, this may not coincide with maximum loading.

The same circuit (Fig. 11(c)) has been found useful with coaxial feeder, the outer screen being earthed and the inner taken to the end of the coil. Matching in this instance is almost automatic—if the feeder impedance is low, a high current flows, while if it is high, the current is reduced. It may be necessary to experiment with the L/C ratio of the tuned circuit, making it on the high side with a high impedance feeder (by which is meant up to 150 ohms) and *vice versa*, but otherwise the arrangement is straightforward and most effective.

Matching With a Differential Condenser

The use of a differential condenser for matching purposes confers similar advantages to those of a "Pi" coupler—the system is easy to put into operation, the load can be adjusted to a nicety, and matching can be effected over a wide range of aerial impedance. Actually of course the method is very similar also to the earlier one advocating taps on the coil, only this time it is the differential condenser which acts as the RF potential divider.

The circuit for an unbalanced aerial (*e.g.*, a long wire which can be of any length) is given in Fig. 12. It should be noted that the aerial is connected to the *rotor* of the condenser, C2, one stator being earthed, and an insulated extension control is desirable. The amount of loading depends on the relative capacitances of the two sections of the condenser. To commence with, that side of the condenser connected to earth is set at maximum and resonance established with C1. If, as is probable, the loading is low, C2 is rotated, maintaining resonance with C1, until the correct anode current is indicated. As before, an RF ammeter can be employed to confirm that optimum anode current coincides with maximum RF current in the aerial or feeder.

Although but rarely adopted, differential condensers can be applied to a balanced circuit by following Fig. 13. Two condensers C2 and C3 are necessary, one stator of each being connected to the ends of the balanced tank circuit, the other stators earthed, and the rotors connected to the feeders. A split-stator condenser C1 is necessary to maintain resonance. The two differential condensers must be adjusted simultaneously and the settings kept as nearly equal as possible. An RF ammeter in each feeder line will indicate if a proper balance obtains—if not, adjustment of one or other of the differential condensers will put matters right.

Effects on Tank Tuning

Once the transmitter tank circuit has been tuned to minimum dip, no further adjustment should be necessary. If under load it is found possible by rotation of the tuning condenser to cause a further dip in anode current, it is a sign that a mismatch exists, probably at the aerial end of the feeder where the latter is used. It may, however, be noted that the insertion of a coupling coil after tuning will reduce the tank inductance slightly and necessitate a slight compensating increase in capacitance. The conclusion is that the length of the aerial is incorrect, but if the effect is small it is not worth while doing anything about it, since the aerial length can only be right at a particular frequency (or over a comparatively narrow band).

If the change of capacitance is appreciable, then attention should naturally be given to the aerial, *shortening* it when the condenser setting has to be reduced and *vice versa*.

To divert for a moment, some may like to have the explanation, in simple terms, of this effect. Taking an ordinary parallel tuned

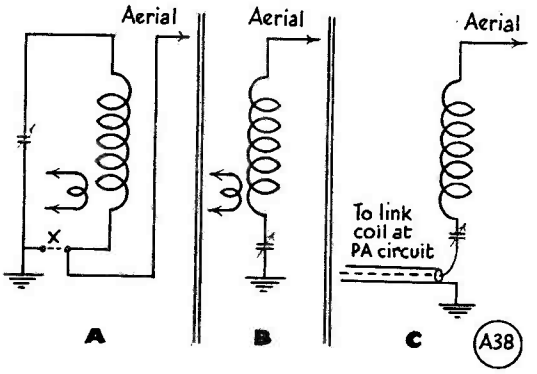


Fig. 11. By opening the lower end of a parallel-tuned circuit at point X (condenser rotor earthed) as in A, a low impedance feed point is presented. (B) Re-drawing shows that A is then the familiar series-tuned system. (C) Is an alternative which avoids having the coupling coil in the wrong relative position. The tuning condenser must then be isolated.

circuit resonanting at say 7,000 kc, the circuit will show inductive reactance if a voltage at a frequency of 6,900 kc is applied across it. That is to say, the impedance of the coil will be less than the impedance of the condenser and the major portion of the current will flow through the inductance. Conversely, if the applied frequency is changed to 7,100 kc, the condenser impedance is the lower and the circuit exhibits capacitve reactance. In the former case, the tuning capacitance has to be increased to restore resonance and, in the latter, decreased.

Now a resonant aerial is similar to such a tuned circuit, but the problem has to be looked at the other way round—the frequency is fixed and the circuit constants have to be adjusted. If the aerial is resonant at 7,000 kc and the applied frequency is 7,100 kc, the case is the same as the second one in the foregoing paragraph. The aerial possesses capacitive reactance which is reflected into the tank circuit, where a reduction of capacitance will be found necessary to counteract it. Shortening the aerial is of course equivalent to bringing its

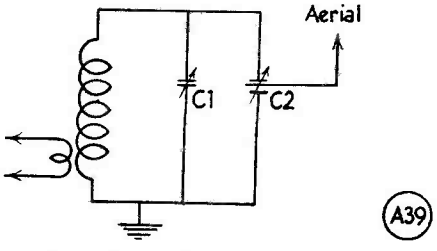


Fig. 12. Using a differential condenser (C2) for obtaining a correct match into an end-on aerial, resonant or non-resonant.

resonant frequency nearer to the applied frequency and when the length is correct, no tank re-tuning will be necessary, and the aerial is purely resistive.

When a separate tuned aerial circuit is used, the reactance of the aerial will be taken up by the condenser in this circuit and provided the coupling is correct, there should be no necessity to adjust the transmitter PA circuit. Some load should always be applied to such a circuit before tuning up, otherwise interaction between the aerial and tank circuits will be terrific and correct tuning points for both will be almost impossible to determine.

Neon Lamp Indications

The neon lamp is a useful device for indicating the presence of RF voltage, but too much reliance should not be placed upon it. In skilled hands, a good idea can be gained of what is happening in any given circuit, but experience is necessary, since neon lamps vary enormously as regards striking voltage and brilliance at different frequencies in RF fields, whilst the voltage and power in amateur transmitters also varies widely.

In general, the neon lamp should strike easily when applied to a "hot" point in an RF circuit, unless the power is low. The glow should decrease appreciably when a load is drawn away, but it should not be reduced by too great a degree and it is in judging this that experience counts. It is definitely bad if the voltage disappears almost entirely in one circuit, but appears at an obviously high value in another, or in another part of the same circuit. Used with discrimination, the neon lamp is a valuable accessory, but greater reliability can be placed on a combination of anode current and RF current meters.

Overloading the Transmitter

The term "overloading" has two meanings —one in which the PA is damped to such an extent that the RF output is reduced and heat dissipation simultaneously increased, and the other where the transmitter is working efficiently but the total watts drawn by the valve (of valves) is greater than the manufacturer's maximum ratings. The latter is a matter of choice and, in this respect, the I.C.A.S. (intermittent commercial and amateur service) ratings, where given, should be noted. Where operation is definitely intermittent, as in snappy CW contacts (*e.g.*, contest operation), it is often possible to run valves well beyond their normal ratings without serious deterioration, but it is usually more economical to keep well within specified ratings.

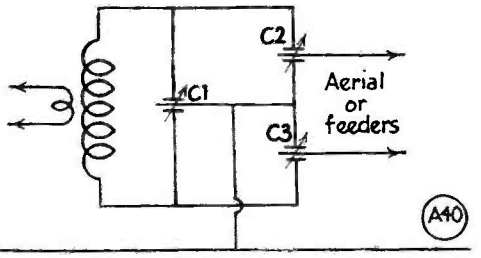


Fig. 13. Circuit for coupling a balanced feeder (or aerial) system using two differential condensers (C2 and C3). C1 is a split-stator for keeping the circuit resonance.

As mentioned elsewhere, the ratio of anode volts to anode current should be maintained close to the normal value. For example, it is bad practice to operate a valve of 25 watts anode dissipation and having quoted maximum ratings of 750 volts and 100 mA, at say 1,000 volts, 75 mA, or at 500 volts, 150 mA, all of which figures represent a total input of 75 watts. In each case, the impedance and working conditions (peak current, peak voltage, bias, drive, L/C ratio and load) are considerably altered and results may not be at all what was expected. On occasion, it is not harmful to allow the anode current to rise a little above normal when the anode voltage is below the maximum advocated.

The minimum dip with a triode valve is generally greater than with a pentode or tetrode. When loaded, the minimum dip of the triode anode current should still be pronounced, but with a pentode/tetrode it is permissible to run up near the maximum (off resonance) value, although a certain amount of dip should *always* be in evidence.

As the loading is increased, the anode current will also increase, but beyond a certain point, which will vary with operating conditions, the RF output will begin to fall off. Generally, if adequate drive is available, the anode current will be excessive before this point is reached, but this is not always the case. Where such overloading occurs, the heat dissipation increases rapidly — for one thing, the extra input is purely heat, whilst the reduction of RF power output again means that some of the normal input is being turned into heat. Damage to the filament or heater of the valve is probable, secondary emission may develop at both the control grid and screen grid and gas may be released, all leading to complete failure of the valve.

Unusual Effects

Occasionally effects of an unusual nature are experienced for which there seems no simple explanation. One such is the occurrence of two points of minimum dip in a PA tank circuit—close together, that is, and not due to subsidiary harmonic resonance. This phenomenon is generally due to the layout permitting alternative return paths for the circulating RF current (perhaps the tuning condenser has been earthed at two points) and a separate resonance occurs for each path. The cure is to re-arrange the wiring so that only one path exists. This may mean insulating a component from the chassis and running a separate (insulated) braid or tape direct to the cathode or filament of the valve concerned, but such action is well worth while as it will reduce unwanted circulating current and stability will be improved.

Feeder resonance may cause difficulty. The feeder may be of such a length that, with the length of one part of the aerial, the total coincides with a number of quarter-waves. Should this number be odd, and the feeder earthed, it will require only a small degree of coupling, as perhaps formed by a loop of wire or cable, to energise the feeder as an end-on aerial. Again, if the length represents an even number of quarter-waves, the feeder-plus-aerial is liable to act as a resonant half- or full-wave aerial and it will tend to become energised by capacitive pick-up. Such pick-up will be minimised if the centre point of the coupling loop is earthed, but the centre-tap should be a true electrical one (not easy to achieve in practice) and the earthing lead of low inductance, which means it must be short and of heavy gauge wire or strip.

There is also the possibility that the feeder by itself forms a resonant circuit and this will be emphasised if a mismatch exists at the point where the feeder joins the aerial. Here it is not the physical length which counts, but the electrical length—with feeders of 300 ohms impedance or more, the difference is small, but with coaxial cable the electrical length will be about two-thirds the actual length.

In every case of this kind, it is best to avoid any length which exhibits a tendency to become resonant in any way. Often shortening or increasing the length by a few feet will shift the resonance to a frequency outside any of the amateur bands.

Earth Connections

At first sight it may appear that the earth connection has little to do with aerial loading, except when a quarter-wave aerial is in use, when of course it is all-important and forms an integral part of the radiating system. But in all the foregoing, it has been assumed that the "earthy" end of the aerial circuit (at least when discussing unbalanced systems) is truly at zero RF potential. If it is not, loading is affected, and there will also be other undesirable effects. Feedback into the earlier stages of the transmitter may cause instability, RF voltage may reach the modulator, with results too common to need description, and even the power packs may be affected, causing a rough note or modulation hum. From all points of view, therefore, good earthing is very essential.

An interesting little experiment may be carried out in this connection if an RF ammeter is to hand. First, the transmitter is operated without any earth connection, using one of the higher frequency bands where the aerial forms the radiating system on its own. Probably results will be fairly normal. The earth is then attached with the RF ammeter in series—almost certainly a current will be registered, providing the meter is a low reading one. It is important that this current has a direct path to earth, of the lowest possible impedance, and no circulatory paths should be allowed. The schematic in Fig. 14 indicates the *wrong* way of earthing a number of units forming parts of a complete transmitter, and it should be remembered also that power leads and interconnecting cables may form alternative paths in each case! The right way is shown in Fig. 15. The junction piece should be a stout brass terminal strip and from this point the earth lead proper should be as short as possible and of low resistance and inductance. One thin wire is definitely not good enough—the gauge should be 14 SWG at least and it is preferable to use several wires in parallel. Even better is brass or copper strip.

The earth lead may give trouble when its length, with the capacity loading of the transmitting equipment, approximates to a quarter-wavelength at the frequency in use, when the transmitter end will tend to develop RF voltage. The mains supply (where used) will form an earth of sorts but will almost certainly have considerable impedance. If the earth does show resonant effects, RF voltage may be fed into the mains wiring to a much greater degree than would otherwise be the case and interference thus caused to broadcast or television receivers.

There are two ways of preventing trouble of this nature. One is to series tune the earth by the insertion of a variable condenser and perhaps a small loading coil. The aim is then

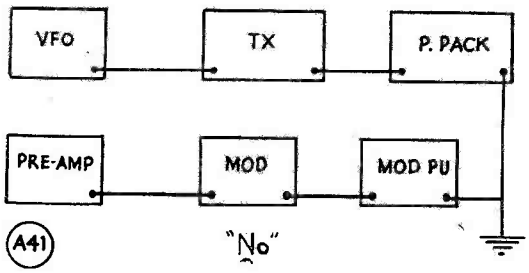


Fig. 14. How NOT to earth down a number of units forming part of a transmitting installation.

to produce a series resonance at the working frequency and thereby cancel out the inductive reactance of the earth lead so that both ends of the earth lead are at zero RF potential. As intermediate points will develop RF voltage, good insulation at all points is desirable. This cure is of course only effective over one particular frequency band, but it is highly probable that the trouble, when experienced, will be found only on one band—that one at which the earth lead is near a quarter-wavelength. On other bands the series tuned circuit should be shorted out.

The other method is to use more than one earth connection. The writer uses three separate earths, the lead to each being of a different length so that any tendency of one to develop by itself a resonance is "killed" by the fact that the other two are in parallel with it. Further, under such circumstances, one or other of the leads is almost bound to have a low impedance at the working frequency and naturally any current flowing to earth takes the path of least resistance. It is interesting to measure the current flowing in the individual earth leads and, in actual fact, it is found that one will take a greater proportion at one frequency and a different lead takes it at another frequency.

There is yet another way to avoid RF appearing where it is not wanted—this is the employment of a counterpoise, cut to a length which corresponds to a quarter-wavelength. The end should be well insulated and it is not advisable to use the earth connection at the same time, or again the combined effect of the counterpoise and length of earth lead may give rise to peculiar tuning resonances.

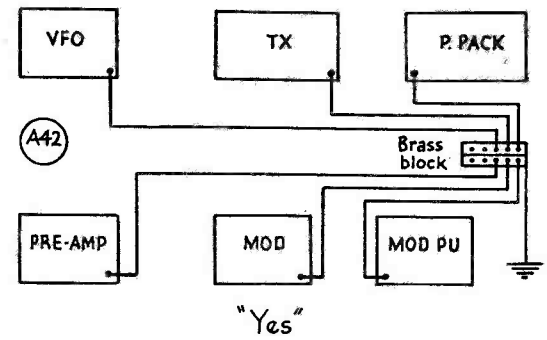


Fig. 15. Compare with Fig. 14. By earthing as shown here, each unit separately, circulating currents and instability are avoided.

BIRTHDAY HONOURS

Her Majesty's first Birthday Honours List was published on June 5 last, the date of the Official Birthday. Included in the List were Air Vice-Marshal L. Dalton-Morris, C.B.E., Assistant Chief of the Air Staff (Signals), who was made C.B.—he operated under the call YI6DM as long ago as 1927; Colonel A. H. Read, Director of Overseas Telecommunications, G.P.O. (the branch that deals with our licences), who was made C.B. in the Civil List; Dr. R. L. Smith-Rose, D.Sc., Ph.D., Director of Radio Research in the Department of Scientific and Industrial Research, who was made C.B.E.; and Dr. B. G. Dickins, Ph.D. Ministry of Supply, who played a large and important part in the operational application of Radio Countermeasures during the last war, also C.B.E. These are well-deserved honours to eminent men in the radio and electronics field, and to them we offer our congratulations.

R.1155 CONVERSION

The small band of radio enthusiasts at the Greenford County Grammar School are anxious to know if anyone can give details for the conversion of the R.1155 for AC/DC operation. The boys are very keen and, not being able to afford expensive equipment, make do with what they are lucky enough to obtain by saving their pocket-money, and by donation. Any reader able to solve their current problem is asked to write: The Handicraft Master, Greenford County Grammar School, Ruislip Road, Greenford, Middlesex.

SHLIGHT SHLIP

We read "Z" for "X," the printer read "X" for "Z." In that caption under the photograph on p.245, June, GM3HXF says it is **not** him—so the call-sign must be G3HZF; indeed, we have it as G3HZF. Sorry, both! We hate slipping on call-signs.

Improving the EL-Bug

CIRCUITRY, ADJUSTMENT AND OPERATION

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

The "automatic" key is becoming widely used as a means of sending good Morse easily; and any operator passing through the "glass-arm" stage, induced either by advancing years or the lack of regular practice, should consider changing to an electronic key—and learning how to use it. But not every El-Bug is all it might be. This article explains the how-and-why, and shows that perfect results can be achieved.—Editor.

MANY and varied have been the designs for electronic keyers which have been published during the past five years. Each of them has claimed certain advantages over all the others, all of which are said to have certain shortcomings of various kinds.

This article is not yet another attempt to recommend a "new" circuit, but simply covers a few personal experiences in trying to make one of the original ones work *perfectly*.

The writer first constructed an El-Bug simply because he was rather tired of being told *(a)* That it was one of the most difficult things in radio to make work perfectly; and *(b)* That it was the easiest thing possible, and why all the fuss?

The actual job turned out to be neither! Within five minutes of soldering the last joint the thing sent the most perfect dashes imaginable, but the dots were all over the place. So it looked like being one of these halfway jobs—simple in conception but badly in need of a tidy-up. It is the tidying-up process that will be described here, in the hope that other imperfect El-Bugs can be similarly treated and with equally good results.

The Circuitry

The diagram, Fig. 1, shows the circuit in its final form. It started as the original OZ7BO circuit and remains very much the same except in matters of small detail. The original circuit, without modifications, works admirably with the right relays, as anyone who has heard OZ7BO on the bands will testify. But he did state, in the original article, that its reliability depended upon the use of a suitable relay in the "A" position, and that the high-speed types available through "surplus" channels were *not* suitable.

This particular instrument was deliberately built with two of these high-speed relays (Type H85C, 10F/480). Here, then, was the probable cause of the erratic dots; Relay A (Ry 1) was operating too fast and breaking the "A" contacts as soon as the condenser C1 began to charge up. So, we thought, if the thing is too fast, why not slow it down instead of going to the trouble of unearthing a slower one? Accordingly C2 (a 1 μF condenser) was connected across the coil of the "A" relay—and

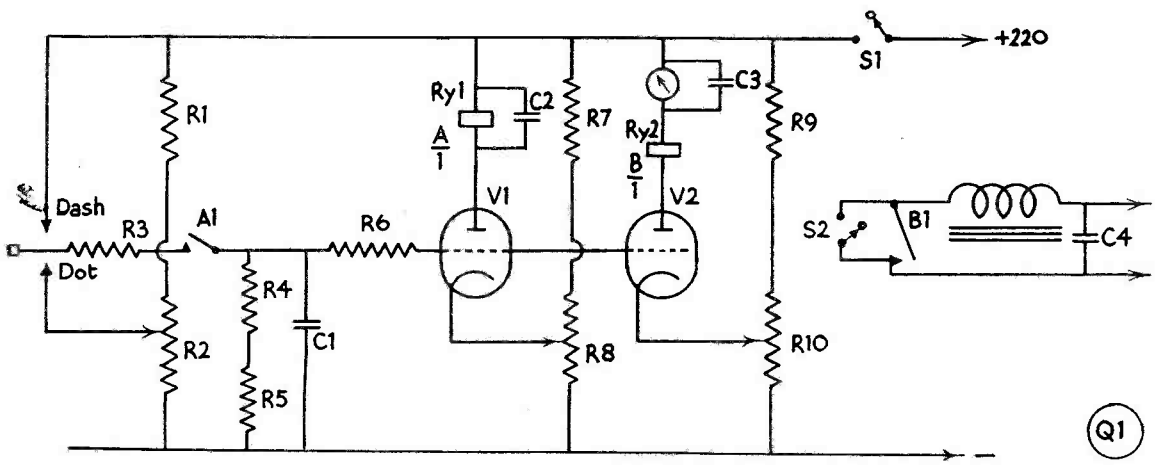
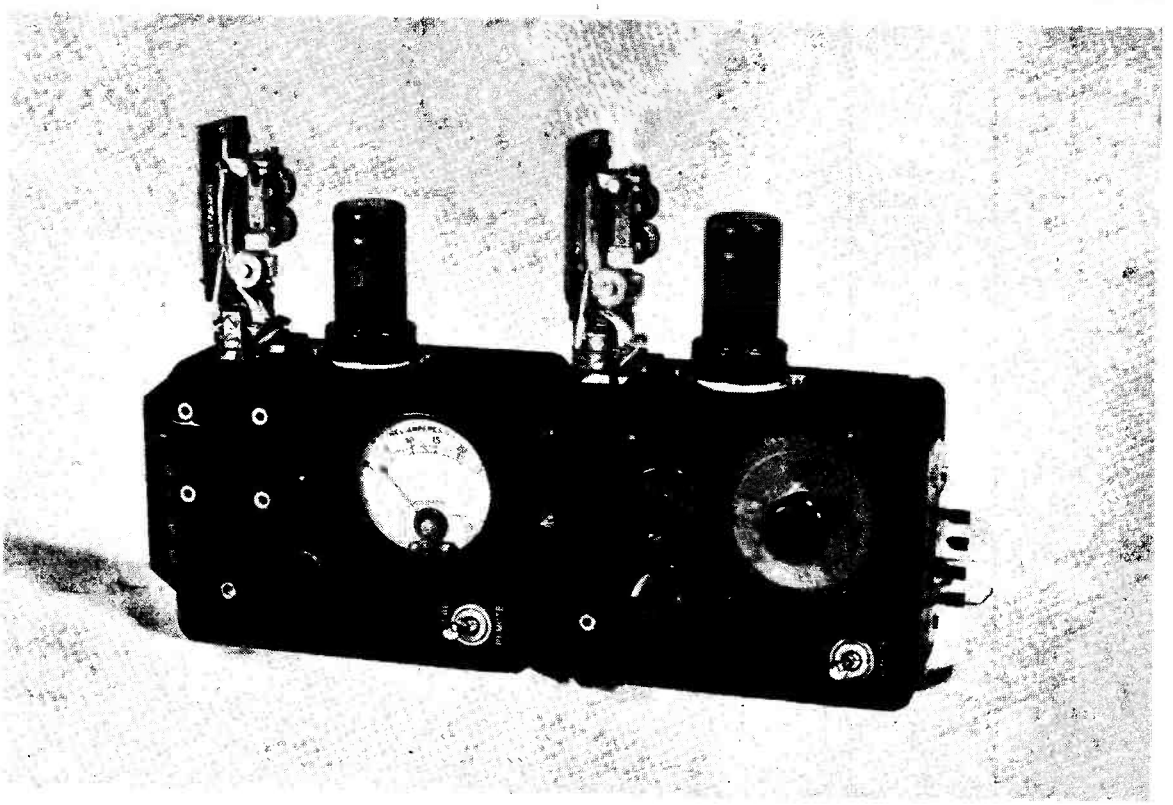


Fig. 1. Circuit of the automatic Morse key described in the article. When the relays RY1 and RY2 are energised, contacts A1 break and B1 make. *(Note: R5 should be shown variable.)*



The electronic key as built up in practical working form. Any other suitable method of construction can of course be used, totally enclosed, and with or without built-in power unit. The meter is a very desirable refinement—see text.

the dots cleaned up immediately. They were perfect !

Next, a certain amount of juggling with values was carried out, chiefly to enable those components available to be used. It was desired to scrap the " breadboard " model and to finalise the design in a much smaller space. To be exact, two small boxes from " Antenna Relay Units Type CCT-29125 " were to be used. All the other useful components had been stripped from these boxes, including the relays (*not* used for the El-Bug, but for aerial change-over), the thermo-ammeters, and the terminals—but it seemed a pity to throw away the empty boxes !

So the two of them were bolted together, V1 and V2 mounted in the correct-sized holes conveniently exposed on the upper sides, and two square holes cut for the fitting of the relays. Most of the V1 components went into one box, and all the V2 components in the other.

The speed control, R5, was mounted on a piece of wood covering the meter hole in the right-hand box, and given a small dial ; the corresponding hole in the left-hand box was filled by a milliammeter which has since turned out to be invaluable for checking the mark-space ratio and the lengths of dots and dashes. This is in the anode circuit of V2.

Two tag-strips were mounted at the ends of the unit, one for the input of HT and LT and the output terminals, the other for the three connections from the external paddle.

The deviations in values from the original circuit details are small. The charging condenser C1 was reduced to .05 μF from 0.2 μF in spite of warnings that too small a value would make the grid impedance too high and

Table of Values

Fig. 1. Circuit of the Automatic Key.

C1	= .05μF	R4	= 200,000 ohms, $\frac{1}{2}$ watt
C2	= 1μF	R5	= 1 megohm, variable
C3	= 25μF	R6	= 2 megohm, $\frac{1}{2}$ watt
C4	= .01μF	R7, R9	= Each two 50,000 ohm, 2 watt, paralleled
R1	= 20,000 ohms 5 watt	V1, V2	= 6J5G, 6J5, or one 6SN7
R2, R8, R10	= 10,000 ohm variable, w/wound	Ry1, Ry2	= *See text*
R3	= 1,000 ohms, 1 watt	M	= 0-25 mA m/c meter

make the thing susceptible to AC pick-up. Reduction in size of this condenser is necessary on account of the use of a high-speed relay in the "A" position—but it still doesn't make good operation possible without the use of the "slowing-down" condenser C2.

The resistors R7 and R9 were made from two paralleled 50,000-ohm 2-watt types on account of the bulkiness of 25,000-ohm 5-watters. Otherwise the circuitry remains almost the same as in OZ7BO's design except that two 6J5's were used instead of one 6SN7 —again a matter of looking in the cupboard and seeing what was there !

Adjustments

The milliammeter is shunted by a 25 μF electrolytic for damping purposes, so that the mark-space ratio can be set up without having to use an externally keyed circuit. It is set so that when the contacts of the "B" (Ry 2) relay are held closed a reading of 20 mA is given ; when dashes are being sent, it reads 15 mA ; and dots give a reading of 10 mA. Careful study of the fundamentals of the Morse code will show that these readings correspond to a theoretically perfect mark-space ratio *and* a perfect ratio of dot length to dash length. These exact readings need not be duplicated, but the proportions must remain the same.

One more point remained to be cleared up. The operation of the "B" relay depended to a great extent on the circuit into which it was connected. A grid-block method of keying gave perfect results, but when it was plugged into another transmitter with cathode keying and a slight spark, the dashes became sluggish at the ends. So an external filter was added, consisting of quite a large choke (20H, to be exact !) and, on the far side of it, a condenser of .01 μF. This gave clickless keying and did not upset the operation of the relay.

Finally, the switches in the two little boxes were used to some advantage. One was employed for cutting the HT (S1) and the other for shorting the keying contacts (S2). If you have been used to an ordinary "bug" key with a shorting switch you are inclined to miss this refinement when changing to an El-Bug —after all, you can't hold the dash contact for a long dash ; it merely sends a sequence of normal ones. So this switch is a necessary refinement.

There only remains the business of learning to send on the thing, which cannot be imparted in print ! One helpful remark, however, may be made: That most early mistakes in the handling of an El-Bug seem to be due to the desire to make certain dashes too long. If you have spent years sending CQ on an ordinary key and making the second dash in the "Q" rather longer than the first (and most people do —just listen to them !) you will have to cure yourself of that habit. This key insists on dashes of equal length for all purposes. If you hold one too long you will merely get two normal ones !

And please do your practice on a buzzer or oscillator, and not on the air ; let it loose when you can handle it properly, and your "fist," though no longer individualistic, will be easy to copy and generally admired. But start up with it on the air straight away, and listeners to your signal will wonder what on earth you are trying to impart with your Chinese, Eskimo or Martian Morse. Finally, when you do master it with certainty, remember that El-Bug Morse is usually faster than it sounds, and don't assume that *everyone* can copy 25's. Time yourself, and you will be surprised at the speeds that you attain without realising them.

QSL BUREAU

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VALE GW6GW

It is with deep regret that we have to record that Howard Gwillim, GW6GW, of Tredegar, Mon., was killed by electrocution on May 27 last ; he was found in his radio room, extensively burned, with his head in contact with the microphone and an HT lead near his body. An inquest was held and a verdict of "Accidental Death" returned. First on the air as G2QG, operator for the old Ebbw Vale Radio Society, he obtained his own call in 1930. As GW6GW he was an enthusiastic LF band exponent, and a very fine telegraphist. All South Wales amateurs knew him as typifying the real spirit of Amateur Radio. He was 51 years old and leaves a widow and 16-year-old boy, to whom we offer our sincere condolences — the writer of this notice knew him well.

Sound Recording

MAGNETIC METHODS AND PRINCIPLES OF OPERATION

R. E. B. HICKMAN
(RCA Photophone, Ltd.)

PART II

THE original U.S. Patent taken out in 1900 by Poulsen is generally recognised as marking the beginning of the history of magnetic recording. Following this pioneer work the process was developed by such workers as Stille, Begun and Volk in Germany, and by Camras and Schrage in U.S.A. At the outbreak of the Second World War the Marconi-Stille magnetic tape recording equipment, extensively used by the B.B.C., was probably the most highly developed commercial magnetic recorder then available. During the war intensive research and development in magnetic recording was carried out both in America and in Europe, and it is probably true to say that nowadays recording on some kind of magnetic material is the most widely used method.

Magnetic Materials

It may help us to a better understanding of the principles of magnetic recording if we start by considering the various types of magnetic materials which are available. Magnetic materials are divided amongst two classes: diamagnetic or paramagnetic. A diamagnetic material is one which has a permeability less than unity. (The permeability of a magnetic material is defined as the ratio of the magnetism induced B to the magnetising force H). Paramagnetic materials have permeabilities greater than unity. In the case of ferromagnetic materials, which are those used in recording, the permeability is much greater than one. Ferromagnetic materials can be further subdivided into hard and soft materials. Both types have applications in recording work. Soft magnetic materials have a low retentivity; in other words, they are readily magnetised in a magnetic field but the effect is removed when the magnetising force is withdrawn. Such materials are used in transformers, pole pieces and magnetic recording or reproducing heads. Hard materials on the other hand, have a high retentivity and consequently retain their magnetic effect long after the magnetising force has been removed, although they are not so readily affected as soft materials. It is magnetic materials of the latter type which—in the form of metallic tape or wire, or embedded in plastic tape, or coated on film or paper—are used as the recording media in magnetic systems.

Types of Recording

There are three possible methods of magnetic recording; namely, perpendicular, longitudinal or transverse (Fig. 1). In all methods the wire or tape passes over a recording head consisting of two pole pieces separated by a very small air gap. The pole pieces may be both on the same side or on opposite sides of the magnetic materials. Coils wound round these pole pieces carry a varying electrical current, the fluctuations of which represent the original sound impressed upon the microphone. The magnetic lines of flux going around the core pass at the gap into the recording medium and when the flux is varied as outlined above the magnetic state of the medium is altered as it is passed over the recording head. Due to the fact that hard magnetic material is used this change in the magnetic state is permanent (or sensibly so) and a recording of the original sound is produced.

In the perpendicular method of recording, Fig. 1a, the magnetic material is actually passed through the gap in the pole pieces. This means that for a given thickness of material the length of the magnetic path in the material is constant irrespective of frequency, and hence a good high frequency response is possible. A disadvantage of the method when using tape is that for high efficiency and quality it is desirable that the gap should be as narrow as possible which consequently imposes limitations on the strength and durability of the tape. The perpendicular method is mainly used in wire recording.

Transverse recording, Fig. 1c, is rarely used in practice. It has the disadvantage of requiring a tape so narrow as to be impracticable. It will be realised that for wire recording, perpendicular and transverse recording are identical.

Longitudinal Recording

The commonest method of recording in present use is the longitudinal mode. There are three arrangements of the pole pieces which may be used. The first employs a single pole piece; the second uses two staggered pole pieces; while the third uses a ring-type head (Fig. 1b). In all three types the length of the magnetic path depends on the frequency of

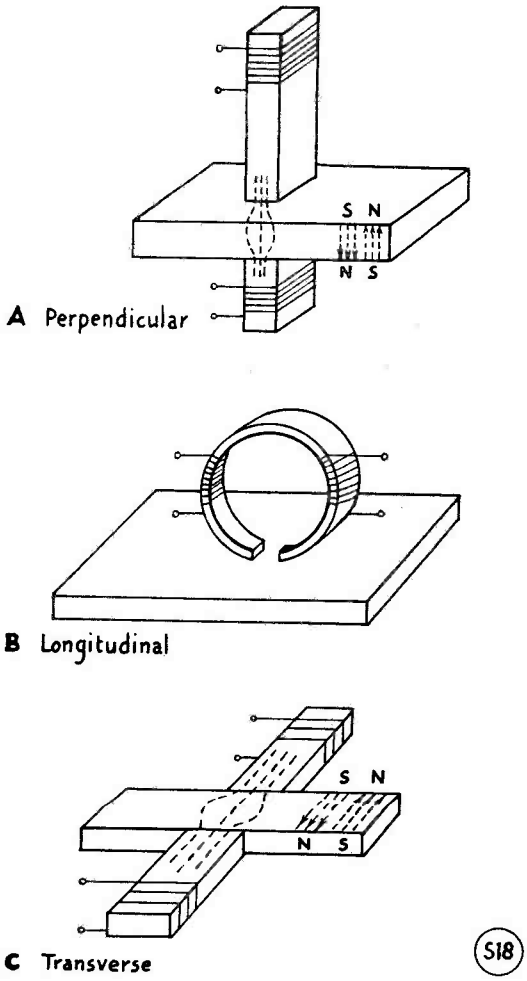


Fig. 1. Three types of magnetic sound recording.

the signal and hence this method is characterised by falling high-frequency response. The principle advantages are that wide strong tape can be used as only the thickness of the magnetic coating is significant; the pole pieces can be wide and sturdy and the gap width can be made very small. Longitudinal magnetisation is the most sensitive of the three types considered and hence the amount of amplification necessary to operate the recording head is less than with the other methods.

Magnetic Materials

Having discussed briefly the various methods of magnetic recording it may be appropriate to give some thought to the properties of the material best suited for use. For the core of the recording head a material is required possessing high permeability, low hysteresis loss and low eddy-current loss. Almost without exception mu-metal is employed as the core material. The characteristics of the high-retentivity material used as the recording medium are much more involved and many hypotheses have been advanced to explain all the many factors involved. Many factors have to be considered in the selection of a recording material, including tape speed, thickness of material, constructional details of the head, and so on. The two important magnetic properties of a recording material are its residual magnetism, *i.e.*, the amount of magnetism remaining in the material after it has been removed from the magnetic field, and its coercivity, *i.e.*, the degree of applied field necessary to reduce this residual magnetism to zero. On the former property we depend in order to induce a signal into the playback head, while the latter property is important in determining the amount of self-demagnetisation which may occur and the frequency response which may be achieved.

Most of the early work on magnetic recording was carried out with wire, but of recent years wire has been displaced as the usual medium by tape. Wire recorders still have their uses, but one serious disadvantage lies in the difficulty of handling wire unless it is wound on plug-in type magazines. Also, as pointed out earlier, it is advisable for optimum results to use a very fine wire and this, by reason of its fragility, imposes certain limitations on the driving mechanism, in particular making it difficult to obtain a high rewinding speed. Magnetic wire is also expensive compared with present day tapes. From a professional point of view a serious drawback of the wire system is the difficulty of editing the recording material. It is not very easy to devise a successful method of cutting out an unwanted length from the wire, although early instruction manuals talked glibly of simply snipping out the unwanted portion and "tying" the broken ends together again! Magnetic tape recorders, using either a paper or a plastic base impregnated or, more simply, just coated with the magnetic material, are capable of overcoming most of these disadvantages of wire.

A plastic tape with impregnated magnetic material was in use in Germany during the recent war. This material was extremely durable and robust for handling, but it was found to be extremely susceptible to magnetic leakage. With this type of material wound

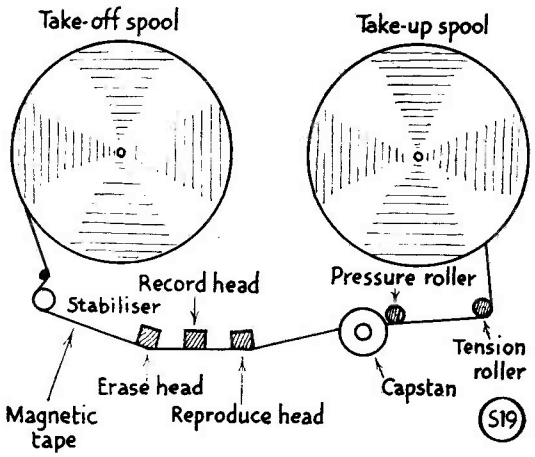


Fig. 2. Typical arrangement of Tape Desk in magnetic recording instruments.

in the usual manner on spools it was found that an image of the signal on any one layer of tape would "leak through" to the layers immediately above and below that containing the signal!

At the present time the tapes most commonly used are made of paper or plastic base coated with the magnetic material. In such a tape the base acts as a sufficiently good insulator effectively to prevent any magnetic leakage when the tape is spooled. Editing and splicing with such a tape is of course very simple. In an emergency it is only necessary to cut out the unwanted piece of tape and patch up the joint with a transparent sticky tape. For more permanent joints specially manufactured splicers are available. Paper tape is very easy to handle and if a reel is dropped or unwound accidentally it may easily be rewound without damage. As another result of its durability and general sturdiness tape can be rewound at high speed when a quick playback is desired.

A Typical Magnetic-Tape Recorder

At the present time there are many tape recorders available on the market, and it is not possible in a short article of this nature to examine the particular features of each one. Several types have been illustrated in these pages. We shall, however, describe a typical instrument and examine some of the essential features which are common to all commercial recorders.

A typical magnetic tape recorder looks at first glance something like a conventional table model gramophone and usually weighs about 30-45 lbs. The single cabinet contains in general all the mechanical and electrical components required for the making and reproducing of recordings. These components may include an amplifier, drive, take-up and rewind motors, supersonic "erase" and "bias" voltage generator, erase and record-playback heads and playback-monitor loudspeaker together with all necessary operating controls. Since the usefulness of a recorder is greatly increased if it is portable most of the commercially available models are arranged to be self-contained with provision for carrying a microphone, spare spool of tape and all necessary connecting leads in the one cabinet.

Tape Drive Arrangements

The standard tape speed for magnetic recording is $7\frac{1}{2}$ inches per second, which gives a 30-minute record on the standard 7 inch diameter spool holding 1,250 ft. of tape, and also permits a good frequency response up to about 7,500 cps. Tape drive arrangements differ considerably according to manufacturers' preferences and to some extent according to the price of the finished articles (see Fig. 2). Some manufacturers provide three separate motors, one each for wind-on, take-up and rewind. Others drive the tape-up spool from the wind-on motor while retaining a second motor for fast rewind. On yet other models a single motor performs all the necessary drive functions.

It will be appreciated that if twin-speed operation is required from an instrument employing a single motor only it may be necessary to provide somewhat elaborate speed change devices. Some manufacturers use a switched-pole, two speed motor, which is truly synchronous at both speeds; other instruments are hysteresis type synchronous motors with

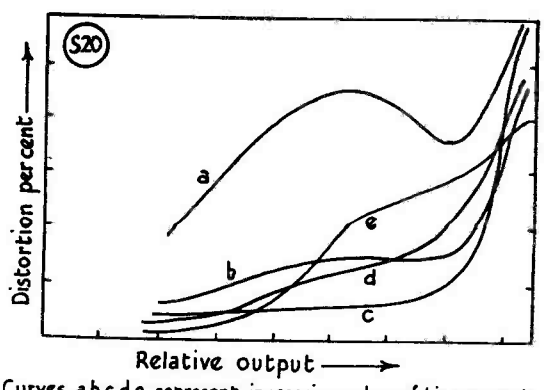


Fig. 3. Curve relating distortion to output level.

two windings which may be switched into circuit as required.

Practically all magnetic recorders use a capstan drive for wind-on. This capstan is fitted with a heavy flywheel to ensure constant speed and reduce "wow" to a low figure. The take-up drive, whether a separate motor or some other arrangement, operates to maintain tape tension forward of the recording head and runs at a variable speed depending upon the diameter of the tape on the spool. Although 7½ inches per second is the standard drive speed many manufacturers provide alternate speeds on their instruments, either a faster speed to permit an extended high frequency response, or a slower speed to permit a longer recording time. A recent development to increase playing time is the twin track machine. This instrument, as the description implies, records two tracks on the same length of tape and incorporates automatic and instantaneous reversal of the direction of tape travel at the end of the reel. Thus a full hour's record can be made using standard spools at standard speed.

Although wind-on speed has been standardized, the same agreement does not seem to have been reached on rewind speed. Various manufacturers list rewind times of their instruments in the range 30 seconds to 3 minutes. Most recorders include some positive type of braking on the rewind motor to enable the tape to be brought to rest almost instantaneously at any time.

Tape Threading

A considerable amount of attention has been paid by tape recorder manufacturers to the basic design of their instruments from the point of view of ease of threading and general convenience of handling the tape on the machine. As a result it would appear that for a horizontal tape deck the tape should move from the left-hand to the right-hand spool and around the front edge of the deck. With machines arranged for vertical spool operation it seems desirable to have the tape move from the upper to the lower spool and along the left hand side of the deck. Threading tape on to a recorder is in most cases a very simple process, merely involving threading the leading end of the tape on to the take-up spool with both spools in position and then lifting the tape over the capstan drive and recording head. In a great many machines the path between the take-off and take-up spools is quite short and for the most part consists of a slot in the recorder head assembly.

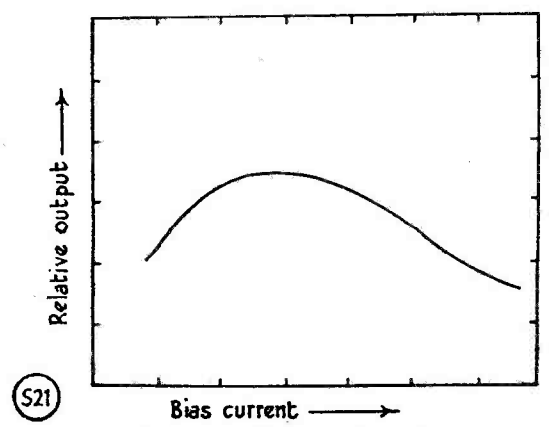


Fig. 4. Output level related to bias.

Recorder Head Assembly

Under this heading we propose to deal with the recording, the reproducing and the erasing heads. Quite a number of manufacturers use the recording head as the playback head also, but the erase head is generally a separate unit. Often the 3- or 2-unit head assembly is arranged as a compact plug-in attachment.

Recording Head

The recording head performs the important function of placing the required programme material on to the tape and in common with the other two heads is precision made to a very high order of mechanical accuracy. In practice most recording heads are of ring type construction, consisting of a small core of high permeability material such as nickel-iron or mu-metal with a coil wound on the core and provided with a gap in the form of a slot over which the tape is passed. The gap must have accurately ground square edges, and be exactly at right angles to the motion of the tape. The head is generally provided with a magnetic shield to reduce stray magnetism. Through the coil passes the signal current and also a high-frequency biassing current. This high-frequency bias effectively removes the inherent non-linearity of the magnetisation curve of the recording medium, although there are many so-called explanations of how this effect is achieved. It can be shown experimentally that there is an optimum value for the bias current; for high or lower values distortion is actually increased (Fig. 3) and the overload level of the tape is decreased (Fig. 4). It is worth remarking that different makes of recording tape require different values of bias, and hence it is advantageous if the bias voltage

of the recorder is adjustable. In order to avoid any possibility of inter-modulation effects between the bias frequency and the audio frequencies in the signal, a supersonic frequency is adopted for the bias, generally of the order of 100 kc.

During its travel over the recording head the tape is first of all subjected to an increasing alternating field (due to combined bias and signal leakage flux). This field reaches a maximum value at the centre of the gap and decreases again rapidly to zero as the tape leaves the gap. The exact width of the gap is not of first importance, the controlling features being the bias frequency and the rate of decay of the leakage flux outside the gap. This decay must be as rapid as possible as the effect of leakage flux outside the gap is to erase the signal recorded on the tape. Recording losses in the gap and subsequent leakage erasure are small in effect, however, compared with those due to self-demagnetisation in the tape itself. In longitudinal recording each wavelength is recorded along the length of the tape, and for a tape running at $7\frac{1}{2}$ inches per second the wavelength of a 7,500 c.p.s. signal would be 0.001 inch. The width of the track would be, say, 0.2 inch, so that a half-wave at this frequency would produce a bar magnet 0.2 inch wide and only 0.005 from north pole to south pole. This ratio of length to width (in this case $0.0005/0.2 = .00025$) is called the aspect ratio of the magnetic material. It has been calculated that for efficient permanent magnetisation of the tape the aspect ratio should be approximately 8. (This figure varies somewhat according to the properties of the magnetic material used. It is lower, for instance, for impregnated tape than for solid wire.) Aspect ratios less than this mean that the material tends to demagnetise itself and of course the effect becomes more pronounced the higher the recorded frequency. To counteract this high frequency loss it is usual for the recording characteristic to be level up to about 1,000 c.p.s., above which frequency it is desirable to introduce pre-emphasis, as shown in the curves of Fig. 5. The output power of the recording amplifier need not be very great, although the bias oscillator must be capable of supplying adequate power.

Reproducing Head

The reproducing or playback head is very similar to the recording head. Indeed in some instruments the same head is used for both functions. The head functions as a generator with its coil remaining stationary in a changing magnetic field. As the flux surrounding the tape enters the region of the gap a voltage is induced in the coil of the head.

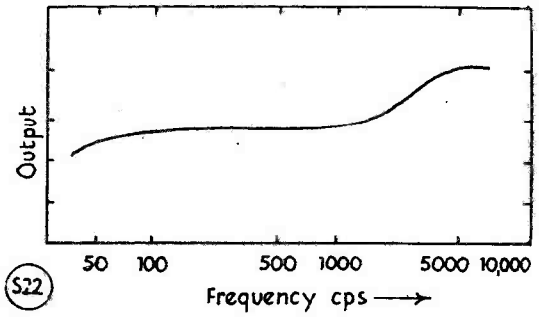


Fig. 5. Typical recording characteristic.

(Part III of this article will follow)

Simple RF Check Meter

ABSORPTION WAVEMETER AND PHONE MONITOR

E. H. TROWELL (G2HKU)

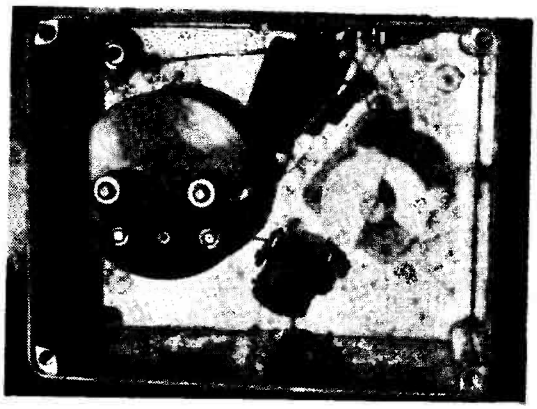
THIS type of measuring instrument is simple to build and relatively inexpensive, yet it is one of the most useful items to have about. It will check the frequency of the transmitter, indicate field strength and monitor a phone transmission, over a range of 1,600 kc to 40 mc. Also, if required, the instrument can be used to facilitate the final adjustment of neutralization in RF amplifiers — and also receive broadcast programmes in the medium waveband !

Circuit

A resonant circuit in series with a Germanium type crystal and micro-ammeter is used. A 2 ft. rod aerial enables outside readings to be taken, but is not essential for use inside the station. To give improved sharpness of tuning the crystal is tapped down on the coil.

Construction

The tuned circuit leads should be kept short by mounting the coil socket directly above the



Arrangement of the parts inside the RF Check Meter.

tuning condenser. The micro-ammeter is of the type actually calibrated 0 to 15 and 0 to 600 volts, and may be obtained for a few shillings on the surplus market. Care should be exercised when soldering the crystal in position, and the wire between the joint to be soldered and the crystal should be gripped firmly by pliers in order to dissipate the heat and prevent damage to the crystal.

Plug-in coils are used, and for the 1,600 kc to 5 mc range a plain former is best. The wire should be set in place by Polystyrene cement after winding and checking. If it is required to receive the Light Programme (or other Medium Wave stations) a coil of 125 turns of 30 SWG enamelled wire should be used, tapped 25 turns from the earth end. A good outdoor aerial will be needed for reception under these conditions.

Calibration

This may be carried out by a signal generator or VFO in the normal manner, or, if neither is available, by coupling the wavemeter to the receiver and switching on the BFO. Tune in a signal on the receiver and rotate C1 until the beat note changes, then read the frequency off the receiver dial. A graph may then be prepared reading frequency against dial readings. An alternative method of calibration, where a calibrated communications type receiver fitted with an S-meter is available, is to couple the wavemeter tuning coil to the aerial input terminals of the receiver by a two- or three-turn link. Tune in a strong signal on the receiver and note the S-meter reading ; now slowly rotate the wavemeter dial until a dip is indicated on the S-meter. Repeat this on other signals until enough points are obtained to plot a graph.

Absorption type meters cannot, of course, give very accurate readings, but since it does not generate any harmonics, it will respond only to the frequency to which it is tuned. It will also detect RF in all sorts of unwanted places, such as microphone leads and mains wiring !

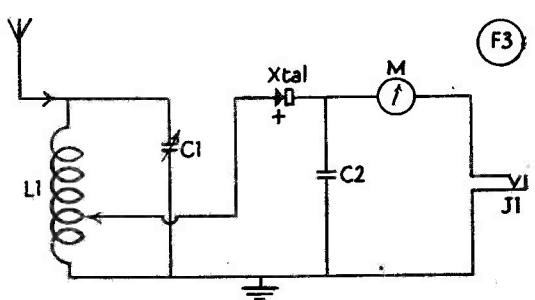
COIL TABLE

L1 = 1600 *kc to* 5 *mc*. 68 turns 30 SWG enamelled wire ; tap 20 turns from earth end.
L1 = 5 *mc to* 15 *mc* 24 turns 20 SWG enamelled wire ; tap 6 turns from earth end.
L1 = 15 *mc to* 40 *mc*. 6 turns 20 SWG enamelled wire ; tap 2 turns from earth end.

LIST OF PARTS

The Simple Check Meter

1 Microdenser 140$\mu\mu$F (C1.) Cat. No. 586 Eddystone.
1 4-pin plain coil former. Cat. No. 763 Eddystone.
2 4-pin threaded coil formers. Cat. No. 765 Eddystone.
1 Coil base, Cat. No. 707 Eddystone.
1 Diecast box. Cat. No. 650 Eddystone.
1 Dial 2in. Cat. No. 595 Eddystone.
1 .002μF mica condenser (C2.).
1 Crystal Germanium type B.T.H., GC1C.
1 Closed circuit jack (J1.). Igranic.
1 0-500 micro-ammeter. (*see text*).
1 Insulated terminal, for aerial.



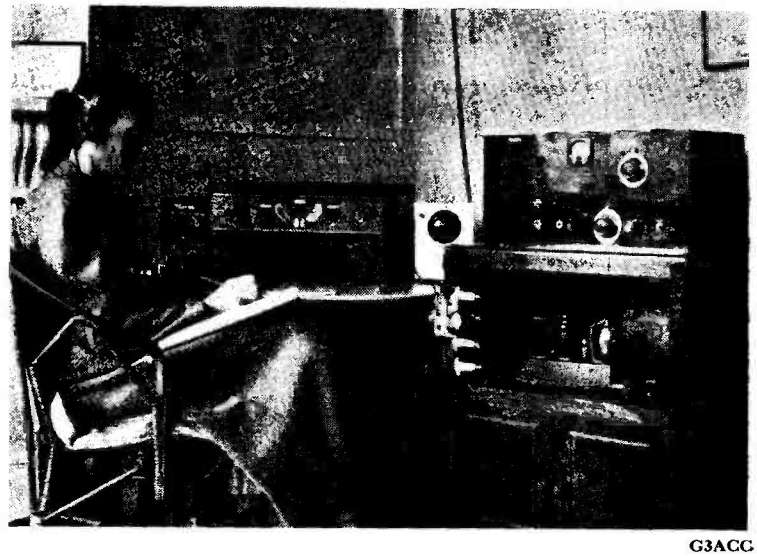
Circuit of the simple RF check meter.

SUBSCRIPTION NOTE

To be sure of your copy, you should place an order with your newsagent for regular delivery of *Short Wave Magazine*, as we cannot yet supply newsagents with copies for casual sales owing to the very high price of paper. In other words, every single copy has to be ordered, whether obtained through a newsagent or by direct subscription from us. If you want to have it delivered by post on publication, direct from us, it costs 30s. for a year of twelve issues—order on The Circulation Manager, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

DX COMMENTARY

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



G3ACG

WHO would be a DX Commentator these days? No sooner do we say that conditions are improving than they flop; if we *say* they are flopping they immediately become brilliant. And as soon as we say that EA9DC/Ifni has been working on phone only, up he comes on the CW band and works practically everybody! So many people have written this month simply to say that they *have* worked him (adding "on CW, too, Hi, Hi!") that it has quite cheered us up. Nice to know that so many people read every word in these columns . . .

Still no news of 21 mc. of course, but by the time you read this the first QSO's will have taken place and the 21 mc Marathon will be well under way. Concerning this Marathon, we propose to offer a prize to the first British amateur to work 100 countries on the new band. He will be invited to come and visit us personally, and to help himself to anything he fancies in a pile of junk which will be laid out specially for the purpose in the Old Garden Shed. (This will range from Marconi R and Mullard Ora valves to *QST* for 1925).

Twenty metres has still been carrying practically all the DX, so we will go straight ahead with that band and the 'chasers' doings thereon.

The DX on Twenty

G8FC (Locking) found four new ones with EA9DC, FB8BF, FR7ZA and ZC2MAC (the last three all around 1600). Other good contacts were KR6IO (1430), KH6's (0800), VP6FM (2100) and all the lesser lights. G2DPY (Shoreham) worked HP1LA (0700), CR9AF, KH6's, JA2OL and EA9DC, and wonders whether anyone actually *has* a card from 9B3AA; he says this type seems very anxious to get cards from DX countries, and he wonders whether he is (*a*) A pirate where he claims to be, or (*b*) Somewhere else.

'DPY adds that some of the "Other Man's Station" descriptions make him realise that such as he, with QRP and strictly limited aerial space, really have to *work* for DX. (But of course we do not confine this feature to QRO stations—we are just as interested in the low-power ones).

G3FPK (London, E.10) has put up a 20-metre dipole with insulators (shorted out) 5ft. 6in. from each end. On July 1 the shorts were to be removed! Meanwhile, he has worked CE (0100), CP1BK (back to a CQ at 0215), KV4 and SU on CW, as well as a YV on phone (0110). Gotaways were VQ1MD, FY7YB and EA9DC. 'FPK asks "What is the non-amateur rubbish that often makes the bottom 20 kc of Twenty unusable?" We think it is a pair (or trio) of picture transmitters—almost certainly Russian. If our 813 is up to scratch, some of the pictures must be pretty scratchy, too . . . .

Talking of 813's, G3ABG (Cannock) was let down by his and has now gone to an 803. But just prior to packing up, the 813 seemed to give him about three S-points more than ever before! Contacts on Twenty were 3V, W6 (four of them in a net!), IS, KV4, FQ, ZD9AA (1935), KZ5R (phoney?), and JY1's.

G3GUM (Formby) tried to get from EA9DC his probable date for operating in Rio de Oro, and got the cryptic reply, "Afta." (However, we understand that he will be there at the end of July). Other stuff worked by 'GUM: VP6FM, JY1, VQ5CK, FF, TA,

CALLS HEARD, WORKED AND QSL'd

LIST OF COUNTRIES BY PREFIXES

Correct to June 1, 1952

AC3	Sikkim
AC4	Tibet
AG2	Trieste
AP	Pakistan
AR1	*see* YK
AR8	*see* OD
C	China
C3	Formosa
C9	Manchuria
CE	Chile
CM/CO	Cuba
CN	French Morocco
CP	Bolivia
CR4	Cape Verde Is.
CR5	Portuguese Guinea
CR5	St. Thomas and Prince Is.
CR6	Angola
CR7	Mozambique
CR8	Goa
CR9	Macao
CR10	Timor
CT1	Portugal
CT2	Azores
CT3	Madeira
CX	Uruguay
CZ	*see* 3A
DL	Germany
DU	Philippine Is.
EA	Spain
EA6	Balearic Is.
EA8	Canary Is.
EA9	Spanish Morocco
EA9	Ifni
EAØ	Spanish Guinea
EI	Eire
EK	Tangier
EL	Liberia
EP/EQ	Persia
ET	Ethiopia
F	France
FA	Algeria
FB	Madagascar
FB	Kerguelen Is.
FB	New Amsterdam
FC	Corsica
FD	French Togoland
FE	French Cameroons
FF	French West Africa
FG	Guadeloupe
FI	French Indo-China
FK	New Caledonia
FL	French Somaliland
FM	Martinique
FN	French India
FO	French Oceania
FP	St. Pierre and Miquelon
FQ	French Equatorial Africa
FR	Reunion
FT	*see* 3V
FU	New Hebrides
FW	Wallis Is.
FY	French Guiana
G	England
GC	Channel Is.
GD	Isle of Man
GI	Northern Ireland
GM	Scotland
GW	Wales
HA	Hungary
HB	Switzerland
HC	Ecuador
HC8	Galapagos Is.
HE	Liechtenstein
HH	Haiti
HI	Dominican Republic
HK	Colombia
HL	Korea
HP	Panama
HR	Honduras
HS	Siam
HV	Vatican City
HZ	Saudi Arabia
I	Italy
I5	*see* MD4
IS	Sardinia
IT	Sicily
I/Trieste	*see* AG2
JA	Japan
JAØ	Iwojima
JY	Transjordan
K	*see* W
KA	*see* DU
KB6	Baker, Canton, Howland and American Phoenix Is.
KC6	Caroline Is.
KC6	Palau Is.
KG4	Guantanamo Bay
KG6	Mariana Is.
KG6I	*see* JAØ
KH6	Hawaii
KJ6	Johnston Is.
KL7	Alaska
KM6	Midway Is.
KP4	Puerto Rico
KP6	Palmyra Is.
KR6	Okinawa
KS4	Swan Is.
KS6	American Samoa
KT1	*see* EK
KV4	Virgin Is.
KW6	Wake Is.
KX6	Marshall Is.
KZ5	Panama Canal Zone
LA	Norway
LA	Jan Mayen Is.
LA	Spitzbergen
LI	*see* 5A
LU	Argentina
LX	Luxembourg
LZ	Bulgaria
M1	San Marino
MB9	*see* OE
MD1, 2	*see* 5A
MD4, MS4	Italian Somaliland
MD5	*see* SU
MD7	*see* ZC4
MF2	*see* AG2
MI3	Eritrea
MP4	Bahrein
MP4	Kuwait
MP4	Trucial Oman
NY4	*see* KG4
OA	Peru
OD	Lebanon
OE	Austria
OH	Finland
OK	Czechoslovakia
ON	Belgium
OQ	Belgian Congo
OX	Greenland
OY	Faeroe Is.
OZ	Denmark
PA	Netherlands
PJ	Dutch West Indies
PK1, 2, 3	Java
PK4	Sumatra
PK5	Dutch Borneo
PK6	Moluccas and Celebes
PK6, 7	Dutch New Guinea
PX	Andorra
PY	Brazil
PZ	Surinam
SM	Sweden
SP	Poland
ST	Sudan
SU	Egypt
SV	Greece
SV	Crete
SV5	Dodecanese
TA	Turkey
TF	Iceland
TG	Guatemala
TI	Costa Rica
TI9	Cocos Island
TT	Tannu Tuva
UA1	Franz Josef Land
UA1, 3, 4, 6	USSR (Europe)
UA9, Ø	USSR (Asia)
UB5	Ukraine
UC2	White Russia
UD6	Azerbaijan
UF6	Georgia
UG6	Armenia
UH8	Turkomen
UI8	Uzbek
UJ8	Tadzhik
UL7	Kazakh
UM8	Kirghiz
UN1	Karelo-Finnish Republic
UO5	Moldavia
UP	Lithuania
UQ	Latvia
UR	Estonia
VE	Canada (including Labrador and Newfoundland)
VK	Australia
VK1	Heard Is.
VK1	Macquarie Is.
VK9	New Guinea
VK9	Papua
VK9	Norfolk Is.
VO	*see* VE
VP1	British Honduras
VP2	Leeward Islands
VP2	Windward Is.
VP3	British Guiana
VP4	Trinidad and Tobago

VP5	Jamaica	VS7	Ceylon	ZD9	Tristan da Cunha
VP5	Cayman Is.	VS9	Aden	ZE	Southern Rhodesia
VP5	Turks and Caicos Is.	VS9	*see* MP4 (Trucial Oman)	ZK1	Cook Is.
VP6	Barbados			ZK2	Niue
VP7	Bahamas	VU	India	ZL	New Zealand
VP8	Falkland Is.	VU	Andaman and Nicobar Is.	ZM	Western Samoa
VP8	South Georgia			ZP	Paraguay
VP8	South Orkney Is.	VU7	*see* MP4 (Bahrein)	ZS1, 2, 4, 5, 6	Union of South Africa
VP8	South Sandwich Is.	W	U.S.A.		
VP8	South Shetland Is.	XE	Mexico	ZS2	Marion Is.
VP8	Graham Land (Antarctica)	XZ	Burma	ZS3	South West Africa
		YA	Afghanistan	ZS7	Swaziland
VP9	Bermuda	YI	Iraq	ZS8	Basutoland
VQ1	Zanzibar	YJ	*see* FU	ZS9	Bechuanaland
VQ2	Northern Rhodesia	YK	Syria	3A	Monaco
VQ3	Tanganyika	YN	Nicaragua	3V	Tunis
VQ4	Kenya	YO	Roumania	4X	Israel
VQ5	Uganda	YS	Salvador	5A	Tripolitania and Cyrenaica
VQ6	British Somaliland	YU	Yugoslavia		
VQ8	Mauritius	YV	Venezuela	7B	*see* PX
VQ8	Chagos Is.	ZA	Albania	9S	Saar
VQ9	Seychelles	ZB1	Malta		
VR1	Gilbert and Ellice Is.	ZB2	Gibraltar	Aldabra Is.	*Prefixes as notified.*
VR1	British Phoenix Is.	ZC1	*see* JY	Bhutan	
VR2	Fiji Is.	ZC2	Cocos Is.	Clipperton Is.	
VR3	Fanning Is.	ZC3	Christmas Is.	Comoro Is.	
VR4	Solomon Is.	ZC4	Cyprus	Easter Is.	
VR5	Tonga	ZC6	Palestine	Laccadive Is.	
VR6	Pitcairn Is.	ZD1	Sierra Leone	Maldive Is.	
VS1	Singapore	ZD2	Nigeria	Mongolian Republic	
VS2	Malaya	ZD3	Gambia	Nepal	
VS4	British North Borneo	ZD4	Gold Coast	Rio de Oro	
VS5	Brunei	ZD5	Nyasaland	Tokelau Is.	
VS5	Sarawak	ZD7	St. Helena	Wrangel Is.	
VS6	Hong Kong	ZD8	Ascension Is.	Yemen	

ET3Q. He now calls his Gotaways "One-way QSO's"—sounds much better, don't you think?

G5BZ (Croydon) has had gardening QRM, but managed quite a lot of DX nevertheless. He says the best way to raise FI8AB is to wait for him to send "CL" and then call him . . . . 'BZ thinks the warm weather must have affected G's tempers, as there has been a sharp rise in the clottery-coefficient recently. (We have also noticed a rise in the hæmo-psychotic index, but you must work that one out for yourselves.) 'BZ's main grouse is about local G's nattering continuously on phone, for which purpose they could use 28 mc, 1.7 mc or the GPO's DC band at 3d. a time.

G6QX (Hornchurch) collected two more Zones this year with VE8RA and CP1BK; others worked were FY7YB (2300), KG4AF (0001), VP7NM (2350), VK5AJ (2340) and VP9AX/P (2330).

G3IGZ (Eltham) is a new operator on the air but an old and very experienced SWL. Within six weeks of receiving his ticket he had worked EA9DC. VS6CG, KV4AA, KZ5CW, CT2 and 3, TA, EK and the like, using 25 watts to a folded dipole. He was sorry to miss FI8YB, KX6AH and ZD9AA—but quite a few old-stagers would like those, too!

G2HKU (Sheerness) only worked a WØ and a 9S4, but heard VR1AB (0545), ZK1BC (0630), OA4ED (0600) and the usual evening DX.

G3IHQ (Felixstowe) is none other than ex-ZE3JL; he hopes to be back in ZE by the end of the year, but meanwhile is running 150 watts on all bands and finding DX mighty difficult to work from G. G3IHI (Swindon) is ex-ZB2L, and he has been QRT in hospital since August, 1951. However, he now has his call and a B2 with a couple of crystals, and his first month has brought in 20 countries and 4 Zones. He has entered the Marathon table and wishes that more "first-year students" would send their scores along, however low they may be; and so do we. 'IHI has heard HH3L around 2300, but too far off his crystal frequencies to be worth calling. He adds that anyone still wanting a ZB2L card can have it from G3IHI. We all wish him a speedy recovery.

EI4X (Dublin) has moved across the city to a better DX location, and his ground-plane has brought him CR4 (0935), 4U-AJ (1915), ZD6 (1830), ZD9 (1920), FL8MY (2115), EA9DC, ZP1TB (2200), CP1BK (2335) and other nice ones. He doesn't like the way the European QRM usually stays with us until midnight.

Twenty-Metre Phone

Our regular phone correspondents have found the band patchy. G3TR (Southampton) worked EA9DC and ZP5CB (formerly ZP4BB). New ones for this year were CE, CT3, LX and ON—as well as the two above. He tells us, too, that CT1YA, inactive for a while, is back on the air, and that LU5XE, in Santa Cruz, was putting in an S9 signal at 2145 on June 6.

[Over

GM2DBX (Methilhill) had new ones on phone with VP5AY, SU5EB and HI6EC. He adds that for those who haven't yet worked PX and 3A. F7BB hopes to be operating as 3A2AQ from the end of June, and as PX1BB from about July 15. There will also be some more HE9 activity.

G3FXB (Hove) is getting going on phone, but meanwhile continues to knock them off on CW. The month's log shows CP1BK, EA6, EA9DC, FL8MY, JA, JY, ZC2MAC (1800), ZP5AY (2200), M1A (1600) and TA3AA (1030). 'FXB has scrapped his ground-plane, which didn't appear to show marked low-angle tendencies in any direction. The 8JK and 66-ft. Zepp. seem to do all that he wants. He suggests, by the way, that we should *not* allow contacts with the USSR to count for the Marathon. Such contacts, he argues, don't show any special skill or DX ability, and the whole business is somewhat fishy. On the whole, we are neutral; those who haven't worked USSR will side with 'FXB, and those who have will be "anti." Maybe inspiration will come our way before the end of the year!

G3CMH is the station of the Yeovil Club—not always out for DX but believing in good solid QSO's, whether phone or CW. Using 20 watts or so, phone has brought in IT, SP, SU5EB, YI3BZL, ZB2A, ZC6UNJ, and CW some 4X's. Best Gotaways were KC6QL (2015) and ZP9IH (2223).

G3HDL (Liverpool) recently moved to a QTH where no outside aerials are allowed. So he wrapped his 14-mc dipole round the walls of the shack and fed it with five feet of feeder. Six weeks of this have brought him in 43 countries in 13 Zones, including EK, IT, AG2, LZ, OX, TF, VQ4, YI, ZB2, LU, YE and W. He says the aerial even loads up nicely on 40 and 80 and gets around Europe on those bands. But he *would* like to find a contact in Oceania for his WAC!

G3ATU (Roker) winkled out EA9DC, ZC2MAC, ZD9AA and KW6AZ, but, like ourselves, missed out on FL8MY and is cursing his luck.

General DX Topics

Regarding the notorious FL8MY, he is otherwise known as HZ1MY/W6MLY / KL7JDG / XE3MY / W4DVL/WØMLY. He also hopes to become known, in time, as a YA, a YI, a CR8, a VQ6, as 4W1MY (shortly) and also with some queer prefix from the Sheikdom of Qatar. He has a 35V2/75A2 set-up on all bands, and intends to QRO shortly to 500 watts.

Rumour has it that VK2QZ, who has been operating from VK9, might be a VR4 shortly . . . KS6AA, KM6AX, W6HQH/KM6 and WØEGY/KJ6 make a nice little bunch for early morning chasers, the first two on CW and the others on phone. They can't be relied upon to show up *every* morning. . . .

The 21 mc Band

From KV4AA we have the following most useful notes on his experiences from May 1 onwards. His first QSO was with PY5XX, followed, in quick succession, by TI2RC, KV4AI, PY1AJ and PY2CK. No W's were audible, but at the time they were working CE3AX, YN1AA, TI2RC and PY2CK. KT1OC, also on May 1, worked HZ1MY, PY2AQ and 6AK, and heaps of Europeans, and heard YU, 4X, ZE and a few others.

On May 2 KV4AA found the band open to W, and made 90 contacts with the U.S.A., giving "firsts" to practically everyone. Later on, VK4HR, VK4SN and ZL1BY were worked. Things slumped on May 3, but Dick worked CE3AX, KH6YL, X8EE (??), WØCXX, HP1BR and a bunch of W6's.

Others reported on the band early in May included ZK2AA and VR2CG; some also known to be on were HC1RE, ZP4AB, CX's, KH6ANZ and ZD9AA.

So there should be no shortage of DX on the 21 mc band—*when we can hear it*!

The Falklands Story

The following gen., *via* our *Short Wave Listener* "Have You Heard" column, and collected by SWL J. L. Hall (Croydon), should interest those who have got their VP8's in a muddle: South Orkneys, VP8AE; Falklands, VP8AI, 8AP, 8AQ, 8AS; Graham Land (Antarctica), VP8AJ, 8AL, 8AM, 8AN; South Shetlands, VP8AK, 8AO; South Georgia, VP8AT, 8AU. There seems to be no activity in the South Sandwich Is. — has anyone ever worked them? Further clearing-up—Deception Is. counts as South Shetlands and Pebble Is. as Falklands.

FOUR BAND DX TABLE

POST WAR

Station	Points	3.5 mc	7 mc	14 mc	28 mc	Countries	Station	Points	3.5 mc	7 mc	14 mc	28 mc	Countries
W2QHH	501	93	92	210	106	210	G3ABG	281	35	79	139	28	146
G6QB	489	51	94	207	135	225	G8VG	259	34	76	123	26	140
G2AJ	433	42	81	192	118	211	G2BW	256	24	57	141	34	147
G5BZ	411	54	89	207	61	211	G2YS	248	40	45	123	40	136
G2VD	403	42	80	175	106	183	GM2DBX	226	5	31	109	81	129
G6LX	385	58	52	169	106	?	G3GUM	218	31	38	148	1	159
G5FA	365	33	111	148	73	163	G6TC	214	17	58	111	28	119
G3FXB	340	48	94	159	39	167	GM3EDU	197	37	41	96	23	116
G6QX	317	47	82	133	55	158	G3FXA	189	22	44	115	8	123
G6BB	310	38	80	138	54	147	G2HKU	185	4	48	119	14	129
G6YR	303	19	43	140	101	160	G3FPQ	168	41	19	101	7	107
HC2JR	293	3	15	143	132	183							

The Forty-Metre Band

Poor Old Forty still has a few devotees, and we should like to see them all suitably decorated. G3ABG (Cannock) had a spasm or two and was pleased to work several W's around 0100. G3IGZ found conditions poor, but managed 9S4AX and CN8CM.

G2HKU worked OA4ED (0600), KP4BR (0350) and KZ5RG (0450). Others heard in the early mornings were CE7AY, HK4DP, HK5DH, LU3DI, CM7PT, YV3AU, HH2FL and some PY's. G3FXB says the band is open for DX and quotes HK4DP and VP7NT, with YN1OC as a Got-away.

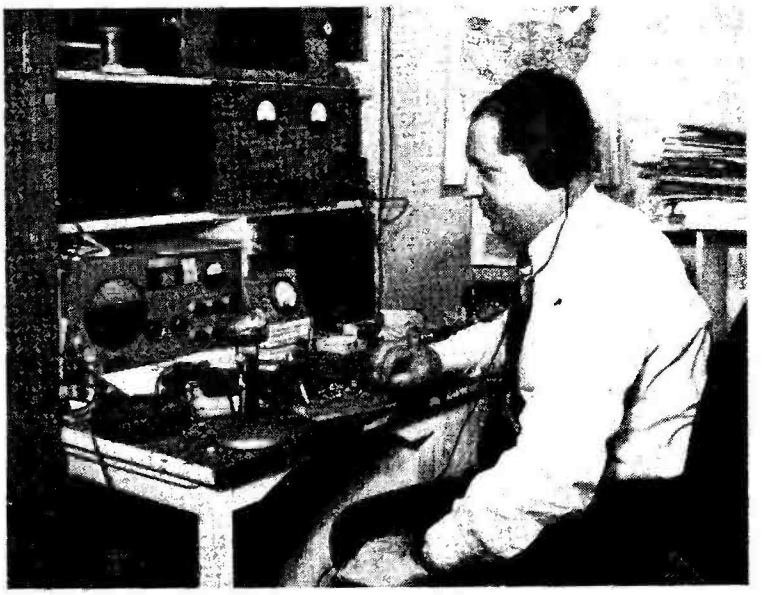
G3IBI (London, S.W.7) is a new reporter who takes a strong line about the jamming on Forty. As he says, it is a shared band only from 7150 upwards, and the Things between 7000 and 7150 are purely pirates. He suggests that we should set a time and date, and let loose all the signals G-land could muster on top of these wretched specimens. ('IBI uses only 10 watts and is rock-bound on 7049.)

G3HYJ (Norwich) was delighted to work ZS6OW (2015) on May 25, for his first real DX contact. Next evening he heard a ZS5 about the same time. 'HJY also tells us that GM3HTH and 3HGA are the only two stations in the Shetlands, and that they count as a separate country for WAE scoring! He reminds us, too, of GM3HXC in the Orkneys.

G2KU and G3DIV will be visiting Monaco early in July. They are to be a very lightweight expedition, but have been allotted the call 3A2AL and will be looking for G's on 7 mc during July 8, 9 and 10. They are both visiting the 2-metre amateurs in the Paris area *en route*.

Eighty Metres

News of Eighty can best be summed up by saying that it is, as usual, open for DX during this part of the year. But one has to stay up late, and one has to try many nights before hitting the right one. PY, LU, CE, VQ4 and ZS are among the countries reported by our spies. G3FXB worked CE and PY, and heard CX1FY being worked by others.



Station of ZS6ACD, Johannesburg, who does not consider himself DX to G's! His transmitter is VFO 6V6-6L6-807 running 50 watts, and the receiver is an SX-43. Aerials are folded dipoles, made of 300 ohm ribbon, for Twenty and Forty. ZS6ACD is very badly situated in terms of local interference.

The other odd bits of DX have been provided by SV1AY and YI3BZL, the latter using only 7 watts.

Overseas News

The former ZE3JQ may now be heard as SU3JQ; his flea-power rig gets reports of 579 from the U.K. and other parts of Europe, and he has worked fourteen countries to date. He says he would like to contact the former ZE's, 2KQ, 2KY and 3JL—if they will give him a call he will be delighted to ragchew with them.

VQ4AA (Nakuru) remarks on the excellent G/VQ4 conditions prevailing on Twenty in the early evenings. W and VE are absent these days, but he says the South Americans are good at times. 'AA tells us that VQ4RF is at present in G, and that VQ4ERR is paying a flying visit to PA. The latter has himself built a new shack "as large as my home," says VQ4AA, "and is surrounded by gadgets." VQ3PBD, who operated as VQ1PBD for a week on Ten and Twenty, reported very few contacts.

VQ2AH (Ndola) describes what he calls his "modest" station—20 watts CW and 10 watts phone, the whole transmitter built into a TU6B. He adds that there are quite a number of active amateurs in the Copper Belt, and there is a Forty-Metre Round Table every Sunday morning at 0630.

W2QHH (Hamilton, N.Y.) reports once more, with an 80-metre score now up to 93. He also made the first W/VP4 contact on the Top Band, so, as he has his three continents, he only needs another five countries to claim the *Magazine DX Award*. (He hasn't yet worked a G, although he had a GD and a GW on that band). Howie's QSL from ZM6AK finally turned up, giving him 210 worked and 210 QSL'd!

ZS6ACD (Johannesburg) has changed the direction of his aerial and now has a dipole running N-S, which is not so good for DX activities. He has, however, collected CR9AF since changing over, as well as VS7NG and a large bunch of Europeans. He asks whether MP4KW counts as Saudi Arabia or Oman — the answer is the former, definitely. Also, should this catch the eyes of EI4X, ZB1BS or ZD4AJ, 'ACD is desperately in need of their cards.

MI3KW (Asmara) hopes to be

running 45 watts of CW to a decent aerial system before long. He warns us that the British Administration in Eritrea is finishing in September, after which Ethiopia takes over the government and the MI3 types will be given ET call-signs. So—if you want an MI3, hurry up about it.

VQ4DO (Nairobi) is much troubled by the persistence with which some G's—even OT G's who, he thinks, ought to know better—ignore his directional CQ calls, coming back to him when he is asking for replies from Oceania or the Pacific. On one occasion, this even led to rudery over the air, with one senior G6 taking what VQ4DO felt to be rather an offensive line. Of course, directional CQ calls, provided the originator makes his intentions quite clear, should certainly be respected. In our experience, they usually are. VQ4DO adds that he is ex-ZS2SA and ex-ZS6DO, so has been around.

Sundry Strays

G3ESV (Wigan) suggests that all tuning-up of rigs, adjusting of beams, other on-the-air testing, and local QSO's, where reports run to S9 each way, should be carried out with scrupulous care *on* the frequencies of the various "intruders" into our bands (such as the 40-metre broadcast and 20-metre pictures already mentioned). An excellent idea, too, if sufficient QRM could be organised to scare them off. We have put up with them long enough, and if no official action is possible, it's time we took some ourselves.

It has been suggested that we should muster all Top-Band types one Sunday between 1400 and 1500 for a quick Top-Band daylight contest. This strikes us as an excellent idea, which we will try to put into force in the autumn or early winter.

G2NJ (Peterborough) and others report that the SM's recently heard on the Top Band were either pirates or overtones, because they have it straight from the SM's themselves that the band is *not* licensed over there. G2NJ's informant adds that he has recently been hearing G's between 2300 and 2330, which surprised him, as he thought they would have disappeared by this time of year.

G3IGW has now become GM3IGW (Alloa, Clackmannanshire) and expects to be in great

DX CERTIFICATE AWARDS

WORKED FAR EAST

No. 1 G3ATU (Roker, Sunderland).

FOUR-BAND AWARD

No. 1 G8KP (Wakefield).
No. 2 G2AJ (Biggin Hill)

WORKED NORTH AMERICAN CALL AREAS

No. 1 GM3DHD (Edinburgh)
No. 2 G8KP (Wakefield).
No. 3 G6LX (Croydon).
No. 4 G2BXP (Oldbury).
No. 5 SM5LL (Enskede)

"My station and I," as DL4EF (Frankfurt) puts it. The Tx is a modified BC-610, with a Meissner Signal Shifter (the original pre-war conception of what we now call a VFO) and the receiver is a Super-Pro. Captain Hamel has been on the air since 1919, and was at one time VO6T, Goose Bay, Labrador. His home call is W3ORO, at Silver Hill, Maryland.

WAZ MARATHON, 1952

Station	Zones	Countries
G5BZ	35	130
G2VD	34	113
G3FXB	34	107
G6QB	33	102
G3FXA	33	87
G6QX	32	80
G8FC	31	89
G3DOG	29	75
G2DPY	28	81
G6YR	28	77
GM2DBX (Phone)	27	81
G3FPQ	26	66
G3GUM	25	78
G2BW	24	79
G3ABG	23	76
G3TR (Phone)	23	66
G3BDQ	23	66
G5FA	20	57
G5GK	17	24
G2AJ	16	45
G2BAM	13	46
G3HDL	13	43
G3IGZ	12	37
G6TC	12	32
G3FPK	11	31
G2BJN	10	37
G3HZL	10	34
G2VJ (Phone)	8	12
G3IHI	4	20
G4QK	4	7
G3GVY	2	9

NOTE: New entries in this table must not include QSO's dating back more than two months from the time of entry. Regular reporters should send in their score month by month — three months' failure to do so will be taken to indicate loss of interest and the score will be deleted.

demand on the Top Band, being the only active one in "Clacks." He is practically a 100 per cent. Top Band man, which should suit everybody! 'IGW promises that every QSL received will be answered—by the same route over which it arrives. His own county-chasing score has reached 46 already.

Clottery Corner

G3GUM takes a very serious view of the Twenty-Metre band—apart from the "Ticking Horror" at the low end—and suggests that action is needed. What riles him most is the number of people who simply call and call a DX station every time he goes over during a QSO. He suggests a new Q signal meaning "I will not work anyone who calls me during a QSO"—but of course the clots who continue this practice would never find out what it meant.

'GUM says, and we agree, that a snappy call just off the frequency (especially if you know the chap) is permissible as the contact ends, but these blind callers who don't even know whether the QSO has finished or not will bring even this useful practice into disrepute, and we may have to give it up in the interests of general cleanliness.

G3CMH also calls attention to bad practices on phone, such as calling on a channel which is already in use, calling "Test" and not signing, and forgetting that call-signs have a prefix—all, alas, much too common.

Certificates and the Like

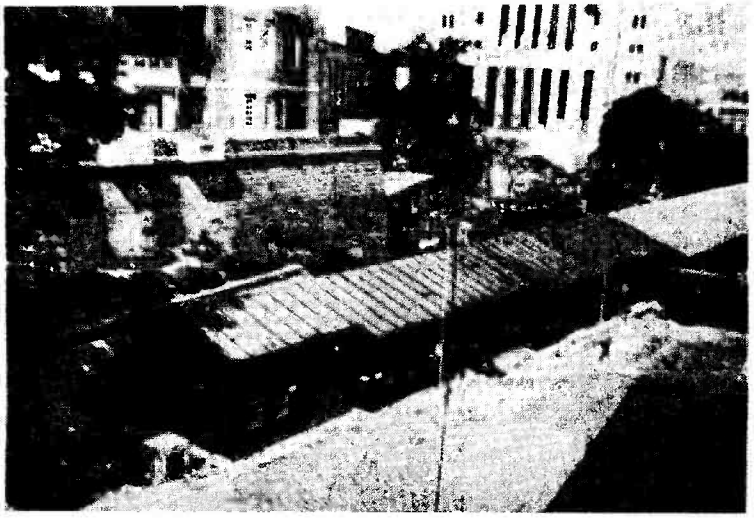
Several claims for the new Certificates have already come in, and the awards are listed herewith. The first Four-Band Award goes to G8KP, and the first WFE (the tough one) to G3ATU. Claims for WNACA have been several, as the list shows.

Congratulations to all who have qualified—and will they please note that the Certificates themselves will be posted to them as soon as we receive the first supplies from our printers.

Incidentally, we never thought for a moment that the inclusion of VE8 (Yukon) would make this one difficult, but several readers appear to think so! G8PW (Manchester) says "Oh dear, Yukon! Who thought that one up? How about a nice FP8 as substitute?" The fact of the matter is that *all* the original VE5's (who became VE8's after the war) were in the Yukon Territory, and the North West Territory was not populated by amateurs until later. The original scheme was that VE8A-M calls were in the Yukon, and VE8N-Z in North-West Territory. But we have recently had a card from a VE8R who proves to be in Whitehorse, Yukon, which seems to indicate a change.

British North Greenland Expedition

This Expedition leaves these shores on July 5, and an amateur licence will be granted. Our old friend G3AAT, R.N., is to be a member (the lucky chap), with



Impression of the station of VS6HR, Murray Barracks, Hong-Kong. The path for the U.K. is directly into the background of this view, hence we are somewhat screened! VS6HR is operated by G3CDR.

Short Wave Magazine

DX CERTIFICATES

THE MAGAZINE DX AWARD

For Conditions see p. 25, March, 1951.

WORKED ALL BRITISH COUNTIES

WABC. For 1.7 mc Band only. See p. 224, June, 1952.

THE FOUR-BAND AWARD

FBA. Twenty countries confirmed on four different bands. See p. 225, June, 1952.

WORKED NORTH AMERICAN CALL AREAS

WNACA. Two-way contacts confirmed with W1-0; VE1-8, with Yukon and N.W.T.; KL7, Alaska; and VO, Labrador and VO, Newfoundland. See p. 225, June, 1952.

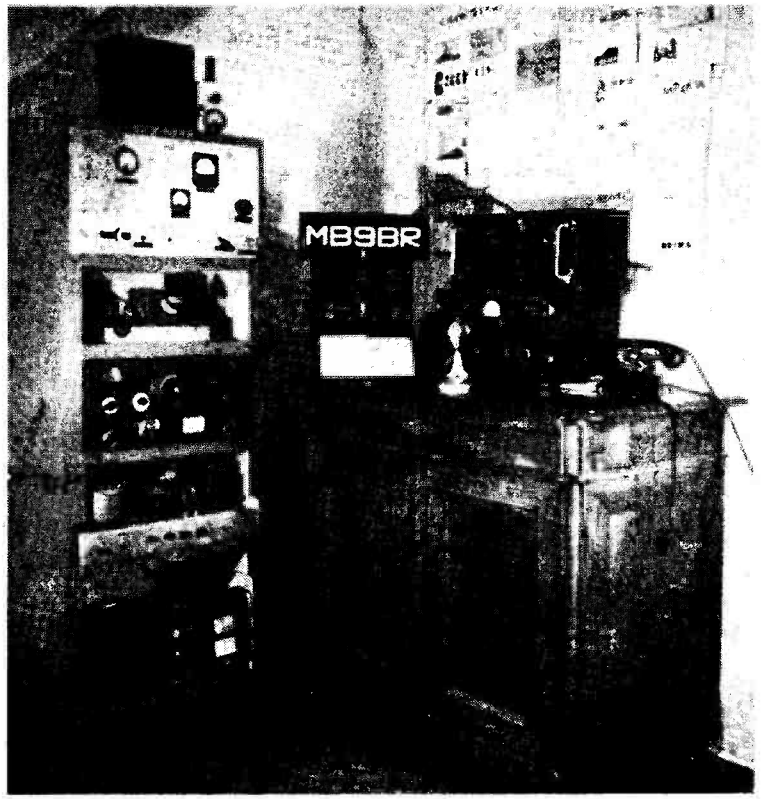
WORKED FAR EAST AWARD

WFE. Eighteen different prefixes confirmed out of the 23 countries listed on p. 225, June, 1952.

Claims for any of these Certificates must be accompanied by the appropriate batch of QSL cards, with a check list, sent by registered post to :—

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

All Claims accepted will be notified by listings in "DX Commentary." Cards will be returned.



MB9BR, Vienna, is ex-G3BDU and has been on from MB9 since August '50, operating on Ten and Twenty. The gear in the wooden rack is home-built, the transmitter running a pair of 807's at 140 watts; receiver is an HRO, and aerial a "ZL Special."

Capt. J. S. Agar, Royal Signals, as radio officer. The main station will be located about 77° North, and the Ice Cap station on the 78th parallel of latitude. Both stations will operate on the 3.5, 7 and 14 mc bands, and they expect to be on the air by October. We hope to be able to notify the call-signs in this space next month. The QSL address will be: B.N.G.E., Room 57, Queen Anne's Mansions, London, S.W.1.

Prefixes

A brand-new list of countries, in order of prefixes, appears with this Commentary. This was brought carefully up-to-date by June 1 and corresponds to the lists adopted by the various other bodies who issue Certificates and the like. We will publish any small amendments from time to time; meanwhile, this list is as accurate and up-to-the-minute as we can make it.

And that's all for now, so we wish you a good month's hunting. The next deadline is **first post on July 16**, and the following one first post on *August 13*. Address: "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. Let us hope for a good bag of 21 mc news by July 16; best of luck on that band, and send in your Marathon entries right away. 73 and BCNU.

DX ZONE MAP

There is a steady demand for the third reprint of our *DX Zone Map*, which gives the keen DX man all the essential information about the Zone areas and the prefixes comprising each Zone. A five-colour map of the world drawn to a great circle projection centred on the U.K., the *DX Zone Map* is designed for wall mounting and is a handsome addition to any station. The price is 6s. post free, of The Circulation Manager, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

Starting on 21 Mc

SOME PRACTICAL CONSIDERATIONS

O. J. RUSSELL, B.Sc., A.Inst.P. (G3BHJ)

This article will suggest various ways of putting out a signal on our new band without necessarily having to undertake a lot of constructional work. The discussion draws particular attention to the possibilities inherent in power triplers and the virtues of third-harmonic radiating systems.—Editor.

NOW that 21 mc, or part of it, has been released for British amateur use, operation on this intriguing new band will attract many who will be glad to escape the congestion on other bands. This will include the ten-metre enthusiasts disappointed by present poor conditions on Ten, and the 20-metre addicts who have tired of the eternal QRM on 20 metres.

For those seeking new worlds to conquer, the following suggestions for 21 mc operation may be of interest. Before the practical ideas, a brief note on the propagation and DX properties of 21 mc may be in order. Briefly, the DX to be expected of 21 mc will be intermediate between 10 metres and 20 metres. Were we at the peak of the sunspot cycle, 21 mc would be a superb long-distance band open for long periods during the day. However, at the present epoch of the sunspot cycle, the full benefits of the new band will not be achieved. Even so, however, it will serve to provide contacts that under peak sunspot conditions were made on ten metres. Briefly, conditions for this year will probably be similar to those on Ten about two years back. Certainly, should Ten show signs of opening, it will be found that 21 mc is wide open. In general 21 mc will open considerably earlier than 14 mc, but when it has closed at night, 14 mc will still be workable. These remarks apply of course to " normal " propagation conditions, and are general for any period of the sunspot cycle. For the present it can be safely said that the ten-metre addicts should be ably to carry on " business as was usual " by a QSY to 21 mc.

So that with poor conditions likely to afflict ten metres for the next two or three years, together with the congestion on 14 mc, a general stampede for 21 mc seems probable. The problem, therefore, is to get on the band without undue delay, and a few pointers are in order. This is best tackled by first considering the generation of RF at 21 mc. This may or not be catered for in the design of an existing transmitter.

The production of 21 mc in a drive stage is the first consideration. In the case of a doubler or buffer stage operating at 28 mc, it is very likely that the 28 mc tank circuit will resonate at 21 mc, by the simple process of swinging the tuning condenser. As a low value of tank capacity is desirable for efficient 28 mc operation, it is to be expected that with normal tuning capacities 21 mc can also be " found " on the same tank circuit. The LC ratio may not of course be ideal, but operation in this way may save the need to provide a separate tank circuit for 21 mc. It is hardly necessary to stress that an absorption wavemeter, or better still, a grid dip oscillator, be used to check that tank circuits are in fact resonated at 21 mc.

With normal crystal or VFO set-ups, operation of the multiplier stage is most likely to be as a *tripler*, with 7 mc drive applied to the grid. The full range 21.00 to 21.450 mc (when available) will thus require crystals or drive in the range 7.000-7.150. But for the time being, only the first 200 kc of the band is open. While crystals of 10.5 mc or so are not generally available, a use might readily be found for crystals in the region around 5.250 mc, operated with *doublers* to obtain frequencies in the 21 mc band. Again, certain surplus VFO units, particularly the " 145 " and the Wilcox-Gay units, can be operated on frequencies in the 5.25 mc region, and so will give 21 mc by doubling twice in succeeding stages. This may very well be useful, particularly as doubling may give somewhat more drive output for the 21 mc PA. Furthermore, efficient doubling needs far less drive than tripling. The importance of this is that hard driving in a tripler stage may very well accentuate TVI difficulties. As the second harmonic of 21 mc is 42 mc, it is easy to see that TVI could be a very severe problem on this new band.

The 21 mc PA

While efficient multiplier operation may be obtained by resonating the 28 mc tank of a multiplier by the use of a higher tuning capacity, it is not so certain that efficient operation of an existing 28 mc PA circuit would be possible by using higher capacity and the existing 28 mc coil. Normally, it is difficult to reduce stray (and valve) capacities on 28 mc to give an optimum LC ratio, and quite often

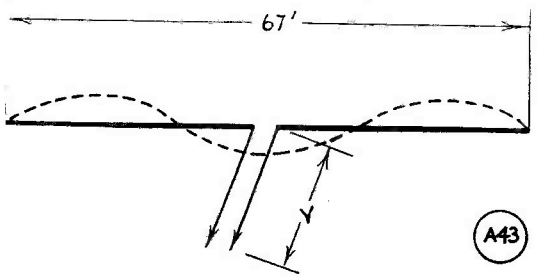


Fig. 1. A 40-metre dipole with 67-ft. roof can be used third harmonically on 21 mc. The current distribution is shown dotted and the feeder tuning system for various lengths L is given in the table.

40-metre Dipole on 21 mc

L ft. (*approx*)	FEEDER TUNING SYSTEM
11	Parallel
22	Series
33	Parallel
44	Series
55	Parallel
66	Series
77	Parallel

the 28 mc tank already operates with rather a high capacity. Generally, therefore, it will be more satisfactory to make a separate tank coil for 21 mc PA operation. It is simple enough to ensure hitting 21 mc, as all that is necessary is to make the new tank coil of the same diameter at the 28 mc tank coil, but with half as many turns again. Adding 50% extra turns to that used for 28 mc is a good recipe also for coils used in the 21 mc tripler stage, and for aerial tuning coil systems.

Finally, one subterfuge to enable 21 mc operation (at any rate on a provisional basis) is the use of an existing PA stage as a power tripler. While this is not very efficient for single ended stages, owners of a push-pull final are reminded that a push-pull stage makes an efficient tripler. Furthermore, use of a push-pull tripler stage is likely to be helpful in suppressing TVI-producing harmonic frequencies. It is a thought, therefore, to utilise an existing push-pull stage—perhaps running at reduced input—as a driver stage for a separately constructed 21 mc PA. In the case of existing multi-band transmitters, where the full addition of a fresh band is difficult, sufficient output may be obtained in this way to drive a fully TVI-proofed outboard 21 mc PA.

The Aerial

Generation of power on 21 mc having been obtained by one stratagem or another, an aerial of suitable kind is needed for 21 mc operation. Where adequate space for putting up an independent system exists, a design for 14 mc can be adapted for 21 mc by dividing the dimensions by $\frac{2}{3}$. Similarly, element lengths used for 28 mc can be used by multiplying them by the factor of 1.33. This enables existing design formulæ to be adapted for 21 mc, in cases where specific dimensions are given for 14 or 28 mc. In the case of arrays, the element spacings are also scaled in the same proportion as the lengths.

However, to many amateurs space is at a premium, and the suggestion of "if room is available" must bring a hollow laugh from many city-dwelling readers. However, there are plenty of possibilities for using existing aerial systems designed for other bands for efficient 21 mc operation. All the possibilities cannot be given here, so the cases chosen represent the most commonly available aerial systems.

Harmonic Relationships

The first system to be considered is an

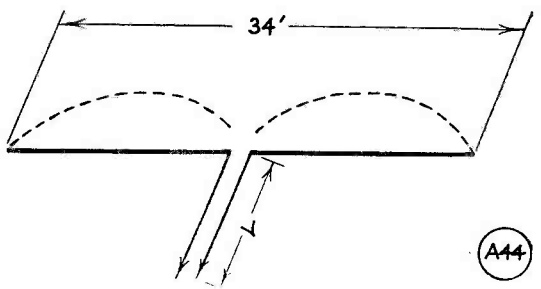


Fig. 2. A 14 mc. dipole operated as a 21 mc. aerial, with the top visualised as a single extended element radiator. Tuning methods for different feeder lengths L are given in the table. A 14 mc folded dipole is not suitable for this mode of operation.

14 mc Dipole on 21 mc

L ft. (*approx*)	FEEDER TUNING SYSTEM
11	Parallel
22	Series
33	Parallel
44	Series
55	Parallel
66	Series

ordinary centre-fed 40-metre dipole with tuned feeders. This can be resonated at 21 mc just as it stands. Actually, it then operates as a " centre-fed three half waves " aerial. This is a novelty to amateur practice, mainly because the LF bands up to now have been allocated in multiples of two. The new 21 mc band is the first amateur allocation to be $1\frac{1}{2}$ times the frequency of the next lowest (14 mc) band. However, the operation of a half wave centre-fed wire on three times its frequency is perfectly feasible. As a note, this might also be of service in adapting a 2-metre dipole for use on 70 cm, although space for a 430 mc system is not yet at a premium in even the most cramped quarters.

It should be noted that the centre-fed " three half waves " type of aerial has a high value of radiation resistance, and gives a very useful radiation pattern that approximates to an all-round coverage. The operation of an existing 40-metre dipole in this manner is definitely not a makeshift, as the centre-fed three half waves system is highly efficient, and superior to a single half-wave. It can in fact be regarded as a " phased extended element " type of aerial, also not very familiar in amateur practice, but a family of highly efficient systems for all that. As a quarter-wave at 21 mc is approximately 11 feet, and a high current point exists at the centre, the lengths of feeders requiring parallel or series feed can be calculated, and some of these lengths are noted in Fig. 1. The popular 40-metre " 67 foot top with 33 foot feeders " aerial will require a parallel tuned aerial coupling circuit at the transmitter end.

It is also possible to use a 14 mc centre-fed dipole on 21 mc. Again, the top becomes a single " extended " length element, but the use of a 33-foot feeder will now require *series* tuning at the coupling end. Other conditions are shown in Fig. 2.

The case of folded dipoles is a little different. It is possible, however, to operate a 7 mc folded dipole on its third harmonic at 21 mc. This again may be a useful stratagem where space for aerials is limited. However, for optimum matching conditions on both 7 mc and 21 mc, a compromise in the top length is necessary. By making the top length 68 feet 6 inches, a reasonable " compromise " match will be given for a two-wire folded dipole with 300-ohm line for both 7 mc and 21 mc operation.

Finally, the " matched impedance " off-centre fed type of aerial—sometimes referred to as a Windom—using 300-ohm line feeder, can also be used in some cases on 21 mc, but with the feeder operating as a tuned line. With the popular version using a 68 foot top fed at 22 feet from one end, the feed point becomes a high voltage point for tuned operation. With a 34 foot top fed at 11 feet from one end, operation as a tuned system would not be satisfactory, as very marked unbalance would occur in the feeders, due to the fact that the feedpoint on one side is high current and on the other side is high voltage ! Violent unbalance of the feeder would thus occur. However, the 68-foot top can be efficiently fed by making the feeder length a suitable multiple of a quarter-wave at 21 mc. With Telcon 300-ohm line, allowance should be made in calculating feeder length for the shortening of resonant lengths due to the velocity propagation factor. Approximately a quarter-wave of 300-ohm line at 21 mc becomes 10 feet, and feeder lengths of 30, 40 or 50 feet as convenient, will serve for initial trials. Odd multiples (10, 30, 50, and so on) will require a series tuned aerial coupling circuit, while even multiples (20, 40, 60 feet) will require parallel tuning as shown in Fig. 3.

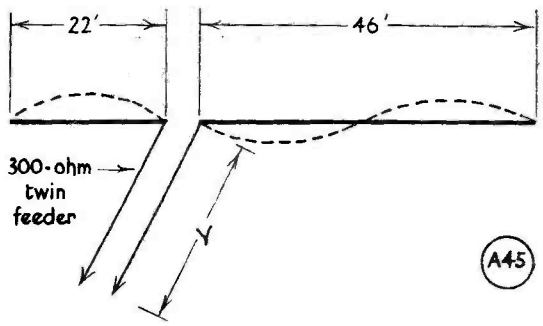


Fig. 3. The matched impedance off-centre fed aerial for 7 and 14 mc can also be used effectively on 21 mc. On the latter band, the 300-ohm line must be seen as a tuned feeder—see table for lengths L and tuning method.

Off-Centre Fed Aerial on 21 mc

L ft. 300-ohm LINE (*approx*)	AERIAL TUNING
10	Series
20	Parallel
30	Series
40	Parallel
50	Series
60	Parallel

Multi-Band Tuner

DESIGN FOR FULL POWER

I. E. HILL (G6HL)

The band-switched transmitter, in a table-top cabinet, is now the recognised layout design for the modern station. It makes for neatness, economy of space and good appearance. It can even be made reasonably efficient electrically, but there is always an element of doubt concerning the switching on the PA side. This article shows how the design of the switched RF output circuit can be improved to carry the heavy circulating currents encountered when using 150 watts input to the PA.—Editor.

IN these days of screened transmitters it is not surprising that plug-in coils are going out of favour and switched multi-band tuners finding ever increasing popularity. For some reason—hard to understand—the design of most amateur transmitter multi-band tuners copied the technique arrived at for receivers, and has stayed that way ever since.

The circulating RF current in a transmitter tank—even a modest 10-watt outfit—can reach pretty high peak values. In consequence we use copper tube or heavy gauge wire for the coils and sturdy plates for the condensers. In the single-band rig we bolt the copper tube rigidly and directly to the condenser plates and make a sturdy RF connection to the valve plate and to earth. But for the multi-band tuner we economise with one condenser and cheerfully use a silly little wafer switch to complete the oscillatory circuit of condenser and selected coil. 'Tis not surprising that band change switches often burn up.

In the average transmitter we need four bands—3.5, 7, 14 and 28 mc ; 21 mc can conveniently be grouped with either the 14 mc or 28 mc range. On any one band there is an optimum condenser size to obtain a proper Q value. We must have a condenser big enough for 3.5 mc, but its minimum capacity is likely to be more than enough for 28 mc, so a compromise must be made. The obvious alternative is to have four separate tuned circuits, the valve plate or grid being connected to the desired circuit. Switching will be at high

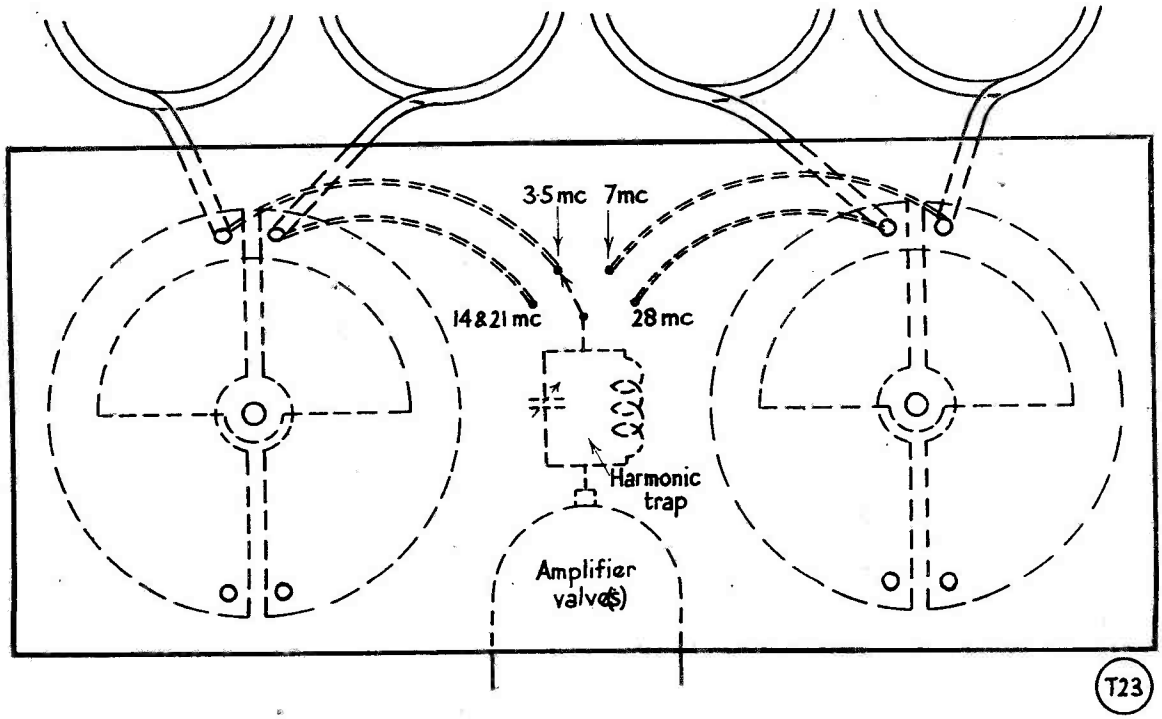


Fig. 1. General layout of the five-band (four circuit) plate tank tuner unit viewed from the end plates. The arrangement can be applied either to single-ended or push-pull RF amplifiers. The rotor sections are earthed through the end plates, and the stator plates are secured with small feed-through insulators, or as convenient.

potential but low current and that presents no serious design difficulty. Four separate circuits will take up a lot of room and also involve rather long leads. Four separate tuning condensers could represent a lot of cash, but there was a time when amateurs made their own ! There would be the other advantage of separate tuned circuits, but band changing is simplified, since each tuned circuit can be left pre-tuned for the appropriate band.

The old-fashioned semi-circular shaped condenser plates are still entirely suitable for current high frequency transmitter construction. On the side opposite to the usual fixed plates there is a lot of wasted space when the moving plates are fully or even partially meshed with the fixed plates. It seems sensible to add a second set of stator plates thus making one condenser effectively to do the work of two. Two double condensers made up in this way can be arranged on either side of the valve plate or grid and thus provide *four* tuned circuits.

Coils can be mounted directly above the condenser plates and a wafer switch can be used to connect the valve anode or grid to the appropriate tank circuit. The output can be switched in a co-axial feed from each tank. If inner tanks are used for the higher frequencies it will be found that the amount of connecting lead is little or nothing in excess of that appropriate to the conventional coil turret of equivalent power handling capability.

Construction

In constructing such a tank the first requirement is a number of similar semi-circular plate condensers assembled in the old-fashioned way and suitable for re-assembly—that is, bolted construction with spacing washers. New end plates will be required but these can be common to both dual condensers and switch support, the general layout being as shown in Fig. 1. This design is applicable to both single ended and push-pull requirements.

Just after the war — while overseas — the writer occupied leisure moments building such a multi-band tuner. Designed originally for a possible kilowatt, the thing was somewhat massive, used rather large plates, ¼in. copper tube for coils and TA12 wave-change switch units for band changing. At 1 kW input there was no sign of switch contact burns or in fact any snag at all. Scaled down to 150 watts (or lower) input, small ceramic wafer switches should be entirely satisfactory and condenser plates of the old " standard " size should fill the bill.

Another modification of the suggestion

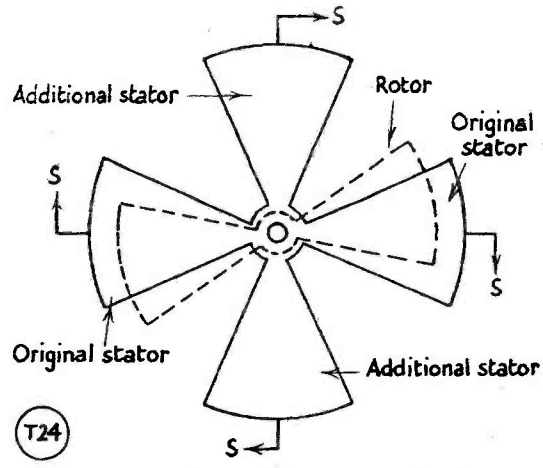


Fig. 2. A differential condenser modified with additional stator plates, to make up a four-circuit tuner for driver stages or PA grid tuning. The stators S connect to the coils and switch contacts.

above, and one which deserves some consideration for low power PA or grid tuning circuits in single-ended amplifiers, is to use one of the differential condensers manufactured originally by Eddystone and fairly plentiful on the surplus market. They are made of brass, are very sturdy and quite adaptable. Unfortunately, their use will restrict the dial movement to 90°. See Fig. 2.

Whichever application of the built-up condenser is adopted, it is necessary that tanks not in use be connected to earth, or at least that tanks immediately adjacent to the one in use be earthed. In arranging the switching care must be taken to ensure that all HT connections to the tank are broken before a direct earth is made. Alternatively, if it is desired to economise on switch contacts, the earthing should be done through a .001 or .002 μF fixed condenser, the latter to have adequate rating for plate voltage and RF. For this purpose it is good practice to use alternate contacts on the wafer switch rather than adjacent ones.

The writer has had a built-up plate tank of this sort in use for the past six years. It is designed for a push-pull amplifier and has two small plate harmonic traps incorporated. The condenser end plates are two aluminium sheets which also support tank coils, variable link coils and the change over switch. Condenser fixed plates and coils are mounted by the use of porcelain feed-through insulators. During its lifetime it has withstood the passage of quite a lot of RF without a single switch burn or other failure.

VHF BANDS

A. J. DEVON

WITH just 60 report-letters, claims and calls lists piled in the pending tray for this month's offering, your fascinated precentor has been kept off the air for several long evenings getting it all sorted out. But that is how we like it, and we feel justified in starting by recording grateful thanks to all these correspondents for their most welcome efforts to keep A.J.D. advised, to put him right, and to warn him about making corney errors like saying Sandown is in Dorset!

Looking through the reports, the general opinion is that conditions were again good for the period to June 11, though not consistently so all over the country. That is to say, when the two-metre band was well open East-West, it was not necessarily so North-West — South-East, though G2AJ/G5YV have maintained a remarkably consistent schedule at 2300 BST most evenings over their 180-mile path. GM's have not yet penetrated to the southern part of the country, and all the distance records are (at the time of writing) still standing firm. Continentals in the shape of F8AA, F8GH, ON4BZ, ON4HN and PE1PL got into the Midlands during the period May 25-June 11, and there have been some excellent GDX contacts across Southern England. EI2W has, of course, provided many stations with a real DX QSO, and practically everybody down-South comments on the consistently high signal level from G5YV (Leeds). On those occasions when the band has been well open, QSB has often been most pronounced, characterised by high peak signal levels and then a fade-away into the noise.

The dates most often quoted for good conditions in one direction or another are: May 14-16, 18-19, 21, 24-27, 29; June 4-6, and June 10.

Activity

This has been fair to moderate, with a burst of enthusiasm for the little contest over the week-end May 24-25; this appeared to stir up activity until about mid-day on the Sunday, when conditions fell rather flat and the pace slackened off. Some half-dozen stations were taking this contest seriously in the point-scoring sense, the maximum in terms of stations worked being about 120.

It is good to be able to say that the GI's and GM's are reported active again and making contacts into Northern England. The Ulstermen are GI2FHN, 2HML, 3BIL, 3GQB, 3AXD and 6VU; the Scots are GM3BDA, 3DDE, 3DIQ, 3EGW, 3ENJ, 3FOW, 6KH, 6LS, 6SR and 6WL.

A good guide to both activity and conditions is the fact that the movements claimed for the Counties Table total 30, which is rather less than one might perhaps have expected having regard to the volume of reports and the calls heard listings for this month. What it amounts to, therefore, is that though quite a lot of stations showed up at different times during the period, there was not much about in the way of new contacts or new counties. The over-all picture of activity is that there are now about twice as many VHF stations on as there were during the same period last year.

GD3DA/P, Snaefell

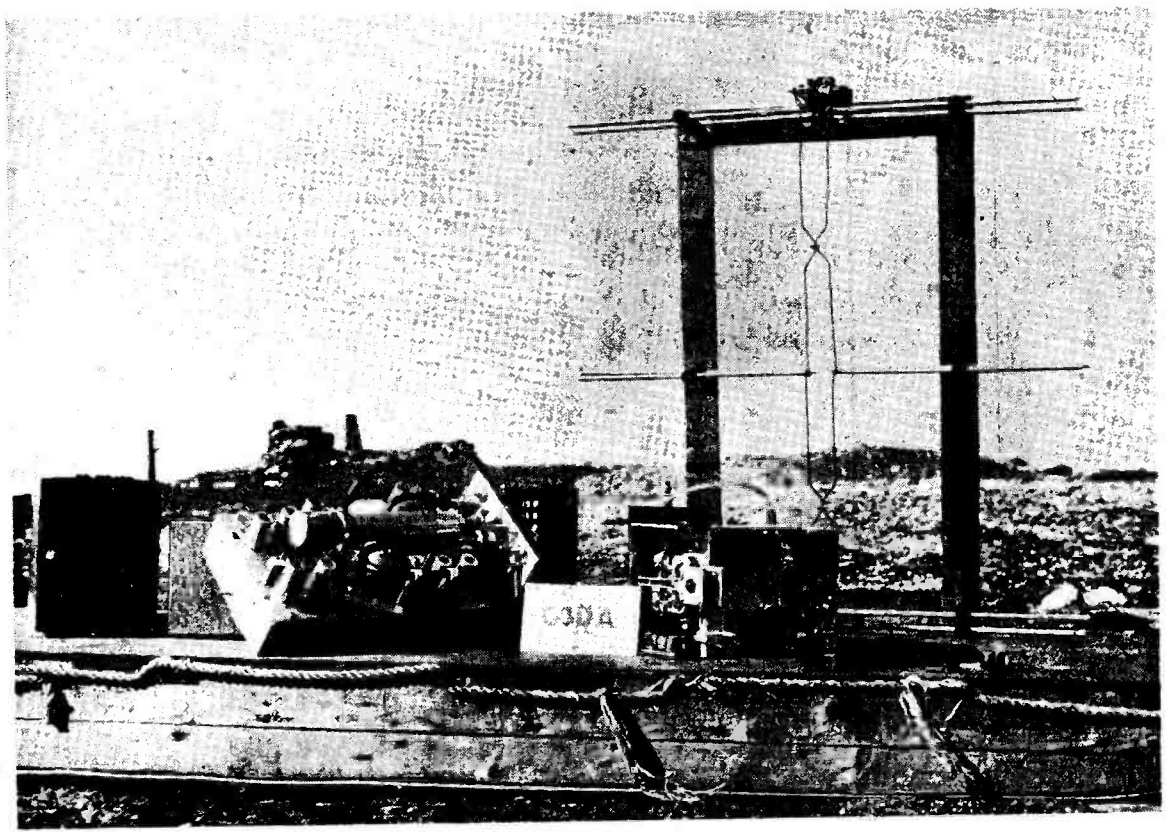
The G3DA expedition to the Isle of Man took place during the period May 15-18, with gear for both VHF bands, and signed GD3DA/P. (It will be remembered that G3DA of Liverpool undertook two such trips last year). This time, he had about 60 contacts with 47 different stations on Two—*see* Activity Report—the best DX being G2AJ; all other QSO's were within the radius Snaefell-Biggin Hill, though G3ABH (Poole) is only just inside the distance. G3DA reports conditions poor on May 15-16, very good on the 17th, and falling off on the 18th. Incidentally, weather conditions were of an almost exactly opposite pattern. The gear for two-metre operation consisted of a cascode converter and a 6F12-6F12-QQVO4/7-832 transmitter giving a measured RF output of 3 watts into a 3-element close-spaced beam. G3DA will be sending QSL cards to new stations worked only—that is, new to him from the Snaefell site—and we are sure all who heard or worked GD3DA/P will wish us to thank him for providing once again a highlight on the VHF scene. (Results were also obtained on Seventycems, but these are dealt with under the appropriate heading).

Another interesting portable expedition is scheduled for July 24-28, when G2AHC, G2AJ and G3DAH take themselves off to the Scilly Isles with 2-metre equipment and the intention to be on every evening from 1800 BST "until there is nobody left to work us"! They will be good GDX to most stations on the band, and there is a possibility that a special QSL card will be minted for the occasion.

And on this theme, G4JJ (Barnsley) proposes to go /P in the rare county of Westmorland over one or two week-ends during the summer—no dates yet.

Technicalia

The points raised in this space last month in quoting G5YN's experiences with his G2IQ-type



The GD3DA/P VHF gear on the summit of Snaefell, Isle of Man, May 15-18. The combined 144/430 mc receiver unit is on the left, and the transmitter (also for both bands) on the right.

converter have produced several useful replies, in which readers generally will undoubtedly be very interested. G3HBW (Wembley) says that the 6J6 RF stage should draw 10-13 mA with a 47-ohm cathode resistor and 100 volts on the plate. If, under these conditions, it is more the reason it is probably a soft valve—which will, incidentally, produce a comforting but quite spurious background "sharsh," making the converter sound lively; the illusion fades when the grid circuit is tuned, as it will have hardly any effect on the noise. G3HBW further avers that it is possible to obtain complete neutralisation of the RF stage, aerial on or off; he can do it with two such stages.

From G2IQ (Sheffield), the maestro himself, we have some valuable suggestions to pass on. In the first place, he gives the assurance that if his converter is built as described it is normally a smooth performer and "nobody contemplating construction has anything to fear." To deal with G5YN's points: Regarding the value of R10, he says this may have to be increased to 20,000 ohms with some 6J6's, with 5,000 ohms as the optimum for good specimens. The modulation hum suffered by G5YN (and others) could be due to a bad 6J6, a faulty stabiliser valve, too low an oscillator grid resistor, poor heater by-pass condensers, wrongly-wound heater RF chokes or, of course, inadequate HT smoothing; in each of these cases, the remedy is obvious, but as a cure in the latter case, G2IQ does suggest a 32 μF smoothing condenser across the HT feed. Some 6J6's are prone to hum, and a little interchanging of the three in the converter will usually produce the right one for the oscillator position. On the point concerning the cathode resistor in the RF stage, G2IQ says that G5YN certainly is losing gain with a value of 470 ohms; the average 6J6 needs 50 ohms, resulting in a plate current of 12 mA—*see* G3HBW's comment on this point. As to neutralising, G2IQ's opinion is that it should be carried out with the proper aerial load connected—the point being that it is of no practical importance whether or not the thing will neut without an aerial! Though drift was not mentioned in G5YN's catalogue of queries, it has been by others. The reply from G2IQ is that if there is drift after a 5-10 minutes' warming-up, then it is most probably due to the use of poorly-insulated components at vital points, such as valve sockets and condensers; these must all be ceramics if drift is to be avoided. And on receive-transmit HT + should be switched

SHORT WAVE MAGAZINE

MARATHON VHF CONTEST

INFORMATION

THIS Contest will be run in four sections over the week-ends **July 19-20, August 23-24, September 27-28,** and **October 25-26.** The maximum permitted period to score will be 12 hours over each of these week-ends. Either the two-metre or 70-centimetre bands may be used and there will be separate listings for each.

A table of results will be published in respect of each week-end section—in the September, October, November and December issues respectively—but the final placing will be determined by the aggregate points gained in *three sections only* of the Contest. This will allow for possible absence over one period. Thus, entrants can either choose their three operating periods in advance, or enter for all four sections, aggregating their three best scores for the Final Table.

So that the monthly tables can be prepared, logs in respect of each week-end operating period must be posted to arrive on July 30, September 3, October 8, and November 5. Only those logs received by these dates will appear in the monthly tables of results, from which the final qualifying Table will be prepared.

Rules and scoring as given here apply to both the two-metre and 70-centimetre bands. The band on which operation is carried out must be clearly indicated when sending in the entry and (in the case of two-band working) separate log forms must be used for each band.

Operators able to work on both the two-metre and 70-centimetre bands may claim for the Final Table any score made by working a particular station on *both* bands. Cross-band working will NOT be permitted for the purpose of this Contest.

In addition to the foregoing, separate Final Table listings will be shown by British VHF Zone Areas, and (provided the entry is not less than ten from any particular Zone) the leading station in each Zone will qualify for a prize. In effect, the Contest will be at once International, National and Zonal, with operators in each VHF Zone competing amongst themselves, as well as scoring for the Final Table.

Operation within the Zone Area will *not* be a condition of entry, but it is hoped that, in the interests of all participants (to minimise local QRM on DX stations and to make searching easier and quicker), all stations will transmit in their Zone frequency areas. (*See* p.49 "VHF Bands," March 1952, for Zone groupings).

As the labour of checking can be eased and the possibility of error eliminated by the use, by all participants, of a standardised log form, the headings as shown in the example should be used when sending in entries. Logs received in any other form, or after the due date for each operating period, will be accepted only at the discretion of the Managing Editor, SHORT WAVE MAGAZINE.

The winner of the Marathon VHF Contest will be the operator with the largest total of points in the Final Table of Results, to appear in the January 1953 issue of SHORT WAVE MAGAZINE. This Table will be prepared from the results published during the previous four months.

Suitable prizes are being donated by Short Wave Magazine, Ltd., for the leading operators in the Final Table of Results, and for the Zone leaders. These prizes will consist of VHF valves and parts, and technical books, or vouchers to the equivalent value.

The first Table of Results, covering the week-end July 19-20, for which logs must be received **by July 30,** will appear in the September issue of SHORT WAVE MAGAZINE.

RULES

(1) Every participant must allot himself a four-figure number, different for each week-end during which he operates.

(2) Contacts can be made on either CW or Phone. A full exchange of numbers, RST and QTH (town and county) constitutes a completed contact, if sent in the following form:— For CW: "7321 RST569 Plymouth Devon." For Phone: "7321 R5S6 Plymouth Devon." This is as from the sending station and must be entered in this form at the receiving end.

(3) Scoring:

(i) For contacts within a radius of 50 miles, 1 point.
(ii) For distances of 50-100 miles, 5 points.
(iii) For distances of 100-150 miles, 10 points.
(iv) For distances of 150-200 miles, 20 points.
(v) For distances of 200-250 miles, 25 points.
(vi) For distances over 250 miles, an additional 5 points for each 50 miles of distance, or part thereof; *e.g.*, a QSO of 410 miles scores 25 + 20 = 45 points.

Log Form

MARATHON VHF CONTEST

Station Call.....

Operator.....

Address.....

.....

.....

.....

Band..... **Zone**.....

Aerial..... **PA Input**..... **Receiver**.....

LOG for PERIOD..... **Number**..... **Location (if /P)**.....

DATE	Clock TIME	WORKED	His NUMBER	RST in	QTH	RST Out	Pts.	Add COUNTY*
	on							
	off							

* Enter 5 pts. for each New County worked only. See Rules 3 (vii) and 4.

Page Total Claimed

(vii) Additionally, each different County (including own) worked will score 5 points; foreign prefixes score as counties for the purpose of this Contest. All county-contacts will score once only during any particular week-end—*see* Rule 4.

(4) During any particular week-end a station may be worked twice to score, provided the time elapsing between such contacts is not less than 12 hours. The county bonus (home or foreign) will *not* be claimed for any second contacts.

(5) The Contest (clock) times will be: Saturdays 1600-0100; Sundays 1030-2330, each week-end.

(i) Out of this maximum of 22 hours, operating periods totalling *12 hours only*, chosen at the discretion of the participant, may be used for Contest scoring purposes, during that week-end.

(ii) An operator who elects to be on for more than the 12 hours may select those periods for which his score is most favourable, up to the 12 hours permitted maximum—*but see (iii) below.*

(iii) An Operating Period is defined as "A spell of watch-keeping, of not less than one hour's duration, maintained for the purpose of scoring in the Contest—whether listening round, calling CQ or working a station."

(6) Portable stations, licensed for /P operation, will score under the conditions as set out above, but in respect of two portable expeditions only out of the three week-ends permitted to score for the Final Table. The aggregate score, for portable or fixed operation under one call-sign for the Contest as a whole, can be allowed in respect of one particular operator only. That is to say, scores made by G9XX, G9XX/A or G9XX/P must be offered by the same individual.

(7) Overseas entries, from countries outside the G area, will be accepted under exactly the same conditions as the foregoing. Ten entries from any one country outside the G area will qualify the leading operator from that country for a special prize.

(8) Logs for each week-end operating period, posted to arrive by the dates given, must be addressed: A. J. Devon, "VHF Bands," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

(9) The decision of the Managing Editor, Short Wave Magazine, Ltd., will be final in all matters relating to this Contest, and entries will be accepted only on that understanding.

off at the RF stage *only*, the oscillator and mixer being left on during "transmit" so as not to disturb the stability. Finally, we might add that a very useful follow-up article by G2IQ on this converter appeared in the July 1950 issue of *Short Wave Magazine*, in which several of the points mentioned here were covered.

G5MR (Hythe) discusses the converter problem in general, and from a slightly different viewpoint. Having started with, and used for a long time, a CC converter, he became tired of breakthrough over the IF he was using, 11-13 mc, and has since changed to an SEO type. After much experiment, this came out as a 954 acorn pentode in a Clapp oscillator, with 22.0-22.4 mc tuned on the grid side, tripled in the plate circuit and linked into a 6J6 mixer doubling to 132-134, thus giving a fixed IF of 12 mc into the main receiver. The beat is T9, with very stable tuning on the (comparatively) low frequency grid circuit of the 954 oscillator. An ingenious arrangement, which is working very well, though G5MR himself points out one possible snag—local TVI from the oscillator tuning over the 22.0-22.4 mc range. It does not happen to bother him, and he suggests that any such difficulty could be overcome by making the initial frequency 33 mc and doubling instead of tripling in the 954 oscillator plate.

On yet another tack, Guy of ON4BZ (Brussels) sends us circuit and layout diagrams of a converter of his own design using a 6BQ7 on the RF side, one-half as a GGT and the other as mixer, with an EF42 cathode follower stage for output matching, and two 12AT7's as CC oscillator-multiplier, the IF being 14-16 mc. ON4BZ claims that this arrangement, which is different from the recent American design also using a 6BQ7, has a measured noise-factor of 3.3 dB, against the more usual 5.5-6.0 dB. His converter has been repeated for, and by, several ON's with equally good results—giving "the really utmost on 144 mc," as Guy puts it—so after the necessary translation has been done and the values taken out, we shall reproduce this circuit with the notes ON4BZ gives on it.

G3FKO (Bath) has been able to do some coil measurements, using a commercial Q-meter, his idea being to check-up on how much silver plating really matters. Two identical coils were made, to resonate at 72 mc with 15 $\mu\mu$F in parallel. One was wound with good quality copper wire, and the other was of 16g. silver-plated. The former had a Q of 445, and the silver-plated coil gave 360. It may well be, of course, that at 144 mc these figures might look very different, as 72 mc is hardly high enough a frequency for a test of this sort.

From G5YV (Leeds) we have a most interesting description of the magnificent new aerial system which is now giving him such excellent results. We hope to be publishing full details of this in due time, so that for the moment all we need say about it is that the beam-head can be raised or lowered through a height range of 62 to 90 feet. At full extension, the beam frequently catches at good strength signals which are not audible at the lower (60-ft.) level. G5YV is now in a position to carry out some very useful comparative tests in terms of Height *v.* Conditions, when the band is (*a*) Poor, (*b*) Average, and (*c*) Wide open.

That there is still much that is mysterious about VHF propagation is well emphasised in the report from G3EHY (Banwell). Over the regular path G3EHY-GW3FYR-EI2W, signals from EI2W are often much stronger at G3EHY than they are at GW3FYR, about 100 miles nearer to EI2W and with much mountanous country between G3EHY and GW3FYR—who, by the way, has a good receiver, and moreover frequently gets EI2W at the same level as G3EHY is doing. The propagation pundits will be interested in this, as it obviously suggests a marked skip effect, often noticed on regular and reliable stations over the same sort of distance in other directions. And here it might be added that several of the reports this month emphasise the influence that local weather does *not* seem to be having on GDX conditions.

Marathon VHF Contest

In these pages will be found full details of the new *Short Wave Magazine* VHF Contest, which is to take place in four sessions during one week-end in each of the months July-October. The first leg is the week-end July 19-20. In other words, just about a fortnight after seeing this, if you receive your *Magazine* by direct mail.

The rules, conditions, dates and general objectives for this Contest have been most carefully thought out and have been under consideration for some time. All the explanations are given in the paragraphs headed "Information," and it is not necessary to enlarge further on them here. We have been told that there are no ambiguities in the Rules. These have been drafted to make the event interesting for *everyone*—our Contests are, of course, open to all comers, irrespective of their affiliations, and we look forward to a large and representative entry.

There are a few advance preparations which, we would suggest, are worth making now. Get a large-scale map of the U.K. and the northern parts of Europe (the "Geographia" series, obtainable through W. H. Smith or Wyman's are excellent) and on it draw circles to scale radii of 50, 100, 150, 200 and 250 miles with own QTH as centre. The scale of the map chosen will depend upon individual preferences and space available for spreading it out, and in some cases on location. Obtain also a supply of *ruled* quarto or foolscap paper, and rule in the vertical lines for the log sheets from the example on p.297, leaving plenty of space for the main headings and the QTH column. The log as sent in for the Contest should be a "fair copy"—do not, we suggest, attempt to keep your final log as you go along. For the purpose of this Contest, a rough log can be kept under the same headings, and the "fair copy" (the one we want to see) made from the rough log.

The monthly results-tables will keep all concerned informed as to how things are going, and we can say here and now that the prizes to be offered for those who emerge at the top of the Final Table will be well worth having.

But, irrespective of the prize-winning angle, this Contest will guarantee interesting results and experiences to all who can come on for any of the operating sessions and will certainly help to stimulate VHF progress and activity.

So there you have it. We are looking forward to some very interesting week-end sessions during the next few months.

VHF Century Club Elections

We are glad to be able to announce that since the appearance of the June issue, the following have achieved the distinction of membership of the VHF Century Club. Certificate Nos. 106-113 have been issued to G2FQP (Ramsey, Hunts.), G3CFK (Great Yarmouth), G3HAB (London, S.W.19), G6QN (London, S.W.19), G3BVG (London, W.5), G3HBW (Wembley), G4LX (Newcastle-on-Tyne), and G3SM (North Harrow), in that order. The claim from G4LX was particularly interesting, as it included cards dating back to some of the early DX openings on the old 5-metre band.

New members of the Fiveband Club, no less welcome, are G6QN (No. 194) and G3GHO (No. 195).

The Station News — North

GM3DIQ (Stevenston, Ayr) is on again regularly and very anxious to give the G's a new county! His aerial is now a massive arrangement of four 5-element Yagis in one-wave square, showing high gain and giving excellent results on send and receive; he gets EI2W at S9 + almost every evening and has worked most of the active GI's; GM6LS (Edinburgh) was raised for the first time on May 20—previously, this had been a very difficult contact. GM3DIQ/GM3DDE are on schedule at 2300 BST every evening and at about 2315 they search South and East; GW5MQ may be interested to know that he has been heard at S8 by GM3DIQ.

A very welcome report from GM3BA (Motherwell), who will be well remembered by many VHF men as G3BA of Daventry, brings us up to date with doings in GM. He himself is on with

TWO-METRE ACTIVITY REPORT

G3HBW, Wembley, Middx. NGR 51/183838.

WORKED: F8AA, 8GH, G2AIW, 2AJ, 2ANT, 2BMI, 2BN, 2DLJ/A, 2DTO, 2FKZ, 2FTS, 2FZU, 2HCG, 2HDZ, 2IQ, 2KF, 2MQ, 2MV, 2UN, 2UQ, 3ABH, 3BVG, 3BWS, 3CC, 3CFK, 3CNF, 3DVQ, 3EDD, 3EHY, 3EYV, 3FAN, 3FEX, 3FUM, 3FXG, 3FZL, 3GBO, 3GDR, 3GHI, 3HAB, 3HCU, 3HSC, 3HVO, 3HXO, 3HXS, 3HZK, 3MI, 3WW, 4FB, 4HT, 5AS, 5DF, 5DS, 5HB, 5LK, 5LN, 5LQ, 5MA, 5MA/P, 5RP, 5UD, 5UM, 5WP, 5YV, 6JP, 6NB, 6PR, 6QN, 6TA, 6UH, 6XM, 8AO/A, GW2ADZ.

HEARD: EI2W, G2CPT, 2OI, 3APY, 3BJQ, 5UF, 8IC. (*May* 17 *to June* 7).

G2DTO, London, S.W.17.

WORKED (*over* 50 *miles*): 2DGB, 2DSW, 2FTS, 2IQ, 2UN, 3FAN, 3FIH, 3GAV, 3GOP, 3HVO, 5YV, 6YU, 8IL, 8OO, GW2ADZ, 8UH. (*Under* 50 *miles*): 2AJ, 2FVD, 2HDZ, 3AJS, 3BPM/P, 3EYV, 3FXG, 3GBO, 3GHO, 3GWE, 3HAB, 3HBW, 3HSC, 3HZK, 3IIR, 5AS, 5DF, 5DS, 5LK, 5LQ, 5SZ, 6CB, 6HC, 6NB, 6PR, 8AO/MA.

G5MR, Hythe, Kent. NGR 61/153352.

WORKED: F3CA, 3LR, 8AA, 8BY, 8GH, 8JR, 8LO, 8MX, 8NH, 8NW, 8OL, 9DI, 9MB, 9MX, G2AVR, 2FTS, 2HDZ, 2HLF, 2KF, 2UN, 3DIV, 3FAN, 3GBO, 3GHO, 3GSE, 4FB, 5MP, 5RO, 5UF, 6NB, 6RH, 6UH.

HEARD: F8EC, G2AHP, 2AJ, 2NH, 2XC, 3ABH, 3AUS, 3BLP, 3CGQ, 3CWW, 3DJX, 3EDD, 3FD, 3FXG, 3GAV, 3GDR, 3GHI, 3HAZ, 3HBW, 3HCK, 3HVO, 3HXO, 3HXS, 3WW, 4HQ, 4MW, 5HB, 5LK, 5MA/P (24 *May*), 5TP, 5WP, 6AG, 6CH, 6WU, 8DV/A, 8IL. (*April* 26 *to June* 6).

G2HIF, Wantage, Berks. NGR 41/404885.

WORKED: EI2W, G2AJ, 2BCB, 2FCL, 2FTS, 2HDZ, 2HGR, 2HGR/P, 2OI, 2PU, 2XV, 3ABA/P, 3AGA, 3AOO, 3APY/P, 3BEX/P, 3BHS, 3BW, 3DJQ, 3EHB, 3ERD/P, 3FAN, 3FGT, 3FIH, 3FKO/P, 3FMI, 3GBO/P, 3MA/P, 3N2, 3WW, 4GR, 4SA, 5HB, 5ML, 5RP, 5RP/P, 6NB, 6XM/P, 6YU, 8DM, 8QY/P, 8SB, 8VZ, GD3DA/P, GW3ENY, 5BM/P, 8UH, PE1PL.

HEARD: G2AOK/A, 2BAT, 3DA, 3EHY, 3ENS/P, 6NB/A. (*May* 5 *to May* 31).

EI2W, Foxrock, Co. Dublin, Eire.

WORKED: G2AJ, 2CBR, 2DCI, 2FZU, 2HCJ/P, 2PU, 3ABH, 3AOO, 3AYT, 3BA, 3BPJ, 3BW, 3CCH, 3CSC, 3DMU, 3EDD, 3GUU, 3GZM, 3HII, 3HWC, 5JU, 5RW, 6NB/A, 8KL, GI2HML, 3BIL, 6VU, GM6KH, 6LS, GW3FYR, 8UH. (*April* 1 *to June* 10: *new stations only*).

G3BJQ, Rugby, Warks.

WORKED: G2AJ, 2AOK/A, 2DJL/A, 2FNW, 2FZU, 2HCG, 2HDZ, 2IQ, 2XV, 3ABA, 3ATK, 3BLP, 3CWV, 3DJQ, 3DUP, 3EHY, 3FGT, 3GHO, 3HAZ, 3IAI, 3IS, 3NL, 5JU, 5ML, 5SK, 5YV, 6CI, 6NB, 6NB/P, 6TA, 6YU, 8QY.

HEARD: EI2W, G2DIG, 2FO, 2FTL, 2HIF, 2JZ, 2MV, 2OI, 2XY, 3APY, 3DO, 3ENS, 3GUD, 3HAJ, 3WW, 4RK, 5DS, 5HB, 5MA, 6SN, 6XM, 8DV/A, GW2ADZ. (*May* 13 *to June* 8).

G2FCL, Shipley, Yorks.

WORKED: G2ADR, 2AJ, 2DKH/P, 2FJR, 2FNW, 2HCG, 2HDZ, 2HIF, 2PU, 2VQ, 2XS, 2XV, 3ABA/P, 3AGS, 3AJP, 3AMM, 3APY/P, 3AYT/P, 3CCH/P, 3CFK, 3CML, 3DMV, 3DVK, 3EDD, 3EHY, 3ENS, 3ERD/P, 3FFV, 3FFV/P, 3GCX, 3GHI, 3HUV, 3MY/P, 3WW, 4JJ, 4JJ/P, 5DS, 5MA/P, 5YV, 6MB, 6PJ, 6XX, 6YO, 8AO/MM, 8GL, 8IC, 8SB, 8SI/P, 8VR, GW2ADZ, 3ATZ/P, 3ENY, 5MQ, PE1PL. (*May* 11 *to June* 12).

G3EHY, Banwell, Somerset. NGR 31/389595.

WORKED: EI2W, G2AIW, 2AJ, 2FCL, 2FNW, 2FQP, 2FTL, 2HDZ, 2HGR, 2PU, 3ABH, 3ANB, 3BJQ, 3BVG, 3BW, 3CVK, 3DJQ, 3DLU, 3EDD, 3FFX, 3FGT, 3FMI, 3FUW, 3FXG, 3GDR, 3HBW, 3HSC, 3HSD, 3HWC, 3HXS, 3IFV, 3VM, 3WW, 4GR, 5BD, 5DS, 5HB, 5ML, 5RP, 5UD, 5UM, 5YV, 6JP, 6NB, 6NB/P, 6XX, 6YU, 8DA, 8DM, 8GL, 8QY, 8SB, GD3DA/P, GW2ADZ, 3FYR, 8SU.

HEARD: G3DO, ON4BZ. (*May* 12 *to June* 11).

G3BVG, London, W.5. NGR 51/181817.

WORKED: G2AIW, 2BN, 2DSW, 2FTS, 2HDZ, 3BNC, 3DJX, 3EHY, 3FAN, 3FQS, 3FXG, 3GBO, 3GHO, 3GOP, 3GSE, 3HBW, 3HSE, 5SZ, 5TP, 6HC, 6KB, 6TA, 6XM, 8AO/A, 8DV/A, 8VR.

HEARD: G2AHP, 2AJ, 2ANT, 2BAT, 2DGF, 2DTO, 2FVD, 2HCG, 2IQ, 2KF, 2LW, 2NH, 2YC, 3ABH, 3AUS, 3BLP, 3BUN, 3CGQ, 3CNF, 3DAH, 3EOH, 3FD, 3FEX, 3FIH, 3FSD, 3FUM, 3FZL, 3GAO, 3GAV, 3GHI, 3GHL, 3HAB, 3HVO, 3HXS, 3IIR, 4HQ, 4KD, 4MR, 5DS, 5LK, 5LN, 5MA, 5RD, 5UM, 5WP, 5YV, 6AG, 6NB, 6UH, 6WU, 8HY, PA0FC. (*May* 8 *to June* 7).

GD3DA/P, Snaefell, Isle of Man, 2,034 ft. a.s.l.

WORKED: G2AJ, 2DCI, 2FCV, 2FZU, 2HCJ/P, 2HGR, 2HIF, 2OI, 3ABH, 3AGS, 3AMM, 3AOO, 3BLP, 3BPD, 3BPJ, 3BY, 3CCH, 3CXD, 3GMX, 3GSS, 3HII, 3HWC, 3WW, 5BM, 5CP, 5RW, 5SK, 5VN/P, 6NB, 6QT, 6XX, 6YU, 8DV/A, 8KL, GI2FHN, 2HML, 3AXD, 3BIL, 3GQB, 6VU, GM3EGW, 3ENJ, 3FOW, 6LS, GW3ENY, 3FYR, 5MQ. (*May* 15 *to* 18).

G2OI, Eccles, Lancs. NGR 33/993753.

WORKED: EI2W, G2AJ, 2ASK, 2DLJ/A, 2FCV, 2FO, 2FTS, 2HCG, 2HCG/P, 2HCJ, 2HDZ, 2HGR, 2HIF, 2NH, 2XC, 3ABA/P, 3AOO, 3APY/P, 3AYT, 3AYT/P, 3BGR, 3BLP, 3BOC, 3BPD, 3BPJ, 3BY, 3CXD, 3ELT, 3ENS, 3ENS/P, 3ERD/P, 3FUL, 3GHO, 3GMX, 3HII, 3WW, 4JJ/P, 5BM, 5CP, 5DS, 5HB, 5MA/P, 5ML, 5RW, 5YV, 6LC, 6NB, 6QT, 8GL, 8HK, 8MZ, 8QY/P, 8SB, GD3DA/P, GW2ADZ, 3ATZ/P, 3BOC/P, 3ENY, 3FYR, 5MA/P, 5MQ.

HEARD: G3ABH, 3BJQ, 3BJR, 3BWS, 3CC, 3CSC, 3DJQ, 3DMU, 3FAR, 3FXG, 3FZM, 3GBR, 6CI, 6JD, 8OU, GM3BDA, GW2CYN P. (*May* 1 *to* 29).

G2DKH/P, Stanley, Co. Durham.

WORKED: G2FCL, 2FZU, 2XV, 3AMM, 3CC, 3CYY, 3WW, 5QU, 5RW, 5YV, 6LI, 6XX, 8GL, 8IC, 8SB, GM3EGW, 3ENJ.

HEARD: G3CJY, 3DMK, 4JJ, 5GX, 6NB, GW3ENY. (*May* 21 *to* 25).

G3FIH, Radstock, Somerset. NGR 31/684559.

WORKED: G2AHP, 2BAT, 2BHW, 2DTO, 2HDZ, 2HIF, 3AGA, 3AUS, 3AVF, 3DLU, 3FKO, 3GBO, 3GSE, 5MA, 5UM, 6NB, 8DM, 8DV/A, 8VZ, 8IL, GW3BNQ, 3FYR.

HEARD: G3ANB, 3EHY, 3IWA, 6XM, GW8UH.

G3IWA, Bath, Somerset.

WORKED: G2HIF, 2MM, 2XC, 3ABH, 3BLP, 3CGQ, 3DJX, 3DLU, 3EHY, 3EUP, 3FAN, 3FIH, 3FKO, 3HXJ, 3HXS, 3WW, 4AP, 4HT, 5HB, 6XM, 8DV/A, 8HK, 8IL, 8OO.

HEARD: G2AHP, 2AJ, 2HCG, 2PU, 2UJ, 3AGA, 3BK, 3CCP, 3CGE, 3FUM, 3GHO, 3HSD, 31FV, 5MA, 5TP, 6NB, 8OU, 8UF, 8VZ, GW3BNY, 8UH.

what he describes as "modest equipment" and is still in temporary quarters. The transmitter is EF91 osc-trebler, EF91 trebler, QQVO4/7 doubler, 832 amplifier, into 829 PA, 120 watts on CW and 60 watts screen modulated phone. The receiver is 6J6 RF, 6J6 mixer, 6AK5 CO into an HRO. Aerial facilities at GM3BA are very poor —all he has is a "tiddly thing" compared with the old 24-ele. stack at Daventry. He is one of the VHF missionaries in GM and has been assisting GM3BDA with a 16-ele. stack, and others in various ways. GM6KH (Hamilton) is using a "ZL Special with two directors" and is putting out a potent signal with it. Quite a number of G's are heard in the central area of Scotland, G3BW being one of the most consistent, and EI2W very strong. Like many others writing this month, GM3BA wishes the latter would come up on CW occasionally, as his phone is not always readable under QSB conditions.

EI2W (Dublin) worked GM3EGW on May 16 for his first Scot this season, and DX G's like G6NB at 255 miles, G3EDD (Cambridge), G8OU (Ashstead, Sy.), G2PU (Cambridge), G3BLP (Selsdon) and G2AJ (Biggin Hill) were coming in to Dublin at strengths around the S9 mark. A particularly good QSO was that with G3ABH (Poole) at S9 + on May 18. On the 21st, G5JU (Birmingham) got across to EI2W, who, in the period up to June 10, also had several GM QSO's and a number of new contacts. The scoring at EI2W as at June 10 was 101 stations worked in 42 counties —so that when he gets all the cards in, EI2W will be able to claim his VHFCC certificate; in view of his own exemplary record in the matter of QSL'ing, we hope that he will not have to wait for these cards.

G5YV (Leeds) remarks that, with him, one of the most consistent of the London stations is G3FXG (Clapham, S.W.4), who can be worked from Leeds three times a day—during the pre-breakfast hour, in the early evening, and again "after TV." G5YV is hearing GM's with the new aerial oftener and more comfortably than before, and was also able to add GI3BIL (Belfast) for a new country on Two; this puts him in the same bracket as G3BLP in Countries Worked, with 12 each—*twelve*! Another interesting QSO for G5YV was with G8AO/MM on June 11. The latter remarked that when berthed in London River he had often heard G5YV at S7 or so. If the tide was out, the ship lay on the mud with G8AO's aerial at road level; every time a bus passed, G5YV's signal went QSB!

From Barnsley, G4JJ reports that he has decided to go /P in order to make himself heard "except to the North," he being badly screened in every other direction.

With G4LX (Newcastle) conditions during the month have been best for the GM's—he has worked GM3EGW, 6KH and 6LS, with GM3BDA, 3ENJ and 6SR heard. Locals active are: G2BCY, G3CYY, G3DXZ (Bedlington), G3EGF, G3GEA (Gateshead) and G4WB. From this district, G2DKH (Stanley, Co. Durham) also reports, with a nice calls list covering some recent /P activity. The G2DKH/P station consists of a 15-watt transmitter and triple superhet receiver, all enclosed in a portable cabinet measuring 17in. x 11in. x 10in.—it has got him as far south as Cambridge.

G2FCL (Shipley, Yorks.) comes into the Counties Tables at the 24th rung, and is getting out very well. The transmitter runs 20 watts to an 832, the aerial is a 3-element beam 35ft. high, and the receiver a G2IQ-type converter, with another one, having *three* 6J6 RF stages, on test.

'Way up in Whitehaven, Cumberland, G3BW is on practically every evening, with G3EHY, G6NB, G5BM and GM3BDA as his most consistent signals. It should be noted that for the present G3BW is CW-only, but in due course he hopes to be on phone. From Higher Walton, Cheshire, near the Lancashire border, we welcome a first report signed G2HCJ, whose main interest is /P operation. He has the gear built into a shooting-brake, the transmitter being SCR-522, with a cascode front end for the '522 receiver, and a regenerative IF stage; this permits a 10 kc bandwidth, with high gain. The aerials used /P vary from a single dipole for 144 mc to a couple of "City Slickers" which can be elevated to 35 feet. G2HCJ's work keeps him on the move, and he hopes to be visiting in many areas during the next few months; he will be on /P most evenings and QSL's 100%. Numerous interesting contacts (actually, some 47 different stations) have been worked already under portable operating conditions.

G2OI (Eccles), with 56, now takes the hot seat from Johnnie G3BLP in the All-Time Counties List, but has not found conditions too good for general GDX working; his calls list shows some good GW contacts, with GM3BDA heard.

Midlands and East

G3BJQ (Rugby) is another who, though very interested in VHF for some years, writes us for the first time; he recommenced active operations with effect from March last, having been off the air for a year due to illness. G3BJQ comes into the Tables at 17 and 16C, and his Activity Report shows that he is busy making up for lost time. The transmitter is a modified SCR-522 with 16 watts into the 832 PA, the converter being triode 6F12 - ½6J6 - 6F12 mixer in the cascode circuit, with 6C4 oscillator and 6C4 cathode follower into an S.640. A new beam system is under construction, with a 4-ele. array in use meanwhile. G3BJQ rightly points out that G3FKO did not do any /P operating from Rugby (as implied in last month's note), but from near his home QTH in the Bath district.

G3GHO (Roade) started on Two nine months ago and has been with us ever since, finding VHF more interesting and satisfying than LF-band working. He remarks on the pre-breakfast hour activity on the band nowadays—G2FNW, G3FXG, G3GHO and G5YV are on regularly—and says that conditions seem good at that time, with high signal levels.

G2HOP (Stamford, Northants.) runs an 832 in the PA with 30 watts, his receiver is a G2IQ converter into an R.1224A, and the beam a 5-over-5 at 53 ft., his location a.s.l. being 100 ft. and somewhat screened to the South.

He is keeping steadily at it, and has worked DX like EI2W, ON4BZ and 4HN, with PAØFB heard.

G3WW (Wimblington), whose height a.s.l. measured in inches is rather less than most people's in feet, raised five new DX or near-DX stations in the period May 17-25; they were G2DKH/P (Stanley, Co. Durham), G3CC (Hull), G3IWA (Bath), GW8UH (Cardiff) and PAØNL at 208 miles. Other good QSO's in this period were with EI2W, G5UF (Dorchester), PAØEO and PAØFB. Then, on July 13, Richard knocked off the best reported GDX contact of the month—he worked GM3BDA at 0040, 439 in. with 569 from '3BDA. Just about this time, G3WW also heard an unidentified GM6. *Nice* going! The QSO with GM3BDA was particularly interesting, as G3WW had visited him on June 7 and the subsequent contact was helped across by G5YV. Richard reports that the GM3BDA location is rather a noisy one, but his normal range southwards is G2IQ, G2OI, G5YV and G6LI.

G6LI (nr. Grimsby) has been on since May 7, and on the 19th found ON4BZ stronger than G5YV; he has been able to work into Scotland pretty regularly, with GM6KH (Hamilton, Lanark) for a new one on June 11, under improving conditions.

From G3VM (New Costessy, East Anglia) we have a note that pressure of business has kept him from putting in more than the odd half-hour on the band every now and again—but he saw that comment last month about East Anglia and the two-metre map, and assures G3AJP that he will co-operate to the full! Indeed, for a long time G3VM was about the only regularly active station in that area. On June 11, he made what to him was a very interesting QSO with G8AO/MM, of whom we have heard quite a lot this month.

London and Home Counties

G3HBW (Wembley) was pleased to hear EI2W for the first time on May 18, and on that evening he also worked F8GH. But the most outstanding signal with him was—yes, you've guessed it—G5YV, with whom he has had several QSO's. But G3BHW is having great difficulty in attracting the attention of certain other Northerners he can also hear and would like to work; of these, G2CPT (Goole) and G8IC (Doncaster) are mentioned. G2DTO (London, S.W.17) reports that G3HVO (Parkstone, Dorset) looks for London contacts at 2200 BST most nights, and G3GBO (Denham) worked F8AA and F8GH during the month, with F8KF, F8NW and ON4BZ heard. G3GBO is getting interested in /P work after his experiences on May 11, even though conditions were not so hot on that occasion.

G2AHP (Greenford) is rebuilding yet again, but has nevertheless found time to notch up some new contacts, as well as keeping in touch with the regulars. He wants Suffolk badly, and asks anyone active in those parts after TV time to remember him—if that fails, he proposes to commission someone to go /P into Suffolk!

Another to get on to the Continent at last is G2FVD (Morden), who fixed F8AA one evening in May, and has got the QSL to prove it; this and two new counties in G3AJP (Suffolk) and G6NB/A (Herefordshire) moves his score along nicely. G3SM (North Harrow) is building himself an aerial tower, so has been off for some time. Bob G5MA, G5MA/P, GW5MA/P, has been out again with G5MA/P and from a site 600 ft. a.s.l., near Storrington on the South Downs, he had several good GDX contacts in the Lancashire-Yorkshire area on May 24; and GW3FYR has given him Cardiganshire for a new county from G5MA, so Bob is also one who moves up a bit in the Tables. G2HDZ (Pinner) gets his score amendments in just on the deadline.

South and West

G5MR (Hythe) got going again towards the end of April, and in about the two months since has worked no less than 14 French stations; but with him conditions have been very patchy, with all distant signals affected by deep fading. Like G8NM, and many others (including your A.J.D) G5MR would like to find many stations regularly on the air at more civilised hours like 1800-2000 (clock-time), instead of all this late-night stuff "after TV."

G3FEX (Bramber, nr. Steyning, Sussex) goes up by two in the Table, and is another who hopes to be out /P frequently during the summer week-ends. The gear for this is a CC converter 6AK5-9003-6J5 with 9002-9003 multi-

MARATHON VHF CONTEST

FIRST LEG

Week End July 19-20

See Rules in this issue.

Logs by July 30 for First Table in September issue.

TWO METRES

ALL-TIME COUNTIES WORKED LIST

Starting Figure 14

From Fixed QTH Only

Worked	Station
56	G2OI (326)
55	G3BLP (535)
54	G3EHY (350)
52	GW5MQ (186)
51	G3BW
50	G5YV
48	G2AJ (408)
47	G2NH, G5WP, G6NB, G8SB
46	G4HT (476), G5BY
45	G5MA, G6XM (356)
44	G2XC, G3ABA (222), G3WW, G4CI
43	G3COJ, G5DF, G5DS (348)
42	EI2W (101), G2HDZ (295), G3BK, G5BD
41	G3BA, G3DMU, G5BM
40	G3CGQ, G3FAN (264), G6YU, G8OU
39	G2IQ, G4SA
38	G3APY, G3VM (208)
37	G2FNW, G8IL
36	G3CXD, G6CB (312), G8IP
35	G2FQP
34	G2AHP, G3AVO/A, G3HAZ (113), G4RO, G5JU
33	G3FZL
32	G8QY
31	G2HIF, G3HBW (115), G5RP
30	G5NF
29	G2FVD, G6CI (101)
28	G3FIH, G5ML
27	G3BNC, G3DAH, G3GSE, G3HCU (152), G6GR
26	G3CFR (125), G3GBO (268), G4MR (170)
25	G5SK, G8VR
24	G2FCL, G3FD, G3FXG, G8KL
23	G5PY
22	G3AEP, G3BPM, G3CWW (221), G3GOP (100), G8IC, GM3BDA
21	G3AGS, G5MR (102), G6XY
20	G2HOP, G3EYV, G4LX, G6TA (123)
19	G3SM, G5LQ (176)
17	G3BJQ
16	G2AOL, G3FEX, G3FRE, GC2CNC, GM3EGW
15	G2DVD
14	G3CYY

Note: Figures in brackets after call are number of different stations worked. Starting figure is 100 such stations worked.

pliers and an IF of 28-30 mc ; on the transmitter side, he runs 8 watts to an 832 into a 4-ele. beam. With this rig, he was out portable on May 11 at what must have been at or very near G5MA's site on Kithurst Hill, Storrington. Eight /P stations were worked, but nothing in the way of DX could be raised. For his home location, G3FEX would particularly appreciate suggestions for schedules from Midlands stations —QTHR.

G8PX (Oxford) writes to say he has turned up again on Two after a stand-down of a couple of years or so, and is now VHF only with the Top Band for the locals. The converter is a new cascode using 6AK5-6J6-6J6 CO-6J6 doubler-mixer, with a 7 mc crystal giving an IF of 18-20 mc ; this is fed to the AR88 through a 6AG5 broad-band IF stage, and results are extremely good ; G5RP's noise factor measurement gave 4.5 dB.

G2HIF (Wantage) gives his "mention for consistency" to G5YV, with EI2W a close second ; most interesting QSO's during the month were with G3AGA for Cornwall. G3BW, GD3DA/P, G4GR for Monmouthshire, and PE1PL. G6JK (High Wycombe) says his version of the "City Slicker" should be described as the "Country Bumpkin," but nevertheless it works FB in more or less the expected directions. G6JK is in the hilly Chiltern country and loses most of what comes down his way from the North—even G5YV is Not There and he has built and unbuilt many converters in trying to solve this problem, but gaining only experience in the process. Well, that is something gained, anyway.

Ted of G2XC (Portsmouth) has been laid up for three weeks, and is in the hands of the medicos for a distressing attack of thrombosis. Nevertheless, he has been strong enough to get on the key at times and found the good conditions earlier in the month. All who follow this piece will wish him well, with a complete recovery and no complications.

G3FAN (Ryde) increased the horsepower to 75 watts (from 15) and, quite contrary to expectations, finds that it is paying him a handsome dividend ; at any rate, some of the more elusive stuff in his difficult direction, Wales, has been worked after two years' trying on the low-power transmitter. This helps him also up the Counties ladders.

No less than three correspondents write in from Bath, or near, this month—G3FIH, G3FKO and G3IWA. G3FIH (Radstock) got phone QSO's with G2BAT and G3AGA (both in Cornwall) and G3DLU for a new local in Weston-s-Mare. G3IWA put himself on 145.300 mc with a new crystal and has worked G3ABH (Poole) in what is rather an unexpected direction for the set of his "City Slicker." G3FKO and G3IWA are co-operating in a /P foray on July 6, and hope to persuade G8DX (also in Bath) to get cracking on Two now that he has an Rx going.

From May 13 until June 11 it was regular DX over 200 miles every evening for G3EHY (Banwell), and he says it is difficult to pick out any high spots—in the circumstances, we should say so! But he gives May 16-18 as the bright nights, with EI2W (Dublin), G3BW (Whitehaven), G8GL (Northallerton), G3VM (Norwich), ON4BZ (Brussels) and many stations to the South-East, all giving S8-S9 reports, culminating in the reception of a "GI3-D-?" on May 21, who was solid copy on everything but his own call and the other GI he was working at the time! "Tantalizing" is what G3EHY calls this, and he would like to hear from anyone who could give him a clue—preferably the GI's concerned. During the whole of the month, EI2W has been worked S7-S9 + on phone, with a colossal signal on June 4. This was while a low-pressure area was moving slowly across the country, with stations apparently along the edge of the front building up to great strength. G3FUW (Hinckley, Leics.) with 10 watts and an indoor beam, was S8 with G3EHY, and many London stations, not usually heard in Banwell, were worked at good strength. In the other direction, G2PU (Cambridge) reported signals from Cornwall, Devon and Somerset coming in more strongly than he had ever heard them.

ON4BZ (Brussels) reports that on May 22-23 conditions peaked in Northern Europe. He himself worked OZ2IZ and OZ2FR, with reports of S9 +, and on the 22nd the OZ's were receiving a few weak G's ; but activity over here was not high and nobody attempted to get across. The SM's and many LA's were on, putting strong signals into Denmark. Several SM6's and SM7's, in the southern part of Sweden, are operating regularly on Two, and SM7BE is once more looking for G's. So the prospects for EDX are again good, and it will pay to put steady calls out on CW to the E.N.E. whenever the near Europeans are coming through. We are all in the same band, and the LA's, OZ's and SM's know where to look for us.

TWO METRES

COUNTIES WORKED SINCE SEPTEMBER 1, 1951

Starting Figure, 14

Worked	Station
48	G3EHY, G5YV
46	GW5MQ
42	G3WW
41	G3BK
39	G2HDZ
38	G3FAN, G5DS, G5MA
37	G2OI
36	G4HT, G6YU
35	G2XC
33	G4SA
32	G2NH
29	G2AHP, G3BW
28	G2FVD
27	G2FNW, G3GHO, G3VM
26	G3AVO/A, G8IL
23	G5ML
21	G3BNC, G3FIH, G6CB
20	G2FQP, G4MR, G6TA
19	G3CWW, G3HCU
18	G8VR
16	G3BJQ, GM3EGW, G6CI
15	G3GOP

Note : This Table will run for one year until August 31, 1952. Movements should be notified monthly.

News about Seventycems

Though quite a number of new stations report, or are reported, equipped for working on 430 mc, there is not so much news of actual two-way contact over the longer distances. But here again, G3EHY/GW2ADZ have had frequent contacts over their 105-mile path, with surprisingly high signal strength ; G3EHY is doubtful whether any of the London group ever look his way when conditions are good, and even when the path is what he calls "bang wide open" it is

invariably impossible to find any of the 70 cm stations on to try a test.

From the North, G3DA (Liverpool) comes in with a budget of news about Seventycem doings up there. During the GD3DA/P tests over May 15-18, he worked GI2HML and GI3CQB cross-band, with the GI's transmitting on 430 mc but without a receiver between them that could find GD3DA/P; they were 599-569 on Snaefell, as was G3AOO (Manchester), also worked cross-band with his transmitter on 70 cm. The only full two-way contact GD3DA/P got on 430 mc was with GW5MQ, who was worked several times with 599 signals both ways. From the home location, G3DA has worked G2DCI, G2JT, G2OI. G3AOO, G3ELT, G6DP and GW5MQ, most of whom are on nearly every evening; others worked cross-band but as yet without 70-cm receivers are G3AYT, G3HII and G8SB — so taking it all in all, there is steady activity in those parts, at least. G3DA himself is on 432.63 mc with an 832 tripler—but he is trying a pair of CV82's as GGT's for the PA. The 430 mc receiver is 446B RF stage, crystal mixer in a tunable cavity, 6F12 IF amplifier and CC oscillator, into an HRO. His aerial is a 5-element Yagi with reflector.

G2OI (Eccles) is rightly puzzled by his failure to work GD3DA/P on 70 cm, as he is an easy contact at the home QTH and was S9 on two metres. Similarly, attempts to QSO G2OI/G5RW have so far failed, though the path between them is a difficult one, even on 144 mc; G5RW is at Ilkeston.

G3BJQ (Rugby) is getting ready for 430 mc, as are G3FEX (nr. Steyning) and G3CAZ (Woolmer Hill, Haslemere). G3FEX has an 832 tripler and 6-element Yagi which have produced a cross-band QSO with G2MV (Coulsdon); a G3EJL converter is under construction, and, in the meantime, G3FEX would like cross-band tests with stations in the London area. During their forthcoming party in the Scilly Isles, G2AJ and his fellow-conspirators may be on 70 cm if they can get the gear ready in time. In East Anglia, stations actually testing on 430 mc are G2YU and G3CDZ, both of Norwich.

Up in Scotland, stations known to be on Seventycems are: GM's 3EGW, 3FOW, 3IBV, 6KH, 6SR, 6WL, and from the high spots good ranges are being worked. On one test GM6WL/P in the Lowther Hills worked GM3FOW (Bearsden) two-way on 430 mc over a distance of about 50 miles —results were "just like a telephone link." Thanks, GM3BA!

Away to the South, in Oxford, G8PX is working up enthusiasm for 70 cm. The converter is to be a CC job using an ASB8 RF and mixer cavity, modified to work with a crystal mixer. He is a bit stuck for ideas about using a CV53 tripler or a CV127 doubler on the transmitter side. G8PX has as his collaborator G5RP, of Abingdon, who is already equipped for the 430 mc band.

What They Say

"Why is the band so empty until 7.0 p.m., and why does everyone disappear when TV starts? Surely all the two-metre chaps don't watch TV every evening, neither can I imagine that they all have to keep off because of TVI. Is the explanation that they just sit and listen until something new pops up?" (G5YV) . . . "I did think of one solution to my QSL problem: Not to work from Westmorland those stations to which I have sent a card, without yet having had theirs for contacts from my home QTH!" (G4JJ) . . . "As regards the moan about not QSL'ing, I would like to know on whose black list I am so that the matter can be rectified" (G3BW) . . . "On the subject of Conditions and Activity, why don't some of the boys throw their barometers out of the window?" (G3GHO) . . . "I have little patience with those who criticise anyone trying to work the EDX in its own language; if all the Europeans used only their own language, some of the clever ones would have a thin time" (G3GBO) . . . "The period around May 24, with exceptionally fine weather and a very high barometer, failed to produce any exceptional DX" (G6LI) . . . "About this QSL business, I think the worst offenders are the old stagers" (G2DTO) . . . "A dozen different stations on in the Greater London area would be fair activity as far as I am concerned. If this is all that can be managed out of 300, where is your high activity?" (G2FVD) . . . "I wish that more stations would use CW, which can be read under conditions when a phone station cannot even be identified" (G5MR) . . . "I expect some of the 2-metre gang think I am very much of an Old Timer, only coming on when it suits me. But it's not that at all; I still have plenty of enthusiasm, but no time to indulge it" (G6JK) . . . "During that spell of hot weather and high pressure around May 23, I was pleased to see many of the prophets fall down about what conditions should have been" (G2HIF) . . . "During my /P jaunts, the XYL is not only cook but also helps with the gear; I am probably unique in having been more radio-active in the six months since my marriage than in the five years before it!" (G2HCJ).

This and That

There have been a number of odd queries, mainly to do with our scoring, some of which look as if they were framed either to baffle your A.J.D. or trap him into some dangerous admission! Here are some quick answers to implicit questions: London, within the L.C.C. area, scores as a county. Counties are otherwise as defined by the 1952 *Whitaker's Almanac* listing of geographical counties; there are 41 English counties, including London and Monmouthshire; 33 in the Kingdom of Scotland; 6 in Northern Ireland; and 12 in Wales, excluding Monmouthshire — making a total of 92 (of which only 55 have so far been worked all-time, incidentally). Irish stations worked score both as country and county, *e.g.* EI2W, Co. Dublin, in the same way as all the other G prefixes; there are 26 counties in the Republic of Ireland. Under this ruling, GC and GD also score as countries and counties, but *not* the administrative county areas, like the Isle of Wight, the Isle of Ely, and the Ridings of Yorkshire.

Another problem is what we are

going to do about G8AO/MM! The answer is that he scores as a new station from any fixed location, but for a county (or country) only when he is docked or at moorings in that county (or country). And the same goes for any other /MM's that may show up on the VHF bands. Any more questions!

Claims for the VHFCC Certificate must be accompanied by a check list with the cards, which should be sent by registered post. And as your A.J.D. is not always in the office, it is usually a few days before the Certificate can be issued and the cards returned.

When sending in score amendments, put them on a separate slip and state clearly which Tables they are for—and give the station call as well as the county for each new one worked to support the claim. We would also like to ask for particular care in the matter of calls list for the Activity Report (in other words, "Calls Heard"). They should be written out clearly in block letters just as they are shown in the Activity Report, and on a separate sheet. Your attention to these (seemingly trivial) points is immensely helpful when one is dealing with a large quantity of mail.

New Irish Organisation

Inspired by EI2W, who has been to Belfast to discuss the matter, plans are in hand for the formation of a body to be known as The VHF Research Society of Ireland. The title is self-explanatory, and the main objective is to foster VHF activity outside the main cities. The GI's are enthusiastic about the idea, and we certainly hope that the project will be successfully carried through—we shall be glad to assist in any way possible.

Finally

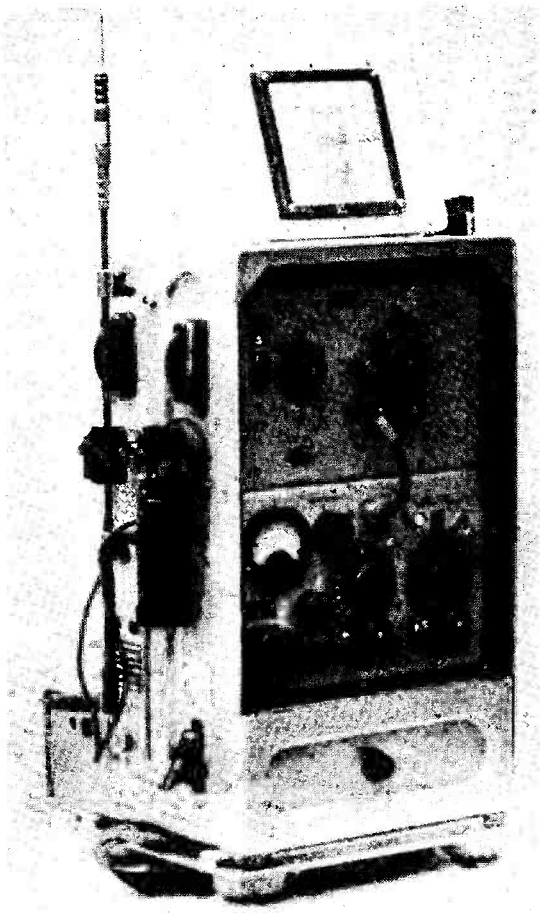
And that about winds it up for this month. We sincerely hope that there are no errors, omissions or misrepresentations, as there has been a lot of material to go through, and not much time in which to do it. Don't forget the first session for the Marathon VHF Contest, and remember that we want the logs by July 30, which allows ample time; the paper work will be quite easy if preparations are made along the lines already suggested.

For the next issue, the closing date for "VHF Bands" will be **July 18.** Address all your news, views, notes, comments, claims and criticisms to: A. J. Devon, "VHF Bands," 55 Victoria Street, London, S.W.1. We meet again on August 8.

G3DA holding the 12-element 70 centimetre aerial array used for his Snaefell tests in May last. Good 599 both-way contacts were obtained with GW5MQ, and cross-band 144/430 mc QSO's with GI2HML, GI3GQB and G3AOO, with these latter stations transmitting on 70 cm. and listening on 144 mc.

TRANSPORTABLE QRP GEAR

The photograph shows a converted Type 18 Mk. III set built into a Type 5 Mk I container to make up a completely portable QRP station, operating from two 1½-volt bell cells and a couple of 60-volt HT blocks. The transmitter section of the original equipment was left "as is," but in the receiver auto-bias has been fitted and AVC applied; bandspread can also be provided and an additional LF output stage to operate a speaker. The result is a neat rig, very suitable for portable work, /A operation, or as a stand-by. This conversion was carried out by: V. N. Louis, 122 Solihull Lane, Hall Green, Birmingham, 28, from whom further details can be obtained.



REBUTTAL

In the February 1952 issue of *Short Wave Magazine*, p.753, we noticed an article in *QST* on the "End-Fed Hertz," by W4ADE. Arising from this, we have a note from W1NKW (Nahant, Mass.) refuting the suggestion that this system is inimical to TV. W1NKW says that with a TVI-proofed 807 rig on 14 mc, running 35 watts, he is able to operate without a trace of TVI on his own or near neighbours' receivers. The point is, of course, that his own transmitter was built to be TVI-proof. Well, we are glad to know it!

BRIMAR APPLICATION REPORT SERVICE

Designed to meet the demand for advance or more complete information on Brimar Valves, the new Brimar Valve Application Report Service, launched in February of this year, has aroused widespread interest and an overwhelming response.

Requests for this service have come from as many as 25 different countries and, besides the radio manufacturers and scientific research stations, there has been a great demand from totally unexpected sources with diverse and varied interests.

The annual subscription of £1 covers all Reports and advance information data sheets which are issued during that year; sturdy loose-leaf binders are provided. The Reports run into anything from 6 to 30 pages, and, in addition to the usual technical information, contain measured performance data in typical circuits, together with comprehensive curves of the various valve parameters which are so necessary for the convenience of the circuit designer.

Reports on the following types have been issued to date:—

6AM6	**6BW6, 9BW6**	**12AU7**	**6BA6**
6AT6	**6CH6**	**12AX7**	**6BS7**
6AU6	**6T8**	**35W4**	**6CD6G**
6BE6	**6X4**	**5OC5**	**6U4GT**
6BR7	**12AT7**	**5763**	**12AH8**

Extra copies of individual Reports can be obtained for 2s. 6d. or 5s. each, depending on the type, and these are stitched into a protective grey cardboard stiffener.

The advance information on new Brimar types will shortly be issued in the form of data sheets, which will bridge the gap whilst Application Reports are being prepared. Write Brimar Valves, Standard Telephones & Cables, Ltd., Footscray, Sidcup, Kent.

TO INTENDING CONTRIBUTORS

We are always glad to see articles on subjects of Amateur Radio interest, and in this particular field we pay the highest rates in the world. A note on how to submit articles appears every month on the Contents page. Contributors can best help themselves, and us, by preparing their material in the form in which they would expect to see it in print. This involves a close study of *Short Wave Magazine*, and careful attention to such points as permitted abbreviations, the use of sub-headings, the drawing convention, the setting out of tables of values, and sequence in the treatment of the subject. Particular care should be given to drawings and diagrams, which *must* be accurate in every detail and conform as nearly as possible to the *Magazine* convention; but they need not be copper-plate, as all diagrams are re-drawn by our draughtsmen. The Editor is always pleased to consider ideas for articles, but as a general rule is not prepared to suggest subjects to aspiring contributors unless they have already appeared in print in *Short Wave Magazine* or are otherwise known as writers in the field of Amateur Radio.

LAST month's paragraph on Under-Water Reception was *not* a leg-pull. Various sceptics have written to suggest that they are not as credulous as all that—but they obviously had no knowledge of Naval Affairs during the last war! It now remains for some enterprising amateur to try out the thrills of under-water reception and transmission, but one does not advise the use of walkie-talkie gear, which is suggested by one of the incredulous gentlemen! Doubtless we shall now receive an interesting account of under-water DX worked on a three-element Plumber's Delight made of (water-filled) lead piping.

GOING PORTABLE?

It is a little hard to account for the lack of real portable, or even mobile, gear in this country. In the States, of course, mobile operation is enormously popular, and quite high-power rigs are accommodated in the spacious boots of large American cars (although one feels that the batteries must get some rather hard treatment). It can be done, though, on a smaller scale, and I recently heard some very nice 80-metre phone originating from the cubby-hole of a Ford-8 some 120 miles away, using quite a small centre-loaded whip aerial. Probably the answer is, broadly, that "nothing succeeds like success" and that if there were more such portables looking for contacts there would soon be still more, anxious to work them. The BC-455 series of receivers give an excellent performance if only one band is wanted; they are economical in their demands on the battery, too. Of course, in this country licensing regulations require that the station be operated /P, and *not* mobile in the accepted sense.

WHY NOT TEN METRES?

Continuing on the same subject, one is always surprised that the ten-metre band has not been used more extensively for portable work, when it is closed for DX. Short-range ground-wave working is quite easy on the band, and, of course, the kind of aerial you can put on a car of any size is likely to be much more efficient on Ten than it is on Eighty. Apart from true mobile operation, the use of real portable gear would seem to be easy enough for anyone with a small car, a combination, or even a solo motor-cycle. But by "portable" is meant just that, and not the kind of gear one often associates with Field Days, consisting of someone's QRO station taken away from home on a couple of lorries and operated from a petrol-driven AC generator!

THE TVI BOGEY

By the time you read this, many of us will have had our first experience of the 21 mc band and the kind of TVI it causes to viewers in the London and Home Counties area. The second harmonic is a much tougher proposition to iron out than the third, and it seems that a lot of hard thinking and rebuilding is going to take place in the southern half of England. This is made even worse by the facts that (*a*) Alexandra Palace is now the lowest-powered of all the TV stations, and (*b*) There are surely more "fringe-area" viewers on AP than on all the other stations put together, for the whole of the South Coast and many densely-populated parts of the Home Counties can only be classified as "fringe." Even a carefully-built 25-watter running on 21 mc can probably put out a sufficient sniff of energy on 42 mc to wreak havoc among these sets that have to operate on the very minimum of RF from the TV transmitter.

GADGETS AND GADGETRY

It has already been said that the ingenuity and, indeed, the technical attainments of the average amateur can be assessed by the goodness or otherwise of his ancillary apparatus (gadgets to you). The transmitter and receiver, in basic form, are fairly straightforward in these enlightened days, but the various things that button on to them give scope for real original thinking. The change-over system, for example: how long does it take *you* to switch from send to receive? Half-a-second, or ten seconds? It makes all the difference on congested bands and in net operation. There is no need to use dozens of relays to obtain an instantaneous change-over—various electronic tricks are well known. (Long before the war the writer even knew an amateur who merely had to rest his hand on the key to effect his change-over, by interrupting a beam from a lamp to a photocell.)

CHATTER AND NATTER

An unkind friend of mine, who has always been rather scornful of the amateur fraternity (being possessed of more than the average technical knowledge and ability himself), called the other day and asked a leading question. "Why," he asked, "do all those amateurs who talk the most appear to know the least?" Listen on the phone bands, he said, and you will hear someone talk a solid fifteen minutes of piffle about 807 parasitics, or something that appears to defy Ohm's law. Those who know their stuff have much less to say, but those who display a shocking ignorance of fundamental principles appear to be almost proud of displaying that ignorance to all and sundry over the air. It's not as if they were asking for enlightenment or advice, either—they talk so long that no one else has a chance to give them any! Empty vessels make the most sound . . . .

NEW GERMANIUM DIODE GD4

The Brimar GD4 is a high-quality diode which, together with the GD3, were the first to be designed specifically for the commercial side of the radio industry.

Produced particularly for noise limiter use in TV receivers, where the peak inverse voltage rating is as high as 50 volts, this diode can replace the GD3, should the latter's lower voltage handling capabilities and lower back resistance be inadequate.

The special treatment of the germanium surface and the design of the catswhisker in this new diode make it suitable to stand up to severe mechanical shock ; it is extremely well sealed in a ceramic tube, and will not deteriorate under changing climatic conditions.

Small in size (about that of a half-watt resistor), the diode can be suspended in the wiring, thus aiding the reduction of stray capacitances. Damage during the soldering of lead wires is practically eliminated by the employment of special wire which, while possessing low electrical resistance, has the added advantage of low thermal conductivity. Write Brimar Valves, Standard Telephones & Cables, Ltd., Footscray, Sidcup, Kent, for further details and prices.

COMMERCIAL TV EXPERIMENT

The first practical application of a private television system in Britain was recently demonstrated. TV was put to work for commerce, the commercial organisation being Glyn Mills & Co.

In 1946 it became clear to the company that certain departments evacuated to Osterley during the war would have to remain there. This created difficulties in that when it became necessary to verify a customer's cheque this was impossible by the normal method of communication—the telephone. Teleprinting and telephotography methods were examined but did not give the immediate picture required.

The company then contacted Pye Radio, who produced a TV unit which was compact, mobile and easy to maintain. Experiments took place over a ten-mile route and, once initial difficulties had been overcome, perfectly satisfactory results obtained.

With this system a manager at Whitehall can immediately refer to a customer's records at Osterley. All that is necessary is for a clerk at the remote end to place the document under the camera and, if a magnified image is required, to change the lens. Such a system has the advantage that a commercial organisation could drastically reduce the size of city premises (where rates and rents are high) and, incidentally, almost eliminate the difficult problem of staff travelling. Glyn Mills have not yet finally decided to adopt the system. Installation costs are estimated at £10,000, supplemented by running costs of £5 10s. per week.

The camera used in the Pye equipment is a remarkable piece of equipment. It measures only 11 x 6½ x 4¾in., smaller than an attaché case—and yet gives extremely clear pictures. For instance, on one test carried out during the Glyn Mills experiments a telephone directory was placed in front of the camera. *All the figures were perfectly readable on the television screen.* The camera is normally remote-controlled from the receiving end, so that all the clerk has to do is to place the cheque or document in front of the camera—which can be operated up to 300 yards from the control unit by the use of a special multi-channel connecting cable.

SOUND RECORDING AND REPRODUCTION

This book has been written primarily as an instruction manual for the use of engineering staff of the BBC, but it will be of considerable value to all interested in the technique of sound recording. No other textbook so comprehensive has previously appeared on the subject. The BBC is now one of the largest users of recorded material in the world, and has developed equipment, both for recording and reproduction, of the very highest standards. J. W. Godfrey and S. W. Amos have had the collaboration of M. J. L. Pulling, M.A., M.I.E.E., K. R. Sturley, Ph. D., B.Sc., M.I.E.E., and P. J. Guy, Assoc.I.E.E., in writing this book. All are members of the BBC Engineering Division.

The principles of electrical recording and reproduction are first set out clearly and fully. Disc recording is then discussed, with a detailed description of the BBC and American Presto equipment now in operation in British broadcasting services, followed by the chapters on the reproduction of discs, and pressings and the processing of discs. The principles of magnetic recording are next explained, with descriptions of the Marconi-Stille, Magnetophon and E.M.I. magnetic systems, which have been used at different times by the BBC. The book then deals with recording on film, and describes the Philips-Miller film equipment as used by the Corporation. There are a number of appendices containing a generous amount of reference information not readily available elsewhere, and a wealth of photographs and diagrams, including many useful graphs.

While the emphasis throughout is on BBC equipment, no student or sound engineer concerned with high-quality recording can fail to find the book of interest, filling, as it does, a noticeable gap in telecommunications literature.

SOUND RECORDING AND REPRODUCTION: A BBC Engineering Training Manual by J. W. Godfrey and S. W. Amos, B.Sc., A.M.I.E.E. Published for *Wireless World* by Iliffe & Sons, Limited. Price 30s. 0d. (postage 8d.). Size D8vo (8¼ins. x 5½ins.), 272 pages ; 176 illustrations and 10 plates. Cloth bound with jacket.

MEMORIAL TO EI3N

In our issue for August, 1951, we reported the distressing accident which led to the untimely death of Michael Collins, EI3N, of Dublin. At the annual general meeting of the Irish Radio Transmitters' Society, it was reported that a cheque for nearly £300 —subscribed by his friends, IRTS members and the IRTS—had been presented to the widow as a memorial to EI3N.

NEW QTH's

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

EI2H, D. Noonan, Corderry, Galbally, Co. Tipperary.

G2BNZ, D. Markland, A.M.A.E.T., 484 Bridgeman Street, Bolton, Lancs.

G3ETQ, G. Whitfield *(ex-YI3ETQ)*, 3 Goldsborough Road, Doncaster, Yorkshire.

G3GRJ, R. S. Johnson, 17 Bullsmoor Way, Waltham Cross, Herts.

G3HPP, Kynoch Radio and Television Society, Kynoch Works, Witton, Birmingham, 6.

GD3HQA, P. B. Bronte-Hearne, Prospect House, Waterloo Road, Ramsey, Isle of Man. *(Tel.: Ramsey 2391).*

G3HQA/A, P. B. Bronte-Hearne, Royal Naval Signal School, St. Budeaux, Plymouth, Devon.

G3HSH, W. E. Moors. 22 Chorley Old Road, Bolton, Lancs.

G3HSW, J. Cassidy, 134 Saltwell Road, Gateshead 8, Co. Durham. *(Tel.: Gateshead 72720).*

G3HUJ, R. Russell, 61 Winchester Road, Davyhulme, nr. Manchester, Lancs.

G3HVJ, A. E. Chappell, Myrtle House, Vespan Road, Shepherds Bush, London, W.12.

G3HVQ, J. Kenton, 7 Warbeck Road, Shepherds Bush, London, W.12.

G3HVX, W. H. Wells, 5 Bonham Grove, Blakesley Road, Yardley, Birmingham.

G3HVY, R. Murcott, 35 Oak Lane, Boney Hay, Chase Terrace, nr. Walsall, Staffs.

G3HWC, W. Pilkington, 36 Malt Street, Preston, Lancs.

G3HWJ, R. F. Warren, 84 Chiltern Drive, Surbiton, Surrey.

G3HWX, B. J. Whitty, 46 Argo Road, Waterloo, Liverpool, 22.

G3HYU, E. W. Freeman, 105 Brackley's Way, Solihull, Warks. *(Tel.: Sheldon 2378).*

G3HZR, B. Harris, 21 Wheatfield Street, Haulgh, Bolton, Lancs.

G3ICA, G. H. Adams, 22 Rosebery Park, Dursley, Glos.

GW3IDJ, A. J. Clatworthy, 76 Bwlch Road, Fairwater, Cardiff.

G3IDL, R. O. Jones, 12 Broadstone Crescent, Brading, Isle of Wight.

G3IEA, A. Bullock, 10 Kenilworth Avenue, Prestwich, Manchester.

G3IEF, K. E. Felton, B.E.M., 46 Prebendal Avenue, Southcourt, Aylesbury, Bucks. *(Tel.: Aylesbury 542).*

GW3IEM, D. M. Lewis, 64 Rhyddings Park Road, Uplands, Swansea, Glam.

G3IEM/A, 3508290 SAC, Lewis, D. M., R.A.F., Skendleby, nr. Spilsby, Lincs. *(QSL via GW3IEM).*

G3IEN, B. S. Jobson, Tofts Farm, Seaton Carew, West Hartlepool, Co. Durham. *(Tel.: Seaton Carew 251).*

G3IEP, F. Harrison, 18 Sherdley Street, Crown Street, Liverpool, 7, Lancs.

G3IER, D. G. Martin, 23 Kipling Road, St. Marks, Cheltenham, Glos.

G3IEU, M. Graham, 5 Tweenbrook Avenue, Gloucester.

G3IEY, D. W. Avard, 38 Butlers Marston, Warwick.

G3IFG, W. R. C. Scott, 19 Redford Avenue, Horsham, Sussex.

GI3IGD, D. S. K. Coulter, 106 Main Street, Bangor, Co. Down.

G3IGO, D. H. Taylor, 14 Buckland Avenue, Slough, Bucks.

G3IPM, R. K. Field, 103 Claybrook Road, Hammersmith, London, W.6.

G3IST, S. Turner, 100 Longmeadow Road, Salford, 6, Lancs.

G3IVP, V. G. Page, 32 Feversham Road, Salisbury, Wilts.

G3IWA, A. J. Worrall, 7 Ainslie's Belvedere, Bath, Somerset.

CHANGE OF ADDRESS

G2BYK, J. C. Payne, 2 Barbican Terrace, Barnstaple, Devon.

G2DWM, H. E. Hardy, 914 North Circular Road, London, N.W.2.

G2FXQ, S. W. Saddington, 1 Shaftsbury Road, Sheldon, Birmingham, 26.

G2PS, E. A. Parsons, 39 Newtown, Westbury, Wilts.

G3BBG, W. J. Williams, 24 Edington Grove, Henbury, Bristol.

G3CAZ, J. J. Springate, 15 Rack Field, Woolmer Hill, Haslemere, Surrey.

G3DVM, J. J. Payne, 50 Cort Way, Fareham, Hants.

G3EGE, D. C. G. Johnson, 5 Charlton Grove, Queen's Road West, Beeston, Notts.

G3FIB, G. A. Livesey, St. Anthony's, Main Road, Marlpit Hill, Edenbridge, Kent.

G3GCR, E. A. J. Miles, 8 Elmfield Road, Cheltenham, Glos.

G3GSA, T. V. Livesey, St. Anthony's, Main Road, Marlpit Hill, Edenbridge, Kent.

G3HEB, Dr. I. Brown, Thornlea, Wharf Road, Crowle, Lincs.

G3IAB, N. R. Curtis, 92 Pelham Road, Wimbledon, London, S.W.19.

G3IFT, F. H. Tobin, 23 Church Walk, New Donnington, Wellington, Salop.

G3WS, F. S. A. Jenkins, 38 Loftin Way, Chelmsford, Essex.

G4PN, L. Milner, 16 Bracknell Drive, Boulton Lane, Derby.

G5QG, M. Hollinshead, 94 Cliff Rock Road, Rednal, Birmingham.

G8PH, H. C. Holley, 91 Richmond Road, Montpelier, Bristol, 6.

CORRECTION

G3EFB, Dr. A. H. Walker, 38 Woodhall Drive, Pinner, Middlesex. *(Tel.: Hatch End 1880).*

CARDS IN THE BOX

Please send a large stamped addressed envelope to BCM/QSL, London, W.C.1, with name and call-sign, and the card(s) will be forwarded. If appearance in "New QTH's" in *Short Wave Magazine*, and in the *Radio Amateur Call Book*, is also desired, that should be mentioned.

G2AUH, 2DIP, 2HDP, 2XD, 3ACZ, 3FGS, 3FH, 3HZL, 3IHM, 3IHR, 3ISM, 6ML, GM3IGY, GW3WIF.

VQ4AA

The Other Man's Station

THIS month we illustrate VQ4AA, ex-VQ3AA — owned and operated by S. H. W. Tanner, East African Railway, P.O. Box 351, Nakuru, Kenya—first licensed in 1948. Since then, a large number of G stations have been worked, as the operator is an exile from the lovely county of Gloucestershire, and his main interest is phone. During the months of April and May last alone he made over 200 G contacts.

Station VQ3AA came on the air from Tanganyika with a CC 40-watt outfit, and up to the time of the move into Kenya, VQ4, 65 countries had been worked. After about 15 months' operating in Kenya, with a 6-month spell of home leave, during which the gear was got together, station VQ4AA "as now is" was put on the air, and the log as at the end of May, 1952, shows 107 countries worked, mainly on 20-metre phone.

The transmitter is controlled by an ECO-VFO built into a TU-series cabinet, the Tx proper being 6AG7-807 into parallel 807's running 90 watts; early stages are wide-band, and a pi-circuit is used in the output tank, which is coax-coupled into an aerial tuning unit. The aerial is full-wave cut for 20 metres, fed with 72-ohm tape tapped in a quarter-wave from one end, after a well-known *Magazine* design for an aerial of this type for 40, 20 and 10 metres. The speech amplifier-modulator is crystal microphone into 6SH7-6J5-6SN7-6SN7, driving a pair of zero-biased 807's, with high and low-level speech clipping. Control is by relay throughout. Main receiver is an Eddystone 640, preceded (for Twenty) by an R9'er based on a *Short Wave Magazine* design. Auxiliary equipment includes a BC-221, and a grid dip oscillator built to another *Magazine* design, with the usual test gear to be found in the average amateur station.

Coming up for the future is a new transmitter with switched wide-band couplers, an 829 in the final PA, and a switched pi-tank network, for all bands from 7 to 28 mc, including the new 21 mc band. The whole transmitter, with its modulator, is being built into a single cabinet, with external power packs. Also under construction are an aerial tuning unit and a CRT monitor with 2½-in. tube.

As already mentioned, the main interest is working G's on 20-metre phone, so that no special effort is made to notch up new countries—but they are taken as they appear when replying to a CQ. Operating conditions at Nakuru are very good, as it is 6,000 feet a.s.l. VQ4AA's nearest neighbour is the well-known DX station VQ4RF, about 16 miles away. When next you hear VQ4AA calling CQ on phone, you will know all about his station and that he will be glad to have a QSO with you.

The Month With the Clubs

This time we acknowledge receipt of the Wirral Amateur Radio Society's NEWSLETTER, *and* CQ-TV *of the British Amateur Television Club, containing much interesting material. Honorary secretaries of those clubs which run their own news sheets (however humble) are reminded that we would be glad to see a copy regularly for mention here.*

Next month in this space we shall announce the dates and outline the rules for this year's MAGAZINE *Club Contest ("MCC"), the seventh in the series—how time flies! As usual, a copy of the Rules complete, with entry form, will be sent direct to all honorary secretaries on our Active Club Register in good time for the event. If you have not reported during the last six months, you have two months in which to rectify that omission. We are considering some prize awards—a challenge trophy for the winning Club, and certificates of merit for the runners-up—to make this year's MCC even more interesting.*

Honorary secretaries are again reminded that we like to see Club-interest photographs (meetings, personalities, field day stations and so on) for possible use in this space. All such photographs used are paid for, and can be returned undamaged. On a more sombre note—we are still getting, each month, anything from three to seven Club activity reports which just miss the deadline. With the best will in the world, late reports can NOT be included as this feature goes to the printers at the last possible moment. So please look to the current deadline, and note that we usually give the one next after as well for the convenience of those secretaries who may not be able to catch the date for which immediate copy is due.

Following are the reports from 26 Clubs—and next month's deadline is **first post on July 16,** *and that for the month following is August 13. All Club reports and notices for this space should be addressed: "Club Secretary,"* SHORT WAVE MAGAZINE, *55 Victoria Street, London, S.W.1.*

Qau Club, Jersey

This Club's "Summer Visitor Season" has now started; G3CGQ and G3BEG have recently looked in, and G8JC is expected later. All amateurs visiting the Channel Islands on holiday will be welcomed. An overseas member, Peter Amy, serving with the RAF, has now been allotted the call GC3IDP, but will not be active from Jersey for some 18 months.

Southend & District Radio Society

The Thames Estuary Challenge Cup Competition, fixed for May 25, was unavoidably postponed, but the opportunity was taken to test out the Club Tx. Recent meetings have included a talk on a Frequency Meter and a demonstration of Servograph Plotting Equipment. The installation and maintenance of a station at the Boy Scouts' Jamboree at Hockley (August 9-16) is being planned.

Watford Amateur Radio Society

Recent events have included lectures on Avo Instruments, GEC Germanium Crystals, Mullard Film Strips, as well as Junk Sales and exhibitions of home-built gear. A successful dinner for members, wives and friends was held on April 25. On July 15 G5PS talks on "I Remember"; August 5 sees an open-air transmitter demonstration; and August 19 a lecture on Aerial Design and Construction. Meetings are at Cookery Nook, The Parade, Watford, on the first and third Tuesdays at 7.30 p.m.

Edinburgh Amateur Radio Club

From June onwards this Club will meet fortnightly in Unity House, Hillside Crescent, Edinburgh, July 9 and 23 being the next dates. Preliminary classes for the R.A.E. are being run throughout the summer, and visits are being arranged to the BBC, a telephone exchange and a radar installation.

Malta Amateur Radio Society

At the recent AGM, ZB1AH was elected President, ZB1BZ Secretary, and Mr. M. Schinas Treasurer. All amateurs passing through Malta will be assured of a welcome if they will ring the President at Sliema 1551, or the Secretary at Pembroke 100. Note Secretary's address, in panel.

Coventry Amateur Radio Society

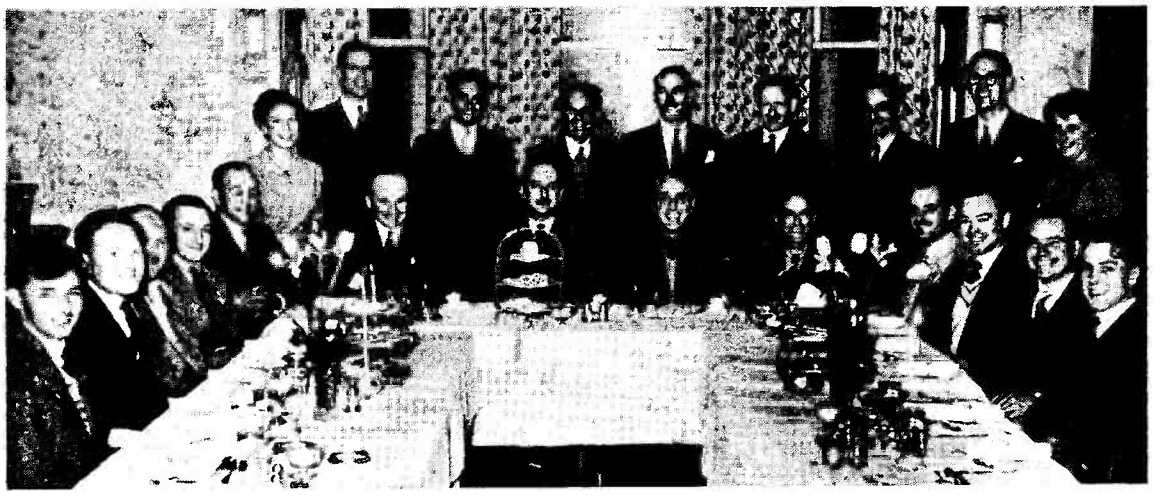
Past events have been a lively Quiz, the MARS/CARS Contest (won this year by MARS) and a 2-metre Field Day in which twelve operators from the Club took part. Forthcoming attractions are an Open Discussion on July 7, a practical demonstration of D-F on July 21, and a talk on Two Metres on August 18. There will be no meeting on August 4.

South Manchester Radio Club

The premises are now available to members every Friday evening, alternate weeks being devoted to arranged programmes, operation of the Club Tx, constructional work, and so on. A lecture and demonstration on VHF is being given by G3FVU and G3BAK on July 4.

Tees Side Amateur Radio Club

The basis of the programme for the new season, as decided at the AGM, is to be lectures and discussions to help all members, especially the newcomers, to grasp the fundamentals. Club business will be kept to a minimum, and constructional work started as soon as possible. The Club licence comes to its anniversary in October, when a 'phone ticket will be applied for. Meetings are every Thursday, 7.30 p.m., at the Joe Walton Boys' Club, Feversham Street, Middlesbrough.



The GD gathering on May 14, when the Isle of Man Amateur Radio Society held their annual general meeting. A guest on this occasion was G3DA, setting out on his Snaefell VHF expedition.

Stoke-on-Trent Radio Society

At the AGM the new season's officers were elected, and the Club found to be financially sound. Recent meetings have been given over entirely to practical work, a new aerial has been erected, and the Club TX, G3GBU, will once more be operating on 3750 kc every Thursday evening from the Club HQ—The Cottage Inn, Oakhill, Stoke-on-Trent.

QRP Research Society.

Rules are being drawn up for an Inter-Society QRP marathon contest, open to any Club in the British Isles. The Hon. Sec. (see panel) would be glad to hear from any interested organisation. London and Home Counties members will hold an informal field day on August 17, which, it is hoped, will include a D-F demonstration; members' fixed stations will also be worked as much as possible. *(We would very much like to have full details of the results of this event.—Editor.)* The VHF section is going strong, and it is hoped that the Club will be able to assist the Bedfast Club in providing QRP gear for members in hospital.

Bedfast Club (W.F.S.R.A.)

A panel consisting of three "bedfast" members has issued its first report. Priority is given to the writing of letters to all Club members each month, and another intention is to supply QSL cards bearing the Club's own emblem to members who would like them. The hand-painted "shack cards" previously mentioned are still on offer, and many more books and magazines of all kinds are wanted. All details concerning the Club are available from Ray Scarborough, 149 Averil Road, Leicester.

Midland Amateur Radio Society

At the last meeting a lecture and demonstration on the Use of VHF in Mobile Radio Schemes was given to a "full house." Two well-known members, G3HBE and G3BUR, were responsible. Visitors are always welcome at the meetings on the third Tuesday, Imperial Hotel, Temple Street, Birmingham.

Purley & District Radio Club

This is the old Sanderstead and Purley Society in a new guise (note Secretary's QTH, in panel). Meetings will be on the fourth Thursday of the month, at the Railway Hotel, Purley, the next dates being July 24 and August 28 at 7.30 p.m. A full programme of lectures is being arranged, and new members and visitors are always welcome.

West Lancs. Radio Society

Meetings are now held every Tuesday evening at 8 p.m., and preparations are under way for an Amateur Radio stand at a local hobbies exhibition in Crosby. Prospective new members are asked to look in at any meeting—apply Hon. Secretary.

German-American Amateur Radio Club

Started with the object of fostering "a spirit of better co-operation between German and American amateurs in Germany," and with their neighbours in Europe and other parts, this Club has just been formed. The first official meeting in Frankfurt, at which officers were elected, saw an attendance of approximately 100 amateurs. At the next meeting the proposed constitution will be presented, committees formed and other administrative details straightened out. We have no nomination for a Secretary, but our informant is Capt. A. L. Hamel, DL4EF, HQ, 60th Trp. Carr. Wg., APO 57, c/o PM, New York, N.Y., to whom enquiries should be addressed.

Manchester & District Radio Society

Beginning with the July meeting, the monthly meetings will be held at the Brunswick Hotel, Piccadilly, Manchester, at 7.30 p.m. on the first Monday of each month—not at the College of Technology, as before. Old and new members will be welcome.

Vickers-Armstrongs Ltd. (Weybridge)—Electronics Section

An Electronics section of the

Vickers-Armstrongs Social and Athletic Club has been formed, and has been granted a clubroom on the Sports Ground, King's Head Lane, Byfleet, Surrey. It will eventually be open seven days a week, but activities at present are confined to Friday evenings. Some 75 members are meeting, and the GPO has granted the call G3IVW; the transmitter will be operating by the end of June. On July 12 the parent Club is holding its Annual Sports Day, and the Electronics section will be putting on a display to which all visitors will be welcome.

Romford & District Amateur Radio Society

On May 20 G2BCX gave an interesting lecture on aerials, illustrated with large wall diagrams, and brought along some waveguides for members to inspect and handle. During June, field day activity kept most of the members very busy, and it seems that the score should be higher than last year.

Slade Radio Society

From July 4 the Club's headquarters will be at the Church House, High Street, Erdington, and all lectures and other events will be held there on alternate Friday evenings, beginning at 7.45 p.m. Members recently enjoyed a lecture and demonstration on FM for Amateurs, given by G5BJ.

Bournemouth Radio & Television Society

The recent summer outing by sea to Swanage was much enjoyed by members. Forthcoming events: July 4, Ordinary Meeting; July 18, Visit to the Alderney Works of the Bournemouth Water Undertaking, 7.30 p.m.; regular meetings are on the first and third Fridays at the Cricketers' Arms, Windham Road, Winton, Bournemouth, at 7.30 p.m.

Yeovil Amateur Radio Club

Meetings are still being held every Wednesday, and a recent one was visited by a party from the Taunton and West Somerset Society, when a very interesting evening of informal discussion was greatly enjoyed. A T.1154 was recently given to the Club, and the past few meetings have been spent in completely dismantling it. G3CFV has made some alterations to the Club transmitter, including an increase of power from 20 to 60 watts and modifications for the 21 mc band.

NAMES AND ADDRESSES OF SECRETARIES REPORTING IN THIS ISSUE

BOURNEMOUTH: Maj. W. H. Inchbold-Stevens, 47 New Road, North-Bourne, Bournemouth.
BRIGHTON: R. T. Parsons, 14 Carlyle Avenue, Brighton 7.
COVENTRY: K. Lines, G3FOH, 142 Shorncliffe Road, Coventry.
EDINBURGH: C. L. Patrick, 19 Montgomery Street, Edinburgh.
ISLE OF MAN: R. S. Trickey, Aigburth, Sunningdale Drive, Onchan, I.O.M.
MALTA: J. Spafford, ZB1BZ, Argus, Paceville, St. Julians, Malta.
MANCHESTER: P. Dean, 31 Park Lane, Whitefield, Manchester.
MIDLAND: G. W. C. Smith, 84 Woodlands Road, Birmingham 11.
PURLEY: A. Frost, 18 Beechwood Avenue, Thornton Heath, Surrey.
QAU, Jersey: Miss Valerie Hunt, c/o 5 Valley Gardens, Bel Royal, St. Lawrence, Jersey, C.I.
QRP: J. Whitehead, The Retreat, Ryden's Avenue, Walton-on-Thames.
ROMFORD: D. L. K. Coppendale, G3BNJ, 9 Morden Road, Chadwell Heath, Essex.
SLADE: C. N. Smart, 110 Woolmore Road, Birmingham 23.
SOUTHEND: G. Chapman, B.E.M., 20 Leigh Hill, Leigh on Sea, Essex.
SOUTH MANCHESTER: F. H. Hudson, 21 Ashbourne Road, Stretford, Manchester.
STOKE-ON-TRENT: J. R. Brindley, B.Sc., G3DML, 45 Rosendale Avenue, Chesterton, Newcastle, Staffs.
TEES SIDE: H. Walker, G3CBW, 64 Ayresome Street, Middlesbrough.
VICKERS-ARMSTRONGS: A. W. Warner, G3FXC, Sales Accounts Dept., Vickers-Armstrongs Ltd., Weybridge.
WALSALL: F. J. Merriman, G2FPR, 123 Wolverhampton Road, Walsall.
WANSTEAD: J. Binning, G3AJS, 150 Upton Park Road, London, E.7.
WATFORD: J. A. Kane, 23 Oaklands Avenue, Oxhey, Herts.
WEST LANCS.: S. M. Sugden, G3GSS, 44 Gores Lane, Formby, Liverpool.
W.F.S.R.A. (Bedfast Club): J. Beavan, G3GBL, 296 Fore Street, Edmonton, London, N.9.
WIRRAL: A. H. Watts, 63FXC, Woodend, 14 Grange Crescent, Hooton, Wirral.
YEOVIL: D. L. McLean, 9 Cedar Grove, Yeovil.

Wanstead & Woodford Radio Society

This Club's 2-metre transmissions continue on the last Tuesday of each month, but will be interrupted in June for a Junk Sale (at the request of members who want some holidays!). Last month there was a competition for home-made gear, and this will be repeated every six months. Forthcoming events: July 8, Practical Night; July 15, Portable Receivers; July 22, Converters; July 29, VHF Tx Night.

Walsall & District Amateur Radio Society

W.D.A.R.S. took part in the Whit-Monday Carnival held by the British Limbless ex-Servicemen's Association, fitting up a complete "shack" on 160 metres and demonstrating Amateur Radio to the visiting public. There was also a display of gear made by members, including a tape recorder, which, as usual, caused much interest and amusement.

Wirral Amateur Radio Society

The first Hamfest and Dinner was held recently, and was attended by 57 members, XYL's and friends. It was voted a great success, and the next is awaited eagerly. At the regular meetings, the Club heard a lecture on Copper Wire and also held a Gadgets Contest, sponsored by G3FRT and won by G2AMV. The Junior Section still flourishes, and summer meetings will include several open discussion nights as well as the more formal lectures.

Brighton & District Radio Club

A full programme in July will be followed by a month of informal evenings during August, after which several well-known manufacturers have promised lectures and demonstrations. July events: July 8, Junk Sale; July 15, talk by G6CL; July 22, talk on Naval Communications; July 29, Informal Evening.

Isle of Man Radio Society.

At the recent AGM Mr. Harry Grist, who has been Secretary since the early days of the Club, was elected President. The Vice-Presidents and Chairman were elected to continue in office. For new Secretary's QTH, see panel. After the business meeting, members sat down to the annual dinner, and G3DA, the well-known VHF operator, who was a guest for the occasion, afterwards gave a talk on 2-metre propagation.

SMALL ADVERTISEMENTS

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

TRADE

QSL's and LOGS by MINERVA. The best there are.—Samples from Minerva Press, 46 Queen's Road, Brentwood, Essex.

WANTED: RCA Speech Amplifiers, type MI-11220 J or K, and Aerial Tuning Units BC939A. Coils and tuning units for BC610 transmitters.—Offers, stating quantity and price, to PCA Radio, The Arches, Cambridge Grove, W.6.

WANTED: BC-610 Hallicrafters, ET-4336 transmitters, SX28's, AR88's, receivers and spare parts for above; best prices.—Write Box 864, c/o Spiers Service, 82 Centurion Road, Brighton, Sussex.

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

TRANSMITTERS, BC610, ET4336; Receivers, AR88, BC348, SX24, etc; Frequency Meters, Test Sets, etc., wanted urgently. We pay high prices instantly.—Write/Phone: Pype-Hayes Radio, 606 Kingsbury Road, Erdington, Birmingham, 24. *(Erdington 4942).*

TRANSMITTERS Required Urgently; types ET4336, BC610, etc.; also spares. Highest prices paid.—Pype Hayes Radio, 606 Kingsbury Road, Birmingham. *(Erdington 4942).*

WANTED: VALVES, SMALL OR LARGE QUANTITIES; 6K8, 6V6, 5Z4, 6AC7, IR5, IS5, FW4/500, 6Q7, 12K8, 80, VU39, EBC33, 3S4, etc., etc. PROMPT CASH.—WM. CARVIS, 103 NORTH STREET, LEEDS, 7.

ROTARY BEAM Antenna indication. Magslip transmitters from 10/- (listed £16). Stamp for circuit and full details.—Engineering Facilities, Ltd., 29 Rea Street, Birmingham, 5.

COLLINS TCS-12 Transmitter/Receivers, with original power packs, connecting cables, etc.; all perfect. P.C. for details.—Box No. (Scot) 1095.

AMATEUR ENTHUSIASTS, short wave or television. Send for free list components, meters, valves, speakers, etc.—The Radio Equipment Company (S.W. Dept.), Castor Road, Brixham, Devon.

45S. EACH offered for new boxed 813's. Other valves purchased.—Send details to Box 1105.

VALVES: 6J6, 12AT7, 10/-; 6AM6, 7/6; EAC91, EF92, EC91, EL91, 6AL5, 6C4, 6/6.—Skillman, Franchise Street, Weymouth.

VALVES WANTED: Types 805, 807, 813, 829B, 832, 866A, 931A, 100TH, 250TH, TZ40, 723A/B, 2K33, 2C43, CV129, CV323. Quantity and price, please, to: Pype-Hayes Radio, 606 Kingsbury Road, Birmingham, 24. *(Phone Erdington 4942).*

SITUATIONS VACANT

MINISTRY OF CIVIL AVIATION: Radio Mechanics are required at Ministry of Civil Aviation aerodromes and radio stations in various parts of the United Kingdom. Rates of pay (London) range from 109/- per week at age 19, to 143/- per week at age 25, and rise, subject to a qualifying test, to 173/-, plus pay addition of 10% on first 191/8 per week, and 5% on any part over that figure. Candidates, aged 19 or over, who have had practical experience in the maintenance of radio or radar equipment should apply to any Employment Exchange, quoting Order No. KINGS CROSS 576.

READERS' ADVERTISEMENTS

3d. per word, min. charge 5/-, payable with order. Box Numbers 1/6 extra. Replies to Box Numbers should be addressed to The Short Wave Magazine, 55 Victoria Street, S.W.1.

RADIOVISION COMMANDER Rx, mint condition; spare valves; manual; £30. 813 (new) with base, 25/-; 2 x 866JR (new), £1.—G3BOI, 3 Addison Road, Gorleston-on-Sea, Norfolk.

DST-100 Wanted. Handbook line-up gen. urgently required. Like correspond with other owners.—Whitehead, Rocklyn, Cardiff Road, Dinas Powis, Glam.

WANTED: R.107 Receiver in exchange for R.1155, P/P and speaker in rexine case; in excellent condition.—Albans, 17 Fern Road, Cropwell-Bishop, Notts.

HRO SENIOR, as new; power pack, PM speaker; complete set of coils, including 10- and 20-metre bandspread; £35. BC221, £15. Pair 35T's, 866's, boxed, £1 each. Black Crackle Cabinet, 19in. x 10in. x 10in., 30/-. Woden Transformers and Choke, 500v. 150 mA CT. 6.3v. 4A. 5v. 3A, 25/-; 2.5v. 10a. CT, 12/6; 7.5v. 5a. CT, 10/-. Swinging Choke, 5/25H 350 mA, 15/-. RTS Transformer, 1750v.-1500v.-1250v. CT. 200 mA, 4v. 4A. 5 v. 5A. 55/-. Trix MC Microphone, 60/-.—G3BFS. *Phone WAX 3542* evenings.

WANTED: Complete rig; Transmitter with VFO and crystal control giving 150 watts output on 14, 21 and 28 mc. Also High-grade Receiver in first-class condition.—Replies to: MP4KAF, Knowle Park House, Kimberley, Notts.

GOING QRP: Power Pack 300v., 250 mA; 80v., 40 mA; 6.3 and 4v. Another, 1,200v., 70 mA; 700v., 200 mA; 300v., 60 mA; 300v., 200 mA; 6.3 and 4v. Both on 19-in. panels. Another 600v., 200 mA; 6.3v., not assembled; all less rectifiers. HT Transfr., 700v., 250 mA; 250v., 250 mA. No fils.; all conservatively rated; 40-watt Tx CW, xtal for 20 and 10, with P/P; 19in. rack, 5ft. 9in. First reasonable offer secures all or part, or will exchange 35-mm. camera.—Barton, Friargate, Penrith.

WANTED: GPO Morse Key; commonly termed double-current key, used on SX/DX baseboards; brass covered movements; some glass-topped. Good condition, please — your price paid. —Box 1110.

WANTED Urgently: Instructional Manual for Marconi B36 receiver; buy or borrow. Please help.—Lewis, 46 Clydesdale Road, Romford, Essex.

SMALL ADVERTISEMENTS. READERS—*continued*

FOR SALE: Three band-switched Tx, 6V6, 6N7, 807, 5 meters, £12 ; Speech Amplifier, 6C5, 6C5, P/P 6A6, with power unit, £5 ; Modulator P/P TZ40, meter for P/P 4304B, £4. All on standard panels and chassis ; carriage extra.—Beaumont, 102 Sydney Street, Chelsea, S.W.3.

HRO 4-gang Condenser with Dial, £3 ; coils, 1.7 (BS), 7 (BS), 3.5 mc, £1 5s. each ; 50/100, 100/200 kc, £1 each ; ARR2X 234/258 mc, £3 10s.; 100 kc crystal oscillator, £1 10s.; SCR522 Test Meter, £1 ; CAY Tuning Unit, 15/- ; BC456 Modulator, £1 5s.; FL8 Filter, 10s.—Wright, 106 Knowsley Road, St. Helens.

1355, RF UNIT, P/Pack, Holme Moss Sound/vision, £5 ; RF26, 35/- ; RF27, 25/- ; VCR97, £1 ; Magnifier, 15/-. WANTED: "Viewmaster," complete or incomplete.—Details: Box 1104.

R.C.A. AR77, £22 ; Monitor Receiver, semi-communications type, 120 kc - 18 mc, £10 ; EIMAC 35T's—approx. 50 Rx valves—few gross Sprague condensers—Bendix compass SCR 269/G, complete accessories and gen. book, altimeter RT7/APN/1, both new. Offers? Would exchange any part ZEISS folding camera.—Box 1106.

ZC4XP Urgently Requires: BC453 IF Transformers, 85 kc.—Offers to Box 451, Nicosia, Cyprus.

SELL Hallicrafters SX28A, also AR88LF, RME VHF, 152A, BC221, AJ modulated model ; all brand-new condition, with manuals. Offers? Professionally-built 150 watt-band switched Tx, VFO/Xtal, final 813, 80/40/20/15/10 ; cost £200. Offers? S.A.E.—Full details: Box 1108.

SHORT WAVE MAGAZINE: Five years with indices 1947/51, clean, 4 volumes filed; first £3.—Stebbings, 146 Stockport Road, Altrincham, Cheshire.

S 740, mint ; offers above £27. WANTED: Communication Receiver, universal Avominor, attenuator FL8, ATP35. — G3IES, 44 Margetson House, N.16. *(STA. 2018).*

HALLICRAFTERS "Sky Champion" Communication Receiver, 550 kc-43 mc, excellent, £17 ; unused Woden UM1, in box, £2 ; 12in. Rola PM Speaker in beautiful cabinet, £5.—Ayers, 12 Midland Road, Gloucester.

WANTED: German Valves, URFA 610 ; STV 140/60 ; RG12D60 ; also American plywood tripod mast (RC 223A).—G3FMJ, 42 Glenthorne Road, London, W.6.

HALLICRAFTER SX.11 Super Skyrider ; 11-valve communication Rx, 5 bands 550 kc-38 mc, bandspread, Xtal, £27 10s.; HRO Senior, 7 coils, bandspread for Ham Bands, Xtal, p/pack and speaker, £32 10s. WANTED: 1155 (M type).—G2BFQ, 13 The Dell. Wembley. *(ARNOLD 7516).*

HALLICRAFTER SX24, recently overhauled ; new valves ; excellent condition ; £15 or nearest offer. 550 volt. 250 milliamp. P/Pack, fitted with spare 6.3 filament transformer, £3. Xtals: 7080, 7145, 7165, 7150 kc, 10/- each, or 30/- lot QRT.—6 Lorne Villas, Workington, Cumberland.

SMALL ADVERTISEMENTS, READERS—*continued*

TWO CNY1's in very good condition and working order; nearest £15 each, plus carriage. S.A.E.—Enquiries: 10 Clare Terrace, Falmouth.

KT8C (6), 9/6 each; EF55 (5), 9/6 each; 6H6 (4), 2/6 each; EF36 (2), 4/6 each; 6SH7GT (3), 4/- each; EF39 (3), 5/6 each. Mostly brand-new—all guaranteed. Please allow postage. — 45 Dunbar Road, London, E.7.

FOR SALE: *Short Wave Listener*, 1948, April, July, October; 1949, May; 1950, January, May; 1951, complete. *Short Wave Magazine*: 1948, May; 1951, complete. *Wireless World*: 1951, February to December.—Offers to K. G. Swinburn, 43 Lytham Road, Levenshulme, Manchester, 19.

NATIONAL 1-10 with coils, p/pack; exchange for BC221 or offers. Also AR88D in perfect condition. RCA Speaker; offers, please.—Box 1107.

SALE: Eddystone 750 with S-Meter, Speaker, Mains Filrer, £50; Universal Avominor, £5; Q-Max GDO (without coils), £6; S441B Power Pack, Modified Swinging Choke Input Filter, Output 300v., 250 mA, 6.3v., 4A; also 150v. Stabilised, £4. QCC Xtals, 3506 kc, 3595 kc, 100 kc, £1 each. GEC transformer 115v. primary, 1250-0-1250 secondary, £3. Type 6A Indicator Unit, £2. TU5B, 10/-. Valves, Resistors, Condensers, Meters.—O'Brien, 28 Broomfield Road, Heaton Moor, Stockport.

B2, BRAND-NEW; spares untouched; Rx/Tx P/Pack and spares; £19 or nearest offer. MCR P/Pack, 30/-. New VT118, £3. — S. Walker, 20 William Street, Staincliffe, Dewsbury.

VALVES, new 813, 30/-; 832's, 20/-; TZ40's, 15/-; 811, 7/6; 8012's, 1625's, 6/-; 1613's, EF91's, 5/-; BC459 Tx 3 valves, 25/-. Q-Fiver coils, 1FT's, BFO, 7/6; RF26's, 22/6; RF24's, 10/-; ZB2, 15/-; R1132, 50/-. P40 (less valves), 15/-. 500 and 100 kc Xtals, 10/-; 1355 IF strips, 15/-. Carriage costs, please! WANTED: AR88 transit case.—G3HQB, 29 Upper Brighton Road, Surbiton, Surrey. *(Phone ELM 2186).*

R.1155, 6V6 output, Power Pack, 8-in. speaker, complete in one wooden cabinet, £9.—Chapman, 20 Douglas Road, Renfrew.

144 MC G21Q, 6J6 PP, convertor, with VR105/30; Eddystone cabinet, £6. WANTED: 6F4 Acorn.—9 Southfield Park, North Harrow, Middlesex.

TRANSMITTING Valves, new: 35T (8), 813 (4), 24G (3), 811 (4), 829 (2), 832 (2), TZ40 (2), 807 (16), 815 (2), 866 (2). The lot, £50.—Box No. 1112.

WANTED: B7G Valves; also 6C4, 12AT7, EF91, 6V6, 12J5, 12SJ7; also BC455 and 2-metre Rx. FOR SALE or exchange: 1.95 BM F.S. Meter, 832's, 829B's.—Box 1111.

FOR SALE: 1124A UHF Receiver, and power unit; 11 valves, circuit; as new; £5 10s. 0d.—Walker, 42 King's Road, New Haw, Weybridge, Surrey.

SMALL ADVERTISEMENTS, READERS—*continued*

EDDYSTONE 750, as new; first £45 or nearest secures despatch passenger train. *Radio Handbook*, 11th Ed., 12/6, 12th 10/-; ARRL, 1950, 5/-; Avo Minor, £2/10/-. — Trevena, Towans, Hayle, Cornwall. *Phone 2101.*

WANTED: HRO Senior 1.7-30 mc BS; good condition; London area.—Details: Corsi, 52 Lintaine Grove, Fulham, London. *(Phone FUL. 4755* after 6 p.m.).

HRO with five bandspread coils, including genuine National coil, 21.00 to 21.5 mc; best offer over £55. Hammarlund Super Pro, £55; AR77, £35; TS159 Frequency Meter, 135 to 165 mc. £10.—Box 1103.

EDDYSTONE 740 Receiver; one owner; excellent working order; £28.—Box No. 1109.

WANTED: Wilcox-Gay V.F.O. for E.T.4336. Will buy outright or exchange for 145 V.F.O. Tx type 5G, 6L6, CO/807 P.A. with self-contained power supply all in the one cabinet. Coils for 20, 40 and 80 M; no valves; £10.—Coleman, Highfure Cottage, Billingshurst.

HALLICRAFTER SX23, in perfect condition, £22 (or nearest offer).—Geary, 117 Taynton Drive, S. Merstham.

AR88LF, Eddystone S504, BC221, Class "D" Wavemeter. Send offers, or S.A.E., for Tx list.—GM3OL, Westland, Pleasance Avenue, Dumfries, Scotland.

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