The SHORT WAVE Magazine

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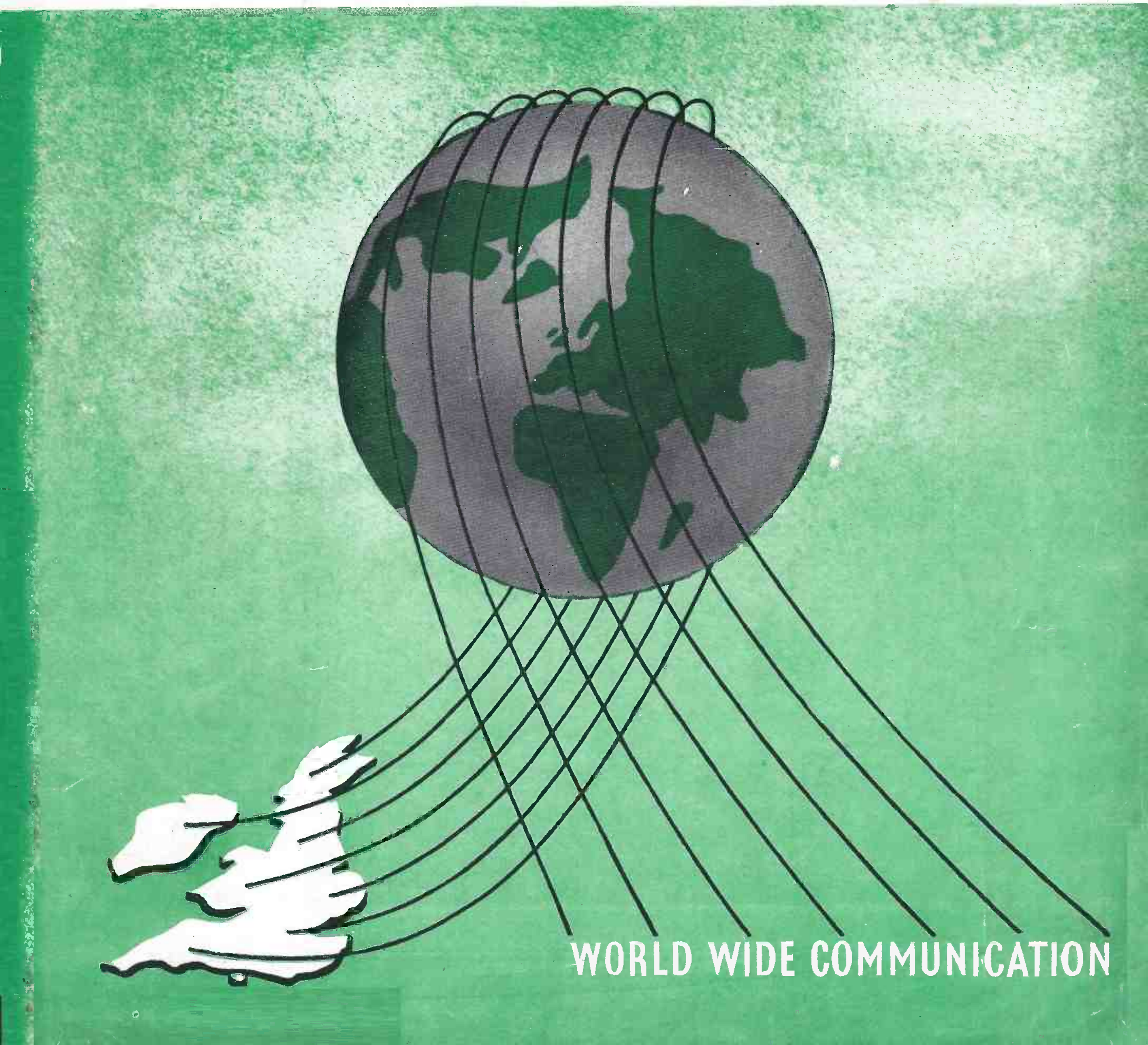
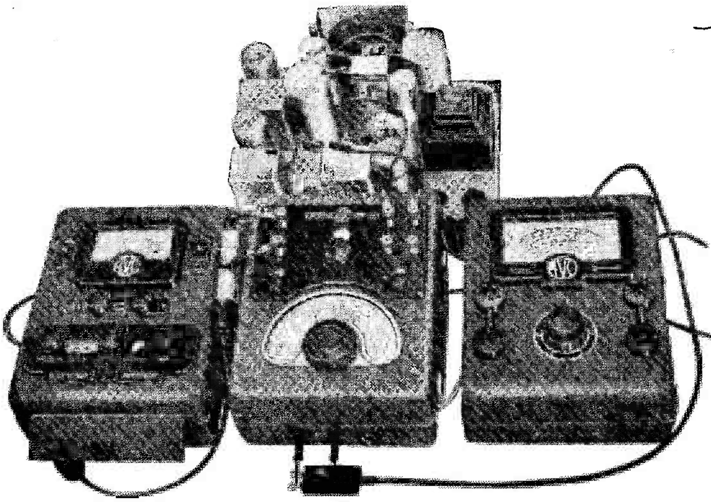
VOL. XI | DECEMBER, 1953 | NUMBER 10





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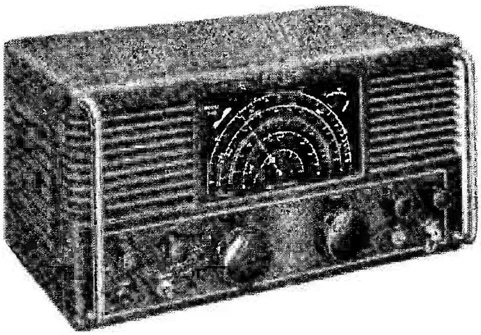

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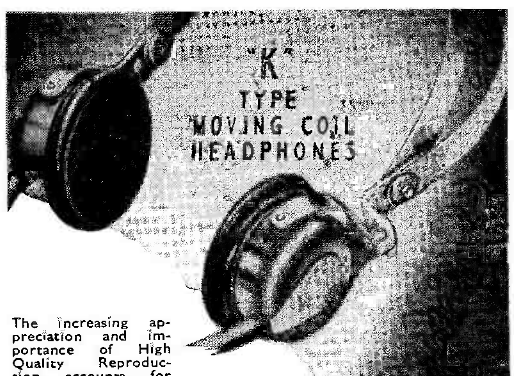

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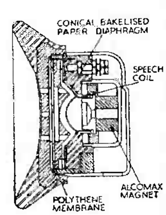

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Managing Editor : AUSTIN FORSYTH, O.B.E. (G6FO)

Advertisement Manager : P. H. FALKNER

Assistant Editor : L. H. THOMAS, M.B.E. (G6QB)

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FOR THE EXPERIMENTER AND THE RADIO ENGINEER

The SHORT-WAVE Magazine

Christmas

Every year at this time it is our pleasure to send those who may glance over this space our greetings and good wishes for the Christmas season.

We number our readers in all corners of the world, from Russia to Alaska and from Greenland to the Antarctic. Many will not be seeing these lines until well on in the New Year. In the realm of Amateur Radio, however, time and space are hardly ever factors of any great significance—for radio amateurs girdle the earth and are in constant communication. And it is in this realm of Amateur Radio that the true spirit of Christmas still lives.

So once again we are happy to have the opportunity of offering our good wishes for their happiness and our thanks for their support to all our readers at home and abroad.

From the Managing Editor and Staff of

SHORT WAVE MAGAZINE

Noise Reduction in Aerial-Earth Installations

THE PRACTICAL APPROACH

J. C. BELCHER (G3FCS)

Nobody reading this article could fail to profit by going outside and applying the principles laid down by our contributor. In fact, for many readers it will be a revelation of what can be done to reduce that " high noise level I'm getting on the band," of which complaints are heard so often. It is not suggested that the ideal installation is always practicable—rather, by an understanding of how local noise levels can be generated, it is shown how a receiving system can be designed to minimise them at the average location.—Editor.

SO far we have considered the design of our hypothetical noise-free receiver. Direct noise pick-up by the circuit wiring is prevented by the triple-screening, and injection of noise voltages by way of the external circuits is eliminated by filter networks in the mains supply and headphone leads.

Two items now require our attention—the aerial and the earth. The design and layout of this part of the installation is possibly more important than the design of the receiver itself—therefore it must receive careful consideration if the installation as a whole is to function correctly.

The Earth System

First of all—the earth system. Here we must consider the type of earth to be used, its location, and finally its installation and wiring. Upon the efficiency of the earth depends the effectiveness of the triple-screening, hence it should have a low resistance connection. Equally important : There should be negligible noise potential appearing between the earth lead and earth proper.

It is to be hoped that, in this enlightened age, no amateur would consider using a gas-pipe, a hot-water pipe or the E lead on a mains socket as the station earth connection ! Not only does the jointing compound used in water-piping result in high-resistance connections, but in addition, its electrical characteristics are often non-linear in nature. Hence, as well as presenting a *high impedance* earth connection, there is the possibility of cross-modulation occurring with strong signals—resulting in an inherent noise level, below which it is impossible to get.

In the previous article (*Short Wave Magazine*, November, 1953) it was stated that the " mains " earth—that is, the connection to the third pin of the mains socket-outlet, is *not* suitable as a radio earth, owing to the high level of noise naturally present on it. For this reason, if no other earthing system is possible it may be far better to do without any direct earth altogether.

From a practical point of view there are two alternatives for a good earth—either a connection to the main cold-water pipe, or else an entirely separate earthing system.

The great advantage of the main cold-water pipe is its low earth resistance—usually of the order of 0·25 ohms, or less. This is due to the large surface area of the network of pipes which is in contact with the soil, an extremely important feature in certain districts where soil conductivity is low. Where a quarter-wave transmitting aerial is used—as is usually the case on the 160-metre amateur band—such an earth is ideal for keeping radiation losses to a minimum. In our particular case, however, the disadvantages may far outweigh this one advantage. These disadvantages are :

(*a*) The " mains " earth already mentioned is usually connected to the main cold-water pipe at some point or other. As a result, interference currents circulating to earth from the mains supply will cause a noise potential to develop across the mutual earth impedance—even if this is only a matter of 0·25 ohms—and will therefore cause noise to appear on the radio earth connection.

(*b*) In the majority of cases, in order to make a connection to the water main *at a point where it enters the ground*—almost always in the region of the kitchen sink—it will be necessary to use a long conductor. This is to be avoided, because further noise potentials can be developed across this conductor by electric and magnetic induction fields, set up by interference currents flowing in the house wiring.

(*c*) Finally, it should not be overlooked that in some districts water supplies are run in non-metallic pipes. As a result, although the earth connection may be taken to a metallic service pipe, the actual earth resistance may be considerably higher than would be anticipated.

On the whole, therefore, a separate radio earthing system altogether is to be preferred. For the purpose of reception, in particular, this system is less likely to be influenced by local interference and will therefore be relatively noise-free. Possibly the only drawback is that a comparatively high earth resistance may result—of the order of 10 to 20 ohms.

Designing the Earth

In order to keep this earth resistance as low as possible, an earth electrode with a large surface area must be employed, buried as deeply as possible. In this respect the usual " 30-inch earth spike " is more or less useless ! For one thing it hardly penetrates the subsoil, and furthermore in hard, frosty weather it will be virtually insulated from earth by the frozen soil surrounding it. Even under average conditions its earth resistance is likely to be of the order of 40 to 50 ohms, and possibly much higher. If an earth spike is used (and it usually is much more convenient to install and maintain than an earth " mat " of wires), then a copper spike about 6 ft. in length should be employed. This should be driven into soil which is *well consolidated,* that is, soil which has not been recently excavated or moved. This is more important than burying it in supposedly *damp* soil. Perhaps it should be explained that soil conductivity depends to a great extent on the presence of humus and mineral salts, the effect of water being to increase the weight of the soil and hence improve the adhesion of the soil particles. This occurs when dust is transformed to solid clay by the action of rain. It is for these reasons that alluvial soil has greater conductivity than sand, and sand in turn has greater conductivity than parent rock. Where average loamy soil is concerned, an earth resistance of between 15 and 20 ohms should be obtained when a 6 ft. earth spike is used.

In order to reduce the value of this resistance, two or more spikes can be employed and connected in parallel. It is important, however, that the spacing between individual spikes be not less than the length of one spike, *e.g.,* 6 ft. Otherwise, if closer spacing is used, the volumes of soil effectively in contact with each spike will overlap, and the total volume of soil in contact with the whole earthing system will therefore not increase in proportion to the number of spikes. Hence, instead of obtaining a resultant value of 5 ohms for three spikes in parallel—having individual resistances of 15 ohms—some value between 5 and 15 ohms will be probable.

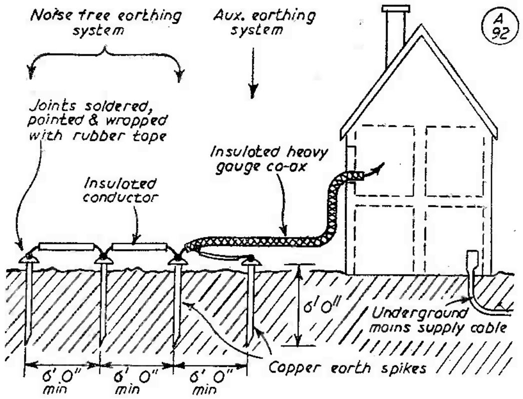


FIG 1a Typical installation of an ideal earthing system

The location of the earth system in relation to its surroundings can be very important. First of all there is the possibility of corrosion —usually electrolytic in character. Admittedly this form of corrosion may go on for years before the surface area of the electrodes is seriously reduced. On the other hand, if the conductor, joining several electrodes in parallel, was attacked this may disintegrate quite rapidly and thereby render useless part of the earthing system. The latter should therefore be kept well away from ash-heaps and soil treated with chemical fertilizers. There is no use in burying deep a galvanised iron bath, carefully jointed to a main lead, and then in three months' time finding that the lead comes away in your hands from a point a few inches beneath the surface. The same thing applies when chemicals are mixed with the soil surrounding earth electrodes, for the purpose of obtaining improved conductivity.

Of considerable importance is the location of

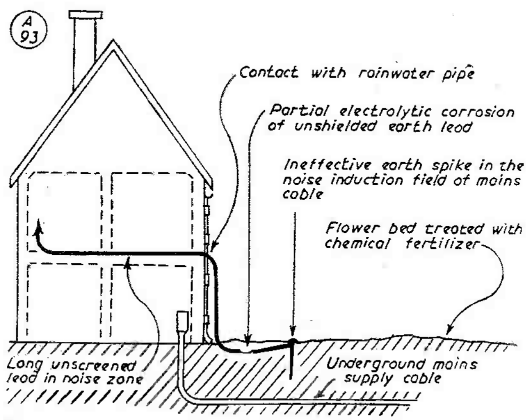


FIG 1b Typical installation of a poorly designed earthing system

any underground electricity supply cable in relation to the main earth. The earthing system should be as far removed from this as possible, for the following reasons :

(*a*) An induction field, set up by interference currents, can exist for several feet on either side of the cable—even when it is buried deeply in the ground and armoured. Hence, noise potentials can be induced in the earth system if it lies within this induction field.

(*b*) Any earth leakage currents from the cable may possibly cause further increase in any electrolytic corrosion of the earth system.

Putting In An Earth

Now let us consider the installation. Wiring should be carried out using a heavy conductor which should be insulated, power cable being suitable if obtainable. The rubber covering reduces attacks on the conductor by the atmosphere and the soil, and also ensures that accidental contact with other metallic objects has none of the scraping effects associated with bare earth leads.

Any joints involved should be well soldered —thus preventing the possibility of high resistance and its attendant noise. In order to prevent electrolytic corrosion taking place between the copper conductor and the lead solder, the joints should be coated with bitumen paint and then wrapped with rubber tape.

The earth lead to the receiver should be as short and direct as possible, at the same time being kept well away from any rainwater or waste pipes which may be carrying interference, and also any mains wiring. If this is difficult to achieve, the use of a screened earth lead should be considered, heavy coaxial cable being employed with the sheath connected to a *separate* earth spike.

An ideal earthing system based on the information given in the previous paragraphs is shown in Fig. 1a, and this should be compared with Fig. 1b which illustrates the type of system to be *avoided*.

The Aerial

If the signal-to-noise ratio at the input to the receiver is poor, then very little can be done afterwards to improve it. Therefore the main requirement of the aerial is not so much to pick up a maximum amount of signal, as to pick up a large amount of signal together with a *minimum* amount of *interference*.

The actual type of aerial employed depends on a combination of factors, among them being local geography and the frequencies upon which the aerial is required to work. Hence no "perfect" system can be suggested or described. Fortunately, if the basic rules are conformed to, there is no reason why a suitable aerial design should not be arrived at to suit *individual* requirements.

First of all we do need a large signal pick-up, or in other words, the gain of the aerial must be as high as possible. This is realised when the aerial is resonant at the signal frequency and when its effective height is at a maximum. Hence its electrical length should be some multiple of a quarter-wavelength, and it should be erected as far from earthy objects as is practicable. This of course is common knowledge—although not always common practice.

The problem which now confronts us is this: If the aerial has high gain at the signal frequency, then it seems reasonable to assume that it will pick up a maximum of stray noise-interference which may be present on the signal frequency, and in that case how is it going to differentiate between signal and interference?

The answer is—by its *location*. Thus, the aerial can both be situated in a position where the interference field is at a minimum, and in addition, so orientated that any interference picked up is negligible.

In the case of *radiated* interference, orientation of the aerial is usually the only solution, unless of course one is prepared to live in relative solitude far from human habitation. Failing the latter, the aerial should have a radiation pattern which is uni-directional and which has a narrow beam width. By this means, signals can be received clear of interference from directions other than the direction from which the interference originates. The limitations of this scheme become evident, however, when the bearings of the signal and interference coincide ! In such a case one can adopt great-circle operation if possible, or even arrange for another type of emission to be used, such as FM instead of AM. It must be admitted, however, that this is rather dodging the issue under discussion, and to be perfectly candid the only cure in such a case is suppression of the interference concerned.

Interference Suppression

Fortunately, from our point of view, most of the interference experienced in practice is propagated by the electric and magnetic induction fields created by mains-borne interference and it is possible to take steps at the receiving station to overcome this.

It should perhaps be explained that these induction fields are only really effective up to a distance of about one-sixth of a wavelength from the electrical circuit involved. At greater

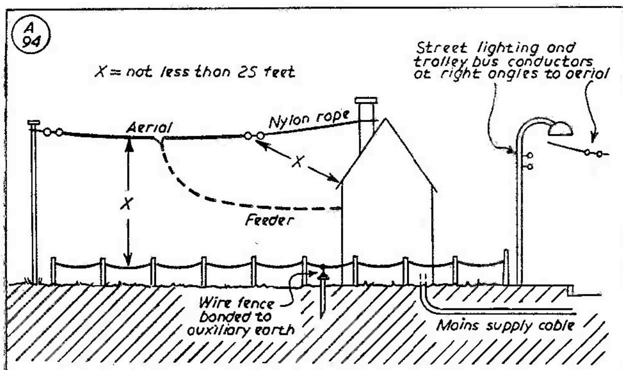


FIG 2A — TYPICAL HORIZONTAL AERIAL INSTALLATION

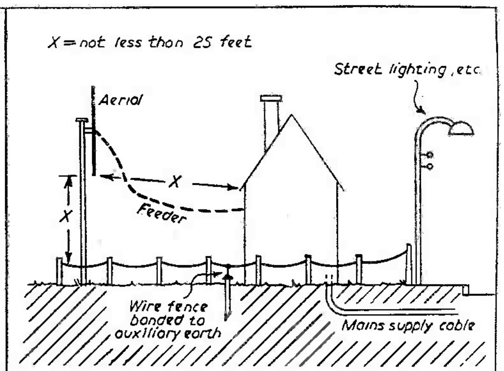


FIG 2B — TYPICAL VERTICAL AERIAL INSTALLATION

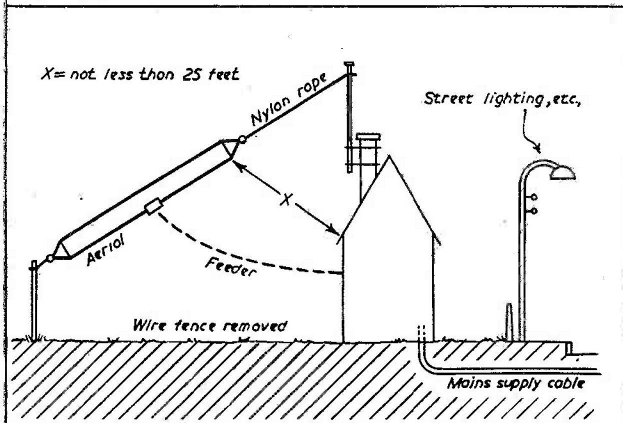


FIG 2C — INSTALLATION USING 'T2FD' AERIAL

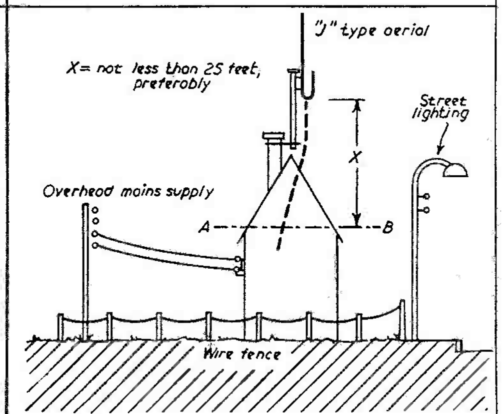


FIG 2D — INSTALLATION SUITABLE WHERE OTHER TYPES NOT PRACTICABLE

distances the radiated fields predominate. On the lower frequencies, radiation is limited by the fact that circuit wiring seldom approaches resonant length—except in the case of overhead mains supplies — and therefore radiation efficiency is low. As a result, the effective zone of interference is limited to that caused by the induction fields. In the case of the higher frequencies the range of the induction fields becomes a matter of only a few feet and therefore unimportant, while at the same time the electrical circuit wiring approaches resonance resulting in increased radiation efficiency. In this case the zone of interference is therefore limited only by that caused by the radiation fields.

Locating the Receiving Aerial

Admittedly, where high frequencies are concerned we are up against the problem of radiated interference as just discussed in a previous paragraph. This time, however, the circumstances can be slightly different. If the radiation is taking place from electrical wiring in the immediate vicinity, it is most likely that the resultant interference will be at a much higher level than that originating a few hundred yards away. Therefore reception would be improved if local radiation fields are avoided as much as possible, and any action taken towards this end will definitely be worth while.

In either case the aerial must be erected clear of all electricity mains supplies, whether they be overhead or underground. Where low frequencies are concerned, *i.e.*, 7·0 mc and below, the clearance required will be one-sixth of a wavelength. This will be 90 ft. at 1·8 mc, 45 ft. at 3·5 mc, and 22 ft. at 7·0 mc. On the high frequency bands, from 14·0 mc and upwards, the minimum clearance should be 30 ft. in order to reduce the effect of radiated interference. Naturally, such clearances will involve difficulty where space is at a premium, and in certain cases will be out of the question altogether. All the same, an average minimum clearance of 25 to 30 ft. should be aimed at where possible. Having established the clearance necessary between the aerial and the mains supplies, the next point to be considered is the orientation of the aerial with respect to the mains wiring. We have to keep two things in mind, the electric induction fields and the magnetic induction fields. The electric induction fields are usually vertical, hence a vertical aerial will respond to them more than will a horizontal aerial. On the other hand, where a horizonal aerial runs parallel to overhead wiring, maximum response to the magnetic induction field will occur.

It would appear, therefore, that a horizontal aerial, preferably at right angles to the mains wiring, is the most convenient type to use, and this is borne out by results in practice. An example of this is given in Fig. 2a. The aerial is at least 25 ft. above the wire fence and at least 25 ft. from the nearest part of the house—in this case the metal guttering. The mains supply is (conveniently !) fed underground on the opposite side of the house, thus giving ample clearance. The overhead conductors feeding the street lighting and trolley-bus system are at *right angles* to the aerial, resulting in minimum pick-up from their magnetic induction fields. Finally, so as to prevent the wire fence from carrying interference into the clear zone, it has been connected to a separate earth spike in order to limit its activities. If the receiver earth lead is screened, and the outer braid taken to a separate earth, then this latter earth will do for earthing the wire fence. The same action should be taken in the case of wire-mesh chicken-runs, and similar outside erections, which should all be suspect as potential noise radiators. While on this subject, it is a good plan to dismantle and remove any old broadcast aerials, wire clothes-lines, and so on which may be in the vicinity.

If a vertical aerial is required—and it has its advantages in some respects — it should be installed as shown in Fig. 2b. It will be seen that its lowest point is at least 25 ft. above the nearest "earthy" object—the wire fence—and is the same distance from the building. While a mast and self-supporting aerial are called for, there is the advantage that less plan space is required over which to install it. Moreover, while it is more prone to interference from electric induction fields, at least it is at right angles to the overhead wiring.

While dealing with vertical aerials, it should not be overlooked that if a ground-plane aerial is used, then the counterpoise is still part of the aerial system, and should be given the necessary clearance. This of course applies to *all* counterpoise systems.

No excuse is given for including the modified "T2FD" aerial as described by N. P. Spooner (G2NS) in the June, 1953, issue of *Short Wave Magazine*. This aerial appears to have definite advantages for noise-free reception — *especially when used for multi-band operation*. The installation is shown in Fig. 2c.

Fig. 2d illustrates the amateur's night-mare—unfortunately only too common. Apart from removing to another house which is fed by an underground electricity cable (or which at least has one side relatively free from overhead wiring of any description), the only alternative is to emulate a sky-scraper and build high. Fortunately no mains wiring is likely to exist above the line A-B ; therefore, if the aerial is mounted on the top of a pole as shown, giving 15 ft. clearance to the top of the house, one may be fortunate enough to find a relatively noise-free zone.

Further consideration cannot be given to the design of the aerial itself, until the design of the feeder has been taken into account, and this will be dealt with next.

The Feeder

The problem which now arises is how to convey the noise-free signal from the aerial to the receiver without introducing noise whilst doing so. In order to achieve this, the feeder system employed must be immune from the influence of both electric *and* magnetic induction fields. At the same time, negligible attenuation of the signal should take place.

We can overcome the effect of the electric induction field by shielding the feeder with an electrostatic screen, as is done in the case of a coaxial feeder. The screen, which should be earthed, is earthed at one point only in order to prevent inductive loops forming.

In the case of the magnetic induction field, a twin feeder is required which is capable of working into a balanced circuit. The latter should then be so arranged that induction currents flowing in the feeder cancel out at the input to the receiver.

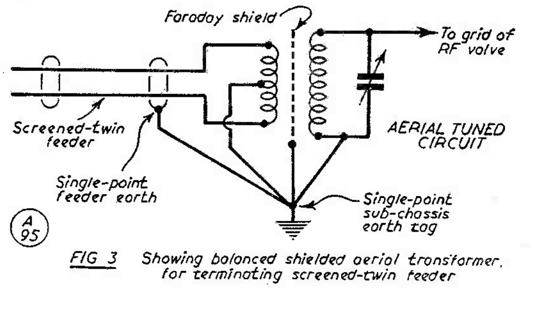


FIG 3 Showing balanced shielded aerial transformer, for terminating screened-twin feeder

We can see, therefore, that in order to give complete protection from both electric and magnetic induction fields a combination of the coaxial and twin feeder is required. For this reason a screened twin feeder must be employed, and fortunately feeder line of this type is freely available.

A suitable balanced circuit for use with such a feeder is shown in Fig. 3. Induction currents, flowing in the feeder conductors and thence to the primary winding of the transformer, induce voltages in the tuned secondary winding which are equal and opposite and therefore balance out. This, of course, will only occur when the currents are equal in amplitude and in order to achieve this it is essential to maintain perfect balance to earth.

For this reason the primary winding is centre-tapped and earthed. Furthermore, in order to prevent the unbalanced secondary winding from causing capacitative unbalance to the primary a Faraday electrostatic shield is fitted. This also has the advantage that any capacitative transfer of energy to the secondary winding is eliminated. Needless to state, the physical layout of this part of the circuit should be as symmetrical, with respect to earth, as possible.

The Aerial and Feeder System

Further consideration can now be given to the design of the aerial. It will be seen that the additional features now required are:

(*a*) The aerial should have a low impedance input.

(*b*) The aerial should preferably be balanced to earth.

For obvious reasons, the hortizontal centre-fed half-wave dipole is ideal in such an application. This applies not only to the simple dipole but also to its more complex forms, such as when used in conjunction with driven or parasitic elements. Of course, in the latter case a quarter-wave transformer may be found necessary between the aerial and feeder in order to give correct termination. The terminated rhombic aerial is also a suitable type to use—again provided that a matching device is employed between it and the feeder.

The main disadvantage of the aerials so far discussed is that, with one or two exceptions, multiband operation is not possible, and, even where it is possible, operation is restricted to two-band working at the most. Unfortunately, long-wire aerials—even when centre-fed—do not permit correct matching of the feeder at all

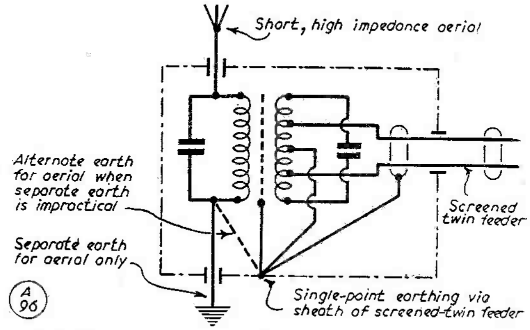


FIG 4 Suggested arrangement for matching a high impedance aerial to a screened-twin feeder using a WBC.

frequencies, in spite of the fact that they are otherwise suitable for harmonic operation.

In a previous paragraph mention has been made of the "T2FD" aerial, this having several advantages which make it distinctly suitable for the noise-free installation. It has a low-impedance input, reasonable balance to earth and, moreover, it is suitable for multiband operation. Apart from the obvious advantages of the multiband aerial, there is one other point which should not be overlooked. Where several aerials are required, one for each band, there is the possibility of the unused aerials carrying interference into the noise-free zone of the working aerial—this is obviated when a single multi-band aerial is employed.

We now have to consider suitable designs for aerials to be used under circumstances as shown in Figs. 2b and 2d. The vertical dipole, because of its inherent unbalance to earth, is not entirely suitable except perhaps on the high frequency bands where a balun can be used. The "J-type," on the other hand, is ideal for a vertical aerial, although of course it is not suitable for multiband operation, and in any case it becomes unwieldy on bands lower than twenty metres.

On the three low frequency bands, and especially on 1·7 mc, a quarter-wave *vertical* aerial becomes impracticable while a half-wave aerial is out of the question. It seems, therefore, that a comparatively short, high-impedance aerial is the only alternative and naturally the problem which arises is that of *how to feed it*. A suggestion which seems worthy of experiment is to use a tuned transformer, acting on the principle of a wide band coupler, between the high-impedance aerial and and the low-impedance feeder, as shown in Fig. 4. The aerial circuit is shown earthed *via* the outer braid of the screened twin feeder; strictly speaking, it should be connected to an entirely separate earthing system altogether, but in the case of Fig. 2d it seems doubtful whether this would be any advantage. Even so, this point should be borne in mind. The weather-proof screening-can being, in effect, an extension of the feeder sheath is naturally connected to it, as also is the electrostatic screen.

Construction

The inherent noise characteristic of an aerial is influenced considerably by its initial construction, and this aspect will be considered next.

Where two conductors are joined together by means of a twisted connection and exposed to the atmosphere, sooner or later the contact surface of the conductors deteriorates. This may be caused by oxidization, corrosion by impurities in the atmosphere, and also by electrolytic action between dissimilar metals. The layer of tarnish so formed is a semi-conductor and, apart from presenting a high resistance path to circulating currents, forms in conjunction with the parent metal a simple rectifier.

The effect of the high contact resistance on reception is fairly obvious—a decrease in signal strength. Usually, however, the resistive value is not constant and can be influenced in a number of ways. For example, the action of gusts of wind upon an aerial will result in a varying tension being placed on the joint in question. This may be sufficient to break down the resistive barrier intermittently with the result that the strength of the incoming signal is being continuously varied. The nett result is that the signal appears to be accompanied by a type of interference varying from key-clicks to a scraping noise in character.

Rectification will most likely show up as a form of cross-modulation in which the interference appears to be superimposed on the incoming signal. This effect is often the cause of the so-called "blanketing" which is experienced in certain cases of BCI. The classic phenomenon which produces a similar result is the well-known "Luxembourg Effect." It will be appreciated therefore that if a certain type of interference is only evident in the presence of a signal—then some form of rectification is taking place and the aerial should not be overlooked as a possible source.

Returning once more to our two conductors, the problem to be solved is that of making an efficient electrical joint which will be resistant to corrosion. There are two ways in which this can be done—by soldering the connection, and by coating it with some protective com-

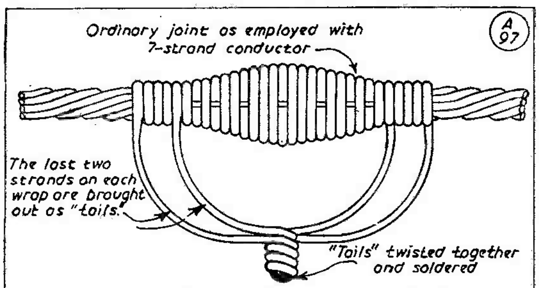


FIG 5A—MODIFIED THROUGH JOINT IN AERIAL CONDUCTOR

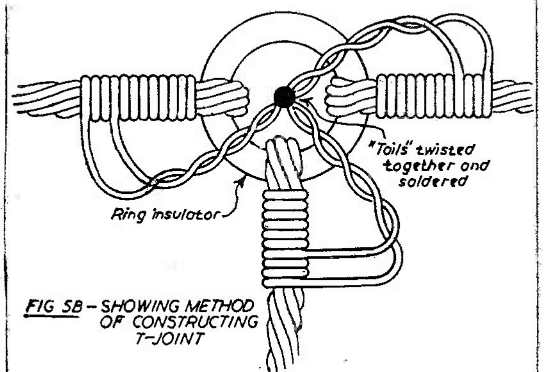


FIG 5B—SHOWING METHOD OF CONSTRUCTING T-JOINT

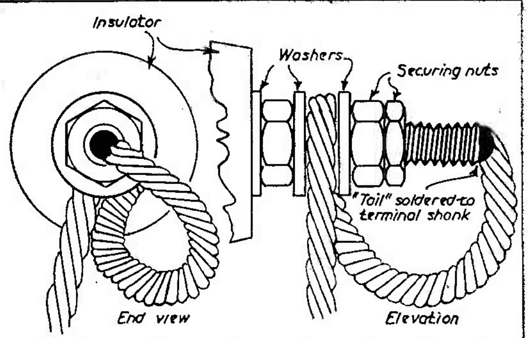


FIG 5C—METHOD OF TERMINATING AERIAL CONDUCTOR ON LEAD-THROUGH INSULATOR

pound such as bituminous paint.

There are disadvantages with both methods. In the case of a soldered joint, the joint is mechanically weakened by the increased rigidity of the conductor, and sooner or later will shear. Furthermore, electrolytic action may take place between the solder and the conductors, and the object of the soldered joint will be defeated. In the case of the compound coating, air spaces will still be left inside the joint which will cause oxidization to take place in spite of the precaution taken.

These failings are overcome in the type of joint illustrated in Figs. 5a, 5b and 5c. The essentials are an ordinary twisted joint—to ensure mechanical reliability—which is electrically short-circuited by "tails" which are joined by a soldered connection, the latter being painted in order to prevent electrolytic corrosion.

Fig. 5a shows a typical joint under tension such as might be made as a temporary repair to a broken aerial pending replacement. Fig. 5b shows a typical T-junction such as might be employed where an open-wire feeder is used between driven elements. Finally, Fig. 5c shows the method for terminating a conductor to a lead-through insulator or tubular element.

One further problem arises in which electrolytic corrosion is experienced, and that is where a copper conductor is connected to an aluminium or duralumin tubular rod element. In this case soldering is out of the question altogether, and the use of aluminium or duralumin wire as a feeder is most unlikely—although it has been tried successfully. In such a case the only alternative is to *drill and tap* the rod to take a length of brass studding which is secured in position with a brass washer and lock-nut at either end. The whole surface of the joint is then coated with bituminous paint. Finally, the copper conductor is secured to the brass studding in a manner similar to that shown in Fig. 5c.

BOOK REVIEW

The Philips Technical Library have recently added two new monographs to their series on Electronic Valves, which has already run to seven volumes. Books VIII(A) and VIII(B) of the series are on a very high level and are written primarily for qualified engineers in the specialised field of TV receiver design. Each book deals with a very limited subject in great detail. The whole treatment and presentation are in the best traditions of technical literature. The sequence is logical. Simplifications and approximations are only admitted where the final practical application justifies them. Theories are developed from first principles and formulæ are derived either in the text or appendices, and not merely quoted.

Book VIII(A) deals with IF stages in Television Receiver Design—a subject which in these days must call for a good deal of detailed attention. Relation between gain and bandwidth, response curves in the complete amplifier, and distortion are dealt with first. Next comes a detailed treatment of noise. This is followed by a study of feedback, and finally practical considerations following on the theory.

The second volume, Book VIII(B) is on Flywheel Synchronisation of Saw Tooth Generators. It is believed to be the first comprehensive treatment of the principles governing the action of these circuits. These principles, and practical circuits for the saw-tooth generator and synchronisation, are dealt with in some detail before the main subject is discussed. This is divided broadly into two parts—the flywheel action of a resonant circuit, and frequency control of relaxation oscillators by phase difference from the synchronisation signal.

Although these books are so highly specialised, the fact that they deal with fundamentals makes them of interest to a much wider public than the designers of TV receivers. In particular, this applies to the treatment of Noise in Book VIII(A) and to the study of Multivibrators in the second book. *Television Receiver Design,* Books VIII(A) and VIII(B) of *Electronic Valves* in the Philips Technical Library.

J.M.O.

CARDS IN THE BOX

If your call-sign appears below, it is because cards are held for you in our QSL Bureau, and we have no forwarding address. Please send a large stamped addressed envelope, with name and call-sign, to: BCM/QSL, London, W.C.1, when they will be despatched on the next (fortnightly) G clearance. If publication of your call-sign/address, in "New QTH's" and in the *Radio Amateur Call Book,* is also required, that should be mentioned at the same time.

G2ASV, 2AWZ, 2BME, 2DZW, 3BHN, 3FFS, 3FQM, 3FWM, 3IBB, 3IDN, 3IGN, 3IIG, 3IPT, 3IVD, 3IYZ, 3JAO, 3JEA, 3JFS, 3JHE, 3JNH, 3MX, 3UG, 3XR, 5WX, 6VR, 8PT, GI3ILU, GW3FRH, 3YB.

CALL FOR HELP

Karl Metzger, DL6DE, Hostmanstrasse 4, Celle 20A, Hanover, asks for the loan (or purchase) of a copy of the handbook for the CR-100 receiver. Readers able to help are asked to write him direct.

RADIO AMATEUR CALL BOOK

The American publishers of the *Radio Amateur Call Book* inform us that, with effect from the forthcoming (Winter) issue, a small price advance will be necessary on the Full Edition. This contains the call-sign/addresses of the amateurs of the world, who are increasing in numbers, with a consequent higher cost of production. The Winter Edition of the *Radio Amateur Call Book* will be available from us about mid-January and will cost 27s., post free. It should be noted that the price of the Foreign edition (which omits the Americans entirely) will remain unchanged at 10s. At the time of writing, we can supply the Full Edition (Autumn issue), which is the latest current printing, at 25s., post free. Order on: Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

Packaged Audio Pre-Amplifier

COMPACT TWO-STAGE UNIT USING BATTERY VALVES

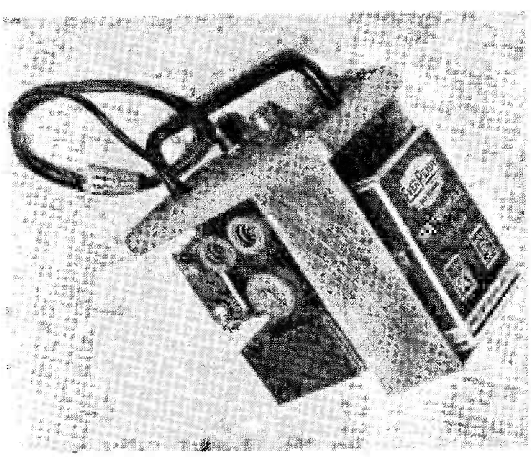
J. W. SWINNERTON (G2YS)

A SELF-CONTAINED "all dry" pre-amplifier has many applications in audio work where small physical size and freedom from power supply wiring are desirable. Where long microphone cables are necessary the unit to be described can be secreted under a table or platform, and is robust enough to withstand accidental rough treatment without the sound engineer having to appear at an awkward moment to readjust it. It is very useful in tape recording and Amateur Radio work where ample reserve gain is required with complete absence of hum.

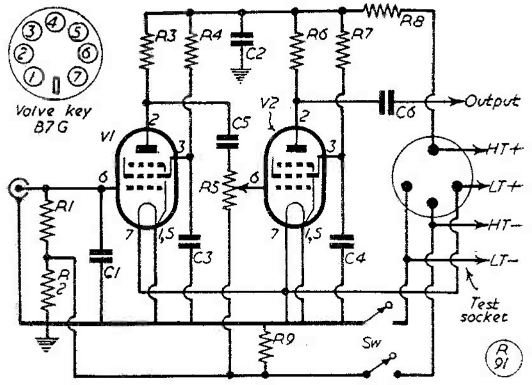
Conventional Circuit

The amplifier employs 1T4 pentodes in a conventional circuit—these were chosen simply because a supply was to hand, and other miniature battery pentodes would do equally well. For normal use, stability rather than high gain is the criterion, as ample reserve of gain is usually available in the first stage of the main amplifier.

Power is provided at HT 90v. (Ever Ready Battery B126) and LT 1·4v. (Ever Ready



General interior layout of the battery-operated audio pre-amplifier, which uses 1T4 valves in a conventional circuit.



Circuit of the audio pre-amplifier, a simple enough arrangement giving reasonable gain and an absolutely hum-free output.

Table of Values

Circuit of Battery-Operated Pre-Amplifier.

C1	= 100 μμF, mica.	R3, R6	= 100,000 ohms.
C2	= 20 μF, 100v. wkng., elect.	R4, R7	= 250,000 ohms.
C3, C4	= 0.1 μF bathtub.	R5	= ½-megohm pot-'meter.
C5	= .01 μF.	R8	= 5,000 ohms.
C6	= 0.5 μF.	V1, V2	= Type 1T4.
R1	= 1 megohm.	Sw	= DPST switch.
R2, R9	= 500 ohms.	Test Socket	—Eddystone No. 707

(*All resistors rated ½-watt.*)

AD35) as these fit the case in which the unit was built. Decoupling is provided through a 20 μF 100v. working "bias" type electrolytic condenser, and RF bypass is afforded by the 100 μμF condenser soldered directly between the grid tag of the first valve and chassis. This is *essential* if the unit is used with a phone transmitter.

A small amount of bias is provided by the 250-ohm resistor from HT-to earth, which is split into two 500-ohm resistors to give the shortest possible grid return path for each valve. A DPST switch is used to break both HT and LT negative.

The input shown is suitable for a crystal microphone, and with the circuit as given a gain of about 15 dB was measured at 400 c.p.s. into a 50,000 ohm load.

Alternative Circuits

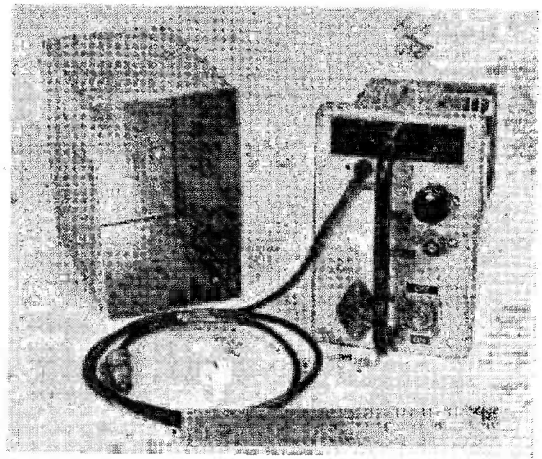
This "basic" circuit is capable of modification and extension. For example, the output stage might comprise a cathode or anode follower and the gain could be made up by an additional stage if required, although this would increase the physical size of the unit. In whatever form it is preferred, it is a handy equipment for large PA work or amateur use.

Construction

The unit is built into the aluminium case, measuring 3½″ × 5¼″ × 5″ deep, which housed an American BC-357 receiver. The chassis portion carries the HT battery and the amplifier is built on a vertical plate at the top of which will be seen the "bathtub" screen bypass condenser with the output isolating condenser mounted on it.

An Eddystone miniature four pin coilholder mounted on the front panel provides a convenient voltage test point, into which external batteries or power pack can be connected without taking the equipment out of service. No ventilation holes are needed, as the heater power is adequately dissipated by the valve cans.

A unit of this sort can, of course, be built up in many different ways by the experienced constructor—the main object of this article is to suggest the use of the easily-obtainable low consumption battery type valves for an absolutely hum-free audio pre-amplifier, with the circuit found by the author to give the desired results.



The model as built by G2YS, with a size comparison — see circuit for details.

Band-Spreading the BC-348

AND OTHER DESIRABLE MODIFICATIONS

M. A. RYAN, Lieut., A.M.I.C.E.I. (EI7D)

Originally fitted as the communications receiver in Fortress aircraft of the American Bomber Force, BC-348's are in regular use at a large number of amateur stations at home and abroad. This article gives a lot of information which will be of great interest to all owners of a BC-348.—Editor.

RECENTLY the writer, on a visit to EI9Y, was so impressed by the bandspread on 14 mc on the BC-348 at that QTH that he immediately decided similarly to modify his own receiver. Having done the 20-metre band successfully, it was decided to go further, by bandspreading on 7 mc as well, and if possible also putting 21 or 28 mc on the receiver.

After a lot of trial-and-error experiments with capacity only, it was found necessary to take pencil and paper and work out the correct capacities required. Despite the scepticism of EI3H the condensers were duly installed, and it was found that 7 mc was "dead on the nose"; the receiver covered, on the existing 7 mc band, from 7000 to 7100 kc by tuning the dial from 6 to 9·5 mc, approximately 90 turns of the tuning handle ; as this has a circumference of 7″, it meant roughly 630 inches of bandspread. On trying out the 21 mc band, however, EI3H had the laugh, as the receiver only went, despite all efforts, to 20 mc. Then it was found that on removing one turn from the proper inductances, 21 mc was covered with approximately 15 turns of the tuning handle — that is, 105 inches of bandspread reading on the dial coverage from 16 to 17·1 mc. The bandspread on 14 mc was easily accomplished and now reads on the dial from 10 to 12·2 mc, and requires 46 turns of the tuning handle, *i.e.*, 322 inches of bandspread.

The writer heartily recommends these modifications as they make the BC-348 a real communications job, comparing favourably with receivers priced very much higher.

While he was at it, the writer also installed separate RF and AF gain controls, changed the 1st RF valve, and removed the AVC line from the 1st RF stage, all of which improve the receiver immensely. The only fault at present with the writer's set is that strong signals overload it, and the RF gain control has to be turned to near minimum (which is considered a good fault). It is suggested that 14 mc be bandspread *first,* as it is done on a range which contains no other amateur band, so there is no fear of the modification doing any damage to an existing band.

Bandspreading on 14 mc

Turn the wave change switch to Band 5, which tunes from 9·5 to 13·5 mc. Loosen the lock nut on the left-hand side of the coil-pack holding the wave-change rod, which runs through the coil pack, and withdraw. An Allen key is required. The end of this rod may be seen protruding from the right hand side of the receiver. Remove the grid caps from the 1st and 2nd RF and mixer valves. Unsolder the connections from the tags at the front and rear of the coilpack, mark them for identification purposes, or alternatively write on the chassis of the receiver the different colours of the wires, and arrow where they go. Unsolder the four leads from the main tuning condenser. Remove the aerial alignment knob from the spindle on the aerial trimmer on the inside of the chassis, underneath, and pull back. (It is not necessary to take out the knob completely.) Loosen and remove all screws holding the coil pack to the chassis. If the above is done in the order given no damage will be caused and the coil pack can now be withdrawn from the chassis.

Number the coil units 1st RF, 2nd RF, mixer and oscillator, so they can be put back in the correct order. Remove the side cover on the left hand side of the oscillator coil can. One side of the other stages is already open.

All the above sounds complicated, but is quite easy in practice, and as the writer has had trouble at times with modifications to other equipment, he has endeavoured to give the removing of the coil packs in some detail.

Deal with the oscillator section first. On examining this it will be seen that the rotor of the wave-change switch has a separate tag connected to one of the tags on the stator, as shown in Fig. 1. Directly connected to the wafer at this point will be seen a small mica condenser (C3 of Fig. 2) which is connected at the outer end to a tag on the rear wafer. Remove this condenser by clipping it off as close to the tags as possible. Do *not* use the soldering iron as you may damage some of the other condensers in the vicinity. Now solder in its place a mica condenser of 20 $\mu\mu$F. It is better to solder this to the bottom wafer first, as you may melt the wax on the condenser doing it the other way. The oscillator coil is now complete for bandspreading 14 mc.

The mixer, 1st RF, and 2nd RF stages are similarly modified; each of them have one condenser at similar points (Fig. 1) connected to the top and bottom wafers. These are removed and new mica condensers of 20 $\mu\mu$F installed in their place. These condensers are the C3 of Fig. 2 and are for limiting the maximum capacity of the main tuning condenser C4. C2 limits the minimum capacity of C4 (Fig. 2).

Testing Out

The coil pack may now be placed loosely back in the receiver and the connections re-soldered. Switch on the receiver. Tune the dial to 12·2 mc by means of the tuning handle. Do *not* change the position of the wave change switch. If a signal generator is to hand, couple it *via* a small condenser to the grid of the mixer valve and set it on at 14350 kc. Now adjust the oscillator trimmer till the note from the signal generator is heard on the receiver; this *may* be quite weak, but that is of no consequence at this stage. Now connect the signal generator to the aerial terminal on the front of the receiver and adjust the mixer, 1st RF and 2nd RF trimmers at the rear of the coil pack till the note comes up strongly. It may be necessary to lower the output of the signal generator to prevent overloading. Remove the signal generator and connect the ordinary aerial.

If a signal generator is not available just connect the aerial to the mixer grid till signals are heard, and tune the oscillator trimmer till the approximate 14350 kc end of the band is found. Then, by connecting the aerial to the aerial terminal and adjusting the mixer and RF trimmers, signals can be brought in at full strength. They should be heard 150% better than they were on the old band. The first signal the writer heard on connecting the aerial was a VS2 at S9+, which was only strength 7/8 on the old band. This is probably due to the better L/C ratio on the new band.

If you do not want 21 or 28 mc or to bandspread on 7 mc, switch off, put back the wave-change rod by gently fiddling the coil can till it goes back easily—if you treat it roughly you may damage the wafers on the switches. Put back all screws, re-solder connections and the job is completed. Comparison of the old 14 mc band with the new should remove all doubts, and you will probably wish to modify Band 6 for 21 or 28 mc !

Modifying for 21 or 28 mc

It is suggested that if modifications are being done for 21 *or* 28 mc, then 7 mc be done as well. Reference to Fig. 2 shows the circuit of each stage, *i.e.*, oscillator, mixer, 1st and 2nd RF. To modify for 21 or 28 mc, the existing C1's, which are 50 $\mu\mu$F trimmers on Band 6 (13·5 to 18 mc) are removed and replaced by 25 $\mu\mu$F trimmers (which can be bought if modification of Band 4 for 7 mc is not required), or can be exchanged for those on Band 4 (which are 25 $\mu\mu$F) if 7 mc is being bandspread. The trimmers removed from Band 6 are used on Band 4 when modifying for 7 mc. The 1st RF trimmer of Band 4 in the writer's receiver was of unknown value so he bought one 25 $\mu\mu$F trimmer only.

Having changed the four C1's, remove the oscillator, mixer, and RF condensers C3 (Fig. 1) and replace the oscillator C3 by a small 25 $\mu\mu$F mica. C3's for mixer, 1st and 2nd RF stages are replaced by 15 $\mu\mu$F micas. Next follow the wiring from each of the new trimmers C1 to the inductances across the C1's. Remove one turn from each of the four inductances by unsoldering at the bottom of the coil formers and gently pushing the wire in the reverse winding direction. Care should be taken as there is a danger of breaking the small wire which runs from top to bottom of each coil at the rear. It is not necessary, or recommended, to alter the original spacing; just clean the end of the coil wire and re-solder, then snip off the removed length of wire. The job is then completed and it is only necessary to put back the coil packs, re-solder the loose ends, and switch on. Connect the signal generator as detailed for the 14 mc modifications and set the dial to 17·1 mc. Adjust the oscillator trimmer till a 21·45 mc note from the signal generator is heard on the receiver, touch up the RF and mixer trimmers—and then wait till the band opens ! Despite bad conditions, the first signal heard by the writer on connecting the aerial was a KZ5 at S7.

For 28 mc, if that band be preferred, the only difference is the removal of two turns instead of one turn from the inductances.

Bandspreading 7 to 7·100 mc

As the writer is not interested in 'phone on 7 mc he converted for bandspread from 7 to 7·1 mc only. However, for those who want

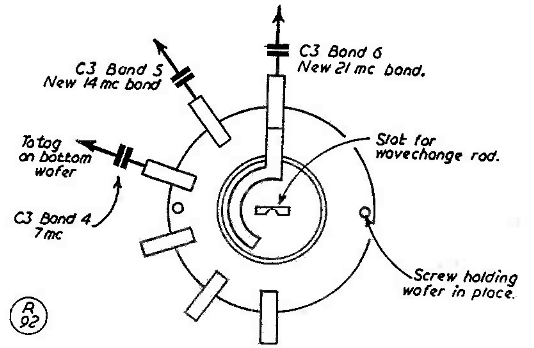


Fig. 1. The wave-change wafer switch connections, tagged to show the modifications required.

the whole band alternative values of condensers are given below.

Switch to Band 4 (which tunes from 6 to 9·5 mc). Remove the coil cans. Remove 25 $\mu\mu$F trimmers C1 from each stage and replace with 50 $\mu\mu$F items. (Those taken from Band 6 will do.)

Oscillator Stage: Remove C2, the small fixed condenser across the trimmer C1, and replace by a 240 $\mu\mu$F mica. Remove C3 (*see* Fig. 1) and replace by a 40 $\mu\mu$F mica. This puts the oscillator at 915 kc lower than the RF signal. It was on the HF side originally, but as the writer had got it by trial-and-error before he started with pencil and paper he left it as it was ! The calculated values, which were not tried on the oscillator only (Band 4), were C1 50 $\mu\mu$F; C2 124 $\mu\mu$F; and C3 40 $\mu\mu$F. So those who want to try the oscillator on the HF side only require to put in a 124 $\mu\mu$F mica instead of 240 $\mu\mu$F for C2.

Mixer: Remove C2 and replace with a 130 $\mu\mu$F mica.

2nd RF: Replace C2 by a 140 $\mu\mu$F mica.

1st RF: Replace C2 by a 120 $\mu\mu$F mica.

C3 for mixer, 1st and 2nd RF stages are replaced by 40 $\mu\mu$F mica condensers.

For those who want 7 to 7·15 mc, make C3 in each case a 65 $\mu\mu$F mica.

Put back the coil pack, switch on, and adjust the oscillator trimmer to a 7·1 or 7·15 mc note from the signal generator with the dial set to 9·5 mc. Touch up the RF and mixer trimmers—and you can now pick the gaps between the commercials operating in our 40-metre band !

AVC Modification

The volume control originally in the set was a ganged audio and RF gain control which the writer separated. It is a decided advantage to be able to turn the RF fully up and still have audio control, as any user of an amateur band receiver will know.

The rear potentiometer on the gang is the audio control and is of 350,000 ohms. A small potentiometer of from 250,000 to 400,000 ohms can be installed about $\frac{3}{4}''$ above and halfway between the original volume control and the BFO knob ; that which controls the dial light dimmer can be fitted on the new spindle. Before the audio control will work it is necessary to short out two of the tags on the front wafer of the MVC-OFF-AVC switch. Turn the receiver upside down, with the panel facing towards you, switch on, and with a piece of insulated wire, try shorting out the tag nearest to the switch on the top half of the panel wafer, and the tag immediately up from it, at the same time getting someone to work the AF and RF controls. If they then work independently the wire is soldered in permanently. If not, try others. This system worked in the writer's case and saved a lot of wire tracing ! The writer installed a small jewel light in the hole left by the removal of the dial light dimmer and for appearance put in a 2-volt bulb in series with one of the 6·3 volt dial lights.

1st RF Valve

The 1st RF valve-holder was rewired for a 6SH7 which works very well. As the writer has approximately 300 valves " in stock " he will probably be able to exchange one for a 6AC7 some day, which should work even better !

Paper Work

For those who possess other marks of BC348, which may have different values of condensers, and who would like to do the modifications for 7, 14, 21, or 28 mc as described here, the following is the " paper work " involved. This, though not 100% perfect, gives values which definitely will work, and the calculations are perfectly simple.

Considering Fig. 2, L1 is the inductance for each stage of each band. C3 limits the maximum capacity of C4 (main tuning), and C2 limits the minimum capacity of C4. C1 is the band-set.

Assuming that Band 4 is required to be spread on 7 mc, find the maximum original values of C1, C2, C3, and C4 for *each* stage. In the writer's case (Band 4) oscillator stage C1 was originally 25 $\mu\mu$F, C2 was 35 $\mu\mu$F, C3 was 390 $\mu\mu$F and C4 16 to 240 $\mu\mu$F. The writer

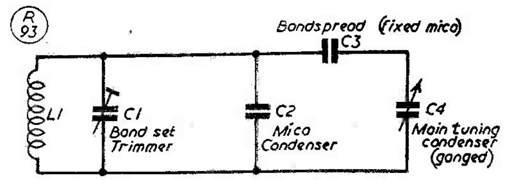


Fig. 2. The circuit actually involved in the BC-348 bandspread modifications explained by EI7D.

now decided, arbitrarily, to make C1 50 $\mu\mu$F, C3 40 $\mu\mu$F (small for bandspread) and C4, the main tuning condenser, left as it was, *i.e.*, 240 $\mu\mu$F. Therefore, required a value for C2 to put the total capacity across the coil what it originally was, *i.e.*, 210 $\mu\mu$F. The value of 210 $\mu\mu$F above is got as follows :

The maximum capacity of C4 with C3 in series with it is $\frac{C3.C4}{C3+C4.}$ which in this case worked out at $\frac{390 \times 240}{390+240}$ which gave 150 $\mu\mu$F approx. This, added to the original values of C1 and C2 (25+35), gave 210 $\mu\mu$F as the original maximum capacity across the inductance L1 of this stage.

With the new values of condensers, C3 at 40 $\mu\mu$F and C4 at 240 $\mu\mu$F gave the new maximum capacity of C4 as $\frac{40 \times 240}{40 + 240} = 35$ $\mu\mu$F approx.

This new maximum value of C4, added to the new value C1 (35 + 50 = 85) and deducted from the original maximum capacity across L1 (210 $\mu\mu$F) gave the new value required for C2 as 125 $\mu\mu$F (210 − 85 = 125).

The same calculations are required for each stage of each band, and while tracking may not be completely accurate in theory, the writer is more than satisfied with it in practice.

Finally, he wishes gratefully to acknowledge the information given by EI9Y, who supplied the data on the 14 mc modification, and the encouragement afforded him by EI3H, EI7R and EI2T. It was EI3H who, at one stage, stopped him from throwing the receiver over the sea-wall !

LICENSING THE SU STATIONS

We are informed that the official *Egyptian Gazette* of October 9 announced that the Council of State had approved the licensing of radio amateurs and the formation of clubs and societies. The new law will presumably apply only to Egyptian nationals, but it will at least remove any further official excuse for withholding MD5 licences.

Simplifying the Buffer-Doubler Chain

SOME NOTES ON DESIGN

B. J. P. HOWLETT (G3JAM)

ONE of the most absorbing sidelines of Amateur Radio is the study of component saving, or getting a quart out of a pint pot, as the saying goes.

A bit of this has been going on at G3JAM recently to devise some method of operating the writer's miniature wideband couplers without wasting undue space and cash on components.

In the normal way, a doubler stage using a beam tetrode looks like Fig. 1, and it will be observed that altogether there are six components used purely to keep the valve operating under optimum conditions. They are the grid leak and condenser, the screen dropper and decoupling condenser and cathode protective bias and decoupling condenser. Which is why a lot of people use triodes . . .

Consider now Fig. 2. Here, full drive is applied to the screen grid (about 150 volts of it) and, provided the control grid base is long enough not to mind the same amount of drive (through the usual condenser and leak), similar performance is assured to that of Fig. 1. The screen grid is obviously in Class-B zero bias and the control grid in Class-C, so Class B-C seems an apt description. No protective bias is required because when the drive is switched off (key up) the valve will take practically no current.

Does it work ? Yes, it does and the writer's transmitter now uses the set-up shown in Fig. 3. The valves are 6AQ5, which is a miniature version of the 6V6. A single 807 PA is easily driven from a 250 volt HT line, and a 300 volt HT supply will enable enough power to be obtained for two 807's in parallel.

Overall, the circuit is eight components short of the usual triode arrangement and sixteen components light in comparison with the conventional pentode circuit. Small high gain pentodes are definitely ruled out because the 150 volts drive required on the screen grid would bias the control grid back to 18-20 times cut-off. For a 6V6, 150 volts is only about five times cut-off at which value it frequency-doubles very nicely.

A fortuitous advantage of the no-drive no-current character of the circuit is the reduction of radiated hiss from the transmitter during reception periods. This hiss, common with multi-stage transmitters, can be a thundering nuisance in the receiver, especially on the HF bands, and usually necessitates cutting the HT

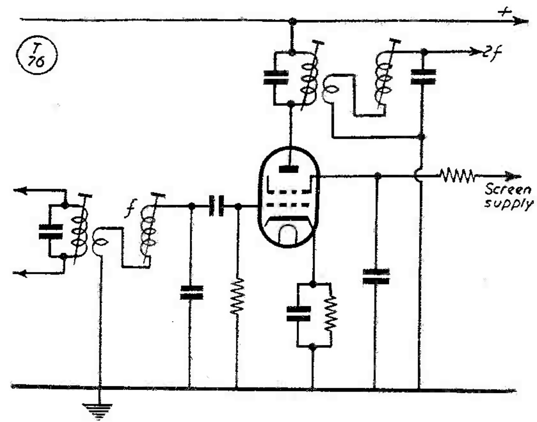


Fig. 1. Doubler stage as normally connected.

or shorting the transmitter aerial terminal to earth.

The modifications are quickly made to existing transmitters, and unbelievers may care to do the 7 mc one first just in case !

The drive control being on the buffer only does make it a bit " sudden " on the HF bands and a fine control, shown dotted, can be added

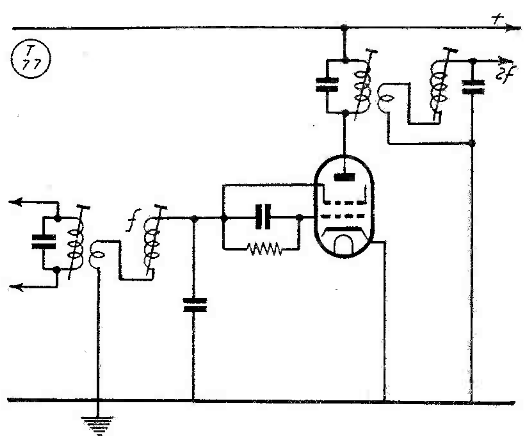


Fig. 2. Doubler stage connection suggested by G3JAM, for reasons discussed in the text.

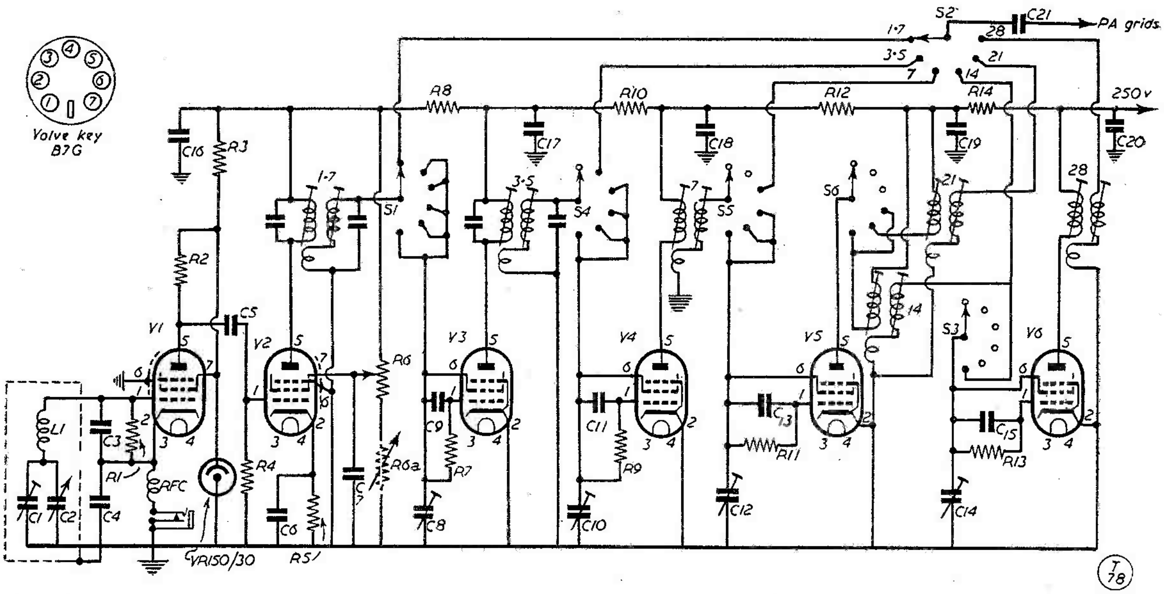


Fig. 3. The Clapp VFO, buffer amplifier and four frequency multipliers in the circuit as discussed by G3JAM in his article. By using miniature valves, a very compact band-switched assembly is possible.

Table of Values

Fig. 3. Circuit of the VFO-Buffer-Multiplier used by G3JAM.

C1	= 20-100 μμF trimmer
C2	= 10-45 μμF variable
C3, C4	= .001 μF, mica
C5, C9, C11, C13, C21	= 100 μμF, ceramicon
C6, C7, C15, C16, C17, C18, C19, C20	= .01 μF, 350v.
C8, C10, C12, C14	= 2-10 μμF trimmers
L1	= 57 turns, 34 SWG enam. on 1-in. diam. former.
R4	= 50,000 ohms, ½-w
R5	= 330 ohms, ½-w.
R6	= 50,000 ohms w/w pot'meter.
R6A	= 5,000 (*optional*)
R7, R9, R11, R13	= 33,000 ohms, ½-w.
R8, R10, R12, R14	= 100 ohms, ½-w.
V1, V2	= 6AM6 (EF91, 6F12, Z77, CV138)
V3, V4, V5, V6	= 6AQ5 (6BW6, 6V6GT, 6V6).
R1	= 6,800 ohms, ½-w.
R2	= 2,700 ohms, ½-w.
R3	= 10,000 ohms, 1-w.

as well. The writer has not so far found this in the least necessary, however.

Also, not having a marvellous stock of valves, only 6AQ5's have actually been proved to work up to the present, but there seems no reason to suppose that other output pentodes and tetrodes can't be operated in a similar manner with, perhaps, a little experimentation.

NOTABLE CELEBRATION

It is probably not realised that the only radio society in the country (if not in the world) with a record of *continuous* existence from pre-1914 days is the Barnsley and District Amateur Radio Club. And not only that — its president today, Mr. G. W. Wigglesworth (G2BH), is a founder-member, who was present at the first meeting on the formation of the Club at the Royal Hotel, Barnsley, on August 21, 1913. This notable event was fittingly celebrated on October 17 last, when among 50 members and visitors at the Club dinner in Barnsley—unfortunately not at the original *venue*—one of those present was another founder-member, Mr. J. H. Naylor, accompanied by Mr. H. Wilde, who joined before the 1914-'18 war. The only change in 40 years has been a slight one in title—it was originally the Barnsley and District Amateur Wireless Association. Barnsley's is an unique record in the history of Amateur Radio, as every other club or society with any pre-1914 existence either faded right out during the 1914-'18 war, or was resuscitated sometime after 1919, either with a new title or on different lines.

STATEMENT — HALLICRAFTERS (Gt. Britain), Ltd.

The liquidation recently of the concern above named was purely a matter of form, as it had never traded, had no liabilities and no assets. It was originally floated some years ago to handle Hallicrafters agency and manufacturing interests in this country, which proved to be impossible owing to import and exchange restrictions. It is emphasised that the existing business of McElroy-Adams Manufacturing Group, Ltd.—of which Mr. H. R. Adams, G2NO, is the managing director — is in no way affected by the liquidation of Hallicrafters (Great Britain), Ltd.

DX COMMENTARY

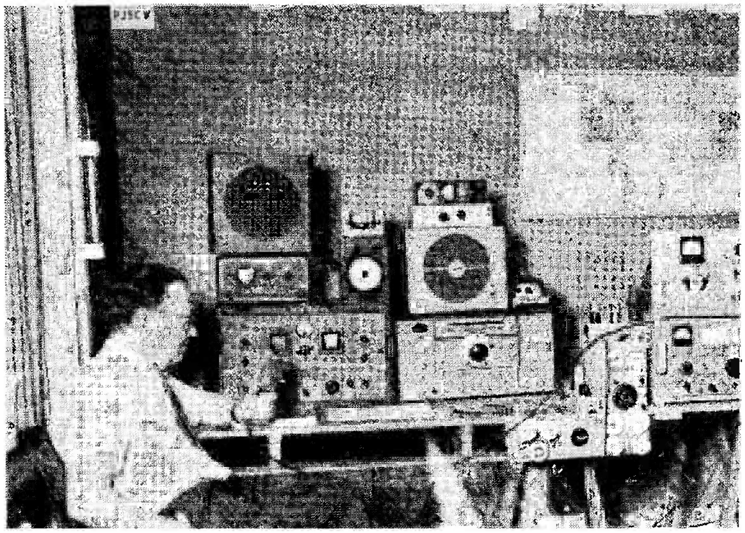
L. H. THOMAS, M.B.E. (G6QB)

WELL, now you know what our bands can sound like with a popular DX working contest in progress *and* good conditions to support it! The CW week-end of the World-wide (formerly *CQ*) DX Contest was blessed with wonderful conditions on all bands, and the activity level was something the like of which we have not heard for some years. Even a VK or ZL was snapped up by the wolf-pack every time he showed up, and we have already heard of some vast scores running into six figures.

The general level of conditions has been very good indeed, and WWV has frequently been heard sending " N 7," which, we think, is the highest figure he has radiated since he started the forecasts. (We might be wrong there, but *we* have never heard him go up to an 8 yet).

The 21-mc band was wide open on October 31 and November 1, the Contest week-end, and many scores have gone up like rockets. Even VK's and ZL's were workable on that band with ease at times. Your Commentator, still using a temporary aerial at that period, made WAC in six consecutive QSO's on 21 mc on the Sunday morning (SVØWE, ZL4GA, VU2JP, LU3EL, ZE3JP and KP4KD), and no doubt others did equally well or better. This is quoted only to show the state of the band, and not with any idea that it was particularly clever.

Fuller news appears in the reviews of the various bands later on.



HB9HK

CALLS HEARD, WORKED AND QSL'd

Top-Band DX

Last month we referred to some " near-QSO's " between ZL and G on the Top Band. Just too late for inclusion arrived the grand news that G6GM and ZL1AH had finally made it. G6GM heard ZL1AH calling him on September 29, and ZL3RB calling him on October 15, but no full contacts were achieved at that time. However, on October 16 ZL1AH and G6GM had their first QSO, with 339 both ways; on the following morning it was 559 both ways, with the ZL peaking to S6. On October 21 ZL3RB was worked, 449/439, and ZL1AH was worked again, 339 both ways. Two further QSO's with the same stations took place on October 22 and 23.

Since the arrival of that news, we hear that G6GM has the QSL's from both stations, with everything checking up perfectly. This has cheered him up no end, because one of the ZL1AH contacts was so good that 'GM though it must be a misguided leg-pull!

And for the information of those who would query the details, ZL1AH used 75 watts into a half-wave aerial—nothing very special. At G6GM, the aerial was also half-wave, his site allowing this to be placed such that one radiation lobe would be in the desired direction. It is true that G6GM has the advantage of an excellent DX site, with no local electrical noise level—since he has no mains, there are no power lines anywhere near! His HT supply is from a converter run off batteries charged from the 50-volt DC house lighting set, and the LT accumulators are kept up by means of—a *wind charger*! Yes! And that means that if there's been no wind recently, there's no DX for G6GM. It's just like that! For receiver he uses an HRO modified to run from the 50v. DC line; the result is very quiet reception, and S1 signals can be copied. The transmitter is an all-band job using three valves and plug-in coils, with an 807 in the PA It can, in fact, be said that G6GM is much more representative of a real *amateur* set-up than many near-commercial "amateur" stations of which we know.

Hearty congratulations to all concerned in this wonderful effort, which must surely be described as the ultimate DX for the LF bands. In terms of sheer distance it is a record which no one can break.

The Trans-Atlantics

These tests will run to the now-familiar routine, starting on December 20. January dates are the 3rd, 17th and 31st, and the times, as ever, 0500-0800 GMT. Note that the DX stations call from 0500-0505, 0510-0515 and so on, with the U.K. stations occupying the other periods. Synchronise your clocks with WWV on 2.5 mc, who is also a good guide to the state of the band.

Frequencies for British stations are 1830-1870 kc, with the East Coast W's on 1800-1825 and the others on 1875-1900 and 1975-2000 kc, with possible activity around 1900-1925 kc. The ZL's will also be on, in the 1875-1900 kc sector.

WØNWX in Iowa will be trying again this year, and warns us that the West Coast Loran on 1850 kc may make that frequency impossible for reception in the West and Mid-West.

G3CED (Broadstairs) kindly forwards a letter from W2EQS in which several useful points are brought up. W2EQS is in agreement with the frequencies we are to use, and repeats the information about West Coast Loran on 1850 kc. He adds, though, that there is another one on 1950 kc, on the East Coast, reputed to use a megawatt, and this one spreads at times right down to 1775 kc.

'EQS pleads for more Top-Band activity in the summer, and thinks there are two open seasons. G3GGN (Littlehampton), who ran skeds with him in the summer, confirms this and is convinced that midsummer contacts should be possible.

Other Top-Band News

Harking back to daylight DX on this band, GM3JDR (Caithness) digs the following out of his log: OH3NY (1615); G3GGN (1345); G2HAR (1540); and OH3NY (1440). He adds that he has had many hundreds of QSO's with stations all over England, including Devon, between 1500 and 1800 GMT.

G3IXE (London, N.W.8) recently had a spell of portable working in the Shetlands, whence he made contacts with GC3EML (Jersey) and with stations in Dover, Bristol, Essex, Cardiff, Portsmouth, Hove and Plymouth, to quote a few. Some of these were around 0700-0800 GMT, and he laments the lack of activity in the early mornings, even during week-ends. The outgoing signals were somewhat helped by the use of an 80-ft. vertical aerial, 200 ft. above sea level—but the rest of the gear really *was* portable!

G6VC (Northfleet) has put the score up to 81 with 79 confirmed, and has found the band nice and lively. He comments an old friend OK1AEH, who QSL's every time he is worked!

GC3EML (Jersey) confirms the Shetland QSO, and also worked GM6RI at 1445 (520 miles with signals 569/589). He has hopes of claiming WABC if Guernsey and Jersey count as separate "counties" (which they do). And so does the County of London, of course. GI3HFT (Belfast) now makes it 80 worked and confirmed, in spite of having missed the G5RI/P expedition.

G2HKU (Sheerness) raised OK1AEH and 3KAB, as well as GM3HGA (Shetland), GC, GM and GW; he also heard HB9CM, OK1CX and 3A2BM. A later note tells us that he worked SP1FT on 1900 kc (November 10 at 2200). G3HIW (Ilford) is another to raise OK1AEH, and reports hearing W1DBE calling CQ around midnight on October 5. 'HIW has received a listener report from KV4AA for last February's Trans-Atlantic tests. G3IVH/A (Norwich) is another who heard W1DBE at midnight on October 5, and he, too, called him without results. The QRM and noise on the other side must be terrific at that time of day.

G3AKY (Sheffield) collects his WABC, and says the 7 mA drain on his 250-volt power-pack can now be eased off. He's going down now, and don't forget the diver! He reminds us that G2AJU, that other exponent of QRP who used to keep Suffolk on the map, is now in VK; another Suffolk representative is badly needed.

G3IAF is now /A at Rowley Bristow Orthopædic Hospital, near Guildford, where he will have to be for some months following a leg operation. Accordingly, he has "a glorious 260 feet of wire, all of 15 feet high, wrapped round the ward and operating theatre" with which he will be using a bedfast 4 watts on the Top Band, going for his WABC/2! Good luck to him from all of us.

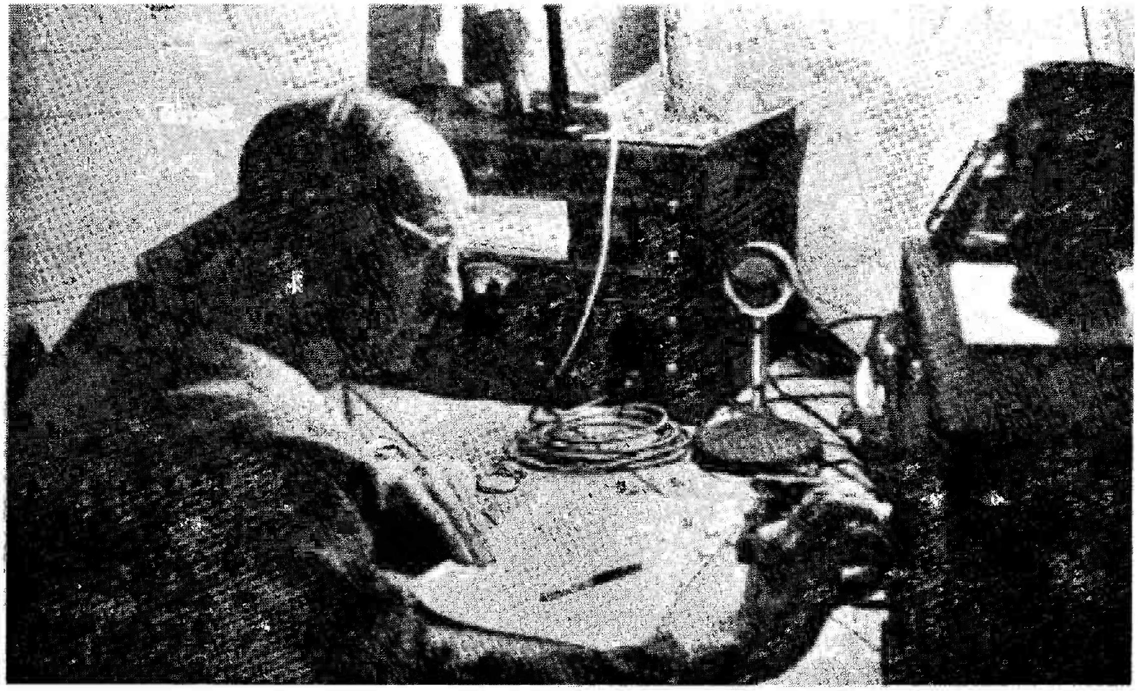
Another /A in much the same

FIVE BAND DX TABLE

POST WAR

Station	Points	3.5 mc	7 mc	14 mc	21 mc	28 mc	Countries	Station	Points	3.5 mc	7 mc	14 mc	21 mc	28 mc	Countries
DL7AA	639	84	146	216	89	104	221	G3FXB	403	54	102	168	40	39	174
G6QB	584	52	106	219	72	135	234	G6QX	399	51	92	143	56	57	168
G5BZ	546	58	107	225	91	65	231	G2YS	362	45	59	142	72	44	157
G2VD	493	47	89	178	70	109	187	G2BW	350	24	57	144	82	43	155
G2WW	469	23	70	189	80	107	196	G3ABG	330	36	82	149	33	30	156
G2BJY	459	48	77	141	77	116	179	G3GUM	328	31	38	168	80	1	177
G3DO	437	24	46	194	66	107	221	GM2DBX *	319	21	31	154	32	81	163
G4ZU	426	11	15	195	85	120	203	G8VG	278	35	76	123	18	26	140
G5FA	405	34	117	150	31	73	165	G2DHV	174	20	21	107	11	15	111
								4S7XG	131	1	21	95	11	3	95

* (Phone)



If you were one of the 50 G's who succeeded in raising CE0AA on Easter Island, here is the station you worked. But if you had a QSO with a "CE0AA" on or about August 5, that was a pirate, as the genuine CE0AA was not actually on the air at that time; his dates were August 7-15. In addition to the G's genuinely worked by CE0AA (we have his list), he also QSO'd 30 stations in 12 other European countries. The receiver was a Collins 75A-2, the transmitter a Collins 32V2 CW/Phone set running 120 watts, and the aerial a long wire. In his week at Easter Island CE0AA made a total of 1,538 QSO's, which for him must have meant pretty solid operating for the whole of the time! At home, CE0AA is CE3AG of Santiago de Chile.

situation was G3GJX at the Wingfield-Morris Orthopædic Hospital, Oxford, who has been on Top Band phone for many months, as a prominent member of the net known as the "Oxford Sunday School." This net has on occasion joined with the "Buckingham Concert Party," as a junior member of the latter was in the Hospital for a time, as second operator to G3GJX/A. Happily, G3GJX has recently been released and can drop the /A.

GM3EFS (Alexandria) makes it 82/83, thanks to a card from Cardigan; this would have put him at the top of the ladder, but GM3IGW has also been collecting cards! 'EFS is in favour of the idea of an endorsement for 80 worked, but doesn't think anyone except those in rare counties stands a chance. He missed 3A2BM, and thinks he was about the only one who did. . . .

GM3IGW (Alloa) soars well above all challengers with his 85 worked and 85 confirmed. He tells us that GM3JFG (Ross-shire), GM3BNX (Berwick), G3IQV (Berks.), G3HEK (Salop) and G3IPC (Cambs.) are all active at present from their "rare" QTH's. 'IGW says that under normal conditions he can guarantee to work the South Coast after 1500 and until 1000. DX phone stations are often heard up there, but they won't listen for DX calling them in daylight.

G3GZJ (London, S.E.8) had a good QSO with GM6RI at 1500, and also raised HB9T. GM3OM (Larbert) has his 80 worked and confirmed, but is very busy and not on the air much. But he did manage to work OK1AEH and hopes to have a little more time from now on.

Incident

Just to show you what can happen, even in these enlightened days, here is a true account of one incident. The place: About 14090 kc; the time: About 1200 on November 8. Up comes JZ0KF, calling "CQ PA," at about 559. Despite his strange prefix, he is known to be genuine and in Dutch New Guinea.

PA0UN replies to his CQ, slightly off his frequency; so, of course, do several other stations, mostly *on* his frequency. PA0UN finishes his call and JZ0KF immediately comes back to him. But, for some strange reason, all the other callers assume that PA0UN will not have been heard, so they all start up calling JZ0KF again, *while he is transmitting.* One ON station calls him for a long time, and as soon as he stops, up comes a strong W on the frequency, calling the ON and asking "what is JZ0KF's frequency?" At this precise moment JZ0KF is still transmitting, on the same frequency as the curious W.

JZ0KF plods through a normal, but difficult, QSO with PA0UN; but the strange thing is that when *he* sends "K." very few stations call him; but when PA0UN sends "K." the whole lot start up again each time.

We take all this to mean that

very few of them were hearing the JZ station at all and were just hopping about on the frequency like cats on hot bricks, hoping in some mood of unquenchable optimism that they might get a QSO.

We should like to point out to all stations concerned that if they would only use what we might laughingly term their brains, the following would be obvious: (1) JZØKF was hardly likely to hear them while he was transmitting—which was the time that most of them were rampant; (2) If he was receiving PAØUN and, in fact, having a QSO, he would hardly be likely to listen on his own frequency each time PAØUN, slightly off it, went over; (3) If they couldn't hear JZØKF, they could hardly hope for a contact, anyway. One bright spot about the whole affair—there were only two G's mixed up in it.

TOP BAND COUNTIES LADDER

(Starting Jan. 1, 1952)

Station	Confirmed	Worked
GM3IGW	85	85
GM3EFS	82	83
GM3JDR	82	82
GI3HFT	80	80
GM3OM	80	80
G6VC	79	81
GI6YW	79	79
G5LH	78	80
G8KP	77	77
G2NJ	76	76
G3IAF	73	78
G3ELZ	73	76
G3HIS	70	73
G4XC	69	72
G3HDQ	69	70
G3GZJ	65	67
G3HIW	63	69
G3HTI	63	65
G3IVH/A	62	64
G2AOL	61	72
G3AKY	61	64
G3BRL	60	61
G2YS	59	74
G5JM	54	77
G3ABG	51	65
G3ITY	41	52
G3FTV	38	53
G8VG	30	40
G3CFG	29	51
G5FA	28	40
G3FZS	23	39

News From Overseas

DL7AA (Berlin) sends in his revised 5-band score and tells us that in the World-wide DX Contest he scored 109,623 points! He very much wants the QTH's of 5A2TT and HZ1KE, both believed to be in the U.K. at present; any help will be appreciated. DL7AA's goal is now his DXCC on five separate bands.

G3AAU/GM3AAU is, by now, in Canada, where he will be living with VE3BWY—" Ham " Whyte and G6WY to his many friends of pre-war days. 'AAU hopes to work many of his old friends and will, at least, be monitoring the Top Band tests. He was also going to be listening on the band on the way over, so we may have an interesting report from him in due course.

ZE3JO (Salisbury) has found the last two months quite good on 21 mc, and has put his score up to 52. Be it noted that he and ZE3JP are both active on the Top Band, frequency being 1870 kc.

4X7XG (Colombo) has been fairly busy on 7 mc, where he has worked ZC4IP, 4X4BX, SM5AQW and a KL7; his static level is high at present, but he might be found on 7 or 3.5 mc at the appropriate times.

G3IJU (also GI3IJU/A) will be in Malta by now, and hopes to be active almost on arrival. QSL's for contacts up to his departure can go through the Bureau in the usual way, but any cards for a later date than November 20 will be taken to indicate piracy!

An absolute welter of news comes from Cyprus this month. ZC4GF is ex-G3AGF, and tells us that at least *four* of the ZC4's intend to put the Top Band on the map this winter. The other three he mentions are ZC4CA, 4CK and 4FB; and the four of them will be running a rig or rigs with about 40 watts on 1840 kc. If this frequency turns out to be a bad one, they can move. On October 23 ZC4CK heard G4XB working G3JEQ, so things look promising already.

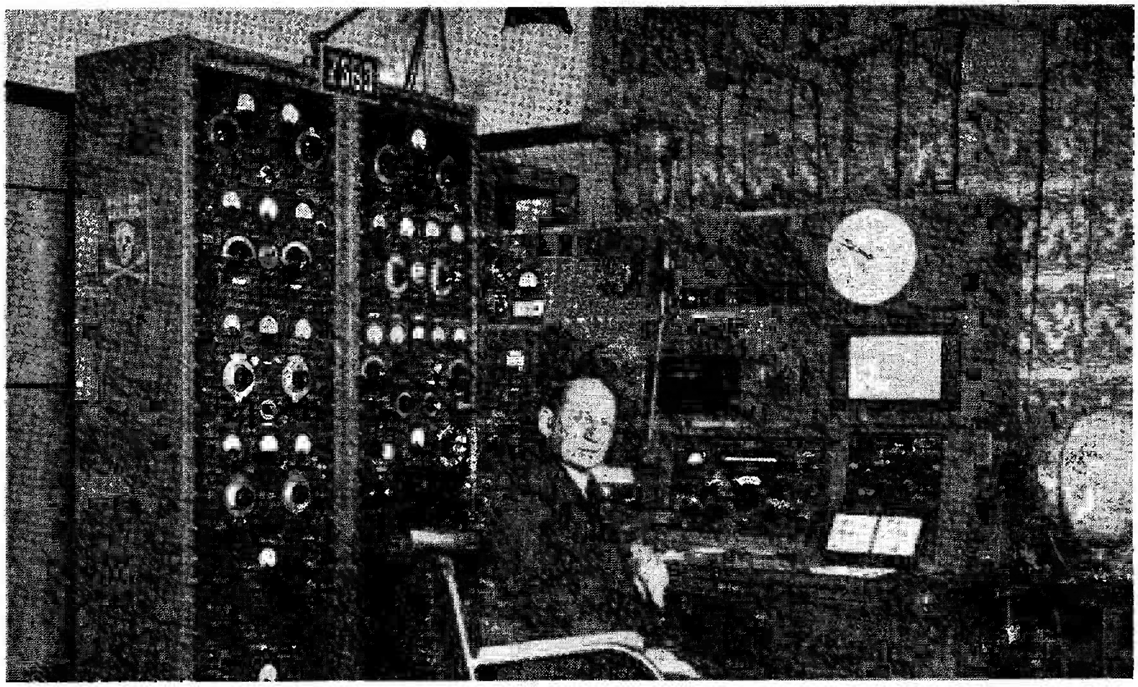
ZC4FB asks us to explain that he is not the manager of the ZC4 Bureau, this work having been taken over by ZC4IP's XYL. The address is, therefore, Mrs. G. Barrett, Box 219, Limassol, Cyprus.

ZC4JA is a new arrival, and is on 14 and 7 mc in the afternoons and evenings. He finds that ZC4 is still considered rare, judging by the gaggle of stations that come back to a CQ. He, too, may be trying Top Band later on, but he is not well situated with aerials.

21 mc MARATHON

(Starting July 1, 1952)

STATION	COUNTRIES
VQ4RF	94
G5BZ	91
G3GUM	90
DL7AA	89
G4ZU	85
G2BW	82
G2WW	80
G2BJY	77
DL2RO	75
G2YS	72
G6QB	72
G2VD	70
G3HCU (Phone)	67
G3DO	66
ZS2AT	62
G3CMH	60
G3TR (Phone)	57
G6QX	56
G8OJ	53
ZE3JO	52
G8KP	50
VK2AWU	47
G3FXB	40
G3ABG	33
GM2DBX (Phone)	32
G2DPY	32
G5FA	31
G3WP	26
GW3CKB	19
G8VG	18
G2DHV	11



The very fine all-band installation at ZS6Q, Johannesburg, South Africa — who has more or less everything ! Separate PA stages are provided for the bands 3.5 to 28 mc inclusive, with a pretuned exciter unit controlled by a BC-221. The speech amplifier incorporates a clipper filter, and the main modulator a negative peak clipper. On the receiving side, ZS6Q has a Collins 75A-3 with a panadaptor and a SSB selector unit. For 3.5 and 7 mc, the aerials are of the expanded "Lazy-H" pattern, and for 14 and 28 mc a dual 3-element beam is provided (one section for each band) fed by inductive links and fully controlled from the operating position, with remote indication. He just sits there and works anything on any band by selection !

New Diploma

The "OZ-CCA" Diploma rules have been amended, and U.K. amateurs can now win it by working all calls OZ1 to OZ9, only two contacts being allowed on each band with any one figure ; each contact counts *one* point, and a total of 60 points will qualify for the award. EDR will be arranging a special contest "to assist in the obtaining of the award." QSL's are required.

Pirate

G3ITX (Potters Bar) has been receiving cards for contacts that never happened, and asks us to "take such action as we deem fit." Apart from this mention, there's not much we can do about it, so please note!

The DX on 21 mc

And so to the DX bands, starting with 21 mc, which has in many ways been the best of them all. Reports are numerous and will therefore be brief.

G2BW (Walton) added ZS7, OQØ (which *is* a separate country), ET, HZ and VP9, and also worked VK and ZL again. G5FA (London, N.11) raised YO, SV, ZB1, OQ5 and VP9 for five new ones. G8OJ (Manchester) put himself up to 53 with SV, VP9, AP, ET, MP4 and IS, among others. G3ABG collected SVØWE.

G6QX (Hornchurch) added ten to his score straight off, with ZD4, ET, VU, AP and VQ3 among the best of them. G3GUM (Formby), on the Sunday of the contest, worked 32 countries and added 8 new ones, making his score 90. Included in the bag were KG4, CP, VU, AP, LZ and ET. YN1AA was mourned for as a gotaway. Also heard on the same day were 4S7, 3A2, OA, CR7 and "the usuals."

G3HCU (Chiddingfold) is getting along with his ambition to raise a DXCC on 21 mc Phone. Latest additions are the following: CR9AH, ET2, HP1CC, KT1BY, VP8AJ, VP9GB, VS1AY, VS6CL, ZS3E and *nine* VK's, among other old friends. He asks whether CN2AP is separate from CN8MM; as the CN2's are in Tangier, they are separate from the CN8's, but the same as the KT1's. 'HCU thinks his 3-element rotary has been a wonderful improvement, and, from the above, we should agree!

G3CMH (Yeovil) raised ET2US, YV5FL and ZD4AB on CW, as well as CR6, ET, FF, OQ, VQ2, VQ4 and many other nice ones on phone. Gotaways on phone included CO, CR6, CT3, CX, HK, HP, TI, VQ1, VS1, ZS3, ZS7 and ZS9. There must surely have been 100 countries on the band during the Contest week-end?

G4ZU (Croydon), also on Phone, raised VS6CL, VQ1NZK, ZS7C, HC1FS, VK9GW, ZL3LE and 4S7FG. His score of 85 includes 80 on phone. G3EHT (Wadebridge) managed several W's and KV4AA, all phone.

G5BZ (Croydon) collected XE, MP4, HZ, AP, VU, VP6, OA and others on CW, while phone brought in VQ1NZK. ET, FF, HK, VP5, ZS3 and ZS7. 'BZ thus romps his score up to 91 and becomes, for the moment, the leading G. He tells us, though, that G2PL is "well over the 100 mark."

GM2DBX (Methilhill) adds 30 countries to his score, which was previously two! They were all on phone and included VP6, YV, KZ5, VU, AP, ZD4, CR4, HK, HP, PJ, YN, CE, VK and ZL.

G2YS netted SVØWE, HZ1HZ, ET2US and EA8BF for new ones on CW. G2BJY collected HK4FV, but thought it a very bad month for the band. G3DO (Sutton Coldfield) raised KV4AQ, VP8AJ, VS1AY and IT1BXX, all on phone.

From all this, you will gather that 21 mc can be quite a DX band, even in the doldrums of 1953. Phone and CW activity seem about equal, and once the band opens, the sky's the limit.

The DX on Twenty

Despite the many attractions of our newest band, there has been no lack of DX on *Twenty*, where conditions have been uniformly good for some weeks. EA9DD (Rio de Oro) put in his promised appearance and was worked by hordes of stations during his stay there. So numerous were the contacts with G's that we won't even mention them as far as this band goes.

G6VC worked CO, W6 and 7, VK, VE8, FK8 and FP8. GM2DBX has had the word that there will be a genuine LZ station on phone during and after December. G2HKU added OD5LX and also worked EA6, FQ, 3V, LZ, YI and the like.

G5BZ's scalps were YK1AH, HR1AA and 1AT, SVØWG (Rhodes), HH3L and ZD9AA on CW, with HR1AA and ET2ZZ on Phone. G3EHT winkled out FM7WN, HP3FL, HI6EC, TG9RB and YV5BQ, plus KL7, W6, VK and ZL—all Phone. G4ZU weighed in with LB8YB (Jan Mayen), KAØIJ, LU4ZO and VU5AB, and also VQ1NZK on phone. QSL's arrived from XW8AA (Laos), VK1HM, FB8UU, VQ7UU and VQ9UU.

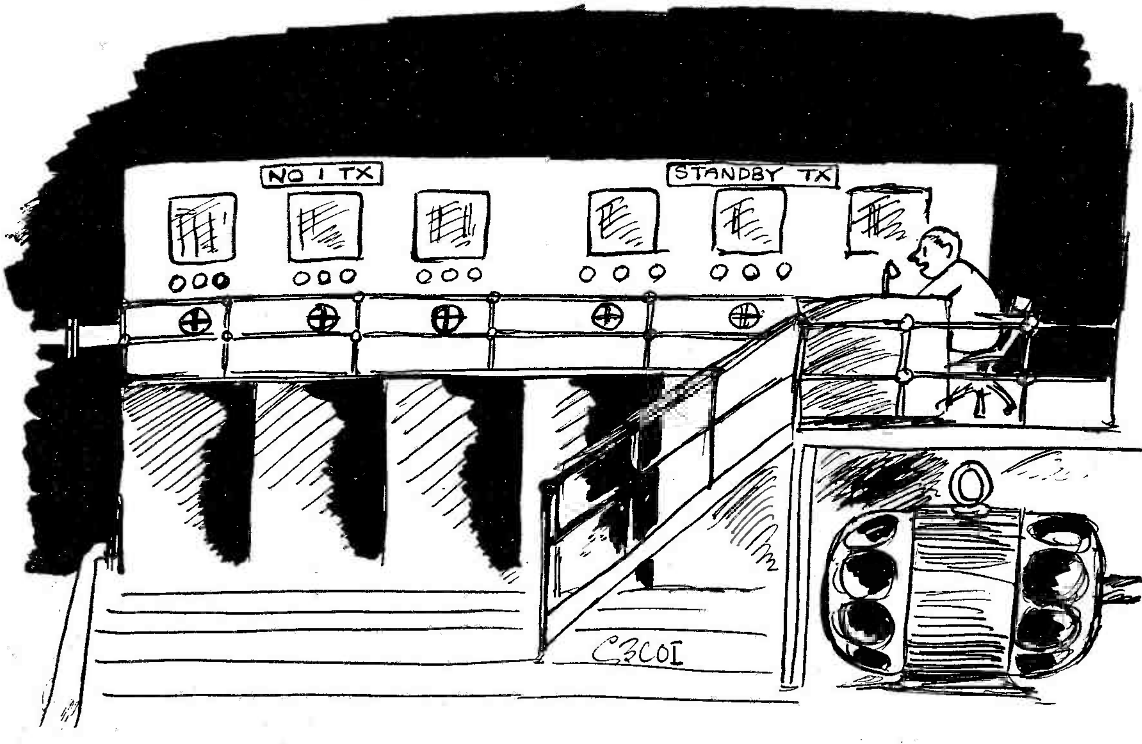
G3CMH worked the "genuine" M1B, TA3AA and YV5BQ on phone, but missed DI9AA, SVØWG, VP2DL and ZS3P. G3GUM found HR1AT for a new one.

G3ABG connected with EA6AF, ET2US, LZ, SVØWG, ST2HK, YV5BZ and HR1AT. G2DVD (Slinfold) worked VP8AK on CW, as well as HH2FL, HR1AA, VQ2JG and several VK's on phone. His QSL from DI9AA has arrived, and makes an interesting addition to the collection. He is surprised how few contacts DI9AA seems to have made, despite his excellent signal.

G2YS came across an "AC4AK," giving QTH as "Llassa," but has no illusions about him. He also worked FI8AR but missed FB8ZZ.

Forty Metres

The few regular 'chasers on *Forty* have found a thing or two there as well. G5FA mentions ZB1TD, SU1FA, VK5LE, SVØPA,



". . . . Yes, old man, I'm a great believer in QRP myself . . . ."

5A2CJ, EA9AP and VU2AC. GM3IGW went in and emerged with ZC4IP, EA9AP, 3A2BM and OY2Z, but missed on EA9DD.

G3ABG managed 9S4AX, 4X4RE, VP9BF and FA8CR, while G6QX made it with EA9DD. G2HKU added I1NU/Trieste and FA8DA, and G6QB found LB8YB and EA9DD for two all-time new ones.

G3JHC (Sheffield) reports and describes himself as a "sprog Ham," but in his first ten days he collected W, TF and plenty of Europeans with his 10-watt 807 breadboard He now finds some real DX seeping through (VP8, VP9, KP4, ZS and the like) but a great dearth of G's on the band.

Eighty-Metre News

Of course, the contest stirred up some 80-metre activity, too. G6VC worked MD5PS up there; G5LH (Horbury) raised EA6AF and 3A2BM for new ones; G2HKU added GD3FBS, SP3AN and OK1GC, and heard OY1P.

GM2DBX got a few new ones, but not DX. A phone sked with two W's during the Contest produced only a sore throat! G5BZ and G6QX both collected EA9DD, who was also heard but not worked by GM3IGW. G5FA raised both 3A2BM and 3A2AY.

New Mystery

G3COY (Stoke-on-Trent) says that he spent a lot of time calling YU1CY, who kept working F's, EI's and the like; eventually the YU came back to him and said 'Tks for your many long calls, but sorry not allowed to work your country . . . SK." So G3COY suggests it would be nice to know which countries are not allowed to work Great Britain, for their sakes as well as ours.

This one has got us guessing, for we frequently work YU and have never heard of any ban. Also, as far as we know, there is *no* country which is allowed to work the outside world in general, but not Great Britain. We suggest that YU1CY is a unique case and that there is "something queer" somewhere. Perhaps it's all to do with the Italians being in Trieste, and the Americans wanting to move out, and Russia demanding a conference!

TRANS-ATLANTIC TESTS 1953-54 SEASON

Dates:

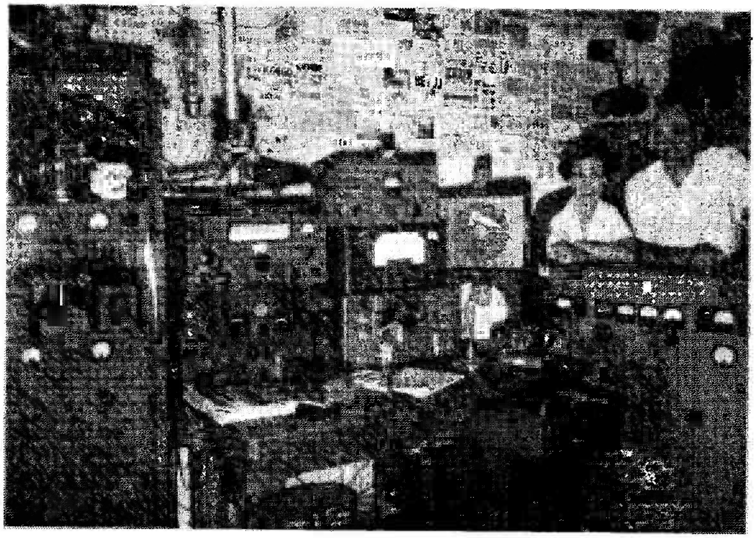
December 20, 1953
January 3, 17 and 31, 1954
February 14 and 28, 1954
March 14, 1954

Times:

0500-0800 GMT
DX stations call at 0500, 0510, 0520 and so on; Home stations call at 0505, 0515, 0525 and so on. Clocks should be synchronized by WWV on 2500 kc.

Frequencies:

U.K. stations: 1830 — 1870 kc
W/VE stations: 1800-1825, 1875-1900, 1900-1925 and 1975-2000 kc, according to location.



EA2CQ, San Sebastian, is the well-known YL operator, who holds DXCC with 178C confirmed on phone. On the right is EA2CA, also of San Sebastian (he is consul for Costa Rica) who has been in Rio de Oro as EA9DE, with EA9DD and EA9DF.

Shorts

G2VD (Watford) made some 83,000 points (multiplier of 170) in the single-operator section of the World-wide Contest. . . . XW8AA in Laos (French Indo-China) is genuine, and the prefixes XU and XV have been assigned to Cambodia and Viet-Nam — but neither of them will be accepted for DXCC.

JZ (see earlier paragraph about JZØKF) is said to be the correct prefix for Dutch New Guinea, as all the PK prefixes and numbers belong to Indonesia.

Season's Greetings

Although we haven't actually started sending "Merry Christmas" or "Mri Xmas" on the air yet, this is our last chance to send our greetings to you all *via* this column (incidentally, let's all use "MX" on the air — everyone knows what it means!)

We do, sincerely, wish all our correspondents and all our readers the Merriest of Christmasses, with health, prosperity and good fortune in DX, not only in the New Year, but for all time from now on.

The deadline for the first issue of 1954 will be **first post on December 14**; as usual, a few days early owing to the Christmas recess. Please make every effort to meet this date—if you miss it there is no possibility of squeezing in afterwards. For the February issue, the date will be *January 15, 1954*.

Address it all to "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

So, for now, 73, BCNU, and, most of all — "MX."

Transistor Test Circuits

INFORMATION FOR THE EXPERIMENTER

In the States, a prolific writer on the application of transistors is R. P. Turner, and this article by him is reproduced with acknowledgments to RADIO-ELECTRONICS, in the March, 1953, *issue of which it originally appeared. A British-manufactured transistor is the GET-1, a germanium triode of the point contact type, which is stated by the G.E.C. to have a frequency cut-off of 250 kc. This limits its usefulness so far as short wave applications are concerned, but nevertheless it is of considerable experimental interest. The General Electric Co., Ltd., have under development a modified transistor which should be suitable for operation on our LF bands.—Editor.*

IN a valve there is no physical connection, as such, between the grid and plate. In a transistor, on the other hand, a definite amount of resistance appears between the emitter and collector. The transistor in a grounded-base circuit may be considered as a 3-terminal resistance network having direct and transfer resistances. Output changes in the transistor affect the input.

Because of the differences between valves and transistors, common valve-testing techniques are not always applicable or adequate for checking transistors. In testing transistors, attention often must be paid to the values of input, output, and transfer resistances.

Measuring Resistances

Fig. 1 shows the equivalent 3-terminal resistance network of a transistor when the unit is connected in a ground-base circuit. (E, I, and R represent voltage, current, and resistance.) Polarities of emitter voltage Ee and collector voltage Ec are shown in this illustration for the point-contact transistor. The opposite polarities are employed with junction-type transistors.

Resistance Re represents the emitter resistance, Rc the collector resistance, and Rb the base resistance. The input resistance of the transistor is equal to Re + Rb and lies between 150 and 1,000 ohms in commercial point-contact transistors. The output resistance is equal to Rc + Rb and is between 10,000 ohms and 1 megohm or more in commercial point-contact types.

TRANSISTOR TEST RESISTANCES

R1 = Re + Rb	$= \frac{Ee}{Ie}$	Measured with output circuit open
R2 = Rb	$= \frac{Ee}{Ic}$	Measured with input circuit open
R3 = Rb + Rm	$= \frac{Ec}{Ie}$	Measured with output circuit open
R4 = Rc + Rb	$= \frac{Ec}{Ic}$	Measured with input circuit open

Four distinct resistances should be checked in a DC test of transistor characteristics. We will designate these as R1, R2, R3 and R4. These resistances have definite relationships to Rb, Rc, Re, and *transfer resistance* Rm. Since transistor resistance values are never measured with a bridge or ohmmeter—to do so would probably seriously damage the transistor—we *calculate* the resistance values from *measured* voltages and currents.

The table lists R1 to R4 showing the transistor resistance values to which these parameters correspond and the voltage and current characteristics which determine their values. It is important to note that either the input or output circuit is open in each of the resistance measurements.

Fig. 2 shows four circuits for measuring transistor voltages and currents for calculating the values of R1, R2, R3, and R4. Operation of each of these circuits is discussed separately in the following paragraphs.

Resistance R1. See Fig. 2a. This measurement is made with the transistor output circuit open. Starting from zero, increase the DC voltage until emitter current Ie, indicated by the DC milliammeter, corresponds to the maximum value specified by the transistor manufacturer for grounded-base operation. The high-resistance DC valve voltmeter then reads the emitter voltage Ee. The value of R1 is calculated from the emitter current (in amperes) and the emitter voltage : R1 = Ee/Ie.

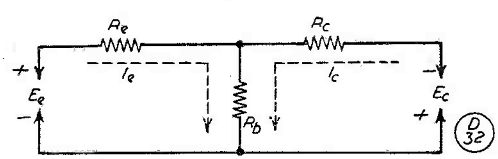


Fig. 1. The equivalent circuit of the transistor.

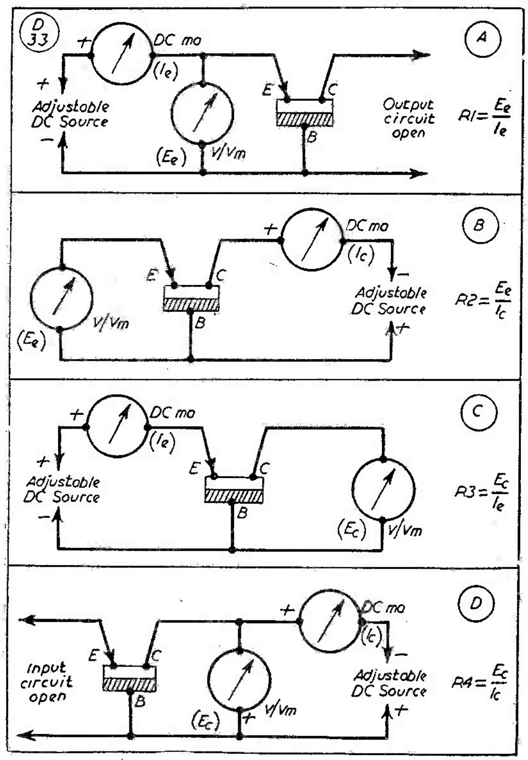


Fig. 2. Connections for the measurements discussed in the text. They enable individual transistors to be properly checked.

Resistance R2. See Fig. 2b. Standard test procedure requires that this measurement be made with the transistor input circuit open. By using a *high resistance* DC valve voltmeter to measure Ee, the equivalent of an open input circuit is obtained. For the highest resistance, it is advisable to use a meter which has no input resistors at all, if such an instrument is available.

Starting from zero, increase the voltage until Ie (indicated by the milliammeter) corresponds to the maximum value specified by the transistor manufacturer for grounded-base operation. The valve voltmeter then indicates emitter voltage Ee. The value of R2 is calculated from the equation R2 = Ee/Ic, where Ic is in amperes.

Resistance R3. See Fig. 2c. This measurement is made with the transistor output circuit open. As in measuring R2, a high-resistance DC valve voltmeter keeps the output circuit resistance high enough to simulate an open circuit while measuring collector voltage Ec.

Starting from zero, increase Ee until the milliammeter indicates an emitter current, Ie, corresponding to the maximum value specified by the manufacturer for grounded-base operation. The DC V/VM then indicates the resulting collector voltage, Ec. R3 is calculated from the emitter current (in amperes) and the collector voltage: R3 = Ec/Ie.

Resistance R4. is measured using the setup in Fig 2d. This test is made with the input circuit open. Starting from zero, increase the voltage until Ic corresponds to the maximum value specified by the manufacturer for grounded-base operation. The DC V/VM then indicates the collector voltage, Ec. R4 = Ec/Ic.

As an example of what to expect, following values are specified for the Raytheon point-contact transistor type CK716: R1 = 150 to 450 ohms, R2 = 25 to 140 ohms, R3 = 15,000 to 70,000 ohms, and R4 = 10,000 to 40,000 ohms.

Practical DC Tester

Fig. 3 shows a practical arrangement for quickly setting up the test circuits shown in Fig. 2 for transistor resistance measurements. The 4-pole, 4-position rotary selector switch switches the DC milliammeter and V/VM to the proper transistor electrodes, and shifts the polarity of the instruments and opens the input or output circuit of the transistor to correspond

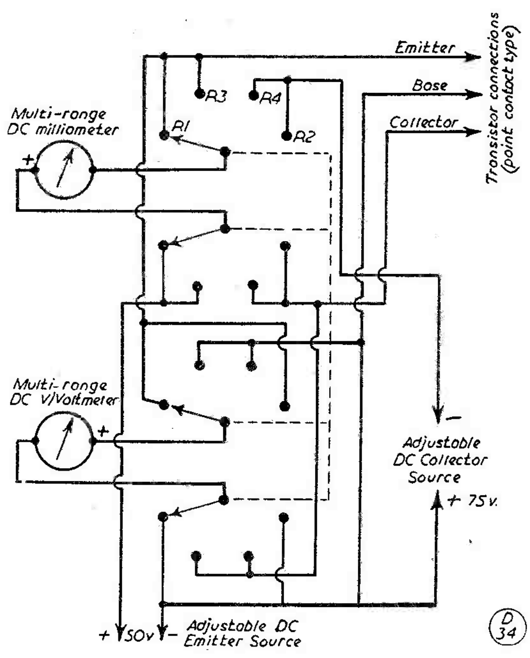


Fig. 3. A circuit derived from Fig. 2, enabling all checks to be made by switch selection. This could be built up as a standard test instrument.

with the circuits in Fig. 2. Rotating the selector switch through positions R1, R2, R3, and R4 automatically sets up the test circuits in Figs. 2a, 2b, 2c, and 2d, respectively. Meter and power-supply polarities are shown for point-contact transistors. (Reverse both meter and power supply polarities when checking N-P-N junction transistors.) The switching circuit, meters, and power supplies might be combined into a single, self-contained transistor DC tester somewhat similar in function and operation to a laboratory valve tester.

Current Amplification

The *current amplification figure*, designated by α, the Greek letter *alpha*, is an important property of the transistor. It may be determined in two ways. One way is in terms of the resistance values measured according to the instructions in the preceding paragraphs: $\alpha = R3/R4$. The other involves setting up the transistor with rated DC emitter and collector voltages for grounded-base operation, and with separate milliammeters for the simultaneous reading of emitter and collector currents. The static values of Ie and Ic are recorded. Then, without changing the collector voltage Ec, shift the emitter current a small amount (dIe) and observe the resulting shift (dIc) in collector current. Current amplification, *alpha*, may be calculated from these readings: $\alpha = dIc/dIe$.

A minimum current gain α of 1·2 is specified for the CK716 transistor.

AC Voltage Gain

In some instances, it will be important to check directly the performance of the transistor

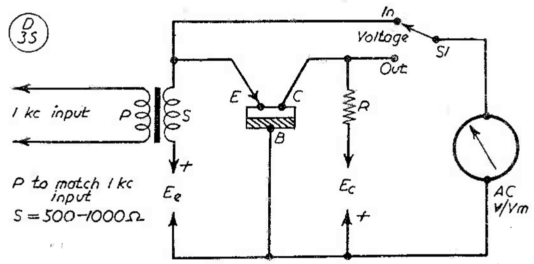


Fig. 4. The voltage amplification of a transistor can be directly checked by using the circuit shown here in the manner explained in the text.

with an AC input signal. The circuit shown in Fig. 4 may be used to measure AC voltage amplification. A test-signal frequency of 1,000 cycles is recommended. Ee and Ec are adjusted to give the emitter and collector currents respectively (in the absence of AC signal input) specified by the transistor manufacturer for grounded-base operation. Load resistance R should be not less than the specified output impedance or the measured R4 value of the transistor under test. In most instances, the AC input signal (E1) between emitter and base should not exceed 0·1 volt r.m.s.

When switch S1 is thrown to INPUT VOLTS, the AC V/VM reads the input signal voltage. When S1 is thrown to OUTPUT VOLTS, the meter reads the output signal voltage (E2). The AC voltage gain is equal to E2/E1. The voltage gain in decibels is equal to 20 log 10 E2/E1.

In the test circuit similar to the one shown in Fig. 4, the CK716 point-contact transistor gives a voltage gain of 50 at 1,000 cycles when Ee is 0·25 volt, Ec is 67½ volts, R1 is 4,000 ohms, and E1 = 0·1 volt.

Clickless Keying

WITH SCREEN CONTROL VALVE

W. SCHREUER (VK2AWU)

UNDOUBTEDLY, one of the best methods for radiating a clean, sharp and clickless CW signal is by the use of a valve keyer such as described by G6HL in "Keying Without Annoying" (*Short Wave Magazine*, February, 1953). The valve keyer, however, does suffer from the disadvantage of complexity, in as much as a separate power supply and probably several keyer valves in parallel are required. The purpose of the present article is to show how good results can be obtained by simpler means, providing certain conditions can be met. In order to avoid repetition, the reader is referred to G6HL's article for the description of the fundamental requirements for good keying characteristics.

Cathode Keying

As set out by G6HL, one of the easiest and most effective ways of keying a transmitter is at the cathode of the driver or earlier stage. Slowing up the keying action by the use of the well-known LCR filter has quite a few disadvantages, the worst being the interdependence of component values. Having set up an LCR filter for a smooth "break," subsequent adjustment for a clickless "make" will spoil the "break" performance ! Adjustment

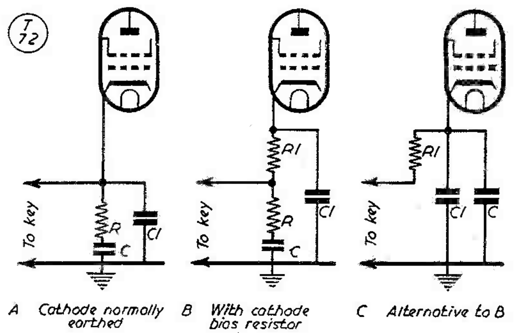


Fig. 1. Cathode keying of an early stage. Values would be: R, 100-500 ohms, ½w.; R1, usual cathode bias resistor; C, "break" delay condenser, .05-0.5 μF; C1, usual RF by-pass condenser.

for correct operation is tedious and, furthermore, very selective as to input conditions of the keyed stage. Other possible difficulties with an LCR filter include the likelihood of undesirable LF transients due to resonance effects and/or change of inductance value with keying.

The aim of the method set out below is to render the "break" and "make" circuits and adjustments *independent* of each other, at the same time avoiding the use of LF chokes.

Screen Control Valve

Briefly, the writer's method consists of the use of a tetrode, or pentode, final stage with a screen control valve and direct cathode keying of the driver stage. The "break" delay is obtained in the keyed circuit itself, by the usual capacity method, while the "make" end of a keyed character is slowed up by a RC network in the grid circuit of the control valve.

There is nothing unusual in the keyed circuit, which is shown in Fig. 1. Resistor R prevents excessive sparking at the key contacts; the lowest satisfactory value should be used. The value of the "lagging" condenser C depends mainly on the operating conditions of the keyed stage and, to some extent, on those of the subsequent stages of the transmitter. Changes of cathode current of the keyed stage of ± 35% or less are of little consequence, though condenser C may be made switchable to cater for different operating conditions of the keyed stage.

Fig. 2 shows a typical PA stage with valve control of the screen. This is also quite conventional with the exception of the RC delay network in the grid circuit of the control valve. In the absence of an RF signal at the PA grid, the control valve conducts, the PA screen voltage is of very low value, and the PA stage is, for all practical purposes, non-conducting. Arrival of RF drive at the PA grid causes a negative voltage to be developed across the grid-leak R1, which gradually (at a rate determined by the product of R and C) appears also at the grid of the control valve. The later is eventually cut-off, thereby allowing the PA screen voltage to rise to its normal operating value. It is due to this feature that the desirable *gradual* rise in signal emanating from the PA stage is obtained. The value of the product RC is dependent on the operating conditions and characteristics of the PA valve(s). It is probably easiest to fix condenser C at some standard value, such as 0·1 μF, and adjust resistor R for the required results at the "make" end of a keyed character.

Adjustment

Without doubt, the best way to adjust the keying action is with an oscilloscope. But this is not absolutely essential, as the "make" and "break" circuits are entirely independent, and good results can be obtained by listening on the station receiver, suitably muted, to the transmitter working into a dummy aerial. Final adjustments may then be made over the air with a local station—preferably on a "dead" band. The usual RF filter in the keying leads, right at the key terminals, must be used to prevent local interference being radiated by the keying leads. This type of interference, though normally harmless, would render practical adjustment impossible.

Practical Circuit

The Driver-PA arrangement used by the writer is shown in Fig. 3. The PA input is

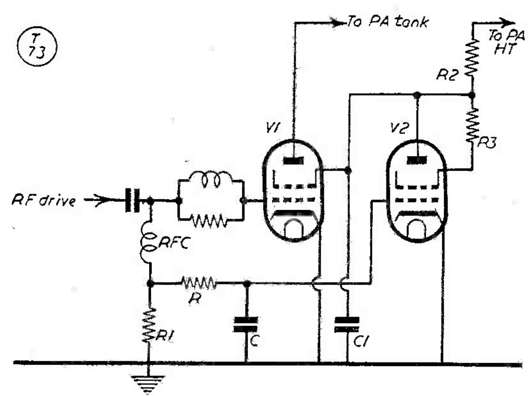


Fig. 2. Typical PA stage with screen-control valve. R is the "make" delay resistor; R1, PA grid resistor; R2, PA screen dropper; R3, 100 ohms, ½w.; C, "make" delay condenser; C1, PA screen by-pass condenser; V1, PA valve(s); V2, the control valve, which can be a 6L6, 6Y6G or similar

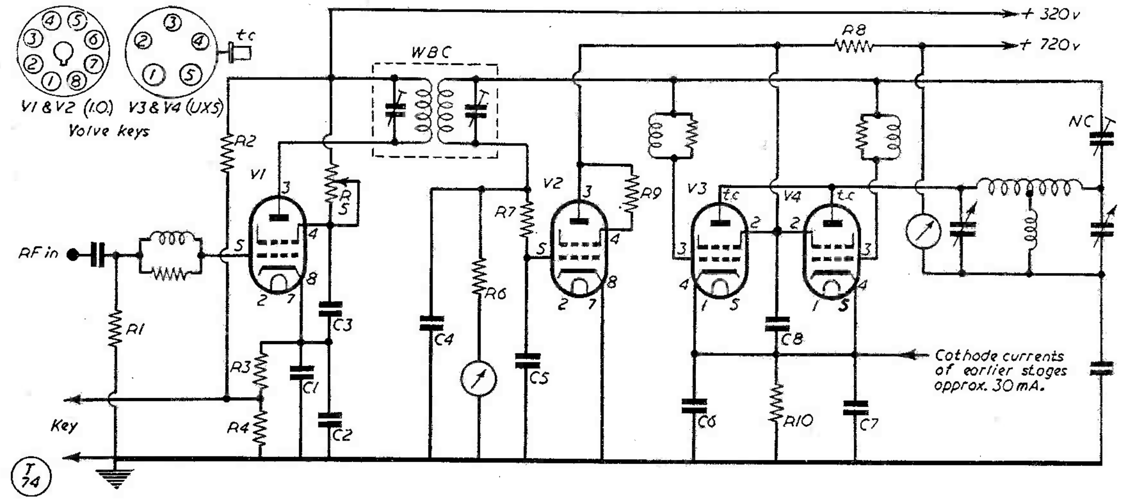


Fig. 3. Circuit of the 130-watt transmitter at VK2AWU, embodying the principles discussed in his article. The PA output can be so closely adjusted for a good keying characteristic that no thumps are audible at a nearby station tuned only a few kc off the transmission.

130 watts with good efficiency on all bands from 3·5 to 28 mc. Slowing up the delay and rise of the signal is achieved by C2 and the R7C5 combination respectively.

The 6L6 driver stage is keyed directly and the potentiometer formed by R2 and R4 prevents the cathode potential from rising to a dangerous value under key-up conditions. The screen dropping resistor R5 is variable for adjustment of PA grid current. The driver stage is coupled to the PA through a wide-band coupler. Depending on the band in use, the cathode current of the driver is between 30 and 50 mA.

The PA stage consists of a neutralized pair of 807's in parallel, with another 6L6 as the screen control valve. The 807's operate with approximately 30 v. of cathode bias by virtue of R10, and also fixed bias of a few volts is obtained by returning the cathode currents of earlier exciter stages through this resistor. This latter feature was found essential in order to eliminate the "back wave" which originally resulted on bands where the driver is operating as a straight amplifier. The total grid and anode currents of the PA stage are 6-7 mA and 160-180 mA respectively. The "key-up" anode current is only 7 mA.

The PA is suitable for normal anode-and-screen modulation. For this, R10 should be by-passed for AF by means of an 8 μF, 350 v. electrolytic condenser, also R8 must be shunted by a 0·001 μF, 1,200 v. DC working condenser in order to avoid AF phase shift at the PA screens. The anode and grid currents should be 150 and 8 mA respectively.

Table of Values

Fig. 3. 130-Watt Driver-PA arrangement at VK2AWU

C1, C3, C6, C7	= .005 μF, 500v. mica.	R4	= 330,000 ohms, ½-w.
C2	= 0.2 μF, 500v. paper.	R5	= 50,000 ohms variable. w/w.
C4	= 500 μμF, 500v. mica.	R6	= 8,000 ohms, 2w.
C5	= 0.1 μF, 500v. paper.	R7	= 220,000 ohms, ½-w.
C8	= .002 μF, 750v. mica.	R8	= 27,000 ohms, 20w.
WBC	= Wide-band coupler.	R9	= 100 ohms, ½-w.
R1	= 47,000 ohms, ½-w.	R10	= 150 ohms, 10w.
R2	= 1 megohm, ½-w.	V1, V2	= 6L6.
R3	= 500 ohms, 2w.	V3, V4	= 807.

Conclusion

The system described has been in use at the writer's station since 1950 in three different suburban locations. At one of these, the closest local (VK2AMJ) was less than 300 yards distant and no trace of key clicks could be heard at his station a few kc away from VK2AWU's CW transmission.

It must be pointed out that any trace of instability soon becomes apparent and cannot be tolerated in a system using no fixed bias. This is considered an advantage by the writer, though it is possible that others may not agree! Apart from the usual search and elimination of parasitic oscillations, the system described is very easy to get going and certainly most economical in components.

"807 MODULATOR UNIT"

In the November issue of *Short Wave Magazine*, in which this article appeared, pp.548-550, VK2AWU informs us that R15 (of 10,000 ohms as given) should be rated 2 watts, and that the driver transformer T1 could be a 1:1+1 of the type fitted in the SCR-522. The turns ratio here is not critical and any single-ended to push-pull inter-stage transformer will do.

Transmitter Output Coupling on the 70-Centimetre Band

Notes by **G4MW**

This useful article gives some valuable practical information on transmitter output coupling at VHF—it will undoubtedly help those who have been trying to run a low-impedance feeder with a resonant-line tank circuit.—Editor.

A LARGE number of amateur transmitters on the 70 cm band use a balanced final stage, either a tripler or a PA. The more usual push-pull valves are a hard-worked 832 or the QQV06/40; the luckier ones boast a a QQV03/20.

In order to achieve a manageable linear tuned circuit in the anode of such valves, it is necessary to employ a resonant line circuit of low characteristic impedance, to minimise the capacitative loading of the valve. Coupling to the aerial feeder is often difficult with such low-impedance anode lines. If it is desired to use co-axial feeder with a balance transmitter output circuit the problem is aggravated.

To overcome the coupling difficulty when balanced feeder is used, it is only necessary to incorporate another balanced quarter-wave tuned circuit, coupled to the anode circuit of the output valve, and tap on the feeder symmetrically about the earthy point. This has the further advantage, especially when the output stage is a tripler, of considerably reducing the radiation of drive frequency on the two-metre band.

Load Variation

Transmitter loading is controlled by altering the coupling between the anode circuit of the valve and the feeder matching circuit; this is achieved by altering the position of the matching circuit relative to the anode lines. The principle to be observed here is that the coupling should be predominantly at the short-circuit ends of both anode and matching lines; capacitative coupling is thus minimised and there is less interaction of tuning between the two circuits.

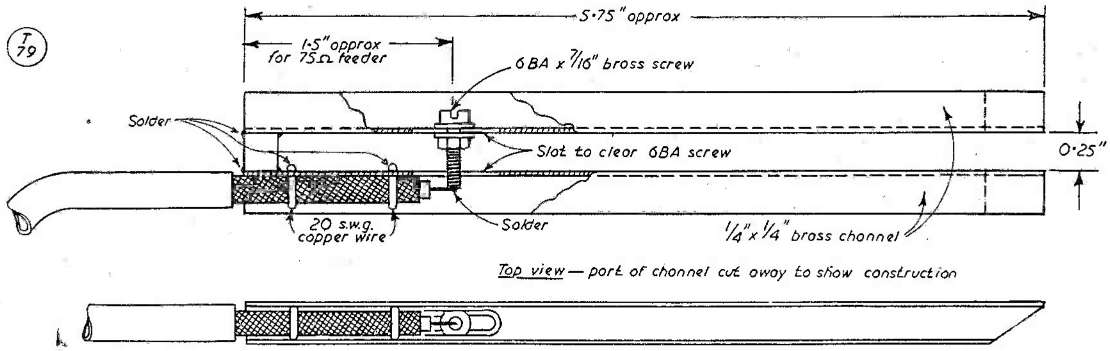
A variety of mechanical arrangements will suggest themselves to give ease of coupling adjustment. It is desirable to earth either the "cold" end of the matching circuit, or, if this makes adjustment of coupling awkward, the rotor of the split-stator tuning condenser.

The point of attachment of the feeder is not particularly critical, and is governed by the following factors: For a balanced feeder of any given impedance, say 300 ohms, the further up the line from the earthy end the feeder is connected, the closer must the matching circuit be coupled to the anode line for a given amount of loading, and the worse will be the rejection of drive frequency radiation. Good power transfer will, however, be achieved provided the feeder is not tapped so high that the line will not tune. Conversely, the lower the feeder is tapped towards the earthy end, the looser the coupling required for a given loading, and better drive-frequency rejection will be obtained. If tapped too low, however, the matching circuit will tune very sharply and there will be some loss of power output due to excessive tuned-circuit circulating current (too high Q). Practically the same considerations apply as in the case of transmitter tank-circuit design, *i.e.*, the efficiency depends on the ratios of loaded and unloaded Q's. It is an easy matter to reach a practical compromise between these two extremes.

Incidentally, the same arrangement may be used to match the transmitter into a lamp load for test purposes. It is only necessary to remove the base of the lamp, and whatever the rated voltage, to tap the lamp up or down the line for best output, retuning the line after each adjustment.

Tuning Adjustments

In tuning the matching circuit, whether connected to an aerial feeder or a lamp load, it is essential to observe the correct procedure. First tune the anode circuit to resonance with *very loose* coupling to the detuned matching circuit, observing resonance on the anode current meter. Now tune the matching circuit to resonance as indicated by a slight rise in anode current. If no rise is observed increase the coupling progressively until a small rise is obtained, when the line is accurately tuned to resonance. The coupling may now be increased until the desired loading is shown on the anode current meter. Do not be tempted to retune the anode circuit. If the minimum of capacity coupling has been achieved, there will be very little reaction of one tuned circuit on the other up to the point where over-coupling occurs. It is as well to try tuning up on a lamp load



General arrangement of the 430 mc transmitter output coupling device suggested by G4MW. These are exploded views, and the general principles are fully discussed in the text. Lower sketch is side view.

to begin with, so that the actual changes in output can easily be observed.

Using Coax Feeder

When co-axial feeder is employed the necessary balanced-to-unbalanced transformation is readily obtained by application of the Pawsey Stub principle to the matching circuit. Anyone who has tried to couple low-impedance coax feeder to a balanced 70 cm. output stage by using an untuned loop will be surprised at the ease with which it can be done using this principle.

Whereas in the case of the balanced feeder the matching circuit could be made up from copper strips or rods, for a co-axial feeder tubing should ideally be used. For ease of construction and adjustment, however, channel-section lines are much more satisfactory. The sketch herewith shows the matching circuit incorporating the Pawsey Stub principle for balance-to-unbalance transformation. The same factors influence the tapping position for the coax as for the balanced feeder.

A few inches of ¼" television-type coax is used to make connection to the matching circuit ; this allows the necessary flexibility for adjustment of coupling. Suitable ¼" × ¼" brass channel can be purchased, or alternatively it can be bent up from 18 or 20 SWG sheet. The diagram is self-explanatory ; note that the 6BA screw is locked to one leg of the quarter-wave line by means of a nut and washers, and the slot in the other leg clears this screw, which is connected to the coax inner conductor. The slots permit variation of the feeder tapping point. Two loops of copper wire are passed round the coax through holes in the line and soldered, to retain the feeder tightly inside the channel.

If space is limited, the matching circuit lines may be bent for compactness. Right-angle bends are considered undesirable, and to placate the purists a short 45° section could be interposed at the bend.

It is desirable that the "cold" end of the matching circuit should be directly earthed when coax cable is used ; the rotor of the split-stator tuning condenser may then be left floating.

The circuit performs quite well even when the quarter-wave lines are comparatively heavily loaded with capacity to keep them short. Excessive capacity will, however, increase the coupling losses and a split-stator of not more than about 10 + 10 $\mu\mu$F maximum should be used.

The same procedure should be followed in tuning up the coax matching circuit as with the balanced feeder. The feeder tapping point will be a little more critical to adjust, but with lines of about the dimensions shown there is a tolerance of at least ¼" either side of optimum.

When tuned up it will be noted that the coax outer is completely "dead." Also, quite loose coupling will be required for full loading of the transmitter however low-impedance the anode lines are.

If you've struggled in the past with a variety of hairpin loops on the end of your coax you will find this coupling arrangement very easy to adjust. And the two-metre chap down the road will be even more enthusiastic about the disappearance of that unmodulated un-keyed carrier in the middle of the band !

VHF BANDS

A. J. DEVON

Conditions Generally Poor Till Mid-November—

Much Constructional Activity—

Individual Station Reports—

Calls Heard and The Tables—

WITH barely 30 movements claimed for the Tables and the VHF Weather Report showing rather flat conditions for the period—that is, compared with some previous months—it is not surprising that there is little in the way of EDX to discuss this time.

On the other hand, the correspondence is as useful and as interesting as ever; and there can be no doubt that there are always keen VHF men on the *qui vive* to squeeze what they can out of the band.

There have been some near-Europeans workable by stations in the southern part of the country, with OZ and SM coming through for brief periods—but the EDX conditions have not been anything like the fine, sustained openings we have had so frequently during the past season. In fact, when one comes to think of it, we can look right back to before March this year to parallel the poor EDX conditions of the last month. Though as your A.J.D. is putting this piece together, we are in that mild, foggy spell about the third week of November, with the barometer high and steady—all of which, by previous experience, suggests good GDX conditions, even if not extending to EDX.

Many VHF stations are now in process of being re-equipped—with some of us, of course, this is a process that goes on *all* the time ! — but the meaning will be clear enough to those who are now giving thought to another converter, or rebuilding the PA, or getting on with the construction for 430 mc. Indeed, in the correspondence this month the emphasis is on construction, or re-construction, rather on DX worked.

Some Technical Points

G6RH (Bexley) mentions the Sylvania 6T4 as a very useful VHF valve which, in place of a 6C4, 9002 or 12AT7 in the oscillator stage of an SEO converter, will give a T9 note in comparison with the more usual T8 of the other types. At the moment, we cannot place an English equivalent for the 6T4, but even if there is not one, it will soon appear.

G3HAZ (Birmingham) has been doing some interesting things on 430 mc. The receiver is now CC, the sequence being 14.166 mc 6AC7 CO, 6J6 x 5, 6J6 x 2 push-push doubler to 425 mc, into CV102 crystal mixer in a coaxial line circuit, giving an IF of 10 mc into the S.640. The result is much easier tuning of a 70-centimetre signal, though some IF break-through has yet to be cleared on the 640. (G3HAZ says this gives him something to listen to when the 430 mc band is dead!). On the 70-cm transmitting side, G3BKQ and G3HAZ have found that by running their tripling RF stages at *zero* watts input, *i.e.*, with no HT on the plate, very good phone working is still possible, with ample output on 70 centimetres! In fact, putting the full 500v. HT on the tripler only increases the RF output by about half-a-watt or so! This is remarkable, but not quite as extraordinary as it sounds, and is an effect which has been noticed before in other similar applications, even on the LF bands. So far as G3BKQ and G3HAZ are concerned, the result they get is a really well-modulated carrier on 70 centimetres, with speech consequently louder than with HT on the tripler!

Another interesting 70-centimetre report comes from G3IRW (Hoddesdon, Herts.), who finds that he can put a signal in at G5DT (Purley) when using a 6J6 tripling to 434 mc with an input of 1.2 watts—the distance is 30 miles. Such results must, of course, be closely bound up with aerial and receiver efficiency, both well up to the mark at G5DT.

G2ATK (Shirley, Birmingham), who is very keen on portability, has built himself a portable transmitter/receiver for 144 mc, of which brief details are as follows: Tx—5763, 5763, 5763, TT15 PA, modulated by 6SN7-p/p 7C5's; Rx — 14 mc CO EF91, EF91, 12AT7, 16-18 mc IF, into an IF /AF amplifier consisting of 12SG7-12K8 - 12SK7 (465 kc) - 12SQ7-12AH7. The result is a portable station consisting of a 15-watt crystal controlled phone/CW transmitter, with a CC receiver which is a double superhet with IF tuning—and the *whole thing* is built into a metal case measuring no more than 12 ins. x 8 ins. x 6 ins. deep. The units are inter-connected, and operation is by push-to-talk. It might also be added that the G2ATK/P receiver really does work—G5BM, G6NB and G6VX have all been heard at various times while driving about Birmingham, using only a $\frac{1}{4}$-wave whip on the car. Distances? 40-70 miles.

Expeditions /P

And for those who missed GW3ENY — G2ATK adds that he hopes to be going /P in Anglesey "soon," using frequencies 144.5, 144.64 and 145.03 mc.

The report on the GW2HQ/P expeditions to Merionethshire (October 18) and Cardiganshire (October 20) came in just too late for our last—*see* Activity Report herewith. G2HQ obtained some excellent contacts, with G3FAN and G5MA as best DX worked, and G8AO/MM heard off Lowestoft. The G2HQ receiver is a CC job, using a 6AK5 triode connected into $\frac{1}{2}$-12AT7 in the RF section, with 6J6 oscillator-multi-

TWO METRES

ALL-TIME COUNTIES WORKED LIST

Starting Figure, 14
From Fixed QTH Only

Worked	Station
64	G6NB
63	G5YV
61	G3BLP (630), G3BW
60	EI2W (194)
59	G3EHY
57	G2OI (349)
56	G8SB
55	GW5MQ
54	G2HIF (200)
53	G2AJ (519), G4CI, G4SA
52	G2HDZ (398), G2NH, G3WW.
51	G3GHO, G5BM
50	G3ABA, G3FAN, G5DS (510)
49	G3IOO
48	G5BD, G5MA
47	G5WP, G6XX (210)
46	G4HT (476), G5BY, G6YU (205)
45	G2XC, G5ML (264), G6XM (356)
44	G2FJR, G3BK, G3CCH, G3HAZ (262)
43	G3BA, G3COJ, G4RO, G5DF
42	G2AHP (428), G3GSE (424)
41	G2FQP, G3DMU, G6CI (167)
40	G3CGQ, G5JU, G8KL, G8OU
39	G2IQ, G3GBO (434), G3VM, G8DA, G8IL (325)
38	G2FCL (234), G3APY, G3HBW
37	G2DDD, G2FNW, G2FZU (180), G3BNC, G6TA (277)
36	G2HOP, G3CXD, G6CB (312), G8IP
35	G3FZL, G3HCU (224), G3HWJ
34	G3BKQ, G3WS (153), G8IC
32	G2FVD, G5MR (180), G8VR, G8QY
31	G3HXO, G5RP
30	G2DVD, G3GOP (208), G3FRY G5NF, GW8UH
29	G3AGS, G3AKU, G3BJQ, G3FIJ (194)
28	G8DL, GM3BDA
27	G3DAH, G3DO, G3FIH, G3ISA (160), G6GR
26	G3AEP, G3CFR (125), G3SM (211), G4MR (189), G8VN
25	G5SK
24	G2CZS, G3FD, G3FXG, G3FXR, GM3EGW
23	G3CWW (260), G3DLU, G3IUD, G4LX, G5PY, G6PJ, GM3DIQ
22	G3AGR (135), G3ASG (150), G3BPM, G3FYY, G3HIL
21	G2AOL (110), G3IWJ, G6XY
20	G3EYV, G3IRA, G3YH
19	G3FEX (118), G3GCX, G5LQ (176)
17	G3JMA
16	G3FRE, G3HSD, GC2CNC
15	G3IWA
14	G2DHV, G3GYY

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

TWO-METRE ACTIVITY REPORT

(Lists of stations heard and worked are particularly requested for this section, set out in the form shown below.)

G3WW, Wimblington, Cambs.

WORKED: F8GH, 8XT, G2BMZ, 2COP, 2DVD, 2FQP, 2HOP, 2UJ, 3AEX, 3BNC, 3CCP, 3CGQ, 3DIV, 3EGV, 3FAN, 3FIJ, 3FSD/P, 3FYY, 3GAV, 3GGJ, 3GHI, 3IIT, 3IRA, 3ISA, 3JFR, 3JHM, 4FB, 4SA, 5DS, 5GX, 5IG, 5NF, 5TP, 6CH, 6NB, 6RH, 6XH, 8DM, 8OU.

HEARD: G2AHP, 2AVR, 2FJR, 2XV, 3BKQ, 3EEL, 3GJZ, 4HT, 4MW, 5MA, 5MR, 5YV, 6AG. (*November* 11-16 *incl.*).

G2HOP, Nr. Stamford, Northants.

WORKED: EI2W, 2ACV, 2COP, 2CVD, 2DCI, 2FJR, 2FNW, 2FQP, 2FWW, 2YB, 3CLG, 3EPW, 3FAN, 3GVL, 3GZM, 3HAZ, 3HTY, 3IIT, 3IOO, 3WW, 4SA, 5GX, 5MA/P, 6CI, 6NB, 6WF, 8SC, GW2ADZ, 2HQ/P, 3ENY, PAØFB. (*October* 9 *to November* 13).

G2FJR, Sutton Bridge, Lincs.

WORKED: G2ACV, 2BVW, 2CVD, 2CZS, 2DJM, 2FTS, 3CGQ, 3DOV, 3FXR, 3GGJ, 3GJZ, 3GVF, 3HBW, 3IIT, 4AU, 4OT, 4SA, 5DS, 5IG, 5JO, 5MA/P, 5UD, 5YK, 5YV, 6AG, 6RH, 6UJ, 6WF, 6YU, 8DL, 8OU, 8SC, 8VN, 8VZ, GW2HQ/P, 3ENY, PAØFB, ØPAX.

HEARD: G2FXK, 3JFR, PE1PL. (*October* 11 *to November* 12).

G3JHM, Worthing, Sussex. NGR 51/125047.

WORKED: F8GH, G2DSP, 2DTO, 2DVD, 2JU, 2NM, 2UN, 3BNC, 3FRG, 3GVC, 3HCU, 3HWF, 3HWJ, 5MA, 5NF, 5TZ/A, 5US, 6AG, 8DL.

HEARD: F3JN, G2BMZ, 2DDD, 3FAN, 3GOP, 3WW, 4SA, 5DS, 6RH. (*October* 24 *to November* 15).

G4OU, Sheerness, Kent. NGR 917737.

WORKED: G2BYF, 2CBA, 4OT, 6CH, 6NU, 8AO/MM.

HEARD: F3LQ, G2CZS, 2FJA/A, 2JF, 3ANB, 5DS, 6NB, 6RH.

G8VN, Rugby, Warks.

WORKED: G2BVW, 2COP, 2FJR, 3ABA, 3BA/A, 3BKQ, 3CHY, 3CKQ, 3DHE, 3DIV, 3DO, 3FUW, 3GHO, 3GVL, 3HAZ, 3HZF, 3HZG, 5JU, 5ML, 6AG, 6RH, 6XX, GW2ADZ.

HEARD: G2ABD, 2ACV, 2AHP, 2AIW, 2AK, 2DVD, 2FNW, 2OI, 2XV, 3CGQ, 3CUZ, 3EHY, 3EPW, 3GHI, 3GHU, 3GWB, 3GZM, 3IRA, 3NL, 4SA, 5MA, 5RZ, 5YV, 6CI, 6NB, 8OU, 8SC, GW2HQ/P. (*October* 18 *to November* 15).

EI2W, Dublin, Eire.

WORKED: EI2A, G2ATK, 3CUZ, 3EPW, 3IOO, 3FRY, 4SA, 5BD, 5BM, 5VN/A, 5YV, 6MI, 6NB, 6WF, 6XX, 8KL, GI3FZQ, 5AJ, GM3DIQ, 6WL, GW2HQ/P, (*October* 15-19).

G3DO, Sutton Coldfield, Warks.

WORKED: G2AJ, 2AK, 2ATK, 2COP, 2DDD, 2DVD, 2FXK, 2NV, 2YB, 3BA/A, 3BKQ, 3BNC, 3CUZ, 3DLU, 3EGV, 3FAN, 3GHI, 3GOP, 3GWL, 3HAZ, 3HTY, 3HZG, 3IER, 3IOB, 3IOO, 3JFR, 4CR, 4MW, 4SA, 5BM, 5MA, 5ML, 5RZ, 6AG, 6AS, 6CI, 6NB, 6RH, 6WF, 6XA, 6XY, 6YU, 8OU, 8QY, 8SC, 8VN, GW2ADZ (*October* 18 *to November* 11).

G3FXR, Northfield, Birmingham.

WORKED: G2ACV, 2ATK/P, 2CVD, 2DCI, 2FJR, 3BKQ, 3CUV, 3EPW, 3HAZ, 3IOO, 3MY/P, 5BB, 5UD, 5YV, 8SC.

HEARD: EI2W, G2HCG, 2XV, 3WW, 4SA 6CI, 6NB, 6XX, 6YU.

G6RH, Bexley, Kent.

WORKED: DL3NQ, 6EP, F3JN, 3LQ, 8GH, 8MX, 9CQ, ON4BZ, 4HN, 4IE, 4YB, OZ2FR, PAØFB, ØFC, PE1PL.

HEARD: DL6SV, 9LT, ON4DN, 4HC, 4UV, SM6ANR.

G2DVD, Slinfold, Sussex.

WORKED: G2DD, 2DDD, 2DSP, 3BNC, 3FAN, 3GHI, 3GOP, 3HCU, 4AU, 5DS, 5LK, 5RZ, 5TZ/A. (*October* 12 to *November* 9).

G3FYY, London, N.W.2.

WORKED: G2ABD, 2BPC, 2DUV, 2HDZ, 2MQ, 2RD, 3CGQ, 3CWW, 3FIH, 3FQS, 3IOO, 3ISA, 3SM, 5BC, 5UM, 8HY, 8SC. (*October* 8 *to November* 10).

GW2HQ/P, Merioneth.

WORKED: EI2W, G2OI, 3IOO, 6XX.

HEARD: G3AUD/P, 4SA. (*October* 18).

GW2HQ/P, Cardiganshire.

WORKED: G2FJR, 2FZU, 2HCZ, 2HIF, 2XV, 2YB, 3BKQ, 3BNC, 3DLU, 3FAN, 3GHI, 3GHO, 3GOP, 3GZM, 3HZF, 3IOO, 4SA, 5BM, 5LJ, 5MA, 5YV, 6NB, 6XA, 6XX, 8DL, GW2ADZ. (*October* 20).

70-Centimetre Band Only

G3IRW, Hoddesdon, Herts.

WORKED: G2RD, 3FP, 3JMA, 5DT, 5VY, 6NF.
HEARD: G2WJ, 3FKZ. (*During November* 1-11).

plier, ½-12AT7 mixer, into 6AM6 1st IF, 9003 2nd IF and regenerative detector, with a 12AT7 as a two-step audio amplifier (which is an unusual application for the 12AT7, but entirely practicable, especially for portable equipment). G2HQ's transmitter for /P operation is CO 6AK5-6J6 tripler-12AT7 tripler to 144 mc-832 PA, clamp modulated by a single 6SH7 using a 6Y6 and carbon microphone. CW input is 25 watts and on phone about 15 watts, and the whole outfit is topped off with a portable 4-element beam. On October 20, his signal was so good and strong in the Isle of Wight that G3FAN was able to play him back.

The Station Reports

G2HOP (Wothorpe, Northants.) has not been on very much, due to a holiday tour abroad and then rebuilding activities (all his HF band gear was destroyed by lightning in early September!)—but he turns in a useful report just the same. The transmitter now takes 120 watts, and the beam is a 5-over-5 balun matched, 300-ohm to 80-ohm, which loads easily and shows a better standing-wave ratio than the previous arrangement. While abroad, G2HOP visited ON4BZ and PAØFP, and was overwhelmed by their hospitality "for VHF's sake," as Guy put it.

G3DO (Sutton Coldfield) brings his scores up-to-date, having had a spell of regular activity, and enters Annual Counties. G3WW (Wimblington, Cambs.) who continues to feature in nearly all the calls h/w lists and from whom we are pleased to hear again, is down to a 5-ele Yagi at 45 ft. after a series of misfortunes in the autumn gales; moreover, this temporary beam can only be swung (from the shack) over the S-WNW arc. During the period, five stations new to him were worked from G3WW.

GW2ADZ (Llanymynech) notes a claim for the GW/HB "First," duly entered, and G3DLU (Compton Bassett) has been rebuilding on the transmitter side—he now has 75 watts in an 829B with "plenty of RF going up the ladder." G3GHO (Roade, Northants.), too busy to be on the air much during the period, found conditions "vile" when he was on—nevertheless, he moves in the Tables. Another to make progress is G2FJR (Sutton, Bridge, Lincs.), who has pushed his hitherto near sea-level beam up to 30 feet, with which he hopes not only to hear 'em but also to work 'em, and to move towards the "top of the class"! G2FJR would like a schedule with anyone wanting just to exchange reports at 1245-1300 any day—QTHR.

G3JHM (Worthing, Sussex) received his ticket on October 24, and was ready for it on 144.97 mc; by mid-November he had worked 19S in 6C; he keeps a Monday - Wednesday - Saturday schedule at 2145 with G3HWF, over a blind path of 85 miles. As an SWL on VHF for 2½ years, G3JHM scored 257S in 36C and 8 countries, so he knows the ropes and now looks forward to working many of the stations he has been listening to for so long.

TWO METRES

COUNTRIES WORKED

Starting Figure, 8

15	G4MW (DL, EI, F, G, GC, GD, GI, GM, GW, HB, LA, ON, OZ, PA, SM). G6NB (DL, EI, F, G, GC, GD, GI, GM, GW, HB, LA, ON, OZ, PA, SM).
14	G3GHO, G5YV.
13	G3BLP, G3CCH, G6XX
12	G2HIF, G3WW, G5BD, G6LI, G6RH, ON4BZ.
11	G2AJ, G2HDZ, G2XV, G3ABA, G3IOO, G5UD.
10	EI2W, G2FQP, G3BK, G3EHY, G3GHI, G3HAZ, G4RO, G4SA, G5DS, G5MA, G8IC, GW5MQ.
9	G2AHP, G3BNC, G3FAN, G3FIJ, G6XM.
8	G2XC, G3GBO, G3GSE, G3HCU, G3VM, G3WS, G5BM, G5BY, G5ML, G5MR, G8SB.

G8VN (Rugby) has kept active, but found conditions generally poor, with not many stations on in the Midlands area; from November 15, however, things were beginning to liven up again. All G8VN's work on two metres is still with his indoor 4-ele Yagi and a transmitter power of 18 watts. This makes his calls h/w lists—*see* Activity Report—look very good. Another station now on in Rugby is G3CKQ, who at the moment is QRP.

At G6RH (Bexley, Kent) the aerial arrangements have been considerably improved—from a 4-over-4 at 35 feet, he has gone to a 4-times-4 at 50 feet; only those with experience of building multi-element beams, and putting them up high, know what this involves in construction, matching and general mechanical know-how. As is to be expected, this beam—with its lower vertical angle—is showing great promise, and comparative tests are being run with G6AG, who has a 16-element stack. Incidentally, G6RH is the only operator this month to show any success with the EDX—*see* Activity Report.

G5MR (Hythe, Kent) has had little time for it recently, but was beginning to find the Europeans coming in again just as he sent off his report. G3IOO (Oswestry) was glad to work GW8UH (Cardiff)—at last!—for a new one, this being by courtesy of G8OU; other interesting contacts for him were EI2W and GW3ENY. On 70 cm, G3IOO is rebuilding his converter to the G3BKQ pattern. At G4OU (Sheerness, Kent) activity has been reduced, due to constructional work, though a few new ones have been raised. G4SA (Drayton, Berks.) remarks that "conditions during the period were good at times, but activity has been low." G2FCL (Shipley, Yorks.) puts in his latest scores, and G2HIF (Wantage, Berks.) assures us he has not abandoned VHF—it is only that he has had to soft-pedal just lately owing to pressure of work.

TWO METRES

COUNTIES WORKED SINCE SEPTEMBER 1, 1953

Starting Figure, 14

Worked	Station
43	G5YV
42	G4SA
41	G3GHO
37	G3IOO
34	G5MA
32	G2AHP, G5DS
30	G2FJR
29	G3EPW
27	G2DDD, G6XX
26	G2DVD, G2FCL
21	G3WS, G4RO
20	G3CUZ
19	G2CZS, G5ML, G6TA
18	G3FYY, G5BM
17	G5MR
16	G2HDZ, G3DO
15	G2AOL, G8VN
14	G3FIJ, G3JFR

Note: This Annual Counties Worked Table opened on September 1st, 1953 and will run for the twelve months to August 31, 1954. All operators who work 14 or more Counties on Two Metres are eligible for entry in the Table. The first list sent should give stations worked for the counties claimed; thereafter, additions claimed need show only stations worked for each county as they accrue. QSL cards are not required for entry in this table.

G6ZP (Malvern, Worcs.) is fully operational on 70 centimetres, and in fact is now on that band exclusively; he and G3JGY, also Malvern, are testing on 430 mc almost every evening. G6AG would probably be interested to know that he was heard by G6ZP on 70 cm at 2100 on September 29.

G3HAZ (Northfield, Birmingham), in addition to his other 430 mc constructional work, is building a 24-element beam for that band, which is going to be tuned right on the nose before being hoisted to its operational height—great things are expected. We certainly hope to hear of contacts with the Malvern stations. G3FXR, also of Northfield, B'ham, has a new 40-ft. mast up for his gamma-matched 4-ele Yagi on two metres, and is building for 70 centimetres, with a G2DD converter and an 832 tripler. Incidentally, Cardiff being home-town to G3FXR, he would very much like to work GW8UH on two metres—well, it ought to be possible, if Alan wound his beam round to the north-east, though it is true that the local screening is pretty effective in all northerly directions from Cardiff.

G2DVD (Slinfold, Sussex) remarks "lack of activity," and G3IRW (Hoddesdon, Herts.) reports for the first time on his 70 cm operations. G3FYY (London, N.W.2), an all-band man, has finally decided to go on the HF bands for the winter, as he prefers *operating* to any other form of amateur activity; so he writes us to keep his pegs in on the ladders, and will be seeing us again in due course.

A new station to report, and another very new one on the air, is G3JFR (Basingstoke, Hants.), who received his licence on September 26, and since then has worked 14 counties; so he takes his place in Annual Counties, and we shall hope to notice steady progress up the ladder as time goes on. G3GBO (Denham, Bucks.) does most of his operating during TV hours, and notches up several new ones—he also moves in the Tables. G4CG, who radiates in S.W. London, and also /A from Port Talbot in South Wales, now has a CC receiver for 430 mc, using those very nice coaxial tuners out of an ARN-89 glide-path receiver; he has also modified the RF stage from an ASB8, for optional use, and the tunable IF on the HRO is 24-30 mc.

Notes from Ireland

EI2W (Dublin, Eire) has been right off the air since October 20 for a complete rebuild, which he intends to get completed in good time, ready for any "surprise openings" like we had in March this year. The 16-element stack will be put up to 40 feet, possibly with another 16 elements added—this should be a formidable affair for two metres!

The long absence of GI3GQB from the two-metre air has been due to illness—but he is now well on the way to complete recovery, so should be heard again shortly.

Crax out of Context

" . . . . I visited G3IOO in early

SEVENTY-CENTIMETRE STATIONS — Eighth List

CALL	LOCATION	FREQ. (mc)	EQUIPMENT
DL3FM	Mulheim-Ruhr	434.2	Tripler, 32-ele stack, SEO Rx
EI2W	Dublin	432.54	Tripler, 16-ele stack, (? Rx)
G2BFT	Solihull	433.17	Tripler, 16-ele stack, (? Rx)
G2BVW	Leicester	432.60	Straight PA, 5-ele Yagi, Special Rx
G2CNT	Cambridge Airport	435.2	Tripler, CC Rx, 12-ele stack
G2DDD	Littlehampton	435.6	Tripler, 16-ele stack, CC Rx
G2DHV	Lewisham	434.97	Tripler, CC Rx, 16-ele stack
G2FCL	Shipley, Yorks.	433.134	Tripler 15E, G2DD C'vrtr., 6-ele Yagi
G2FKZ	London	435.95	*no details*
G2FNW	Melton Mowbray	?	Tripler, 5-ele Yagi (? Rx)
G2HCG	Northampton	434.00	*no details*
G2HDZ	Pinner, Middx.	435.17	Straight PA, SEO Rx, 20-ele stack
G2MV	Kenley, Surrey	435.22	*no details*
G2RD	Wallington, Surrey	435.57	*no details*
G2WJ	Great Canfield, Essex	436.00	Straight PA, CC Rx, 16-ele stack
G2XV	Cambridge	435.10	Tripler, CC Rx, 12-ele stack
G3ABA	Coventry	?	Tripler, 16-ele stack (? Rx)
G3AOO	Denton, M'cr.	433.13	Tripler, 4/4/4, CC Rx
G3AYT	Hyde, Ches.	433.13	Tripler, City Slicker, CC Rx
G3BKQ	Blaby, Leics.	434.05	Tripler, 48-ele stack, CC Rx
G3CGQ	Luton, Beds.	434.10	*no details*
G3DA	Liverpool	432.6	Tripler, 6-ele Yagi, CC Rx
G3EOH	Enfield, Middx.	436.03	Tripler, G2DD C'vtr., 12-ele stack
G3EUP	Swindon, Wilts.	433.9	Tripler, 3 stk'd dipoles, CC Rx
G3FAN	Isle of Wight	435.80	*no details*
G3FFC	Leicester	?	Tripler, 16-ele stack (? Rx)
G3FIJ	Colchester	435.18	Tripler, SEO Rx, 5-ele Yagi
G3FP	Sidcup, Kent	436.04	*no details*
G3FZL	Dulwich, S.E.22	435.24	Doubler, CC Rx, 12-ele stack
G3GDR	Watford, Herts.	435.39	*no details*
G3GOP	Southampton	435.00	*no details*
G3GZM	Tenbury Wells, Worcs.	?	Tripler, 16-ele stack (? Rx)
G3HAZ	Northfield, Birmingham	433.59	Tripler, CC Rx, 4/4 Yagi
G3HBW	Wembley, Middx.	434.61	Tripler, 12-ele stack, CC Rx
G3HHY	Solihull, Warks.	433.93	Straight PA, 21-valve Rx, 4-ele Yagi
G3HTY	Kidderminster, Worcs.	?	Tripler (? beam array and Rx)
G3IAI	Northampton	433.80	*no details*
G3ILI	London, S.E.22	434.97	Tripler, 6-turn Helix, R.1294 mod.
G3IOO	Oswestry, Salop.	432.54	Tripler, 16-ele stack, SEO Rx
G3IOR	Hellesdon, Norwich	?	Tripler, SEO Rx, 4-ele Yagi
G3IRA	Swindon, Wilts.	436.05	Tripler, SEO Rx, 8 d'ples stk'd
G3IRW	Hoddesdon, Herts.	434.3	Tripler, SEO Rx, 16-ele stack
G3IUD	Wilmslow, Ches.	432.41	Tripler, CC C'vrtr., 6-ele Yagi
G3JGY	Malvern, Worcs.	436.00	Tripler, SEO Rx, 12-ele stack
G4AP	Swindon, Wilts.	436.50	Tripler, CC Rx, 3 stk'd D'ples
G4CG	Wimbledon, London.	435.07	CV53 PA, CC Rx, 9-ele yagi
G4OT	Maldon, Essex	435.240	Tripler, G2DD C'vrtr., 4/4 Yagi
G4OU	Sheerness, Kent	432.414	Tripler, Superhet, 3-ele Yagi
G4RO	St. Albans, Herts.	434.16	Tripler, 16-ele stack, CC Rx
G5CD	Hendon	435.66	*no details*
G5DS	Surbiton, Surrey	435.61	Tripler, G2DD C'vrtr., 16-ele stack
G5DT	Purley, Surrey	436.02	*no details*
G5YV	Leeds	432.72	Tripler, 8-ele stack, G2DD C'vtr.
G6CW	Nottingham	?	*no details*
G6NF	Shirley, Surrey	435.47	Straight PA, 5-ele Yagi, SEO Rx, ASB8 cavities
G6RH	Bexley, Kent	434.7	Tripler, 16-ele stack, ASB8 C'vtr.
G6YP	London, S.E.5	435.75	*no details*
G6YU	Coventry	434.10	Tripler .CC Rx, 16-ele stack
G6ZP	Malvern, Worcs.	435.78	Tripler, SEO Rx, Corner reflector
G8QY	Birmingham	?	Tripler, 24-ele stack (? Rx)
G8SK	Enfield, Middx.	433.15	Tripler, G2DD C'vtr., 8 ½-waves stk'd
G8VR	London, S.E.22	435.0	Tripler, SEO Rx, 12-ele stack
GM6WL	Glasgow, W.1.	?	P/P CV53 PA, CC Rx, 20-ele stack
GW2ADZ	Llanymynech, Mont.	432.84	Doubler SEO Rx, 32-ele stack
GW5MQ	Mold, Flints.	432.58	Tripler, 3-ele Yagi (? Rx)
ON4UV	Fayt-lez-Mange, Nr. Charleroi	434.7	Straight PA, CC Rx, 32-ele beam

This list is incomplete as regards some stations known to be equipped for the 70-centimetre band. All 430 mc operators are asked to forward details for inclusion in this Table, under the headings given.

November and there listened to stations I had not known to exist outside the calls-heard lists" (G3FXR). . . . "I would like to see a review of all the latest VHF circuits; in fact, I'd like to see a separate magazine devoted wholly to VHF" (G6ZP). . . . "The two-metre operators who had a QSO with HB1IV will be very disappointed if no confirmation is forthcoming by way of a QSL" (G4SA). . . . "It seems that some people will not come on VHF because one cannot work China straight away. I am convinced that most of the fellows now on VHF are genuinely interested in amateur experimental work, and do not seek to plaster their walls with QSL cards, as we did in days gone by" (G4OU). . . . "The only TVI trouble I have is on the XYL's receiver; I am putting in a 6 mc crystal to dodge it" (G2FJR). . . . "The police in The Hague thought I was a spy when I tried to locate PE1PL for my visit" (G2HOP). . . . "As regards activity, I can say that every time I have come on wanting a test, there has been somebody there to give me a report" (G3DLU). . . . "What about a medal for Bob's XYL, who goes with him on his /P trips" (G3GBO).

TWO-METRE FIRSTS

G/DL	G3DIV/A-DL4XS/3KE	5/6/50
G/EI	G8SB-EI8G	23/4/51
G/F	G6DH-F8OL	10/11/48
G/GC	G8IL-GC2CNC	24/5/51
G/GD	G3GMX-GD3DA/P	29/7/51
G/GM	G3BW-GM3OL	13/2/49
G/GW	G5MQ-GW5UO	22/10/48
G/HB	G6OU-HB1IV	12/9/53
G/LA	G6NB-LA8RB	29/6/53
G/ON	G6DH-ON4FG	25/9/48
G/OZ	G3WW-OZ2FR	1/6/51
G/PA	G6DH-PAØPN	14/9/48
G/SM	G5YV-SM7BE	1/6/51
GC/DL	GC3EBK-DL3VJ/P	22/3/53
GC/EI	GC2CNC-EI2W	8/10/51
GC/ON	GC3EBK-ON4BZ	4/3/53
GC/OZ	GC3EBK-OZ2FR	2/3/53
GD/EI	GD3DA/P-EI2W	30/7/51
GD/GM	GD3DA/P-GM3DAP	29/7/51
GD/GW	GD3DA/P-GW5MQ	28/7/51
GI/EI	GI3GQB-EI2W	13/6/51
GI/GD	GI2FHN-GD3DA/P	29/7/51
GI/GM	GI2FHN-GM3OL	1/7/49
GI/GW	GI2FHN-GW3ELM	8/7/49
GM/EI	GM3BDA-EI2W	12/6/51
GW/DL	GW5MQ-DL4XS	22/9/51
GW/EI	GW2ADZ-EI8G	19/4/51
GW/F	GW2ADZ-F3LQ	14/5/50
GW/HB	GW2ADZ-HB1IV	14/9/53
GW/ON	GW2ADZ-ON4YV	13/5/50
GW/PA	GW2ADZ-PAØHA	13/5/50
GW/SM	GW2ADZ-SM6QP	1/7/53
DL/OZ	DL6SW-OZ2FR	4/3/51
DL/SM	DL2DV-SM7BE	10/3/51
EI/DL	EI2W-DL3VJ/P	29/8/52
EI/ON	EI2W-ON4BZ	21/9/51
EI/PA	EI2W-PAØFC	10/10/53
ON/OZ	ON4BZ-OZ2FR	3/6/51
ON/SM	ON4BZ-SM7BE	2/3/53

Certificate Awards

VHF Century Club Certificate No. 155 goes to G2DVD, Slinfold, Sussex, he having complied with the rulings. And to G5MA, of Ashtead, Surrey, goes the Certificate for 40 counties worked and confirmed in the year to August 31, 1953. Some more VHFCC claims are in hand as this is going to press, and will be noticed in this space in our next issue. Conditions for the award of the VHFCC were given in November "VHF Bands."

As your A.J.D. taps these lines, reports are coming in of another improvement in conditions, so it will be very interesting to see what has been happening—next year!

Briefly Retrospective

So much seems to have happened in 1953, and in the field of VHF in particular it has been a year of solid achievement and great progress. Your A.J.D. would suggest that this can be measured by the large increase in 430 mc activity — and the astonishing results obtained on that band—and by our much clearer understanding of the mechanism of VHF propagation. As the result of G3EGB's outstanding contribution on this subject, it is now possible for the British VHF operator to see each month exactly how his EDX and GDX results were obtained on both bands. There is now light, where we were groping in the dark, and, what is more, it is light on a matter of fundamental importance in the realm of VHF communication, not only amateur, but professional as well.

Season's Greetings

It is once again A.J.D.'s pleasure to offer good wishes for a Happy Christmas and a Prosperous New Year to all who follow this piece—adding, as he has often done before, his sincere thanks to those who, by sending in their reports in such great volume every month, have made it possible for him to present "VHF Bands" as the mirror of progress and achievement. Long may this happy relationship continue.

Our next will be dated January, 1954—and for this the latest date must be **Monday, December 14.** Send all your VHF news, views, ideas, complaints, criticisms and suggestions to: A. J. Devon, "VHF Bands," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. CU in the New Year, on January 8, all being well.

BRITISH ISLES
TWO-METRE ZONE PLAN

(This is reproduced here for the benefit of newcomers to the band).

Zone A & B: 144.0 to 144.2 mc.	All Scotland.
Zone C: 144.2 to 144.4 m.c.	All England from Lancs. Yorks., northward.
Zone D: 145.8 to 146 mc.	All Ireland.
Zone E: 144.4 to 144.65 mc.	Cheshire, Derby, Notts., Lincs., Rutland, Leics., Warwick and Staffs.
Zone F: 145.65 to 145.8 mc.	Flint, Denbigh, Shrops., Worcs., Hereford, Monmouth and West.
Zone G: 144.65 to 144.85 mc.	Northants., Bucks., Herts., Beds., Hunts., Cambs., Norfolk, Suffolk.
Zone H: 145.25 to 145.5 mc.	Dorset, Wilts., Glos., Oxon., Berks. and Hants
Zone I: 145.5 to 145.65 mc.	Cornwall, Devon, Somerset.
Zone J: 144.85 to 145.25 mc.	London, Essex, Middlesex, Surrey, Kent, Sussex.

BRITISH ISLES
SEVENTY-CENTIMETRE
ZONE PLAN

FULL BAND, 420-460 MC

Area (mc)	*Service*
420-425	SEO Transmission (MCW and Phone).
425-432	Amateur Television.
432-438	CC Communication Band, Station Frequencies tripled from Two-Metre Zone.
438-445	Amateur Television.
445-455	Future Amateur Development.
455-460	SEO Transmission (MCW and Phone).

VHF WEATHER REPORT

PERIOD OCTOBER 15 TO NOVEMBER 11

A. H. HOOPER (G3EGB)

TWO short spells early in the period, then very poor conditions, and finally an eight-day spell with interruptions.

For the first week of this report a belt of high pressure extended over us from the Azores to Scandinavia with an erratic influence at VHF. Then followed, on October 23, a period of unsettled weather, with a long spell of poor conditions lasting until November 4, when an anticyclone travelled eastwards over our southern districts and France, reaching eastern Europe during November 8. For the last few days a high pressure belt lay across France into Germany, yielding good conditions interrupted on alternate evenings by cyclonic weather.

Interpretation

For EDX we need the help of radio-refractive index discontinuities aloft which can scatter a proportion of low angle radiation back again towards the ground at distances far beyond the horizon. The presence of these (MRI) discontinuities over East Anglia has been ascertained from the results or radio-soundings reported in *The Daily Aerological Record* of the Meteorological Office, London. Fig. 1 shows the levels at which discontinuities were found. In addition to isolated discontinuities, there can be seen a layer sinking earthwards during October 16 and then fading away, while for October 21/22 another layer, after settling to 5000 feet, reversed its movement and rose to over 7000 feet before disappearing. The subsequent blank spell was not really broken until November 4. Thereafter fluctuating layers appeared, which suffered frequent interruptions.

U.K. Coverage

In an attempt to find out whether the "reflecting" layers of Fig. 1 were extensive, radio-soundings over other areas of the British Isles have been examined. The period started with a gradual build-up of conditions, the first two evenings being good for the SE, Midlands and GM; the next two evenings good for western districts, Lancs. and GI, and then culminating in a layer at about 2000 feet over all areas on October 19. This represented peak conditions, as the anticyclone continued its eastward drift, and by the following evening the layer had disappeared from over all but East Anglia. Then followed a poor spell, with only small isolated layers aloft from time to time. Conditions began to pick up for all southern regions and the Midlands on November 4, for the South-west, West and North-west on the following evening, and then by means of a layer at 4000-5000 feet over all areas except GM and GI on November 6. After bad weather all day on the 7th, another layer spread from the West over our Southern and Midlands districts in time for the night owls and early risers. This was short-lived, however, with the rapid return of bad weather, but it appears possible in the evening (November 8) for stations south of 52°N to have linked up with excellent conditions on the Continent. On November 10 and 11 the marked MRI layer still extended from F into OE and was at about 5000 feet over Sussex. In that there was nothing aloft over Lancashire, there will have been a boundary zone, with lucky stations to the south and unlucky stations to the north. It would be very interesting to be able to establish the position of this zone from reports.

At the foot of Fig. 1 is given a graph of mean sea level barometric pressure in Bedfordshire, for those who are interested in the correlation of this quantity with VHF propagation. Equivalent values for the millibar scale are given in inches of mercury.

Table I is derived in part from the charts in *The Daily Weather Report* of the Meteorological Office. All entries are for the evenings of the dates quoted. The first line shows the type of pressure system affecting Home Counties.

In addition to the tremendous improvement occasionally yielded by layers aloft, enhanced propagation—over inland paths—can be expected on evenings of radiation cooling in the surface layers of the atmosphere. The effect is less spectacular for we islanders, when considered in terms of country prefixes, but quite worthwhile. The second line of Table I shows the time for evenings of radiation in Bedfordshire when saturation lifted the super-refracting layer off the ground. Where the times are after midnight they are still entered under the pre-midnight date. The surprisingly poor showing during the first anticyclonic spell arose from the cloud cover drifting over from the North Sea. Further to the west clear nights, with the radiation cooling customarily expected of high pressure spells, were occurring. It was not until the next high pressure spell in early November that radiation resulted, but even then the effect was not very strong.

The remaining lines of the Table show the occasions when propagation to the countries indicated is considered likely, from a survey of the MRI discontinuities aloft. Open paths to intervening countries are implied. It will be seen that, by comparison with earlier months, the possibilities have been inferior. This is inevitable with the unsettled conditions of autumn, but should not be discouraging; remember the beginning of March! The table shows how bady served has been the NE path. The band has opened to the East and South-east from time to time, and it can be seen, for example, that both paths opened as far as DL on October 20, but only as far as PA and ON on the following evening. Southern openings are seen to have been infrequent until late in the month. The evenings of November 8 and 11 appear to have been the best.

In Retrospect

The most outstanding period last month proved to be October 7-11, with October 10 as the best evening. This was successfully anticipated in the

Date	OCTOBER 15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Pressure system over Southern England	A	C	A	A	A	A	A	A	D	D	A	D	D	D	D	D	D
Radiation over Bedfordshire, GMT	—	—	—	—	—	—	—	—	—	—	21	—	—	—	—	—	—
Discontinuities aloft, suggest propagation to the countries indicated: NE	—	OZ	—	—	—	—	OZ	—	—	—	—	—	—	—	—	—	—
E	PA	DL	—	—	DL	DL	PA	PA	—	—	PA	—	—	—	—	—	—
SE	ON	ON	—	—	—	DL	ON	ON	—	—	ON	—	—	—	—	—	—
S	—	—	—	—	—	47°	47°	—	—	—	—	—	—	—	—	—	—

Date	NOVEMBER 1	2	3	4	5	6	7	8	9	10	11
Pressure system over Southern England	D	D	D	A	A	A	D	D	A	A	A
Radiation over Bedfordshire, GMT	—	24	—	02	23	01	03	—	22	21	—
Discontinuities aloft, suggest propagation to the countries indicated: NE	—	—	—	—	—	OZ	—	—	—	—	—
E	—	—	—	DL	—	DL	—	—	—	DL	DL
SE	—	—	—	DL	—	OE	—	OE	—	DL	OE
S	—	—	—	47°	49°	43°	—	43°	—	43°	43°

Table 1

Table 1. The possibilities for EDX working at VHF from October 15 to November 11. Country prefixes show approximate directions and distances from South-East England to which good conditions are thought to have extended.

Notes:—(1) *Conditions listed are for the evenings of the dates shown.*

(2) *D = Depression. A = Anticyclone. C = Col. slack pressure gradient.*

(3) *Times in the second line mark the fading of inland super-refraction.*

(4) *Country prefixes indicate the approximate limit of conditions.*

(5) *For the southern path, which is wholly over France, it has been necessary to indicate limits in two-degree steps of latitude. The latitude of Paris is about 49°N, and that of Marseilles 43°N.*

(6) *Occasions of particularly marked discontinuities are printed in heavy type and are underlined.*

assessment of GDX and in the Table for EDX. As the period brought EI within range of the Continent, it is thought that a more detailed examination will be of interest. Fig. 2 represents a vertical cross-section of the atmosphere along a path ESE from Dublin, over GW and G to Suffolk, and onward to Bavaria. The topography is shown, together with the MRI "reflecting" layers that developed during the period. At 0200 GMT on October 8 a saucer-shaped layer between 5000 and 6000 feet aloft had developed over the British Isles and Continental coastal areas. Twenty-four hours later, the layer, still at about the same level, had spread ESE-wards over DL. Thereafter it sank progressively earthwards, but weakening over the North Sea on October 10 (the dashed line) and finally strengthening and extending further to the ESE by 0200 GMT on October 11. It was these last two results that were stressed in the Table (p.560, November) as being exceptionally good. The last, peak, condition has several interesting features. First, and most important for EI2W, it remained high enough in the West to clear the Welsh Hills. In the East it apparently linked up with what had been earlier a separate layer over Austria. Finally, when standing well back from the figure it seems to the writer that the layer is following the *broad* features of the terrain. This is one isolated case, but the feature merits investigation. As in the case of the layer shown in Fig. 2 last month, the presence and extent of this layer could not have been deduced from the surface weather charts. The associated anticyclone travelled about 1000 miles from Liverpool Bay on October 8 to eastern Europe on the 11th, and from the surface charts the assumed peak period would have been the evening of October 8. In fact, the reflecting layer developed on the southern periphery of the system and then swung clockwise round it. On this occasion it was largely associated with a ridge extending westwards from the anticyclone, but this, too, the writer has found to be an inadequate indicator. The layer was tilted downwards to the South, and the

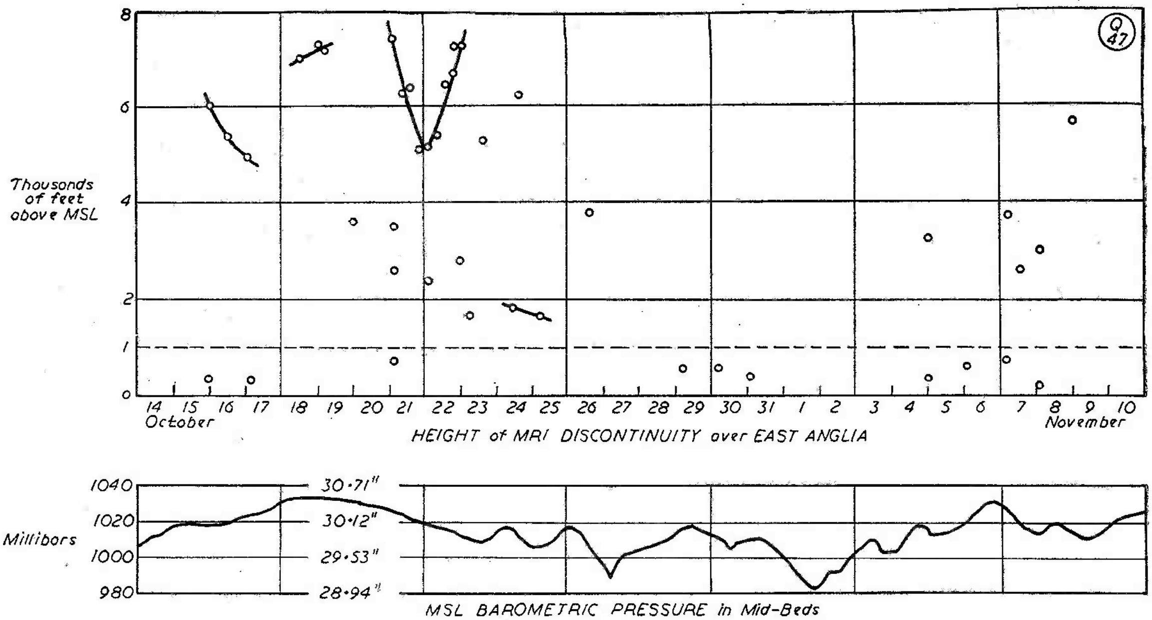


Fig. 1. Showing the reflecting layers that formed over East Anglia during the period October 14 to November 10. On some occasions they are thought to have extended out over the Continent, yielding EDX, as suggested by Table 1. It is clear, however, that conditions have not been as good as during some recent months.

progressive lowering of the layer in Fig. 2 represents the successive arrival of lower portions of the layer through horizontal motion rather than sinking in the vertical. One final point is that the figure fails to illustrate the curvature of the Earth. Over the path represented, the surface curves through an angle of over ten degrees. Such curvature would take the midpoint of the MSL line in a hump up to a height of 60,000 feet!

G3EPW in Bury, Lancs., who had a QSO with ON4BZ on October 11, achieved this with the layer at a greater height. By 0200 GMT on the 12th it was at a general level of about 3200 feet and extended only to the Continental coastline. There appears to have been no propagational reason why the earlier evenings were not even better for Lancashire/Continent.

Two dates mentioned in last month's Report, September 30 and October 5, received no comment at all in November "VHF Bands." The former was a snap spell with a weak high-level discontinuity developing in a newly-arrived and vigorous airstream, which seemed likely to have yielded somewhat improved propagation over the UK. For the latter evening a layer below 4000 feet over most of the UK, and below 3000 feet over Lancashire, occurred. It extended over the Continent at between 5000 and 6000 feet. It is difficult to accept that conditions

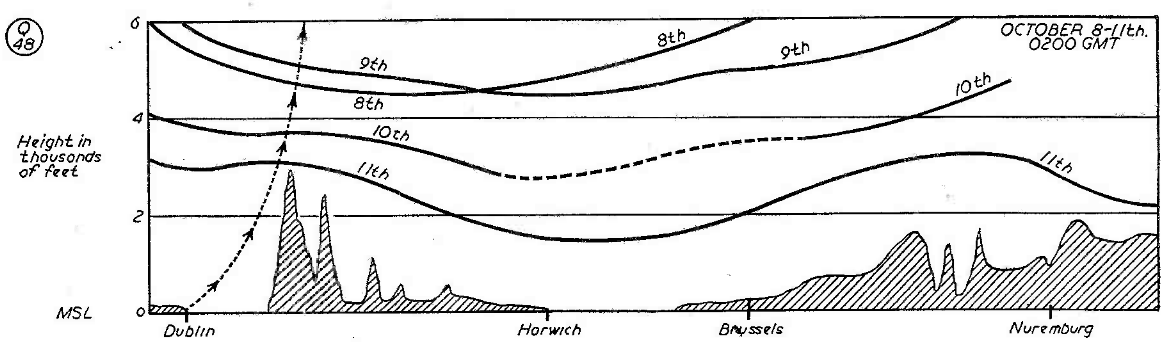


Fig. 2. From the reports in "VHF Bands" and by the analysis made here in the November issue, the period October 8-11 was found to be particularly good for EDX working. This sketch shows the reflecting layers which formed over the path from Dublin, Eire, in an east-south-easterly direction, with their heights at 0200 GMT, on the nights October 8-11. Owing to scale limitations, the vertical heights are greatly exaggerated in relation to the distance, but this does not affect the argument. The dotted ray, emanating from EI2W, shows how his signal reached the reflecting layers to overcome the barrier of the Welsh Mountains. On the night of the 11th, it might well have been possible for him to have worked OE — had there been a VHF-equipped station available in Austria.

were not enhanced by its presence. Perhaps the event was overshadowed by the spell to which it was a preamble. Especial comment upon this evening is sought.

Last month some figures were given for certain ray paths. The dotted curve in Fig 2 shows the path of a ray emitted horizontally at sea level from Dublin. (The exaggerated height scale makes it appear very much steeper than life). The arrival angle (90°—incident angle) at 6000 feet appears to be in the order of 80°. In actual fact, it is just over 1.1°. We see that from sea level at Dublin, the most useful ray easily clears the Welsh Hills. Taking the effective level of the Welsh Hills at 2500 feet and average conditions of refraction, then an aerial array at Dublin can be raised to about 140 feet above MSL before the lowest usable ray, by then at 0.12 degrees below the horizontal, strikes the Hills. Further height increases would not seem to be of much value, because the radiation then possible at even lower angles would be impeded by the mountains, and only a slight increase in signal strength, by virtue of being closer to any reflecting layer, could be expected.

Statistics

In a most interesting letter, G5YV has forwarded the results of the first three months of his schedule with ON4BZ. There has been no time, yet, for a detailed examination of them, but it is already apparent that when an MRI discontinuity develops over East Anglia, then signals both ways over the 300-mile path average about 2 S-points stronger. It is hoped to present complete data on this path on a later occasion.

In this connection, the writer is anxious to hear from operators who maintain schedules with a view to amassing information for other paths.

The permission of the Director, Meteorological Office, London, to quote information derived from the referred official publications is acknowledged.

T9 with the T.1154

SIMPLE MODIFICATIONS FOR SATISFACTORY OPERATION

B. T. CHAPMAN (G2ASY)

The well-known T.1154 is a band-switched click stop transmitter with a useful frequency coverage, 3.0 to 10.0 mc in the HF range, and was first produced about 1940 for general-purpose operation in R.A.F. bomber aircraft. It continued to be a standard fit all through the War and was used for long-range CW and phone working, and for the jamming of German night fighter R/T control channels. The first article to be published on the T.1154 appeared in our issue for October, 1946. Since then, many of these transmitters have been heard on the amateur bands, but mainly with extensive modifications amounting almost to a complete rebuild. This article shows how a T.1154 can be put into satisfactory amateur CW service with the minimum of modification.—Editor.

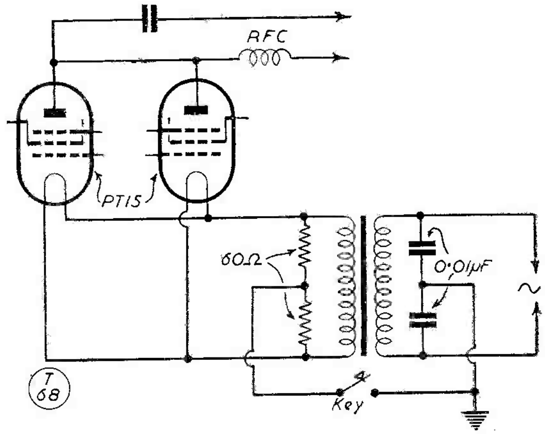
IT seems to be a very common idea that to get on the air with the T.1154 there are very extensive alterations to be made. The writer's own experience, however, shows clearly that only very minor and inexpensive changes are necessary to prepare this excellent transmitter for use on the amateur bands. When it first became known among some of G2ASY's radio friends that he had got a T.1154 he was told that what he would have to do would be to strip it right down and rebuild it from the bottom up, using 807's in the final stage. But the fact is that at the moment of writing the transmitter is being used with the original valves, *i.e.*, two ML6's and two PT15's in the PA stage *and* using AC to supply the heaters and filaments. Furthermore, excellent reports of a T9 note are being obtained, with some surprised remarks about "such good signals from the T.1154." For those who want a good table-top transmitter at a very reasonable cost the following details may be of some help.

First Steps

The first thing was to remove completely the long-wave tuning sections, being careful to leave the common HT positive lead intact. This is the rear-most of the vertical bare wire leads on the left of the chassis. It feeds the yellow, red and blue sections through an RF choke just at the rear of the yellow oscillator sections. The next step was to get the red and blue oscillators operating with a T9 note when feeding the oscillator valve with AC. As the T.1154 was designed for complete DC operation it seemed obvious that there would be snags arising when AC was used. A .01 μF condenser was connected across the filament of the oscillator ML6 and the note checked with a BC-221. The note was found to be T9 all right, but when driving the PA stage the same method of getting rid of the AC ripple in the note did not work at all. It sounded just like a buzz saw ! Then a friend suggested using a separate filament transformer to supply the PT15's and to eliminate the long yellow positive LT lead to the PA valves by taking connections direct to them from the transformer. So a 3 amp. LT transformer was installed in the space formerly occupied by the long wave PA tuner (bottom right of chassis). But the note was still T5 or worse ! Then came a suggestion to connect two 60-ohm resistors across the secondary of the filament transformer in series and earthing the point between them, with two .01 μF condensers across the primary of the same transformer and to earth in the same manner.

This was done, and it worked like a charm. Gone was the AC ripple and the note was T9. When the yellow lead to the PT15's was removed the connections from the other sides of the filaments to the chassis were also taken out as it seemed to be a good way of keying the PA by breaking the lead from the centre of the two 60-ohm resistors and inserting the key there. This idea worked well and the keying is clean and smooth.

The send-receive relay at the right-rear of the chassis was fixed in the "send" position and the aerial lead plugged in to the "HF aerial" socket. Using 19.2 watts (400 volts at 48 mA) many QSO's have been obtained on the 3.5 and 7 mc bands. When stations have been told that a "Marconi Jeep" was in use, they have replied that they would not have known it unless it had been mentioned. The aerial used is a 68ft. end-fed, but a Windom is being put up for 14 mc working.



Modifications to the PT15 PA stage of the T.1154, as suggested by G2ASY. By these and the minor alterations to the driver stage as detailed in the text, he has been able to obtain a good T9 note.

In conclusion, a word about purchasing a T.1154 will not be out of place. Many such transmitters are being sold very cheaply, but some are in very poor shape. It is better to pay just a little more and get one in good mint condition as this will save quite a lot of trouble in the long run. The one installed at G2ASY had never been used and was in its original case when it came from Clydesdale Supply Co., of Glasgow.

If these short remarks on the changes made will help those who are considering using a T.1154 the time and trouble spent both in making the changes and writing these lines will be well rewarded.

SEVEN NEW OSRAM VALVES

Seven new valves have recently been added to the range manufactured by The General Electric Co., Ltd. They have been designed to meet various special requirements, particularly in the television and car radio fields. The Osram Z719 has been developed primarily for use as a signal frequency and IF amplifier in television receivers ; in addition, it can be used as a video amplifier and synchronised separator. It is an internally-screened high slope short base RF pentode with a B9A (Noval) base. Two cathode connections are provided to reduce input circuit damping, and the slope is 7.4 mA/V. The heater, rated at 6.3v. 0.3 amp., is suitable for series or parallel operation, and the low operating anode voltage of 170v. makes the valve of particular interest for "transformerless" television receivers.

The Osram U43, which is also designed for television receivers, is a miniature high-voltage EHT rectifier of the wire-in type with an indirectly heated cathode. The heater rating is 6.3v., 90 mA. With a unidirectional impulse input, the peak input voltage is 17 kV and the rectified current 0.35 mA.

The Osram N329 output pentode is intended for use as a frame and sound output valve in "transformerless" television receivers. The heater rating is 16.5v. 0.3 amp., and the valve is mounted on a B9A (Noval) base. When used in the sound stage, a maximum audio output of 4 watts can be obtained with an anode voltage of 170v.

Also on a B9A (Noval) base is the Osram U709 full wave indirectly heated rectifier. The heater rating is 6.3v. 0.95 amp. The maximum R.M.S. input voltage is 350v. and the rectified current is 150 mA.

The other three new valves are chiefly intended for use in broadcast and car radio receivers. All have a heater rating of 6.3v. and are mounted on a B7G base. They are direct replacements for their American equivalents. The Osram X727/6BE6 is a heptode frequency changer with a conversion conductance of 0.425 mA/V. The Osram W727/6BA6 is a variable-mu RF pentode with a mutual conductance of 4.4 mA/V. And the Osram N727/6AQ5 is a beam tetrode with a maximum audio output of 4.5 watts.

PLUG-IN METERS

The illustration shows an interesting idea from the States. All meters made by the Cole Instrument Co., Los Angeles, can be supplied with panels for plug-in mounting, in either the 3-in. or 4-in. sizes they manufacture. The contacts are silver-plated with adjustable tension, and the obvious application is on test gear. The leaflet also suggests "replacements on busy panels, changing over on production-line testing, and on field equipment."

GPO MORSE TEST — NEW ARRANGEMENTS

As things are at present, the applicant for an amateur transmitting licence needing to take a Morse Test is given it at "his nearest head post office." It has been getting more and more difficult for the GPO to produce telegraphists, at odd places up and down the country, who are qualified to test a candidate; the reason for this is that hand-speed working has long since ceased to be used on Post Office telegraph circuits—communication is either by teleprinter or telephone, not by Morse key! Henceforth, therefore, the radio amateur Morse Test will be given *on request* only at:

(*a*) General Post Office Headquarters, London, E.C.1, *or*

(*b*) GPO Coast Stations at Burnham, Cullercoats, Humber, Land's End, Niton, North Foreland, Oban, Port Patrick, Seaforth, Stonehaven and Wick, *or*

(*c*) At the Radio Surveyor's Office at Belfast, Cardiff, Falmouth, Glasgow, Hull, Leith, Liverpool, London, E.C.3, Newcastle-on-Tyne and Southampton.

We are also officially informed by the Post Office that in order to meet the needs of those applicants who cannot reach these places—though many we know would try to make the journey to a Coast Station, which would probably be an interesting visit —the Test will also be arranged (if sufficient candidates come forward) in January and September each year at the following head post offices: Birmingham, Cambridge, Derby, Leeds and Manchester. So really the facilities are quite adequate and, as usual, the GPO people have done their best to meet our reasonable requirements.

All communications regarding the Morse Test for the radio amateur licence should be addressed to: Overseas Telecommunications Department, Radio Branch, G.P.O. Headquarters, St. Martins-le-Grand, London, E.C.1. And if you want to take it in January, *write now*.

THE "TYANA" SOLDERING IRON

A new light-weight soldering iron now available is the "Tyana," which is a very neat job with an adjustable pencil bit, a 40-watt heater element for quick work, and aluminised finish for heat resistance. It is available in 100-110, 200-220 and 230-250 volt ratings, and is supplied with a bench stand. We can recommend this as a handy and serviceable instrument and, at 19s. 6d., it is reasonably priced. Kenroy, Ltd., 152/297 Upper Street, London, N.1.

RADIO QUARTERLY

Several articles in the September issue of *Radio Quarterly* will be of particular interest to readers of *Short Wave Magazine*. There is a very useful and practical treatment of Aerial Systems for the communication bands, with much information derived from actual experience. The constructional articles include full details for the building of a general-purpose Test Meter and, on the VHF side, the published material on the famous G2IQ Converter—first featured in *Short Wave Magazine*—has been collected under one heading. Other articles are on a Versatile Crystal Receiver Unit, Improving HF Reception and the Radio Amateur's Examination. The reference matter includes the latest and most up-to-date Zone and Country Prefix lists, with all additions and amendments. The price of *Radio Quarterly* is 4s., post free, of the Circulation Manager, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

TRANSISTOR TRANSMITTER, G5CV/P

Working from first principles, and using a circuit of his own design, G5CV (Godalming) has succeeded in working telephony on 3608 kc with a transmitter using only a single transistor; it runs at an input of .02 watt with power from a 22½-volt deaf-aid battery. It is believed to be the first time phone has been possible with a transistor-oscillator, and reports on the signal from any distance are particularly requested by G5CV. He is now engaged in developing further the principles and circuitry involved.

BC/TV LICENCES

There are now over thirteen million receiving licences in force, of which more than 2½ million are for TV and nearly 200,000 for receivers fitted in cars —which, as the GPO points out, must be licensed separately.

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.

G3AYZ/A, J. F. Turner, Aldersbrook County Secondary School, Ingatestone Road, Wanstead, London, E.12.

G3EFE/A *(QSL via GW3EFE).*

G3GMS, C. P. Thayne, 186 Town Lane, Bebington, Cheshire.

G3IQA, E. H. Buck, 152 Southgate Road, Great Barr, Birmingham 22A.

G3ITI, V. R. A. Boards, Branston, Harewood Road, Collingham, nr. Leeds, Yorkshire.

G3IWF, N. F. Smith, 8 Roland Avenue, Holbrooks, Coventry, Warks. *(Tel.: Coventry 88820).*

GW3IYI, W. J. Squires, 41 Penllwyngwyn, Bryn, nr. Llanelly, Carms. *(Tel.: Llangennech 215).*

G3IYP, 1051 Squadron Air Training Corps Radio Club, H.Q. Heath Lane, Dartford, Kent.

GM3JCC, J. C. Cunningham, 45 Marshall Street, Larkhall, Lanarkshire.

G3JCV, W. A. Hawkins, 31 Cedarland Crescent, Nuthall, Notts.

G3JCX, M. T. Jones, 45 Urban Gardens, Wellington, Shropshire.

G3JDA, C. C. Price, 5 Hornshurst Cottages, Rotherfield, Crowborough, Sussex.

G3JDU, G. Burton, 18 Cross Street, Farnworth, Lancs.

G3JDZ, S. G. Upperton, 72 Kingsmead Avenue, Worcester Park, Surrey.

G3JEC, C. H. R. Brooke, 9 Lavender House, Seagate Road, Hunstanton, Norfolk.

G3JEK, 4032936 SAC Holden, W., M.R.S. (Signals Section), R.A.F. Station, Harpur Hill, Buxton, Derbyshire.

G3JEL, A. L. Skilton, 2a Jackson Road, Holloway, London, N.7.

G3JEO, C. Sadler, 5 Westfield Crescent, Patcham, Brighton 6, Sussex.

G3JEQ, W. R. Steverson, Merrydawns, Meadowside, Great Bookham, Surrey. *(Tel.: Bookham 2459).*

G3JEZ, R. R. Bastin, 86 Christchurch Road, Newport, Mon.

G3JFB, S. J. Turnbull, 267 Kingston Road, Ewell, Epsom, Surrey. *(Tel.: EWE 7577).*

G3JFD, B. J. C. Brown 196 Abbey Street, Derby, Derbyshire.

G3JFF, M. J. Matthews, 94 Victoria Road, Dartmouth, Devon.

GM3JFG, Rev. I. W. T. D. McHardy, The Rectory, Saltburn Road, Invergordon, Ross-shire.

G3JFN, C. Sonley, 42 Kings Bench Street, Hull, Yorkshire. *(Tel.: Central 32237).*

G3JGH, C. Merrett, Room 24, "A" Block, Brooklands Hostel, Haynestone Road, Coventry, Warks.

G3JHC, B. Jenkinson, 23 Newsham Road, Sheffield, 8.

G3JIC, A. Renwick, 11 St. Paul Street, St. Helens, Lancs.

G3JLA, A. E. Latham, 64 St. Paul Street, Islington, London, N.1.

G3JLB, L. A. Belger, 32 Lorton Road, Gravesend, Kent.

G3JNR, N. J. Richards, Fishmongers' Arms, Cley, Holt, Norfolk.

G3JVJ, R. A. Wybrow, 54 Lordship Lane, East Dulwich, London, S.E.22.

G3JWR, I. W. Rhyder, 85 Mary Street, Scunthorpe, Lincs.

G3JWW, W. Walker, 4 Dudley Terrace, Potter Street, Harlow, Essex.

CHANGE OF ADDRESS

G2DPD, R. H. B. West, 27 Gloucester Road, Whitton, Twickenham, Middlesex.

G2DQW, A. C. Williams, 47 Croft Road, Yardley, Birmingham 26.

G2ML, T. Geeson, Meadowside Bungalow, Chelford Road, Broken Cross, Macclesfield, Cheshire.

G3AHO, C. Finch, 182 Devonshire Street, Keighley, Yorkshire.

G3ALH, J. Turney, Fullerton House, Collingham, nr. Leeds, Yorkshire.

G3CCX, P. Craw, Dinard, Sea Lane, Rustington, Sussex.

GW3CGM, Dr. F. B. Singleton *(ex-G3CGM),* Vron House, Vroncysyllte, Wrexham, Denbighshire.

GW3DZL, I. C. Elias, The Mount, Llewellyn Circle, Mayhill, Swansea, Glam.

GW3EFE, A. R. Bryant *(ex-J4AAP / YI3EFE / G3EFE),* 30 Min-y-Mor Road, Holyhead, Anglesea.

G3EMO, H. Ward, 24 Manor Way, Woolton, Liverpool.

G3EUK, R. W. Curtis, 7 Fairfield View, Fairfield Park, Bath, Somerset.

G3EXP, A. J. Bassett, 18 The Broadway, Newbury, Berks.

G3FDU, J. A. Bladon, Madresfield, Jack Lane, Davenham, Northwich, Ches.

G3FME/A, J. C. Scott, 17 Russell Road. Lee-on-Solent, Hants.

GC3FSN, R. A. Butcher, 50 David Place, St. Helier, Jersey, C.I.

G3FTG, D. Calcott, 11 Clifton Drive, Stafford, Staffs.

G3GRF, G. R. Foggin, 16 Maclagan Road, Bishopsthorpe, Yorkshire.

GM3HHB, W. Brown, 7 Broomage Avenue, Larbert, Stirlingshire.

G3HPY, G. Mayor, The Laurels, New Street, Chelmsford, Essex.

G3IBI, R. G. Scutt, 38a Kenway Road, Kensington, London, S.W.5

G3IPB, S. C. Barrell, 16 Leigh Road, Cobham, Surrey.

G3LS, R. W. Stewart, 21 Kilwick Street, West Hartlepool, Durham.

G3TC, B. C. Cooper, 71 Ringstead Crescent, Crosspool, Sheffield, 10.

GM5PV, T. Sagar, 5 Hillview Place, Fallin, Stirling.

G8DA, P. A. B. Malvern, 3 Chard Road, Exeter, Devon.

Random Jottings

by the Old Timer

ONE of the most interesting things about Amateur Radio, as a hobby, is its amazing versatility. There are so many different things to do, and so many different ways of doing them. In the same smallish town you may call on two amateurs, neither of whom is in touch with the other, either on the air or off it; they may be using two sets of gear that resemble each other in no way whatever; and they may never even have heard each other! One is interested in CW communication over long distances (or let us call him a DX-chaser) while the other once knew enough CW to pass his test but has never used it since, and operates exclusively on 80-metre, or perhaps 2-metre, phone. These two amateurs have virtually nothing in common except their hobby, and if they got together in person one would imagine that the conversation would dry up pretty quickly. If we know the typical "ham," however, that would not be the case at all, and they would soon find some sub-division of their hobby that would be of mutual interest.

TWO EXTREMES

Consider, now, the variety that is possible even in stations which are devoted to the *same* branch of Amateur Radio. Again, in quite a smallish radius, one could find two stations with a common interest—possibly 20-metre phone—which hardly resemble each other at any point whatever. One consists of a large room full of expensive gear; a commercial transmitter and receiver, a handsomely built console, chromium-plated microphones and an elaborate control system. The other, housed in a cubby-hole, garden shed or corner of an attic, is entirely home-brewed. The transmitter spreads horizontally over quite an area of bench; the receiver sits to one side; between them are loose wires, a soldering iron, the contents of several boxes of nuts and bolts, empty cigarette packets and a pipe, some very dog-eared and slightly burnt copies of the *Magazine,* and, in fact, everything you can imagine except "football bladders all blown up," as an RAF friend of ours used to say.

WHICH IS WHICH?

The interesting fact is this: That it is impossible to say, *from appearances,* which of these two is the keener or more successful operator. It may well be that the console owner has that certain lack of knowledge and ability that makes him an unlucky and unsuccessful seeker after DX, while the owner of the spider-infested junk pile has his DXCC with 200-sticker and picks out every "new one" as it arrives. On the other hand, the positions may be reversed; one simply cannot tell. And, whichever of the two is the *successful* one, which of them is the happy one? For we know of several strugglers, with home-built gear, poor accommodation, execrable aerial system and, one would think, everything against them, who are far keener and derive infinitely more happiness from their hobby than those who have everything-laid-on-and-no-trouble. One suspects that the whole thing must be decided by an attitude of mind, and probably that the man who makes the best use of what he has turns out to be The Happy Ham.

NATURE IN THE RAW

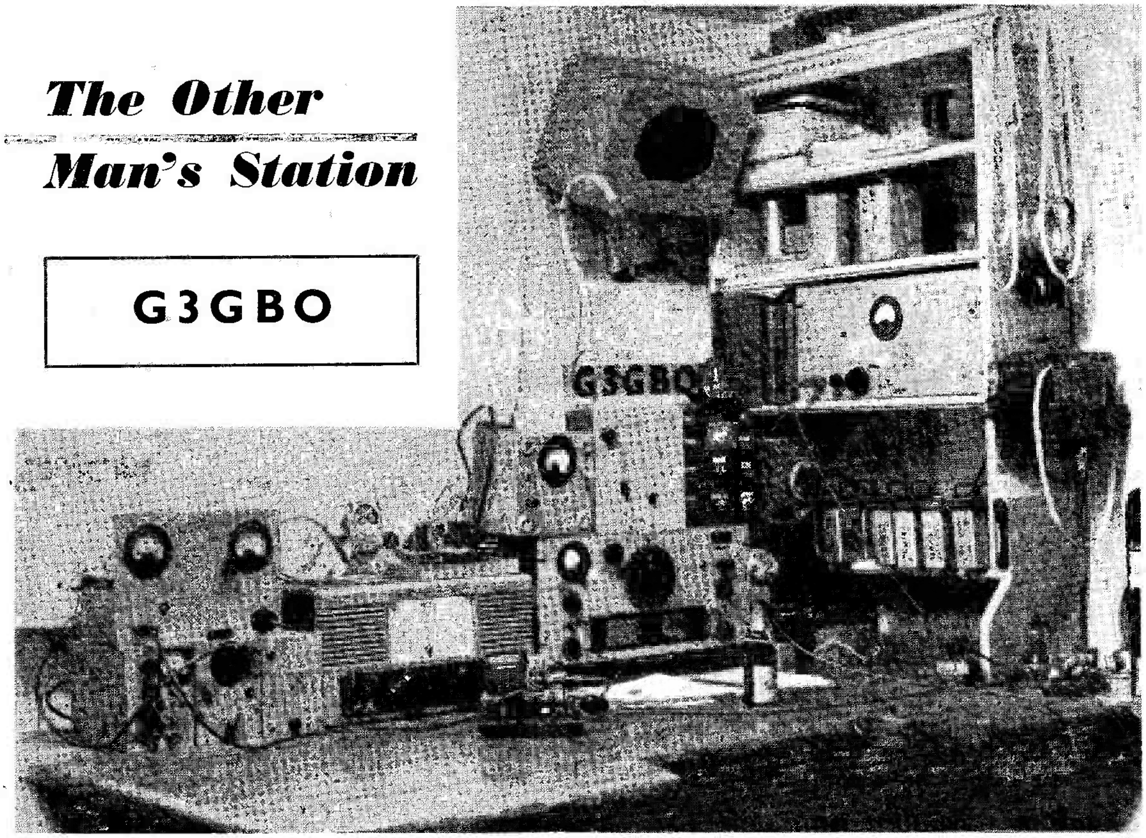
Unhappy the man who has to depend upon trees for aerial supports! Sooner or later there comes a gale, and either he is not at home to loosen his halyards, or the weather is so terrific that he doesn't venture outside anyway. Then comes one super-gust, one particular tree rocks violently, and the aerial becomes one of the two-electrode variety. There are always plenty of sympathisers who tell him to "use a counterweight" next time," and so on, but only those who have braved the perils of spiky, knobbly, jungle-surrounded trees know how impossible this is. One's halyard does *not* go neatly up a straight trunk, through a pulley and down again; it only gets there at all by forcing its way through holly-bushes, hawthorn hedge, low branches and all of kinds of obstructions, and when one loosens it at the bottom the aerial hardly comes down under it own weight! When the wire holding the pulley that holds the halyard finally parts, it is a job for an archer, a rocket-scientist or the local fire brigade.

JAMMERS

For some strange reason, we seem to be experiencing a lot of interference on our bands from jammers of various kinds. Is it that the technique of those who operate these things (does one *operate* a jammer?) is lacking something? We felt sure, a few days ago, that a thing that settled on about 14100 kc was meant to be tuned to some spot in the 15 mc band on which a broadcasting station was putting out the dogma of the Pluto - Demo - Imperio - Capitalist warmongers, and it pained us to think of all these kilowatts being wasted on jamming out one of *our* crystal frequencies in the 14 mc band. How strange the mentality that uses jammers at all — in times of peace — and how scared the owners must be of what might possibly be heard if the said jammers ever ceased to jam. But if we must have this jam-yesterday, jam-tomorrow and jam-today inflicted on us, let us hope that the chief jamsters will buy a new frequency-meter. (Or would it be more patriotic to reflect that a jam on 14 mc means an unjammed broadcast on 15 mc?)

The Other Man's Station

G3GBO



OUR picture this month shows the station operated by D. T. Bradford, G3GBO, of 9 Oxford Gardens, Denham, Bucks., first licensed in 1949 after a successful apprenticeship as an SWL on the VHF bands.

Indeed, the main interest always has been VHF, and many hours were spent listening on the old five-metre band before we lost it, and then on two metres, until the ticket came through in November, 1949.

Transmitting activity was at once started on Two, the band which has since been in continuous use at this station, with occasional QRP CW appearances on the other bands. For 144 mc, the transmitter consists of ½-6J6 as CO near 6 mc, the other half working as a trebler to give output at 18 mc; a second 6J6 multiplies 18-36 and 36-72 mc in the two halves, driving an EL91 doubler to 144 mc, into a TT15 buffer amplifier. These stages are contained in the central unit of the three to the left of the S.640 receiver. An 832 PA, running about 30 watts input (the highest power normally used) is mounted above this. The whole VHF set-up is TVI-proof.

Between the two-metre exciter and the S.640 is the converter power supply, the converter itself being in two units, above the S.640. These consist of a 6J6 CO-multiplier, producing an IF of 17-19 mc, and an RF amplifier-mixer chassis using a triode-connected 6AK5 with inductive neutralisation, followed by an EC91 connected GGT, feeding into half a 12AT7 as a second GGT stage; the other half of the 12AT7 works as a triode mixer. The S.640 is then operated as a tunable IF/AF strip. This converter was originally built with the idea of fitting it inside the S.640—but the final installation has not yet been carried out, as the existing S.640 power supply is insufficient.

To the right of the S.640 is an HRO, incorporating a noise-limiter, giving coverage of 50 kc to 30 mc and (with a modified coil pack) from 38 to 47 mc as well, thus serving as a useful means of checking on TVI. Above the HRO is the rotary beam control unit and position indicator, the HRO power-pack, a small 2½-in. oscilloscope, and an RF-27 unit modified for 10 metres.

The modulator is housed on the shelf at upper right. The crystal microphone (mounted in the neck of a champagne bottle!) feeds into the grid of an EF37A; this is followed by ½-ECC31, with another ECC31 used as a phase splitter and driving a pair of 6F6's, which plate-and-screen modulate the 832 PA on two metres. The modulator also includes a pair of PT15's, to be driven from the 6F6's when higher modulating power is required. To the right of the modulator, on the side-wall of the shelf, is an Elliott auto keyer—to take the hard work out of routine CQ, test and schedule calls—while send-receive switching is carried out by means of relays controlled from a single switch on the S.640; and an FL8 audio filter on the output of the S.640 helps to take the weight out of QRN on weak CW, since there is heavy main road traffic nearby. The hardware on top of the bug key is an adjustable key-click filter, which has proved useful in removing the final traces of thump from neighbouring receivers.

To the left of the 2-metre exciter is a small CC Top Band rig and all-band exciter using TT11's. A B2 is also available for the LF bands, and the aerial is a 250-foot long-wire, made possible by some sympathetic neighbours with long gardens.

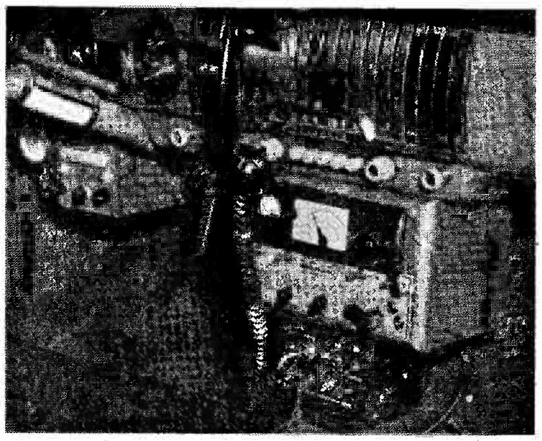
On two metres the light-weight beam, 40 feet high, is a 4-over-4 constructed of ⅛-in. dural rod with very wide element spacing, using Q-bar matching into the K.35 tubular 300-ohm feeder; the latter is 90 ft. long. The beam-head has low wind resistance and is rotated by means of a fully-suppressed motor; this is housed in a box near the top of the mast, with a worm-reduction gear driving both the beam and a small variable resistance for actuating the position indicator, in the usual bridge circuit.

The log for Two Metres shows some 430 different stations worked in 39 Counties and 8 Countries, the best EDX to date being HB1IV, on the famous occasion recently. The main activity is working what comes on the two-metre band, and experimenting with VHF gear.

As mentioned earlier, before becoming licensed G3GBO was a well-known and very active SWL specialising in the VHF bands, and to us—having watched his progress since those days—it is of particular interest to see him figuring in this series as a fully-established VHF station with an excellent operating record.

A PORTABLE/MOBILE STATION

The photograph shows the W6SXI mobile transmitter/receiver installation—for operation on 80, 40, 20 and 15 metres too! The transmitter is wholly enclosed in a box 12 ins. x 7½ ins. x 7½ ins., and the valve sequence is CO/VFO 6AG5-6AG5-6AQ5-807, phone or CW, with HT from a motor-generator run off an auxiliary battery. The receiver is an American commercial product, the Soner MR3, and the control box is W6SXI's own design. With a centre-loaded whip aerial mounted on the car, DX worked by W6SXI on the equipment as illustrated here includes DL, G, HP, KH, LU, VK and XE—nice going by any standard.



W6SXI, Martinez, Calif., has a mobile-portable outfit in his Cadillac.

BOOK REVEIW

Now in its third edition, *A First Course in Wireless*, by "Decibel," is a little book that sets out to explain in simple language to the absolute beginner the fundamental principles of radio. It assumes no previous knowledge of electricity and only a nodding acquaintance with mathematics. The reader may be a little discouraged to find, on the first page in italics, "No one knows exactly what it is"—referring to electricity. However, if he perseveres he will, in fact, acquire a good knowledge not only of what it is, but also what it does in this particular field. In fact, the title of the book, "A First Course in Wireless," does not really do it justice, as much of the latter part deals with such principles as the superheterodyne receiver, AVC, push-pull circuitry, and sidebands—all of which is enough to take even a keen amateur some time to assimilate.

The average reader will probably show more than academic interest in the subject and in the original form of the book—as a series of articles in the B.B.C.'s pre-war publication *World Radio*—the material was presented alongside constructional articles. In book form, it would have been advisable to omit the few practical details about making coils for a crystal set, and so on, which are inadequate in themselves to ensure success, and instead to include cross-references to the appropriate literature on home-construction.

As "A First Course in Wireless" started in print as early as 1934, the triode and the screen-grid valve predominate. While this is justifiably within the scope of the title, in the third edition the modern HF pentode might have replaced the screen-grid, to bring the book into line with current practice. *A First Course in Wireless*, pp.225, indexed, price 12s. 6d. nett, published by Sir Isaac Pitman & Sons, Ltd., Pitman House, Parker Street, Kingsway, London, W.C.2.

J.M.O.

The Month With the Clubs

We have already heard a goodly number of Clubs doing battle in the first week-end of the Eighth MCC, *and by the time this appears in print the contest will, of course, be a matter of past history—except for the results, which will not be known until the January issue is published.*

Secretaries and personnel of all competing Clubs are reminded that the logs for MCC *should have been in our hands by* **December 1,** *in order that the entries may be judged and the results compiled in time for our next issue. If they have not already been sent, it is too late now!*

Will Club Secretaries also please note that, in accordance with the usual arrangement, there will be no routine Club Notes next month, this feature being devoted entirely to a review of MCC.

In addition to this month's reports, which are to hand from 24 Clubs, we acknowledge the following publications: SRCC *Monthly News;* QLF *News Letter* (WEST KENT); *Monthly Newsletter* (CLIFTON); *"QRP"* (QRP *Research Society); and News-Sheet* (PURLEY).

The deadline for the next batch of Club Reports is **first post on Wednesday, January 13,** *for the February issue. Address them to "Club Secretary,"* SHORT WAVE MAGAZINE, *55 Victoria Street, London, S.W.1.*

Birmingham & District Short Wave Society

On November 9 a member gave a talk on Closed Circuit TV, which was a continuation of the October lecture. Attendances at meetings are being maintained, and a welcome is offered to any visitors interested in any aspect of radio or TV.

Clacton Radio Club

Regular meetings have continued at the Laxfield Guest House, Beach Road, and members have been concentrating on Morse practice. The past Secretary, Mr. R. F. Bliss, has received his "ticket," and will be active before long; G3HSM is active on all bands from 160 to 2 metres; and G6AB, normally a keen devotee of the LF bands, has announced that he is interested in 70 cm for local QSO's.

Derby & District Amateur Radio Society

Forthcoming events: December 9, Sale of Members' Surplus Items; December 16, Annual Prize Draw; and December 18, Second Annual Christmas Party (held in Room No. 4, M.U.O.F., 119 Green Lane, Derby.)

Lancaster & District Amateur Radio Society

In October a very successful Junk Sale was held, and several new members were enrolled on the spot. At the November meeting Mr. R. Cordingly, G3BAP, gave a talk on VHF Technique, with the accent on 70 cm working. There is considerable activity in this direction among the Club members.

Midland Amateur Radio Society

The Annual Dinner was held on October 10, 55 guests and visitors being present. The event was highly successful and much enjoyed by all. On October 20 G3HAZ lectured on VHF and UHF equipment. Plans are now being drawn up to make the annual Christmas meeting a really festive occasion, and visitors will be welcomed. Meetings are on the third Tuesday, 7 p.m., at the Imperial Hotel, Birmingham.

Neath, Port Talbot & District Amateur Radio Club

Meetings are held on the second Wednesday, the next being on December 9, 7.30 p.m., at the Royal Dock Hotel, Briton Ferry.

QRP Research Society

More members have recently passed the RAE and GPO tests, and will shortly be calling QRP. The Dartmouth and Kingston Clubs both have QRP sections, and interesting reports of their activities are received. Reports from other Clubs with similar interests will be welcomed, and will be published in "QRP," the Club news sheet.

Southend & District Radio Society

Recent meetings included the demonstration of a home-built Williamson amplifier, and an evening of films showing the use of radio and radar for Transport Control. At a November meeting held on the air at 0715, a birthday party was given in honour of G2KT, the Club's Chairman, on the occasion of his 75th anniversary. He has been on the air for over 40 years and is a familiar voice on the 160-metre band.

Spen Valley & District Radio & Television Society

Forthcoming events as follows: December 16, "Poor Man's BC-221"; January 13, Cinema Show (GPO); January 27, Visit to Electric Lamp Manufacturers' Association, Leeds.

Torbay Amateur Radio Society

At a recent meeting a welcome was extended to G4RD, now living in the district. At the November session a representative from a Torquay firm of instrument makers gave a talk on production methods, and for December it has been arranged that various members will describe their aerial systems. Meetings are on the third Saturday at the YMCA, Torquay.

Bristol & District Amateur Radio Society

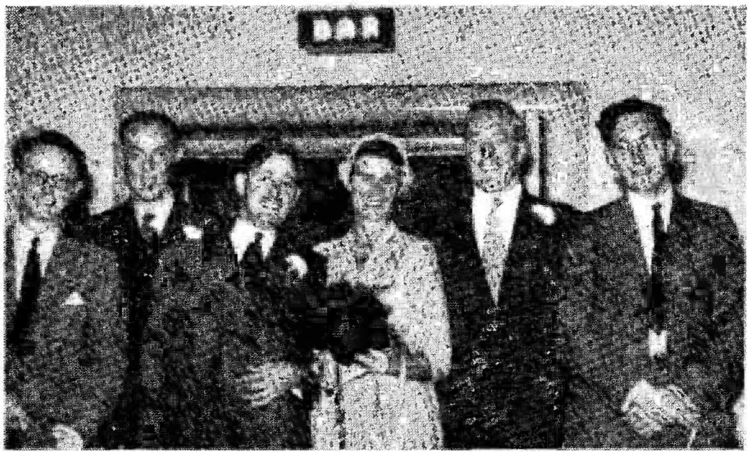
This Club meets every Friday at 8 p.m., at the Redcliffe Parish Hall. Several interesting events have taken place at recent meetings, including a Radio Quiz, an Informal Night and a home-constructor competition. For the future there are talks on VHF and Tape Recording.

Cannock Chase
Amateur Radio Society

The talks on Aerial Systems by G2AMG are attracting good attendances, and membership has now passed the 30 mark. Cannock Chase was on for MCC with the call G3ABG.

Clifton
Amateur Radio Society

The accent has now been placed on constructional work, a workbench and a useful set of tools being available. The Christmas Hamfest will be held on December 11, when the annual Constructional Contest results will be announced. Recent events were a Junk Sale and a Film Show. Meetings are every Friday, 7.30 p.m., at 225 New Cross Road, London, S.E.14.



The QAU Club of Jersey was well represented at the wedding of their secretary, Miss Valerie Hunt, to GC3FSN, at Millbrook, Jersey, C.I., on September 10. Left to right GC2CNC, GC5OU, GC3FSN, the bride, SWL Ford, and GC2FMV.

Edinburgh (Lothians)
Radio Society

Meetings continue at 25 Charlotte Square, Edinburgh, the next being on December 17 (Beginners' Night), January 7 (SSB Working) and January 21 (Workshop Practice). At recent meetings there have been some talks on 2-metre equipment, and a visit has also been paid to Kirk o'Shotts.

Radio Society of Harrow

Members are looking forward to the annual Construction Contest for the Pikett Cup. Forthcoming events are: December 11, Construction Contest; December 18, "Fun and Games"; January 1, Practical Night. The Club Tx is usually on the air (3.5 mc) on Practical Nights. Visitors welcome any Friday evening, 7.30-10 p.m., at the Science Lab., Roxeth Manor Secondary School, Eastcote Lane, South Harrow.

Liverpool & District
Short Wave Club

At the recent AGM, G6KS was elected President, G3ELL Chairman and Mr. A. D. H. Looney Secretary. Activity has increased recently and some very interesting events have taken place, including a Construction Contest, won by G3ETH. The Annual Hamfest is fixed for November 20, and there is a Social Evening and Children's Party on December 15, with a film show. Visitors welcome any Tuesday at 8 p.m., at St. Barnabas Hall, Penny Lane, Liverpool 15.

Surrey (Croydon)
Radio Contact Club

On December 8 there is a talk by G6CL on "International Telecommunication and Radio Conferences, and how they affect the Radio Amateur." The meeting will begin at 7.30 p.m., and any local readers who wish to attend will be welcomed. Meetings are on the second Tuesday, at the Blacksmiths' Arms, 1 South End, Croydon.

West Kent
Radio Society

Meetings continue fortnightly at Culverden House, Tunbridge Wells, and the "Annual Get-Together" is fixed for December 16 at the Red Lion, St. John's Road. Visits to the shacks of transmitting members are also very popular, and more are scheduled for the future. A copy of the newsletter will be sent to any potential new member on request.

British Two-Call Club

A recent new member is VK3AST/G3DKI. The Club's "Peter Trophy" contest was held during November. HZ1KE/DL2KE has been awarded the "Diploma of Service," making 10 members who have qualified. VP6CDI and CN2AP have been home on leave. Application forms for membership are available from the Secretary, G2DHV.

Ravensbourne
Amateur Radio Club

At the recent AGM, Mr. J. Miller was elected President, G2WI Vice-President, G2DHV Chairman and Mr. J. H. F. Wilshaw Hon. Sec. Membership has risen to 52 in three years, and the Club Tx has made 190 contacts on four bands. An exhibition of home-built gear will take place on March 8. Meetings are held every Wednesday, 8 to 10 p.m., in the Science Room, Durham Hill School, Downham.

Barnsley & District
Amateur Radio Club

On Saturday, October 17, the Club—the oldest in the country, with a record of continuous existence—celebrated its foundation 40 years ago by a dinner at the King George Hotel, Barnsley. With the president of the Club, Mr. G. Wigglesworth, who is a founder-member and still actively interested in radio, 50 members sat down, with visitors from the Pontefract, Rotherham, Sheffield and Spen Valley clubs. Two other original members present were Mr. J. H. Naylor (also a founder) and Mr. H. Wilde, who joined before the 1914-'18 war.

Solihull Amateur Radio Society

They recently held their first field day, operating on all bands 1.8 to 420 mc, under call-signs G2ATK/P, G2BFT/A and G3GEI/P. Many interesting contacts were made and a great deal learned. It is planned to operate G3GEI, the club station, on the 1.8 and 144 mc bands. Other projected activities are VHF lectures, Morse practice and technical instruction for those taking the R.A.E. Meetings are on alternate Fridays, the next being on December 11, at the Old Manor House, High Street, Solihull.

Coventry Amateur Radio Society

The society has been successful in obtaining accommodation, for their exclusive use, at 9 Queen's Road, Coventry, and the formal opening was performed on October 12 by their president, who is the well-known Old Timer, Mr. F. W. Miles, G5ML. The Club station, G2ASF, has been installed and operates on the 1.7 to 28 mc bands. Meetings are on alternate Mondays, the next being on December 7, when G2BFT will put on a film show.

East Surrey Radio Club

The October meeting took place at Caterham School, by courtesy of G2AJS, who had arranged an interesting programme of experiments and demonstrations covering such erudite subjects (from the radio amateur point of view) as the behaviour of sound waves, ultra-violet light and micro-waves. The next event is the annual dinner, to be held at the Dinner Gong, Reigate, on December 12.

NAMES AND ADDRESSES OF SECRETARIES REPORTING IN THIS ISSUE

BARNSLEY : P. Carbutt, G2AFV, 33 Woodstock Road, Barnsley.
BIRMINGHAM : F. C. Cook, 67 Regent Road, Handsworth, Birmingham 21.
BRISTOL : N. G. Foord, 71 Brynland Avenue, Bristol 7.
BRITISH TWO-CALL CLUB : G. V. Haylock, G2DHV, 63 Lewisham Hill, London, S.E.13.
CANNOCK CHASE : C. J. Morris, G3ABG, 58 Union Street, Bridgtown, Cannock.
CLACTON : R. J. Appleby, G3INU, 95 Oxford Road, Clacton.
CLIFTON : C. H. Bullivant, G3DIC, 25 St. Fillans Road, London, S.E.6.
COVENTRY : K. Barber, 1 Charterhouse Road, Coventry.
DERBY : F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby.
EAST SURREY : L. G. Knight, G5LK, Radiohme, Madeira Walk, Reigate.
EDINBURGH (LOTHIANS) : L. Stuart, 38 Caledonian Crescent, Edinburgh.
HARROW : S. C. J. Phillips, 131 Belmont Road, Harrow Weald.
LANCASTER : A. O. Ellefsen, 10 Seymour Avenue, Heysham.
LIVERPOOL : A. D. H. Looney, 81 Alstonfield Road, Knotty Ash, Liverpool 14.
MIDLAND : D. Hall, 144 Hill Village Road, Sutton Coldfield.
NEATH and PORT TALBOT : H. G. Hughes, GW4CG/A, 3 Hill Top, Styclewen Villas, Baglan Road, Port Talbot.
QRP RESEARCH SOCIETY : J. Whitehead, 92 Rydens Avenue, Walton-on-Thames.
RAVENSBOURNE : J. H. F. Wilshaw, 4 Station Road, Bromley, Kent.
SOLIHULL (Birmingham) : S. Avery, G4PR, 37 Coppice Road, Solihull, Birmingham.
SOUTHEND : J. H. Barrance, M.B.E., G3BUJ, 49 Swanage Road, Southend.
SPLEN VALLEY : N. Pride, 100 Raikes Lane, Birstall, near Leeds.
SURREY (Croydon) : S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon.
TORBAY : L. D. Webber, G3GDW, 43 Lime Tree Walk, Newton Abbot.
WEST KENT : F. R. Freeman, 1b Queens Road, Tunbridge Wells.

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XTALS: 1, 2, 4 and 5 mc, 10/6 ; 100 kc 3-pin, 12/6 ; 33, 35 and 38 mc, 8/6 ; 1196 Tx with valves and 6450 kc xtal, £1 0s. 0d.; R1125 VHF two-valve Rx, complete, 10/-; miniature VHF Tx/Rx, 10-valve with ant., £2 10s. 0d.; IF/AF Amp./Mod. units, 10/- ; switch units, Type 202, 500-600 mc co-axial line tuning, £1 0s. 0d.; 1KV and 5KV EHT Transformers, 10/6 and 25/- ; 230/12v. 1-amp. Transformers, 5/- ; Masteradio 6-volt Vibrator Packs, complete, 10/-. Carriage extra ; s.a.e. list.—Armstrong, 40 The Oval, Mirehouse, Whitehaven, Cumberland.

WANTED: Batt Rx 12 to 28 mc at reasonable price ; also Coils for R1082.—D. C. Knight, 358 Worting Road, Basingstoke, Hants.

EXCHANGE (or sell) Voigtlander Focussing Brilliant, Heliar f.3.5, Compur 1/500 sec.; exposure meter and amplifier ; telescopic tripod ; filters, etc. (value over £40), for good communications Rx, 10-550m. WANTED: Radiovision Regenerative Preselector ; full particulars, please. — Rev. S. J. Smith, St. Bride's, Cowdenbeath, Fife.

SMALL ADVERTISEMENTS, READERS—*continued*

BARGAINS: 14/28 mc Tx Clapp VFO, 6SN7, 6AG7, 6L6, 807 with p/pack for 105, 255, 350v. stabilised and 650v. to PA, £18 10s. 0d.; V55, RF/IF controls, Top Band coverage, internal p/pack, £13 10s. 0d.; 2-stage Pre. Sel. to match, 3-30 mc, internal p/pack, £8 10s. 0d.; matching speaker, £1 5s.; 40/80 Tx Clapp VFO, 6L6 driver, p/pack with mains meter, push-pull 807's, switched p/pack giving 350, 500, 750v., fully metered, aerial tuner, rack mounted, complete, £20; BC306 Tuner, £1; 1000v., 150 mA p/pack with associated supplies 350, 500, 7.5, 6.3, etc., £10; HY40's, 25/-; 812's, 35/-; TZ40's, 20/-; PT15, 10/6; AR88 speaker, new, £3; 24G tubes, new, 30/-. WANTED: 813's. Bound volumes *QST* 1937, '38, '39, 40, '44, £1 each; July, December '43, January, June 1945, 10/- each; loose, 1946, 1947, 8/- each. *CQ*, September 1948, September 1949, 10/6. *Bulletins*, 1947, '48, '49, '50, '51, 7/6 each. All genuine enquiries answered. Photo of most of this gear in October *Short Wave Magazine*. I want cash; what do you want?—R. Mitchell, G5LH, Croft House, Horbury, Nr. Wakefield.

RME 69 Receiver, £20; Pre-selector DB20, £10; American Tx, 150w., all-band switched, Collins coupler switched and 'scope built in, xtal/VFO phone/CW, £100; HRO coils, GC 30/-, BS 55/-; 6/12v. vibrators, 10/-; American 110v. DC-AC inverter; Tx/Rx 469 mc RT7/APN4, also RT19/ARC4; s.a.e. replies.—Box 1339, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

EDC CONVERTER, 230 DC to 230 AC at 150 watts, £5. Rotaries: PE 94A (for SCR522), 24v. to 300v., 200 mA, 150v. and 12v., £1 10s. 0d.; 12v. to 500v., 150 mA and 220v., 200 mA, 15/-; 24v. to 220v., 150 mA, with filter and relay, 10/-. Unused, guaranteed 813, £2; VCR 522 1¼in., £1; Indicator ID7APN4 with 3BPI, £1 10s.; ASB8 Indicator with all valves, £4; ASB power unit (Hi-Ci), £1; Class-C Wavemeter (needs attention), £1.—Box 1338, Short Wave Magazine, Ltd., 55, Victoria Street, London, S.W.1.

BC221 built into TU5B cabinet with stabilised power/pack and monitor speaker, calibration amateur bands only £23. Condensers: 4 μF, 500v., 4/-; 4 μF, 1000v., 6/-; 4 μF, 2000v., 9/-; all paper type. Chokes: 7H 300 mA, 9/6; 7H, 200 mA, 9/-. Transformers (all 230v. input): 4v. 5A x 2, 12/6; Philips 250-0-250v., 60 mA, with two LT, 7/6; 7.5v. 4A x 2, 4v. 2A, 5v. 3A, 6.3v. 3A, 15/- (tag panels damaged); 4v. 4A CT, 4v. 3A x 2, 11/- (panel damaged); Philips 10-watt amplifier for 200v. mains, £2; Eddystone full-vision dial, new, 12/6. Postage extra.—G4RS, 17 Tudor Avenue, Bebington, Cheshire.

WANTED: *Bulletin*, May/October 1934; *QST* before 1924; most *CQ* 1945/6; *Radio* before 1941; *R/9*.—G3IDG, 95 Ramsden Road, London, S.W.12.

VALVES, Chokes, Transformers, etc.; s.a.e. for list. Parcels of surplus gear containing minimum: 10 resistors, 10 condensers and other small parts. Value more than £2 for 5/-. Five lots for £1, carr. paid.—Ellett, Meppershall, Shefford, Beds.

WIRELESS Publications Wanted.—G3IHM, 67 Higher Croft Road, Lower Darwen, Lancs.

SMALL ADVERTISEMENTS, READERS—*continued*

FOR SALE: R1155 Receiver, as new; also power/pack and output stage for same, 10 gns.; all (or near offer).—Cornerways, Exeter Road, Honiton.

AR 88D, S-meter, manual, mint condition, performance superb. WAS, BERTA. Delivery up to 100 miles, £50.—J. H. Caldwell, G8US, 9 Chanters Road, Bideford, Devon.

BC221 FOR SALE, first-class condition, £25; complete with internal power/pack.—Phone *HAR: 6945.*

VALVES, mostly new and boxed. At 1/-: D1. At 2/6: EB34, 220B, HL23, 37, 59, 43, SP61, 42, ACP4, 215P. At 5/-: EF54, RL37, 12AH7, 6SS7, 28D7, HVR2A, 2A3, EL32, 6G6G, Vi103, 6C8, 956, 12C8, VT50, VT25, KTZ41, 1637, 6SH7, 313C, EBC33, 6SL7, 6SG7, 7V7, CV54, U76, 6K7, 6AC7, 6S7G, 12J5GT, P61, 7475, 6AN5, 955, 15D2, 9D2, BL63, 8D2, 4687, VP23, EF36, EK32, 3V4, 12AU6, 12AW6, 9004, 1X2A, EF50, 6SQ7, 6SK7, 6SA7, 6SC7, 6Q7, 6SN7, 6F6, 12A6, 6J5, 12SG7, 12AH7, 6SJ7, OZ4, 6F8, OB3, 82, 5V4, 5Z4, T31, V1111, VU111, 9002, 9003, 9001. At 7/-: 1LN5, 3B7/1291, 3D6, 1LC6, 1LH4, VU113, KT66, TVO5/12, 6C4, Z77, 717A, 25Z5, UU3, 807, 1625, DET25, 6AG5, MU2. At 10/-: CV90, VS68, 8012, EC91. At 15/-: VT90, 866A, CV228. At 20/-: TZ40, 90CV (PEcell), 8336 (PEcell). At 30/-: 815. At 40/-: 726A, 725A, 813, 931A. Please add 3d. each post and packing.—G. A. Jeapes, 129 Cambridge Road, Trumpington, Cambs.

EDDYSTONE 640, complete with phones and handbook; perfect condition, unused; £20 o.n.o.—J. Raynor, 22 Hadbury Road, Basford, Nottingham.

MAGSLIPS: Ideal beam indicators, six matched pairs, 2in. sender-receiver motors; £1 set, plus carriage.—41 Lichfield Road, Walsall, Staffs.

AN Enclosed Rack, 150-watt bandswitched CW Tx (can be cathode modulated) with separate VFO and push-button relay control unit; buyer collects; £35. Table-top 160-metre and 80-metre CW Tx, internal VFO, £11. 144 mc Crystal Converter, IF28 to 30 mc, £8. 420 mc RT-7/APN-1 Rx/Tx, less relay, £6.—E. Parvin, 19 Fellbrook Avenue, Beckfield Lane, Acomb, York. *(Tel.: 78283)*

MCR1, complete, power/pack, headphones, coils; as new; £5 10s. 0d. Pair U19/23 Rectifiers, unused, 15/-.—Hobbs, 15 Vincent Road, Coulsdon, Surrey.

SCR522 Tx, modified, complete modulator, xtal, £5. Many QSO's on Two. PX4 (2), AT20 (3), 1625 (3), 813 (4). Offers?—Box 1340, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

AMERICAN Carbon Steel Drill Sets, 1/16th to ½-inch by 64ths. Leading U.S. manufacturer; brand-new; boxed; 45/- per set; present-day value £3 10s. 0d. Stands for above 4/6 extra. Hand bench drill, 0-½inch chuck, as new, perfect order.—C. Hall, 43 Cleveland Road, Lytham, Lancs.

WANTED: Class-D Wavemeter, BC348 AC, or S.640.—Pse airmail reply to VR2AS, Box 44, Suva, Fiji Is.

FOR SALE: Valves—6L6, 5/-; DET12, 35T, 808, TZ40, 10/-. T.C.S. meters, 3-amp. RF, 200 mA, 5/-.—Curtis, 27 Weymouth Bay Avenue, Weymouth.

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OZ4A	7/-	6K7G	6/6	12SG7	7/6	EF39	6/6	XP(2v.)	4/-
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5Z3	8/6	6SA7GT	8/6	42	8/6	4D1	4/-	AC6PEN	6/6
5U4	8/-	6SQ7GT	8/6	43	8/6	8D2	4/-	AC5/PENDD	12/6
5Z4	8/6	6SG7	7/6	75	8/6	9D2	4/-	PEN25	6/6
6A7G	8/6	6SH7M	7/6	78	8/6	15D2	10/-	PEN46	7/6
6AC7	6/6	6SK7GT	7/6	80	8/6	R3	8/6	QP25	6/6
6AG5	7/6	6SL7GT	9/-	866A	15/-	D41	5/-	SP61	4/-
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6B8	7/6	6SS7	7/6	9003	6/-	KT2	5/-	VP23	6/6
6C4	8/6	6V6GT	7/6	9004	6/-	KTW63	7/6	VP41	7/6
6C5GT	5/-	7C5	8/6	9006	6/-	U17	10/-	U22	8/6
6C6	6/6	7A7	8/6	954	6/-	U19	10/-	ATP4	4/-
6D6	6/6	7C7	8/6	955	6/-	Y63	8/6	TP22	8/6
6F6G	8/6	7H7	8/6	956	6/-	P2	4/-	TH233	10/-
6G6G	6/6	7B7	8/6	1299A	7/6	MU14	8/6	41MP	7/6
6H6GT	5/-	7S7	10/-	TZ40	37/6	PX25	12/6	42SPT	6/-
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6J6	9/-	12K7GT	8/6	EF55	12/6			6U5G	7/6
6AK5	9/-	12K8GT	8/6	EB34	3/6				
6J7G	6/6	12Q7GT	8/6	EBC33	8/6				
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Incorporating high impedance mu-metal twin-track heads. Two-speed capstan, for tape speeds of 7½ and 3¾ inches per second. Three heavy-duty motors allowing for fast forward and rewind facilities without tape handling. All controls operated by electrically and mechanically interlocked push buttons. Price **£23/2/0.** Carriage free. Send S.A.E. for full particulars. (Available from stock).

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Amplifier: 10" x 6" x 2½" (complete and assembled) **£13/5/0**
Power Unit: 9" x 5" x 2½" **£4/15/0**
TWO UNITS COMPLETE: £16/16/0
(Kit of Parts Complete: £13/5/0)

INDICATOR UNIT TYPE 182A

This unit contains VCR517 Cathode Ray 6in. tube, complete with Mu-metal screen, 3 EF50, 4 SP61 and 1 5U4G valves, 9 wire-wound volume controls and quantity of resistors and condensers. Suitable either for basis of television (full picture guaranteed) or Oscilloscope. 'Scope constructional circuit included. Offered Brand New (less relay) in original packing case at **67/6** (plus 7/6 carr.).

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Brand New in sealed cartons, these contain 6 EF50's, 5 EA50's, 1 SP61, a host of condensers, resistors, transformers, chokes, relays, switches, 7 pots and 5 smoothing condensers. Size: 18in. x 8½in. x 7½in. Only **59/6**, carriage free.

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1 mA **11/6**

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6v. 1 amp. G.E.C.	4/-
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Type RC3/521. 3-speed, complete with 2 crystal heads, **£9/19/6**, carr. free. TRADE SUPPLIED.

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This unit is ideal for conversion for a 'Scope Unit or basis for Midget Television. It contains C/R Tube type ACR10 (VCR193A) complete with holder and cradle, also earthing clip. 1-VR66, 2-VR65, 24 mfd. 550v. wkg. condenser, potentiometers and a varied assortment of resistors and condensers. These units are in new condition and packed in wooden transit cases. The C/R Tube will be tested before despatch. Dimensions: 8½in. x 6½in. x 11½in. **45/-.**

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723 A/B and C/129 Klystron Valves, Philips Trimmers, 3-30 pF. RL18, NR88. Any quantity.

Trans./Rec. type T1403. Brand New (less coils and valves). 70/-, carr. 5/-.

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Complete with 6 valves, 2VP23, HL23 DD, QP25 TP25 and ATP4, aerial rods, I.F. trans. Mike trans. in new condition but less transmitting components and coils removed by M.O.S. **30/-**, carr. paid. (Less valves **10/-**).

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As specified for "Inexpensive Television." Complete with 8 valves VR65 and 1 each 5U4G, VU120, VR92. Only **29/-**, carriage 5/-. Or Brand New in original packing case, **55/-**, plus 5/- carriage.

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15v. (50c) A.C./D.C.	M.I. 2½"	Flush Panel Mounting ...	12/6
20v.	M.C. 2"	Square " "	7/6
150v.	M.C. 2½"	Flush " "	10/-
40v.	M.C. 2"	Square " "	7/6
3000v.	M.C. 2½"	Flush " "	21/-
4000v.	M.C. 2½"	Flush " "	21/-
3500v.	M.C. 3½"	Projection ...	21/-
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MILLIAMMETERS

500 Microamp	M.C. 2"	Round Panel Mounting ...	15/-
1 M/A	M.C. 2"	Square " "	12/6
1 M/A	M.C. 2½"	Flush " "	22/6
5 M/A	M.C. 2"	Square " "	7/6
10 M/A	M.C. 2½"	Flush " "	10/-
30 M/A	M.C. 2"	Round " "	7/6
30 M/A	M.C. 2½"	Flush " "	10/-
50 M/A	M.C. 2"	Square " "	7/6
200 M/A	M.C. 2½"	Flush " "	10/-
300 M/A	2½"	Flush Mounting ...	10/-
500 M/A	M.C. 2½"	Flush Panel Mounting ...	12/6

AMP-METERS

1 Amp.	T.C. 2½"	Projection ...	6/-
3 Amp.	T.C. 2"	Square Panel Mounting ...	6/-
6 Amp.	T.C. 2½"	Flush Mounting ...	10/-
20 Amp. A.C./D.C.	M.I. 2½"	Round ...	10/-
15 Amp.	M.I. (50c)	Projection ...	35/-
30 Amp.	M.C. 2"	Square Panel Mounting ...	7/6

M.C. = Moving Coil. M.I. = Moving Iron. T.C. = Thermo-Coupled.

All Meters are Brand New and in original cartons.

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