The SHORT WAVE Magazine

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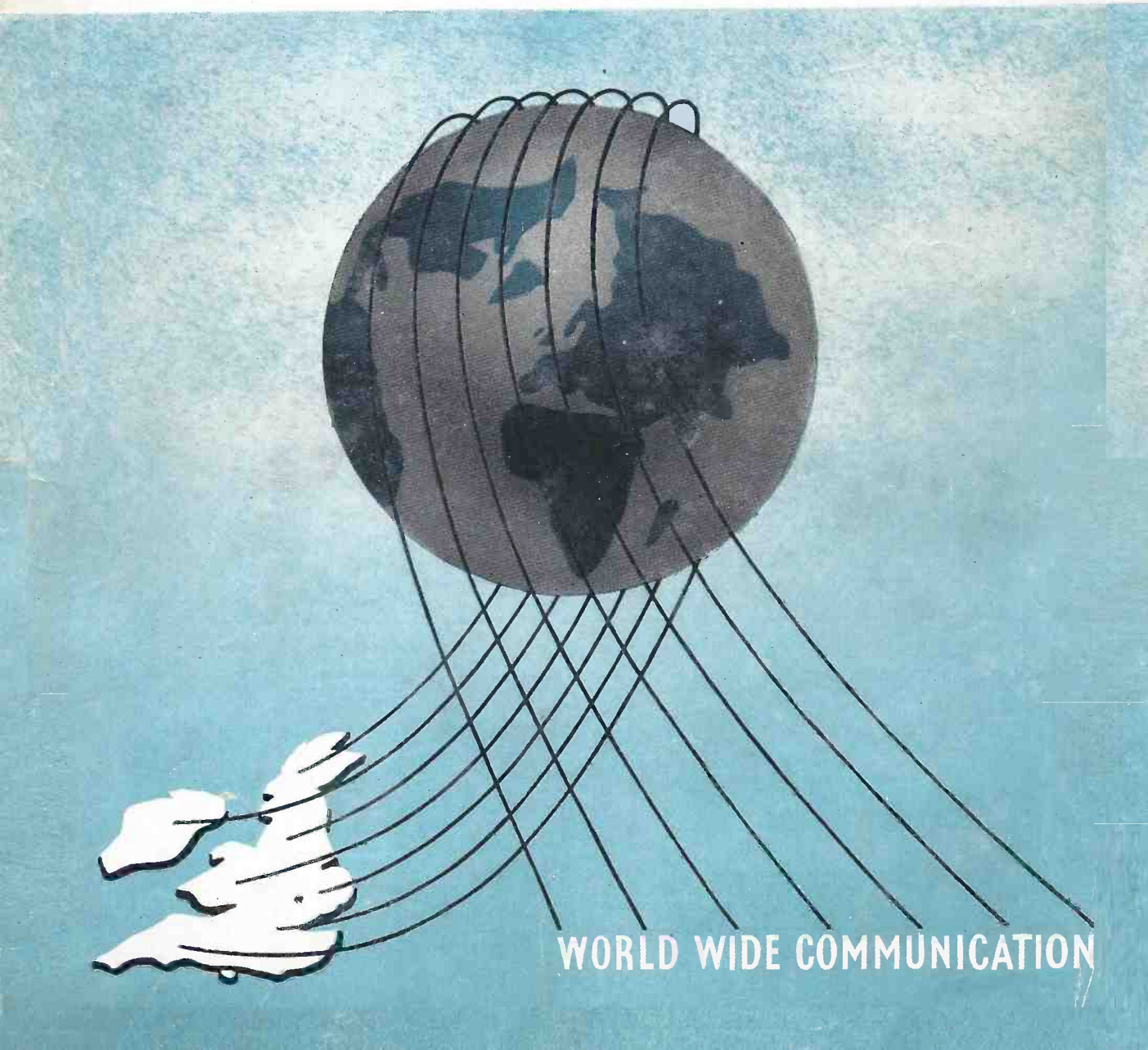

WORLD WIDE COMMUNICATION

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THE *SHORT WAVE LISTENER* ASSOCIATED WITH THIS MAGAZINE IS SPECIALLY FOR THE RECEIVING ENTHUSIAST

FOR THE EXPERIMENTER AND THE RADIO ENGINEER

The SHORT-WAVE Magazine

EDITORIAL

Safety *Periodically, we have to report a dreadful and unnecessary accident, in which an amateur loses his life—or is maimed or blinded—by incautious or careless contact with the HT supply to his equipment.*

Most healthy individuals can take the odd " bite " now and again and think nothing of it. But there are authenticated cases of death having been caused by voltages much lower than mains pressure, and there are often complicating factors such as bodily health and the path taken by the paralysing current which produce dissimilar effects in different cases.

The fact is, therefore, that all who handle gear running voltages much over 200 or so owe it not only to themselves but also to their family and friends not to expose themselves to unnecessary risks. The HT supply units should be boxed in, or if they are built chassis-style stowed away behind earthed wire-mesh screens, allowing for ventilation and inspection. All HT connecting points should be by plug-and-socket assemblies, or made through insulated terminals for HV leads; small stand-offs, with insulated screw terminals fitted, are very suitable.

Other obvious precautions are not to handle the gear with power on and if, as often happens, adjustments have to be made under operating conditions, they should be done with one hand only and the other pocketed. A quick on-off switch, placed so that everyone in the house knows where to find it (and how to use it if an emergency does arise) should be connected so that everything—and that means absolutely everything—goes off when the switch is broken.

All these are common-sense and straightforward precautions. Do you take them?

Austin Forsyth G6FO.

Self-Powered Grid Dipper

PORTABLE GDO USING MINIATURE VALVES AND BATTERY SUPPLY

A. B. WRIGHT (G6FW)

The GDO, either in the HF or VHF versions, has long since been found to be an indispensable instrument at all stations where any sort of experimental or constructional work is done. Designs previously published have suffered somewhat by reason of the fact that, using mains valves and requiring an external power supply, they have not been truly portable. The instrument described here is a calibrated grid dip oscillator which meets all practical requirements in the sense of being portable as well as covering a wide frequency range.—Editor.

THE design of the Grid Dip Oscillator which forms the subject of this article was inspired by the description of the "HF GDO" by J. N. Walker, G5JU in the April, 1951, issue of *Short Wave Magazine*.

The particular features claimed for the writer's version are its portability and independence of power supply, made possible by the use of suitable miniature valves and batteries. This extends the usefulness of the meter, the applications of which were adequately covered in G5JU's excellent series of articles, to tests and checks outside the shack—aerial resonance measurements, for instance—where a connection to the supply mains would be difficult or even undesirable. The instrument has amply repaid, on these grounds alone, the small amount of time and cash spent in its construction.

As in the original "HF GDO," a DC amplifier is incorporated to provide a more positive indication of resonance and improve the sensitivity of the instrument. The use of dry batteries and the choice of suitable valves has also enabled the original circuit to be somewhat simplified and facilitated the housing of the meter in a metal case of reasonably small dimensions.

The GDO is completely self-contained. It needs two 957 acorn type triodes, a 1.5 volt U2 type cell providing filament current, and two 22½ volt deaf-aid batteries in series for HT.

Circuit and Construction

A variation of the Ultraudion oscillator has been adopted (Fig. 1), employing a minimum of components, and giving a very good indication of resonance from the broadcast band down to at least 80 mc. Thus, it has wide application in the Amateur Radio field as well as in television work. (The writer has in fact accurately lined up a TV superhet receiver using the GDO alone.)

The instrument was built into a small steel box obtained on the surplus market, but any metal container of approximately the same size would suffice, as the dimensions (about 7ins. x 3ins. x 1½ins.) are not very critical, being determined mainly by the size of meter used.

The method of construction, layout and wiring are clearly suggested by the photographs, the only points worthy of mention being the desirability of short leads between the tuning coil, variable condenser and the oscillator valve. The HF connecting leads should be in as heavy a gauge wire as practicable to ensure constancy of calibration, particularly in the higher frequency ranges.

The 957 has the advantages of low filament and HT consumption, ready oscillation at the higher frequencies and dimensions small enough to enable an instrument to be made which can be conveniently held in the hand when in use. If difficulty is experienced in obtaining the 957's (the originals of which were again "surplus" stock) use could no doubt be made

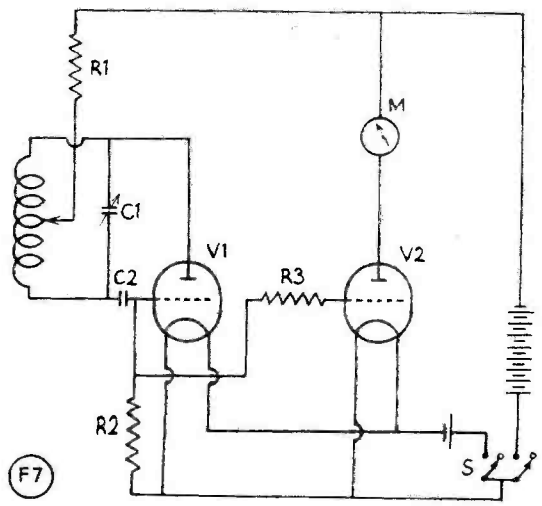


Fig. 1. Circuit of the GDO as constructed by G6FW. It is based on the original G5JU design, but is made self-contained and therefore fully portable by the use of miniature valves and battery power.

of such valves as the 1T4, DF91, DF92 or DF93, all of which are of the button-base type and of low filament consumption. The writer has had no experience with these alternative types and some experimenting with resistor values may be necessary to obtain equivalent results. The use of battery valves has the additional advantage that negligible heat is generated, and the calibration of the instrument thus remains reasonably constant.

The resonance indicating meter used in the original model is a miniature 0-1 milliammeter of 1¼in. diameter. These meters seem somewhat scarce now, but a standard 2in. flush-mounting meter could no doubt be incorporated with but a small increase in the overall dimensions of the instrument if component positions, which are not at all critical, are carefully planned beforehand. The values of the components used have been determined experimentally and will hold good for the type of valve specified. It will be noted that no provision has been made for zeroing the meter, as the value of HT specified will give about .9 mA maximum deflection when the meter is wired directly into the anode circuit of V2 as shown in the circuit diagram.

The tuning capacity is of the miniature low-loss type with ceramic insulation. While its value is not critical, care should be taken to obtain one which has as low a minimum capacity as possible, and a maximum not less than 100 $\mu\mu$F, if a reasonable range is to be covered by each coil. The tuning condenser should be mounted so that both rotor *and* stator are insulated from the metal box, either by the use of insulated bushings, or, as in the original, by using a condenser in which the mounting bolts are let into the ceramic end plate. An insulated flexible coupling is provided to insulate the metal dial from the condenser rotor, a small extension shaft of insulating material being used to ensure freedom from any possible hand-capacity effects.

Table of Values

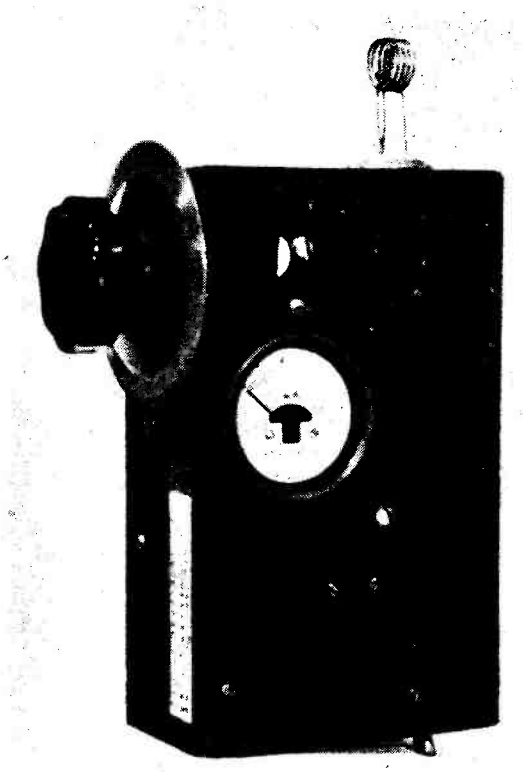
Fig. 1. Circuit of Self-Contained Grip Dip Oscillator

C1	100 $\mu\mu$F variable (*see text*)	R3	1.5 megohms
C2	100 $\mu\mu$F	V1, V2	957
R1	1,000 ohms	M	0-1 Milliameter
R2	220,000 ohms	S	DPST toggle switch

Coil Table

30-80 mc : 5 turns 18 g. Tinned copper, ½ in. d., spaced ½ in. (*see text*).
14-35 mc : 15 turns 28 g. enamelled, ¼ in. d., spaced ¼ in.
5.8-15 mc : 27 turns 28 g. enamelled, ¼ in. d., close spaced.
2.4-6 mc : 57 turns 28 g. enamelled, ¼ in. d., close spaced.
0.96-2.5 mc : 125 turns 36 g. enamelled, ¼ in. d., close spaced.

All coils centre-tapped.



The portable Grid Dipper as constructed by G6FW, using miniature battery valves and incorporated supply cells. The coil shown in position is for the 30-80 mc range.

Miniature Coil Construction

The coil holder is a ceramic button-base valve holder mounted at the top of the metal box, as near as possible to the tuning condenser. The coils in the prototype were home constructed, and consisted of ½in. diameter paxolin tubing, although a more efficient insulating material such as polystyrene would perhaps be preferable. Each former is 2in. in length ; the coil pins are merely three one-inch lengths of 18 gauge tinned copper wire, placed in grooves made in the coil former with a hacksaw blade, each wire being secured in position with Durofix and bound securely in place with several turns of strong thread. The thread is then impregnated with Durofix and left to dry. About ½in. of each coil pin is left protruding from the bottom of the coil, and 3/16in. above the thread binding. The actual windings are of enamelled copper wire, in accordance with the details given in the coil table, each winding being positioned as near as possible to the top of the former. The ends of the windings and

the tapping are brought down inside the the former, out through three suitably placed holes and soldered to the appropriate pins. These coils will be found very rugged in use and calibration remains quite constant despite considerable handling. Each winding should be coated in Durofix or polystyrene cement to hold the turns rigidly in place.

If desired, commercial coils such as the miniature Denco series may be used, although some adjustment of the turns may be required to ensure complete coverage. The coil for the highest frequency range is made self-supporting, and consists of 5 turns of 18 gauge tinned copper wire, ½in. diameter, spaced the wire thickness; 1½ins. of each end of the coil is left, and the two wires are bent parallel to form the coil pins, the tap being a similar length of 18 gauge wire soldered to the centre turn of the coil, and bent down parallel to the other two leads to form the third pin. The coil is smeared with Durofix to hold the turns in position, the three pins being shaped to fit the coil holder.

This latter coil (which is shown in position in the photographs) has also proved very reliable in use, despite the absence of a former, calibration being reasonably constant despite handling. The construction of this coil and its small dimensions enable it to be used in the more inaccessible positions of a receiver or transmitter.

The coils specified in the table cover a range of approximately 960 kc to 80 mc, with an overlap between each range. The bandwidth covered by each coil may, of course, be reduced if greater accuracy of calibration is required, by fitting a smaller value tuning condenser; this would increase the number of coils required. In practice, however, the accuracy of calibration using the specified coils has been found sufficiently good for most practical requirements.

A metal clip secures the 1.5 volt cell in place, the HT batteries being wedged in between the holder of V2 and this clip, as in the photograph. Connections are soldered direct to the batteries, care being taken to avoid shorts between the connections and the metal box.

A metal plate covers the back of the box and is held in place by two bolts.

Testing and Calibration

After construction, the wiring should be carefully checked and a coil inserted in the holder. If the GDO is now switched on, the meter should read fairly close to the zero mark; the lower frequency coils bring the pointer of the meter almost to zero, owing to the greater intensity of oscillation.

Touching the coil with the GDO switched on should bring the meter reading nearly to full scale deflection, thus proving that V1 is oscillating and that everything is in order.

Calibration of the GDO is carried out on the lower frequency ranges by placing the instrument near to a communications receiver and heterodyning the signal picked up from the GDO, care being taken to identify the correct and not the second channel signal. A note is made of a series of such readings, and a calibration graph drawn up for each coil.

Very accurate calibration of the 30-80 mc coil is easily carried out by means of Lecher wires. A pair of 20 gauge tinned copper wires, about 30 or 40 feet in length, are set up in the garden (or indoors if sufficient space is available) spaced about 2" apart. The wires are kept as taut and parallel to each other as practicable, and clear of surrounding objects, each wire being insulated from its support at each end. A single-turn loop connected across one end of the wires is very loosely coupled to the coil of the GDO. If the edge of an ordinary kitchen knife is now slid along the wires, at right angles to them, and in a direction away from the loop, a point will be found at which the pointer of the GDO meter will suddenly move to full scale, indicating resonance. If the coupling between wires and coil is sufficiently loose, the point of resonance will be found to be extremely well defined (or

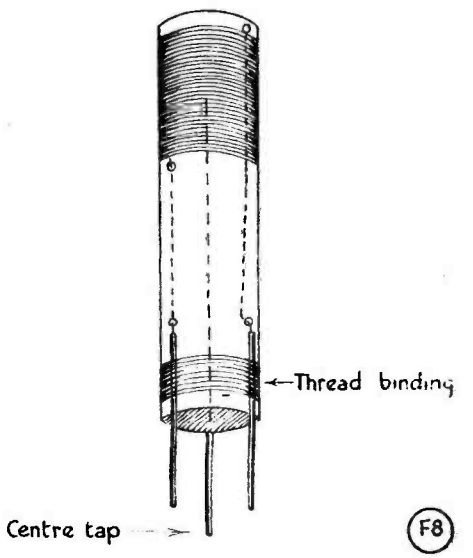
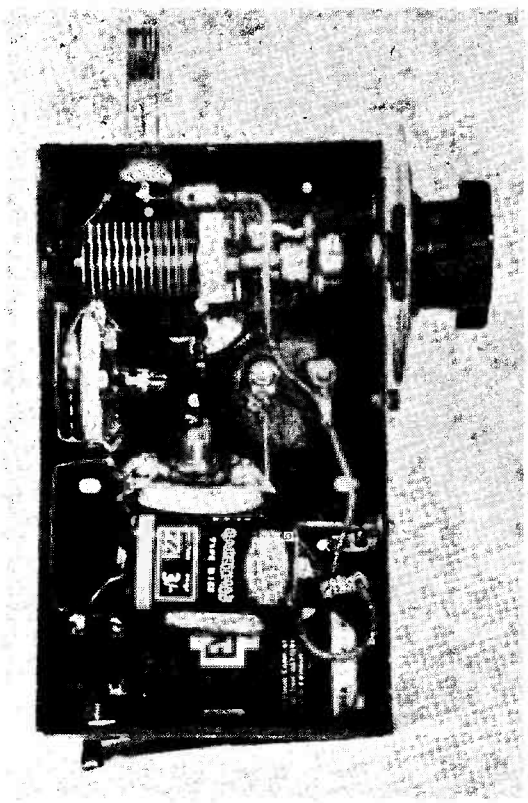


Fig. 2. Showing the construction of the coils for the LF ranges—see text for explanations.



Interior view of G6FW's self-contained Grid Dipper, showing how the parts are disposed in the box.

" sharp ") and should be carefully noted by tying thread or marking against a piece of paper fixed near the Lecher wire at this point. The knife should then be moved along until a second point is found where the same indication of resonance occurs—and on the higher frequencies it will be found possible to obtain yet a further point as the knife edge approaches the end of the wires remote from the GDO.

The frequency to which the GDO is tuned can then be ascertained by accurately measuring the distance, in inches, between the first and second points of resonance, which is equal to a half wavelength. The frequency in megacycles is then 5906 divided by the length in inches. This can be checked, if more than two resonance points have been obtained, thus increasing accuracy.

Although theoretically there should be no insulating material between the two Lecher wires it will assist in keeping them parallel if thin cardboard spacers are placed on the wires every 5 feet or so. In practice no effect on calibration can be discerned.

If care is taken in setting up the Lecher wires, obtaining precise indications of resonance by reducing coupling to the GDO coil to a workable minimum, and measuring the required distances accurately with a good steel rule, calibration will be found extremely accurate. A quick check on calibration can be easily obtained by heterodyning known signals within the range covered.

Although a plain dial is used on the writer's GDO, there is no reason why a calibrated circular scale, cemented to the metal case and used with a suitable pointer should not be fitted. This may, of course, require an instrument container of slightly larger dimensions than that specified, although with suitable positioning of the components, the overall size of the instrument should still permit of convenient handling.

An alternative plan, adopted in the case of the original model, is to fix strips of paper to the back or side of the case, printed with a set of calibrated readings for the bands most used.

Operating Hints

In use care should be taken not to place the coil of the GDO any nearer to the inductance or circuit being measured than is necessary to obtain a definite movement of the meter, or some inaccuracy will result due to pulling. The looser the coupling the greater the accuracy.

When winding a coil to cover a certain band of frequencies, as determined by the GDO, due allowance should be made for the stray capacities which will exist across the inductance when in place in the actual circuit, especially when constructing coils for the higher frequencies. It is, in fact, preferable to connect the coil into the receiver or transmitter, with, if possible, power applied to the valves, as it will be found, especially on the higher frequency ranges, that different readings will be obtained with the valves cold than when used under operating conditions.

It will be noticed that when measuring the resonant frequency of an *oscillating* circuit, the meter will give a downward kick on resonance, even with very loose coupling. This is a phenomenon which can be put to good use when measuring, for instance, the frequency to which the local oscillator of a superhet receiver is tuned.

When attempting to measure the resonant frequency of an aerial, some confusion may arise owing to the existence of a number of meter deflections, due to the absorption of power from the oscillator on harmonics.

Sound Recording

DISC CUTTING, AND PHOTOGRAPHIC FILM RECORDING

PART III

R. E. B. HICKHAM

(RCA Photophone, Ltd.)

GOING on from p.279 of the July issue of *Short Wave Magazine*, the voltage induced in the reproducing head varies in sympathy with the recorded signal. The signal obtained from the tape is extremely small, less even than that for a microphone and hence a considerable degree of amplification is necessary in order to drive a loudspeaker. For this reason also it is essential that the gap width be as small as possible and the tape be in full contact with the head. As was stated before, one full wavelength of a 7,500 c.p.s. tone will be 0.001 inch long. If the gap in the playback head is 0.001 inch wide then it would just span one wavelength and hence *no* signal would be reproduced. It is desirable that the width of the gap should be less than one half wavelength at the maximum frequency desired. For this and the other reasons given above it is obvious that a well-made playback head calls for machining and general manufacture of the highest order.

Erasing Head

The erasing head is in general design very similar to the two other heads already described. Erasure of the recorded signal is effected by passing the tape through a strong AC field. In practice the erasing head is often fed with the same frequency that is used for the bias in the recording head. Silicon steel is often used in very thin laminations for the core to give the very high flux densities needed for complete erasure. A wide gap is also used to increase the efficiency of the head and in some designs a double-gap design is adopted. The whole head should preferably be mounted in a solid copper shield to prevent radiation of the erasing frequency.

It was stated above that the playback and recording heads may be combined in one. In like manner recording and erasing may be done in the same head. One arrangement which has proved quite satisfactory is to use two gaps on the same core, one narrow one for recording and a wide one for erasing. The coupling between the separate recording and erasing coils is fixed so as to obtain the correct values of bias and erasing currents.

Magnetic Disc Recorders

An interesting development in magnetic recording is the disc recorder. This instrument, looking very much like an ordinary gramophone playing desk, enables magnetic recordings to be made on to coated paper discs. These discs can be erased and re-recorded almost indefinitely without apparent loss of fidelity. The paper discs can be folded and even sent through the post like an ordinary letter. The process is similar to that used for recording on tape, and the recording head traverses a spiral track similar to that on a normal gramophone record. It is held to this track by a pin carried on the recording arm which engages in a spiral groove cut in a guide disc. The same head is used for both recording and playback. Reproduction may be either by a built-in loudspeaker or by headphones. The paper disc is about the size of a 10 inch gramophone record and with a turntable speed of 15 r.p.m. gives a 6-minute recording. Erasing is done simply by holding a permanent magnet in contact with the disc for one or two revolutions. The principal use of the instrument is as an office dictation machine.

In this final article we shall consider briefly recording by mechanical/electrical embossing on discs, or Disc Recording as it is generally called, and photographic recording on to film, usually known as Sound-on-Film.

Disc Recording

This method includes the ordinary gramophone record in which form it must be familiar to practically everyone. The important commercial advantage of this system is the ease by which almost unlimited copies can be made from the original recording.

For the non-professional recordist the most successful and convenient approach is the so-called instantaneous or direct lacquer disc recording. A disc of metal, generally aluminium, is coated with a film of a special nitrate lacquer and is rotated under a cutting tool in the recording head. The head is constrained to follow a spiral track and a groove is cut in the lacquer coating by the cutting stylus which is made to vibrate by a current passing through the head, representing the

amplified signal formed by the original sound. The number of grooves may vary from about 90 per inch for standard 78 r.p.m. recording up to about 300 r.p.m. for recordings at 33⅓ r.p.m. The nitrate coated discs used in the process described are sufficiently hard to be played back immediately on the usual type of player, which may consist of a tone arm and pick-up mounted on the same base board as the recording head and playing back through the recording amplifier.

Recording Head

Detailed design varies considerably from instrument to instrument, but basically a disc recorder consists of a turntable and motor unit, a recording head, a transport device for the recorder head, and an amplifier.

Most recording heads in present day use are of the moving iron type using a balance armature. The field magnet will probably be a high flux density cobalt-alloy permanent magnet. The whole structure is very accurately made so as to provide mechanical stability and freedom from flutter. The response characteristic of such a cutter head is determined by the resonant frequency of the mechanical system comprising the effective mass of the moving system and the effective stiffness of the centreing system. Below resonance, the mechanical system will act like a spring ; in other words, a constant applied force will produce a constant deflection of the armature and hence frequencies below resonance will be recorded at constant amplitude. Above resonance, the system becomes mass controlled and a constant applied force will result in a decrease of amplitude of deflection of the armature in inverse proportion to frequency. In other words, above resonance the frequencies are recorded at constant velocity. The transition point or cross-over frequency is generally taken as around 500 c.p.s. for theoretical consideration (see Fig. 1), although in practice, according to the design of the head, it may be as high as 1500 c.p.s. On some professional type recorders, in order to minimise as far as possible changes in the elastic properties of the suspension and damping of the recorder head due to changes in the ambient temperature, it has been found worth while to incorporate a small heating coil and a thermostat in the head itself. By this means the head temperature may be maintained fairly high (about 95°F) and uniformity of response maintained (see Fig. 2). The power requirements for this heater coil will obviously be quite low.

The E.M.I. Model TR/50 Tape Recorder, a good example of a high-grade commercial instrument.

Recording Stylus

In practically all cases nowadays recording stylii are sapphire jewel points. They are ground into a wedge shape so that a shaving of lacquer is removed from the disc. It is essential that the resultant groove be noise free in reproduction. Sharpness of the cutter is therefore very necessary and a burnishing edge is also ground on to the sapphire to polish the groove. The width of this burnishing facet must be kept as small as possible, however, in order to avoid a loss of high frequency response and recording level. In disc recording the width or depth of the groove is conditioned mainly by the dimension of the playback stylus and not by the modulation or by the groove spacing. A good fit must be obtained between the side walls of the groove and the reproducer point to avoid a chattering effect and consequent distortion. To achieve this, the recording stylus must have a suitable tip shape and the depth of the cut must be controlled during recording. The depth should be such that contact with the groove sidewalls is made well below the surface of the disc so that surface

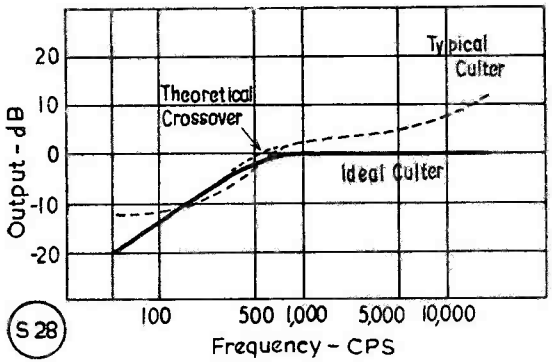


Fig. 1. The recording characteristic.

scratches and irregularities are not reproduced as noise. Contact with the bottom of the groove is not desirable during reproduction hence it is good practice to make the recording stylus smaller than that which will be used for reproduction. Stylii as used today vary from those with an included angle of 70° and a tip radius of 0.002 inch (used for 78 r.p.m. recordings) to those with 90° included angle and 0.001 inch tip radius (for 33⅓ r.p.m. fine groove recording). See Fig. 3.

A sharp cutting tool will remove the thread of lacquer quietly and smoothly. The only noise should be that of the recorder head itself, which "talks" audibly during the louder passages, so that when test or blank grooves are being cut there should be no tearing or scraping sound. By placing the ear close to the disc during recording it should be possible to hear the cutting which should be even in character and produce a steady faint hiss. The amount of noise heard in this manner when cutting a blank groove is a fairly good indication of the amount of surface noise which will exist on the finished disc.

Groove Dimensions

The depth and width of the groove are determined to a large extent by the grinding shape of the cutting stylus, as explained above. In addition the depth of the cut is dependent on the weight acting on the stylus. In most disc recorders this pressure can be adjusted. Also important in determining the depth of the cut is the height above the disc of the pivot of the recording head. This height, also, is often made adjustable. The proper depth of the groove can be found by observing the width relative to the remaining wall. The wall-to-width ratio is generally made 2 : 3, although it varies somewhat with the number of grooves per inch. A shallow groove may result in the reproducer stylus jumping out and damaging the record. On the other hand, if the groove depth is too great the groove sidewalls will tend to be deformed or actually disappear on peak modulation with the result that "echoes" from the adjacent moves may be heard, or in extreme cases the reproducing stylus will break into the next groove. Most recording instruments provide a means for regulating and also holding constant the depth of cut. Professional models also usually include a travelling microscope for actually measuring the wall-to-width ratio. Measurements are of course made on blank or unmodulated grooves.

Number of Grooves per Inch

The number of grooves per inch for any given recording is dependent upon the area of the disc available and the length of recording time required. In general, of course, a standard commercial lacquer disc is to be cut and so the starting groove diameter is fixed. The question of the smallest inner diameter which can be allowed is bound up with what is known as tracing distortion. The reproducing stylus has a rounded tip of finite radius and when the recorded wavelengths are short and comparable to the size of the playback tip, difficulty is experienced in tracing the path of the recording stylus. This is known as tracing distortion, and may reach serious proportions on the innermost grooves at the higher audio frequencies (see Fig. 4). It is generally reckoned that the minimum usable diameter for 78 r.p.m. discs is about 4 inches and for 33⅓ r.p.m. discs about 6.5 inches. The total number of grooves (G) for any recording time (T) at any recording speed (N r.p.m.) will be :

$$G = T \times N \quad \ldots\ldots\ldots\ldots (1)$$

The usable playing radius (R) in terms of the starting groove diameter (Ds) and finishing groove diameter (Df) is:

$$R = \frac{Ds - Df}{2} \quad \ldots\ldots\ldots\ldots (11)$$

The number of grooves per inch will then be :

$$n = \frac{G}{R} \quad \ldots\ldots\ldots\ldots (111)$$

A few, say four, blank grooves should be allowed for run in and out and so the pitch (P) of the groove will be :

$$P = \frac{1}{n + 4} \quad \ldots\ldots\ldots\ldots (IV)$$

Fine groove recordings are made nowadays with up to 300 grooves per inch, but the attainment of high standards with such close spacing demands perfect technique and equipment.

The Recording Disc

The disc used in recording plays a most important part in determining the quality of the eventual result. However, apart from selecting discs which are neither so soft as to cause high frequency loss, nor so hard as to produce a high noise level on reproduction, and employing careful handling, the recordist has little control over his discs. Lacquer disc manufacture has made great strides in the past few years and there are now several reliable brands from which to choose. The shavings which are cut from the lacquer coating during recording need careful handling as they burn easily. All recorders employ some positive method of removing swarf, in general taking advantage of the fact that the thread shrinks as it is cut off and naturally tends to move to the centre of the disc. The more expensive machines employ suction equipment to remove and trap the swarf as it is cut off.

Drive Mechanism

It is impossible to describe here a typical drive mechanism since the details vary so much between manufacturers. It will suffice to say that the turntable is generally a very heavy, accurately machined and carefully balanced unit driven by a powerful speed controlled motor. It is essential that the assembly should be free from vibration, wow or other variations. The carriage and lead screw for the recording head should be positively driven from the motor and provide for adjustment of depth of cut and pressure on the cutting point. The more elaborate instruments also provide for varying the number of grooves per inch which can be recorded. Some models also permit recording from either outside-in or inside-out. Most instruments include provision for groove counting so that recording or reproducing at any pre-selected point on the disc is possible.

Photographic Sound Recording

Sound-on-film recording is almost entirely confined to the cinema industry, and has reached a high state of development. There are fundamentally two types of photographic sound recording: variable area and variable density. In variable area recording the photographic image is formed by full exposure of a variable amount of the sound track, and in variable density recording a variable exposure is made of the full width of the sound track, the variations in each case being dependent upon the frequency being recorded.

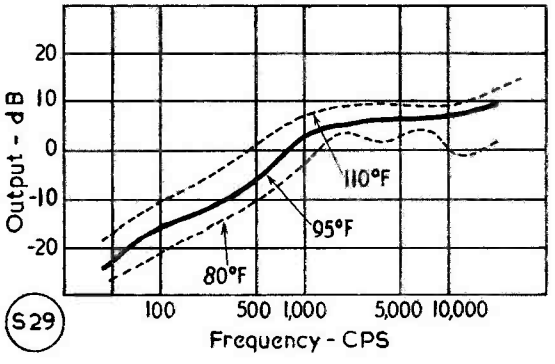


Fig. 2. Change in frequency respon se with temperature.

The relative merits of the two systems have been argued since the beginning of motion picture recording. The principal advantages of variable area recording are :

(1) Low distortion of low frequency or high amplitude signals.
(2) Less critical to exposure and development.
(3) Higher photocell output.
(4) Less ground noise resulting from grain.

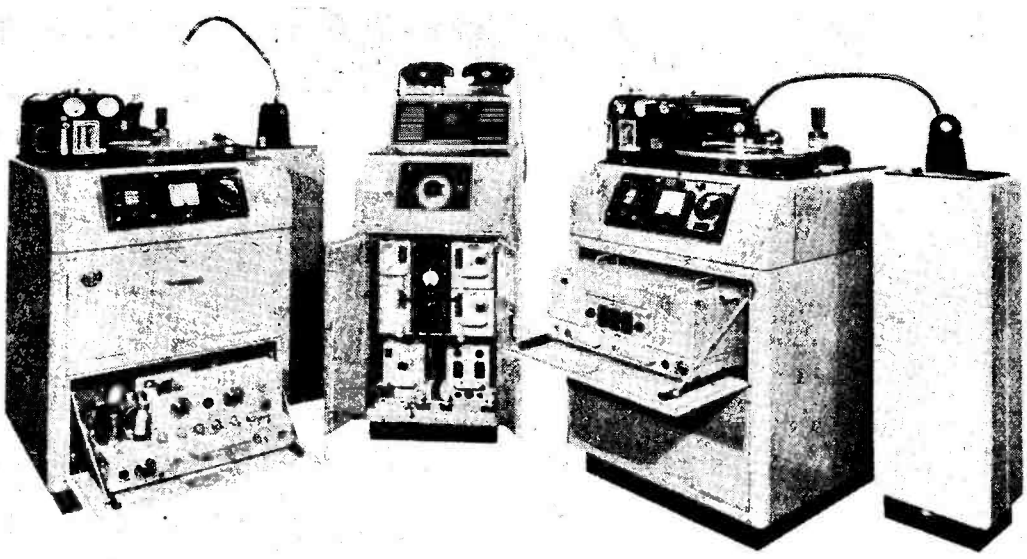
The principal advantages of variable density recording are :

(1) Low ground noise resulting from dirt or scratches.
(2) Less effect on quality of reproduction due to imperfections in the reproducing system.

The two basic methods of photographic recording are each capable of many variations such as bilateral, push-pull, and squeezed track. Each variation can claim some special technical advantage. However, the basic operations in producing any of these tracks are very similar and indeed the same recording machine can often produce several different types of track. In the limited space available here we shall describe one system only, namely, variable area recording.

Recording Optical System

Fig. 5 shows the optical system by which the exposure of the sound track is controlled. The filament of a high intensity lamp (L) is focussed on to a galvanometer mirror (G), passing on its way through a triangular aperture (A) in a mask. By means of the lenses (B) and (E) an image of the aperture (A) is produced at the plane of a horizontal slit (S). When the galvanometer mirror is vibrated by the audio frequency signals the image of the aperture moves up and down across the slit



The BBC's Type D Recorder, as manufactured by E.M.I. Factories, Ltd. This is fine equipment for precision work of the highest order and is extensively used for BBC canned programmes.

so that more or less of it is illuminated according to the position of the image. The illuminated slit is then imaged on to the film by the objective lens. The width of the slit is an extremely important factor in determining the fidelity of the recording. The slit used is approximately 2 thousandths of an inch wide, while its image on the film is approximately $\frac{1}{8}$th of this size. Since all the light passing through the slit is focused on to the film the image intensity is very high, high enough in fact to give a satisfactory photographic image during the extremely short exposure time during which any given point on the film is within the light beam. It will be appreciated that as the film is moved past the image slit a record, of which the envelope shape represents the audio frequencies fed to the galvanometer, will be impressed on the film.

Mirror Galvanometer

The galvanometer may be described as the heart of the recorder and a short description may be worthwhile—though its construction will be familiar to all who have done Vth Form physics. A thin armature vibrates between the pole pieces in sympathy with the audio frequency modulation. A permanent magnet is employed. The moving end of the armature is formed into a knife edge on which rides a duralumin bar carrying the mirror. A thin ribbon of non-magnetic material forms a tension strip for the mirror holder. Due to the physical dimensions of the system a small movement of the armature causes a relatively large angular movement of the mirror. Very little audio power is required to give maximum swing of the mirror, while a flat response is available from about 30 c.p.s. to upwards of 10 kc. Although of delicate construction such a galvanometer is extremely rugged due mainly to the extreme light weight of all the moving parts and the fact that it will stand heavy overload without injury. It is one of the most useful and sensitive instruments ever invented.

Ground Noise Reduction

When a film is run through a sound reproducing system the light from the exciter lamp

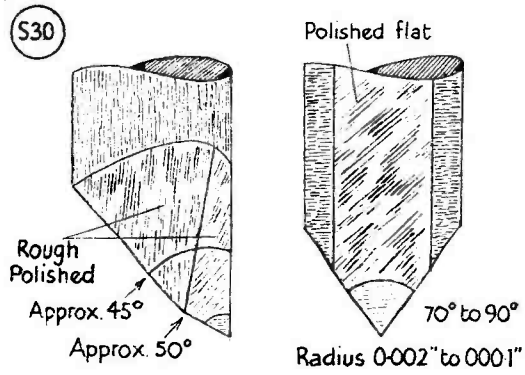


Fig. 3. The shape of a recording stylus (greatly enlarged), as explained and discussed in the text.

after passing through the sound track will be modulated not only by the photographic image on the film, but also by sundry other unwanted variations in transparency. Of these the most objectionable to the listener is that due to dirt and other opaque marks on what should be clear parts of the sound track. It is therefore desirable to have as little clear film in the sound track as possible and the elimination of this feature is known as ground noise reduction (GNR). A special GNR amplifier rectifies a portion of the feed to the galvanometer, so producing a DC bias which fluctuates in accordance with the average amplitude of the recorded signal. This bias operates a separate shutter situated between the mask and the galvanometer. The shutter is then moved so as to permit the illumination of only so much of the slit as is required for the modulation. With such an arrangements a decrease of some 10 dB in ground noise can be realised, which of course means an increase of 10 dB in the dynamic range which can be recorded.

Film Transport Mechanism

In order to obtain high quality results in photographic recording it is essential that the film speed past the slit shall be absolutely constant. To this end most high quality optical recorders employ a magnetic driving mechanism. A copper flange is mounted on a heavy flywheel and reacts with a multi-pole magnet so that eddy currents are induced in the copper flange proportional to the velocity of the flange.

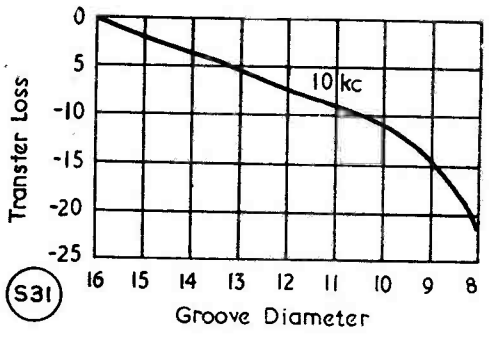


Fig. 4. Representation of losses due to what is known as Tracing Distortion, an important factor in high quality work.

Any steady speed difference between the magnet and the flange exerts a continuous torque, while any mechanical oscillation will produce a component of torque which will resist or damp the oscillation. Attached to the other end of the shaft carrying the copper flange is a smooth drum on which the film rides. The drum and shaft are carried in low friction bearings so that the driving power is derived from the film itself. Slack loops are formed on both sides of the drum to absorb any remaining slight variations in speed.

Film Resolution

Early optical sound recordings were very deficient in high frequency response. Considerable losses occurred in the optical system due to the need to use a relatively wide slit in

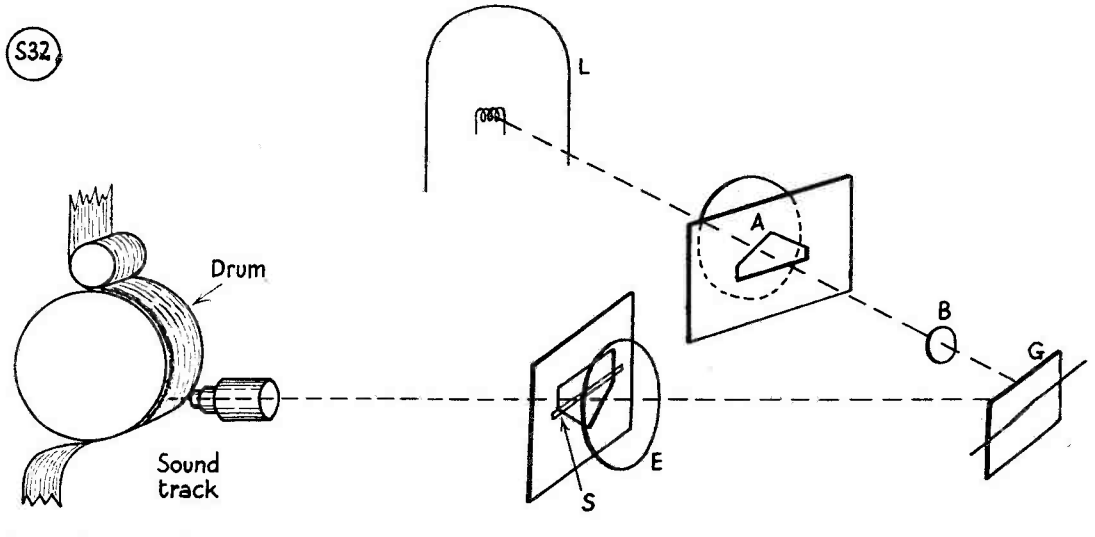


Fig. 5. Diagrammatic representation of the optical system involved in photographic sound recording. This is as for the sound-on-film technique now generally used in recording for the cinema.

order fully to expose the film. Nowadays a slit width of $\frac{1}{4}$ mil. is used. Below this width high frequency response may be limited by the resolving power of the film itself. Due to the grain structure of the photo-active silver bromide in the film emulsion, diffusion has the same effect as that of recording with a wider slit image. Recent improvements in recording have been directed towards reducing image spread due to this cause. Extremely fine grain emulsions have been developed which allow a very high degree of film resolution. Developing technique has been also brought to a high degree of technical excellence. The most striking improvement in high frequency results has been obtained by the introduction of ultra-violet light recording.

Ultra Violet Recording

It is well known in optics that the resolving power of a lens increases as the wavelength of the incident light decreases. With ultra-violet light recording a special lamp and filter system is used to produce a narrow band of light in the range 3,500 to 4,000 Angstrom units. A special optical system is also employed. Film emulsion absorbs ultra-violet very strongly, and so scattering of light inside the film does not spread far. A sound track recorded by ultra-violet light is much cleaner and sharper than a track recorded by normal white light, resulting in reduced ground noise, better high frequency response and reduced distortion.

Re-recording

A large proportion of the sound recorded for motion pictures is re-recorded before making the release print. By this process levels can be adjusted, additional sound effects can be added and the sound track can be edited. This method also enables the benefits of the constant speed recorder to be incorporated. In this connection reference may be made to sound recording on 16mm film. This is frequently done by optical reduction printing from 35 mm film recorded as described above. Direct recording of sound on to 16mm involves a much more serious problem in maintaining a constant speed due to the slower running speed of 16mm film. Consequently it is not possible to obtain the same high standard of recording on 16mm film as on standard stock, and it is usual practice to incorporate volume compression and high frequency attenuation.

Low Power Two-Band Transmitter

DESIGN FOR 20/40-METRE OPERATION, ADAPTED TO TU6 ASSEMBLY

A. H. CAIN (VQ2AH)

There have been many designs suggested round the TU series of boxes, all of which contain numerous useful and very well-made parts. This article describes an interesting adaptation of the TU6 as a low-power CW/Phone transmitter for the HF bands. Even if a TU6 unit is not actually available, our contributor's treatment will suggest ideas for the construction of a similar transmitter.—Editor.

IT has always been the writer's ambition to build a self-contained compact transmitter. While it is appreciated that the use of separate power pack, separate aerial unit, separate VFO, and so on has certain advantages, band changing can become quite a complicated job —the equipment can take up a considerable amount of space, and moving QTH's frequently (as in the writer's case) becomes something of a nightmare. What was wanted was a complete unit of reasonably small dimensions. When a TU6 box came to band, and a day or so later an 832 valve, work was commenced.

Some of the components used in the construction are probably not specially suitable, but radio gear is not easy to come by in Northern Rhodesia and only components available were used. In fact, with the exception of the 832 and crystals, the transmitter is made up from the spares-and-bits-pieces box. The TU6 itself provides a considerable number of items.

Circuit

A 6SK7 as an ECO on 80 metres drives a 6AG7 as a buffer doubler; output from this stage is broad-band coupled into an 832 working as a straight amplifier on 40 metres and as a power/doubler on 20 metres. The 6AG7 may also be operated as a CO, using 80- or 40-metre crystals.

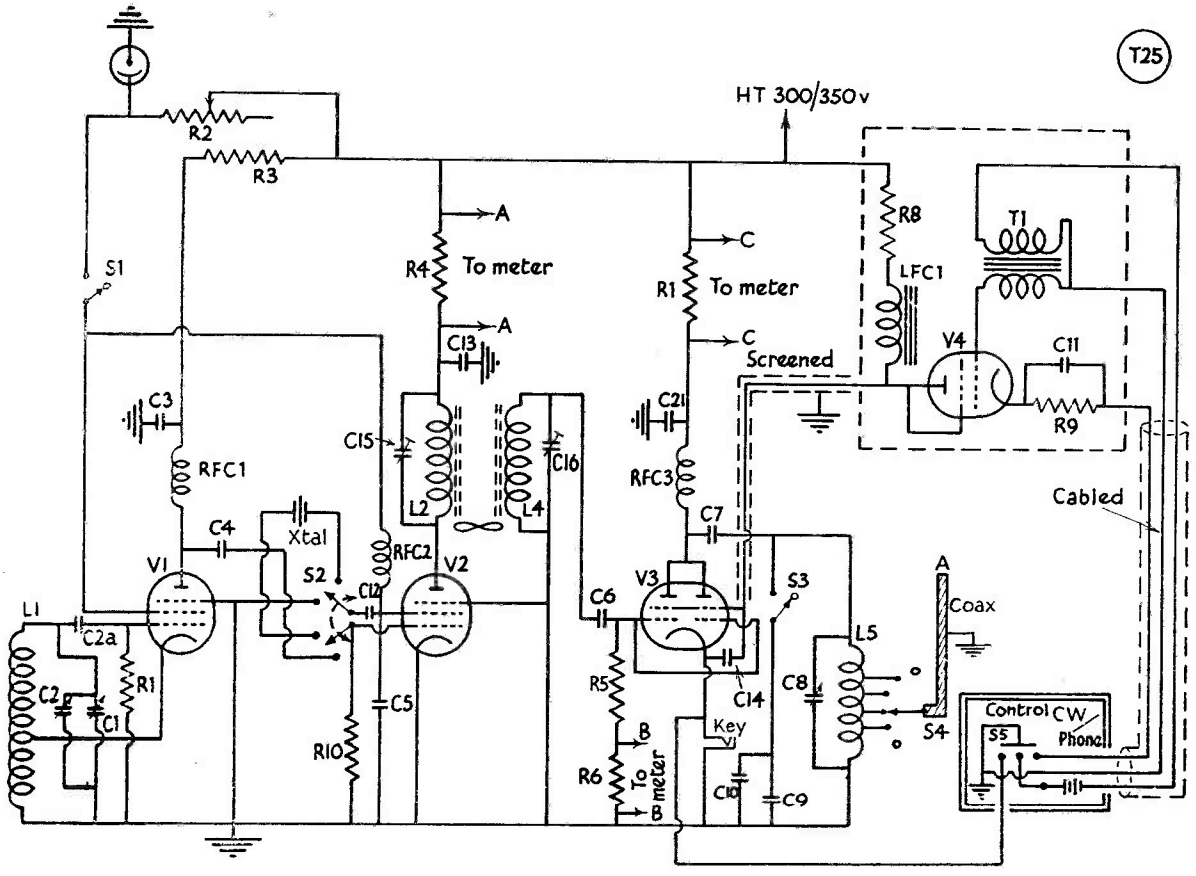


Fig. 1. Circuit complete of the 20/40 QRP Transmitter designed by VQ2AH to utilise a TU6 unit. The PA is an 832 twin tetrode operated with grid and plate sides paralleled, modulation being by screen control using a 6V6.

Table of Values

Fig. 1. Circuit of the 20/40 CW/Phone Transmitter

C1 = M.O. Tuning Condenser in TU6
C2 = 100 $\mu\mu$F midget variable
C3 = .001 μF mica
C4 = 100 $\mu\mu$F mica
C5 = 20 $\mu\mu$F mica
C6 = 100 $\mu\mu$F mica
C7 = .006 μF mica
C8 = PA tuning condenser in TU6
C9 = 50 $\mu\mu$F in TU6
C10 = 50 $\mu\mu$F in TU6
C11 = 50 μF, 50 v. wkg. electrolytic
R5 = 20,000 ohms
R7 = Value depending on meter resistance
R8 = 20,000 ohms
R9 = 300 ohms
R10 = 47,000 ohms
R6 = 100 ohms
T1 = microphone transformer
LFC1 = Midget type audio choke
S1 = Toggle switch
S2 = Toggle or miniature Yaxley type
C12 = .002 μF mica
C13 = .005 μF mica
C14 = .0008 μF mica
C15, C16 = Trimmers in broad band coupler, approx. 3 to 30 $\mu\mu$F
C17 = 100 $\mu\mu$F mica
C18 = .005 μF mica
C21 = .005 μF mica
R1 = 47,000 ohms
R2 = 50,000 ohms variable
R3 = 10,000 ohms
R4 = 100 ohms
S3 = Band switch in TU6
S4 = Antenna coupling switch in TU6
S5 = Yaxley type
RFC 1 & 2 = RF chokes in TU6
RFC 3 = 2.5 mH RF choke
V1 = 6SK7 (metal)
V2 = 6AG7 (metal)
V3 = 832
V4 = 6V6 (metal)
V5 = VR150

The 832 PA was originally tried in a push-push circuit, and while this performed well on 20 metres efficiency on 40 metres was low —as was expected. The half sections were then tried in parallel and work very well. Providing the 832 is heavily biased and plenty of drive is available from the previous stage, the 832 functions quite satisfactorily as a power doubler.

The PA normally operates on 20 metres and for 40-metre work the condensers C9 and C10 are switched into circuit. (These padding condensers are from the TU6.)

Aerial loading is obtained by tapping the

PA tank coil (using the "Antenna Coupling" switch) working towards the "hot" end increasing the loading. A better scheme would be to use 300-ohm tape into a Two-Band Windom, and when tape becomes available this system will be tried.

Power Supply

The power supply is a conventional full wave rectifying circuit. The main transformer is fully shrouded, upright mounting, with 350-0-350 secondary plus 6.3v. and 5v. heaters. As the mains transformer and smoothing choke are in the same compartment as the PA it is preferable to have these components fully shrouded. The smoothing condensers should be 500v. DC working, as the HT off-load rises to approximately 450 volts. A VR150 stabilizes the screen voltage of the 6SK7 and 6AG7, the voltage to the VR150 being adjusted by a variable resistance.

Phone Working

It must be admitted that phone facilities were an afterthought, most of the writer's activities being confined to CW on 20 metres, but for local and semi-local QSO's on 40 metres a single 6V6 modulates the screen of the 832. Audio input is from a carbon microphone. Speech quality is reported as good, but it is also reported that percentage modulation is a bit low. This could be rectified with a speech amplifier in front of the 6V6, but space and milliamps did not permit this. A modulator/speech amplifier is being constructed to plate modulate the 832 (this is being built in another TU) so in the meantime the 6V6 remains as amplifier-modulator and does very well—and will be allowed to remain in the transmitter even when the new modulator *is* built.

Input to the PA is approximately 20 watts on CW. On phone, the input drops to 10 watts due to the necessity for a fairly low screen voltage in order to obtain reasonable modulation. This is another reason why plate modulation will eventually be used. Owing to the lack of a suitable miniature switch for S5, this switch was built into a small box which also contains the 3-volt microphone energizing battery and is connected to the transmitter *via* a 4-way cable. If a miniature switch is available, a place can be found for it on the right hand side of the front panel.

Metering

A single 0-50 mA meter is used to measure: (1) 6AG7 plate current. (2) 832 grid current. (3) 832 plate current. In position 3 the meter is shunted to read 0-100 mA.

Construction

All internal components are removed from the TU6 with the exception of : MO and PA tuning condensers, "Antenna Coupling" switch, Band Change switch. Any very tight nuts or screws can usually be loosened by the application of a few drops of amyl acetate on to the locking compound with which they are smeared—or a touch with a warm iron will usually free them.

The vertical dividing plate in the unit is removed and put to one side. Holes are cut or drilled in the front panel for the: Meter, Crystal-holder, Crystal-VFO Selector Switch, Crystal-VFO On/Off Switch, Aerial terminals. On the rear wall of the unit holes are drilled for : Mains Input, Key leads, 4-Way Cable to CW-Phone Control Box. The cutting out of the latter on the rear wall depends on whether a miniature switch is available for S5.

The vertical dividing plate which was removed is replaced vertically and approximately $5\frac{3}{4}$ ins. from the MO side of the unit.

Two pieces of dural or similar metal are cut, one piece $7\frac{1}{4}$ ins. x $1\frac{3}{4}$ ins., the other piece $7\frac{1}{4}$ ins. x $5\frac{1}{2}$ ins. Two holes for octal valve holders are cut in the narrow strip; these will take the oscillator valve and Buffer-Doubler valve. A solder tag goes under each valve holder's securing bolts, and earth returns for the two stages are taken to these.

A ceramic coil former (L1) $1\frac{1}{8}$ in. dia. is close wound with 22 turns enamelled 18 SWG wire, tapped at 6 turns from the earthed end. (If a different diameter of coil former, or SWG of wire, is used it is suggested that the correct tapping point be found by trial.) This coil is mounted at one end of the narrow strip, then the valve holders are put on facing downward, *i.e.*, the valves are inserted from under the strip and are operated inverted. It is possible to do a fair amount of wiring before bolting the strip into the unit, but using a smallish type soldering iron no difficulty will be encountered even if all the wiring is left until later. The strip is mounted between the vertical dividing screen and the bar which holds the MO tuning condenser and on a level with this bar.

The larger piece of metal has two holes cut; one to take an octal valve holder for the rectifier valve, the other being shaped so that an 832 valve will drop through. Several smaller holes will need drilling for various

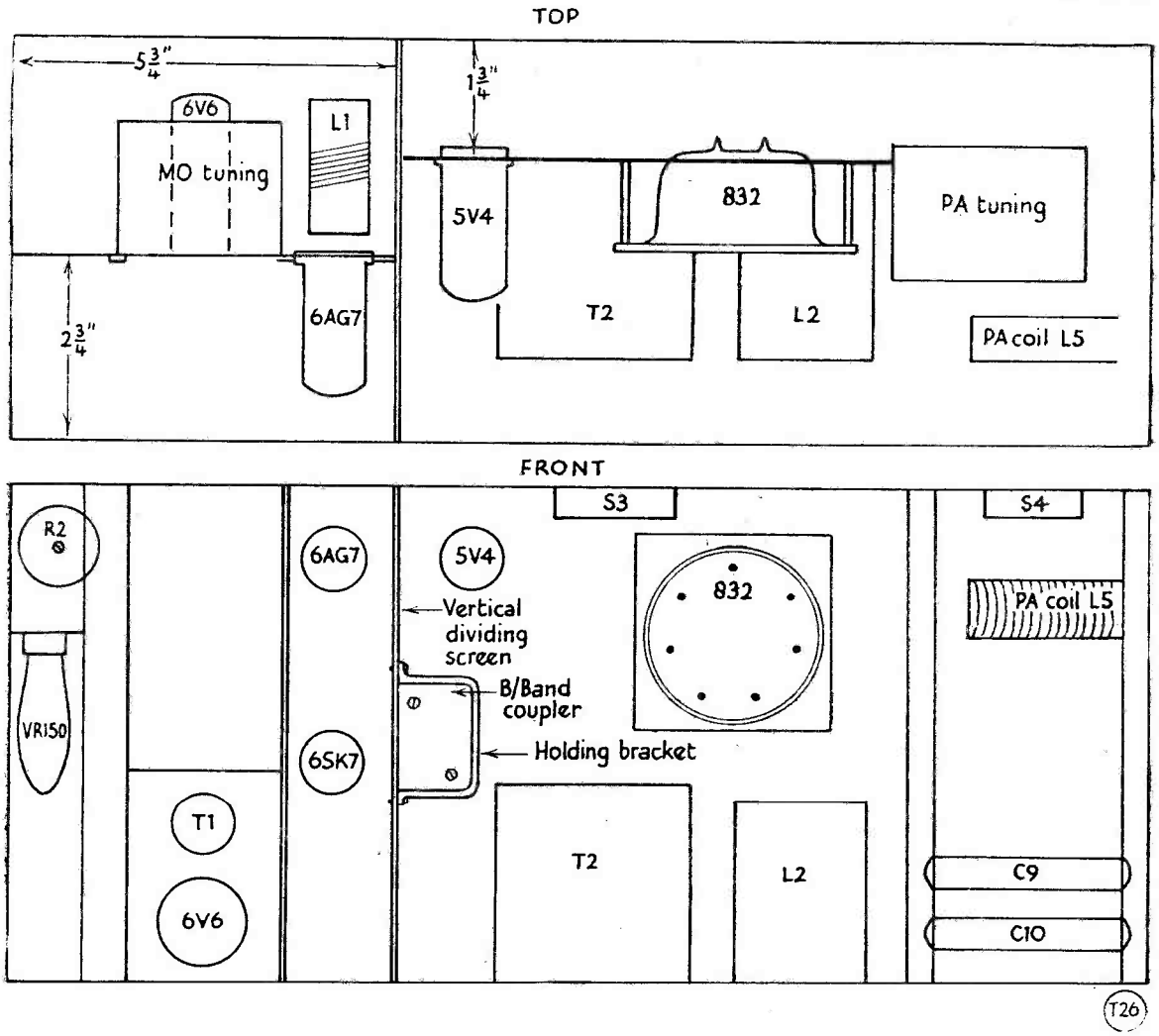


Fig. 2. Sketches showing levels of screens and general layout of the main components on the TU6 chassis; as indicated here, all the space is carefully used.

leads, *e.g.*, leads from mains transformer to rectifier and HT leads from smoothing choke. The positions of these holes will depend upon the power unit components used, so are not given here. The octal valve holder is again mounted facing downwards, as the rectifier valve also operates inverted. The 832 valve holder is supported on pillars approximately 1 in. long. This holder is under the metal plate and facing upwards, as the 832 valve operates upright and is inserted from the top of the unit.

The transformer and smoothing choke are next bolted to the plate, and underneath. The exact position will depend on the size of these components, but in any case they are mounted as close to the rear wall of the unit as possible. This section is now bolted in to the unit approximately $1\frac{3}{4}$ ins. from the top, and the heavy work is completed.

Drive Section

The oscillator was now wired up to the circuit. No snags were encountered and with 250v. on the anode, and 150v. on the screen the note on the station receiver was T9. A Clapp was originally tried; plenty of drive was obtained, but as no silver mica condensers were available for the construction, drift from cold was considerable. Anyone who favours

the Clapp oscillator and has the components can use that circuit, with the knowledge that drive will be ample and possibly T9x obtained. The VR150 valve holder, and variable resistor, are mounted on brackets and secured under the MO tuning condenser. The Xtal holder and Buffer-Dblr were next wired up as far as possible before the Xtal-VFO selector switch was mounted. (The switch used by the writer is rather a large one and completely obscured the valve holder and Xtal holder tags.)

The broad band coupler was secured in position on the vertical screen by means of a clamp. The present coupler is a modified commercial type. The original coupler was home constructed from the *Short Wave Magazine* design. This was very efficient, but difficulty was experienced in screening the coupler completely and a commercial type was therefore installed, making a neater and more compact job. Grid drive was a bit down (approximately 4½ mA), but this is considered satisfactory. A coupler made up in

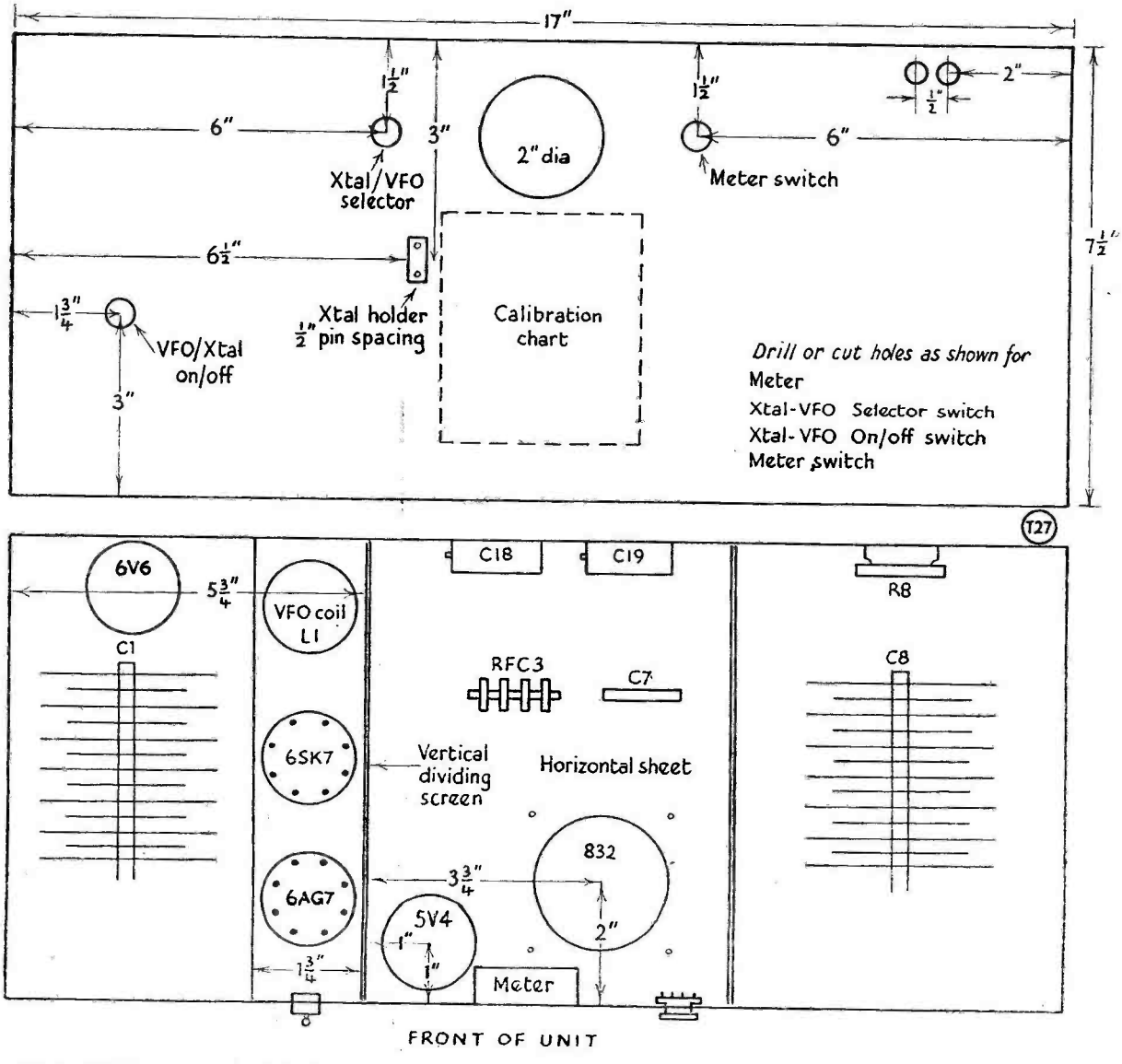


Fig. 3. Further constructional details and placing of components. This is a front-panel and top-chassis view and is not to scale.

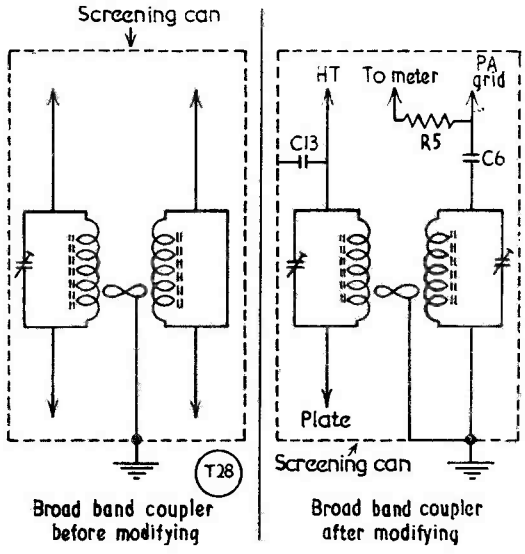


Fig. 4. Modification to the commercial broad band coupler, as mentioned in the article by VQ2AH. C6 is 100 $\mu\mu$F ; C13, .005 μF ; and R5 20,000 ohms.

an 1143 IF transformer would be very satisfactory from a screening point of view, could be made very efficient, and would be much cheaper.

The pins of the coupler used were cut off, and the various leads soldered direct ; this was necessary as the coupler was too long to fit vertically under the unit.

The modifications to the coupler consist of :—

(1) Earthing one end of the secondary winding.
(2) Wiring inside the screening can of the coupler the
  (i) Plate by-pass condenser, C13
  (ii) The grid resistor R5
  (iii) Grid condenser C6

The 832 stage was next wired. A point to mention here is that all AC heater wires were screened and earthed, as were any long runs of HT lead, *e.g.*, from power pack into oscillator compartment.

The PA tank coil is wound with 9 turns of 18 SWG on a $1\frac{1}{2}$ in. diameter ceramic former ; turns are spaced approximately $\frac{1}{8}$ in. The coil is mounted under the PA tuning condenser, as close as possible to the "Antenna coupling" switch contacts. The padding condensers C9 and C10 are also mounted under the PA tuning condenser, which is modified by removing 5 plates from the rotor and 5 plates from the stator.

The aerial terminals are fixed on the top right hand corner of the front panel ; these are of the spring loaded type, as used on a lot of American equipment.

Only one of the sections of the band change switch is used, that nearest the PA valve. The section in the oscillator compartment can be left disconnected. The band switch wiring must be as shown, *i.e.*, from plate of 832 to switch and then to padders, *not* from plate to padders and then to switch.

The PA choke RFC3 and condenser C7 are mounted on the top of the horizontal plate carrying the PA, and as near the 832 as possible.

Setting Up

Assuming that the VFO is working correctly and that coil size and windings have been adhered to, it will be a simple matter to adjust condensers C1 and C2, so that by monitoring on the station receiver the VFO signal can be set to 3.5 mc. By setting C1 (MO Tuning B) at some round figure on the dial and vernier, say 20.00, C2 can be rotated until the beat note is heard on 3.5 mc ; making C2 variable is only to assist calibration of the main scale.

Switch meter to read 6AG7 plate current, and with an insulated trimmer tool adjust C15 of Broad Band Coupler for a dip in meter reading. (6AG7 plate current is approximately 20 mA.) This dip will be very slight, but should be observable.

Switch meter to PA grid position. With plate and screen voltages removed from the 832, close the key and adjust C16 for grid current as shown on meter. Adjust for maximum, then return to C15 and adjust slightly, again for maximum grid current. Lift key, apply plate and screen voltage, switch meter to PA plate current position, press key and rotate PA tuning C8 for a dip. Off-tune plate current is well over 80 mA so the tuning of C8 should be done as quickly as possible.

With the band switch in the 40-metre position, plate current should dip to approximately 10 mA. On 20 metres the dip will be to about 15 mA.

The aerial coupling (tapping) is dependent on aerial length, and if the tappings are used as shown the loading can be increased from Position 1 to 6 until the PA loads to approximately 65 mA. An RF meter in the aerial will be helpful in adjusting loading for maximum output, although with a half-wave aerial and the RF meter near the transmitter, RF indication will be low.

Having determined that the transmitter as a whole is working correctly, the broad band coupler should be adjusted to the centre of the bands in use.

The crystal oscillator should now be tried. Selector switch to "Xtal" automatically disconnects VFO from the Buffer Grid, but leaves the VFO running. This has been found useful in calibrating the VFO by beating against various crystals. In addition, a 3.5 mc frequency control crystal (with modified base) is used to pin-point the lower edge of the bands.

Phone Working

After some months of CW operation it was decided that for local and semi-local QSO's, phone would be more convenient for technical "natters."

One valve was about the maximum permissible, both as regards space and milliamps from the power pack. A 6V6 was therefore selected to screen modulate the 832. Audio input to the 6V6 is from a carbon microphone. A 3-volt dry battery energizes the microphone and is housed in a small box along with a Yaxley-type switch S5. Incidentally, a large number of wireless control units are on the surplus market even now, both British and American types, and an ideal unit is that designed for the "Command" equipment.

Constructing Phone Section

A piece of dural or similar metal approximately 3 ins. x 3ins. is needed. A hole to take an octal valve holder is cut in this, centrally, but as near one edge as possible; this is necessary so that the 6V6 (metal type) will clear the rear of the MO tuning and the rear wall of the transmitter. The microphone transformer is also mounted on this plate. The 6V6 components are grouped round the valve holder. The plate complete with transformer, 6V6 and associated parts is secured to the two bars which support the MO tuning condenser.

The modulation choke is a miniature AF component and is mounted on the rear wall of the transmitter, in the oscillator compartment next to the vertical screen.

Normally the 832 screen voltage is 200 volts for CW—moving the switch S5 to "Phone" completes the cathode circuit of the 832 and 6V6 and energizes the microphone. The 6V6 plate and screen current through resistor R8 produces the extra voltage drop for phone working and 832 screen voltage goes down to approximately 120 volts. It will be noted that the 6V6 is operated as a triode, as recommended for this type of modulation. The addition of a voltage amplifier and audio gain control in front of the 6V6 would be advantageous, if a miniature valve (6AG5, 6AK5) was available and mains transformer ratings not exceeded.

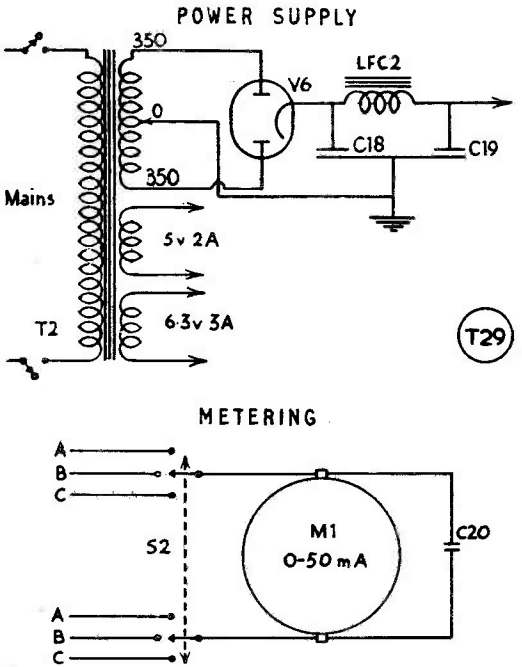


Fig. 5. Power supply unit and meter connection for the QRP 20/40 Transmitter. C20 is .002 μF; S2 is a Yaxley switch; M1 an 0-50 mA meter; T2 the mains transformer; LFC2 a suitable smoothing choke; C18, 8 μF 500v. DC electrolytic; C19, 16 μF rated as C18; V6, suitable rectifier.

Setting up for Phone operation is simple. First, adjust for CW and maximum loading, then put S5 to "Phone" position; plate current and RF current will drop to about half the former value, which is correct.

Final Notes

No case is available for the transmitter, and in any case in the interests of heat dissipation would not have been used. The perforated top and bottom screens *are* used, the bottom screen having two rubber feet fitted on the rear corners to raise the back of the unit so the whole thing stands horizontal. The top screen will need some cutting done, to clear the meter case and switches.

No fantastic results are claimed for the rig as described here, although DX has been worked on 20 metres when the input was down to 15 watts to the power doubler. If anyone works VQ2AH, they'll know it's that 832 doing its stuff, as it is the only transmitter now possessed at this station.

DX COMMENTARY

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

VE1EA

AS might be supposed, this is practically going to become a 21 mc commentary for a while. The opening of the new band has given a wonderful impetus to some of the DX-chasing types who were becoming a little jaded and tired of life, and as many of them remark, it *is* a Real Event. We have not had a complete new band presented to us since we were *so high*, and now—even if its arrival is somewhat belated—we really have some fresh territory to explore.

There is hardly a letter in the bag this month that does not make some reference to 21 mc, so we must obviously deal with it first, and at some length. The other bands will then have to be "squeezed" in accordance with the remaining space, but the 3.5 and 7 mc bands are hardly mentioned this month.

CALLS HEARD, WORKED AND QSL'd

The DX on 21 mc

The band was opened in due form at 0001 BST (or slightly before!) on July 1, and immediately treated us to a wonderful display of short-skip. In the South we heard GM's at S9 plus, and had no difficulty in working GD, GI, GM and GW in the first few minutes. Strangely enough, we have very seldom noticed such good conditions for local working since then.

G8KP (Wakefield) sends in a Marathon entry showing that he has worked roughly twice as many countries on the band as the average score of the others, but apologises for his "low" score on account of lack of time! His first QSO on Fourteen was with I1RY, followed up by the locals. On the second day he managed ZS6, ZE, EK, ZC4, VQ4, OQ, PY, W2, KP4 and KZ5, plus sundry Europeans. New ones added after that were 5A, JY, HK, HZ and still more Europeans, amounting to a total of 33 countries. The aerial used for all this has been a two-element 14 mc beam, "in any position."

'KP comments that all the contacts have been short and snappy, with everyone afraid of missing something new on the band. The whole thing is rather like a contest, and the demand for QSL's will be heavy.

G3CMH (Yeovil) found the DX better than on 14 mc, and worked OQ, PY and ZC4. G2BP (Chatham) is not yet on, but has heard W1, 2, 3 and 5, as well as OQ, OD, ZB1, ZE, EK and PY. G2BJY (West Bromwich) claims the first YI-G contact (with YI3BZL) and also worked ZE, ZC4, VQ4, 5A, HZ, PY and the locals. Heard, but not yet worked, was such nice stuff as ZD9AA, CT3, JY and much of the usual DX. ('BJY also sends a list of commercials heard, and asks whether it is a shared band after all. In theory it is not—but can you imagine these types shifting from their nice cosy spots until they are blasted out of them? (Most of them do nothing but send V's, anyway, to "keep the channel open.")

GC3EML (Jersey) is active on the band and should be in much demand. He has already worked 17 countries and heard many more. G2YS (Chester) is on the air again, and has worked ZC4, W4, PY and LU already.

G8OJ (Manchester) has stuck exclusively to 21 mc, and has been rewarded with 24 countries, including most of those already mentioned. He, too, has heard ZD9AA but has not worked him. G5FA (London, N.11) asks why all the active stations huddle

together instead of spreading out over the 200 kc. (We also should like to know the answer to that one).

G5BZ (Croydon) thinks 21 mc will be very interesting, and has raised about 16 countries. Got-aways were ZD9AA, HK3CK, JY1OG, HZ1MY and a few others. G3FXB (Hove) has been diverted from the band by his newly-acquired 14 mc phone, but has worked KP4, PY, W, VQ4 and ZC4, to mention a few. He comments on the outstanding signal from W2AJR, even when no others are audible. We, too, have noticed this, and imagine that the man has an Aerial System!

G3DO (Sutton Coldfield) has not been very active and has only worked five stations—but they were all in different continents! He heard ZD6DU and ZD9AA. G3ABG (Cannock) has been on, but was rather disappointed. He seems to have been hearing the stuff but not working it.

G5VT (Bishops Stortford) heard ZD9AA calling CQ on an empty band (1430), but he was soon snapped up by ZS, OQ5 and the like. 'VT worked ZE3JJ and had his QSL by first post on July 4! He wonders when we shall hear the first signal from Australia (don't we all!)

GM6LS (Edinburgh) took a listen "among the commercials," and the first signal he heard was G3BAD — he wonders whether this has some hidden meaning.

Overseas News — 21 mc

Still exclusively on the subject of 21 mc, we have a few interesting DX reports. ZE3JJ (Salisbury) says the ZE's were very pleased to welcome the arrival of the G's, as they have been waiting on the band for years! He claims the first "legitimate" ZE-G contact, having worked G5VT at 1650 on July 1. Other active ZE's on Fourteen, he says, are 3JO, 3JP and 2JV. ZE3JJ, too, is mystified by the way the stations crowd into a few kilocycles instead of spreading themselves out; and he also makes the interesting point that hitherto the PMG out there has not required a knowledge of Morse, so there are many ZE's on phone only. They, of course, find the new band most dull, as we are on CW only. (But they *could* learn the code . . . . ?)

ZS2AT (East London) made his first 21-mc DX contact with your Commentator in person and thinks it might be the first ZS2/9 (July 2). But he finds the band pretty shocking out there.

From KV4AA (St. Thomas) we learn that ZL1HY is active on 21 mc, and also that W4COK made a rapid WAC with PY, CT3AN, HZ1MY, HB9FU, VK4HR and KZ5AW—total time, just over four hours (1800-2230). He tells us, too, that HB stations are limited to frequencies between 21250 and 21450 kc.

Countries on Fourteen

After some research, we have compiled the following master-list of all countries which have been either worked or heard on 21 mc, *in the U.K.*, since July 1. Here they are: CN8, CT1, CT3, DL, EA, EI, EK, F, FQ, G, GC, GD, GI, GM, GW, HB, HK, HP, HZ, I, JY, KP4, KV4, KZ5, LU, OA, MI3, OD, OE, OK, ON, OQ, OZ, PA, PY, SM, SU, TA, VE, VQ4, W, YI, YU, YV, ZB1, ZC4, ZD6, ZD9, ZE, ZS, 4X, 5A and 9S. That makes 53 of the best—and doubtless there will be another score or so about by the time this reaches you in print.

DX on the 14 mc Band

Twenty has suffered slightly from the excitement about the new band, but we can't say that the QRM has been noticeably less. In any case, conditions have been very poor except for the bright patches which have become such a feature of these lean years.

The Expedition of the Month was, of course, provided by HZ1MY, who turned up for a couple of days as 4W1MY and proceeded to operate with the very best conveyor-belt technique, both on phone and CW. The behaviour of the Clots made him very hot under the collar and he probably went off the air sooner than he intended to (just as he did from FL8MY). We heard him on phone, trying to work a ZS whose call-sign he didn't get right. Everyone joined in the conversation until he came back with "Listen, all you guys, I'm going to work this ZS. Sort yourselves out and use some sense. I don't care if I never work any of you, and if you call while I'm in QSO I will not reply and will not QSL." That apparently cooled off the mob for a little, but later on he was heard saying "What's the good of all you guys calling while I'm transmitting? And don't call on my frequency, or you will *not* get a QSO." But still the Clots kept it up, both on phone and CW. (After all, if you never even listen for the DX chap and keep shrieking your head off all the time, how do you know what he's saying about you?) However, most of the well-behaved ones who used the zebra crossing managed to get their QSO's, and very snappy ones they were.

Other Expedition news is that EA9DC will probably be in Rio de Oro some time in September, and that VS5ELA should already have been active (late in July). Latest news at the time of writing was that he hoped to open up on the 24th or 25th from Brunei.

Conditions for Central America and the Caribbean seem to have been good most nights, and G8KP mentions KG4AF, T12TG (on 14010 every day at 2300), T12PZ and others. From various other parts he collected TA3AA and ZA2AB on CW, plus HZ1TA, YI3BZL, VQ4FCA and EA8AE on phone. He heard FO8AB on at 0900 (14050).

G3CDC (Nottingham) worked 4W1MY and also W5AGB/FM.

21 MC MARATHON

(Starting July 1, 1952)

STATION	COUNTRIES
G8KP	33
G8OJ	24
G2VD	20
GC3EML	17
G6QB	17
G2BJY	16
G5BZ	16
G5FA	10
G3FXB	7
G3ABG	6

giving QTH as "Fletchers Ice Island"—what the heck? EH5IF was another funny one, said to be on a Spanish ship 600 miles out from Gibraltar. G2YS mentions FP8AM (1520) and FF8AN (0750). G3HZL (Isleworth) managed VP5, LZ and TA, but some "notable Gotaways" were HH3L (2300), HC2SR (0000), HP1LA (2230), ZP5WW (2240), TG9AQ (0130), FY7YB (2240), ET3R (1745) and FB8BB (1800). What a pity the Gotaways are usually more interesting than the QSO's!

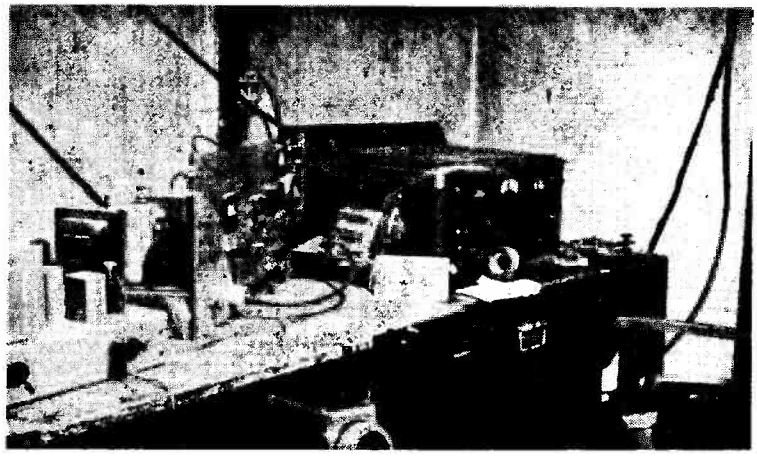
G8OJ was one of the lucky ones with W4IMY—thanks to a well-timed call off his frequency. G5FA runs a sked with VP9GX at 2130 GMT, who will be pleased to work other G's afterwards. Others for 'FA were CT2BO, KV4AA, TA3AA, KZ5LL, HZ1TA (phone) and 3V8AN.

G5BZ heard FM7WH calling "CQ F." A return call of "CQ FM" brought him back! Other nice ones were CR6PI (0600), ZS2BC (0545), AP2K (phone) and 4W1MY.

G3HDL (Liverpool) wormed out FF8AS, but missed on FB8ZZ about the same time (1635). EA9's, TA3 and VS2CR have helped the score along. 'HDL also managed to exchange several overs with a UA3 without disclosing his call-sign, and the UA3 was good enough to explain that CQ WSEM meant only "HA, LZ, U, YU, YO, DL8 and OK." We shall have to try moving to Canterbury to boost our score up a little.

G6TC (Wolverhampton) collected KG6AF (0100) and EA9DC (0830) plus the usual W's. G3TR (Southampton) has found Twenty pretty poor, but got his card through from W6HQH/KM6, now known as KM6BE. He wants four more Brazilian states on phone for his WAB, having acquired the Matto Grosso (PY9).

G3FXB has been mostly on phone, and finds that one tends to get *better* signal reports—doubtless owing to most people's touching faith in the S-meter as a precision instrument! Pick of the log are CM9AA, IS, LX, LU, MF2, VP6FO and 6WR, VQ4, YI and the like. CW yielded only FQ8, JA, KH6, ZS3 and 4W1MY, the Gotaways being AP2L, HI6EC and VQ5CY (all phone).



ZC1AZ as operated at Amman, Transjordan, for the two years to January, 1950. An 813 PA produced the RF on 14 and 28 mc, CW and Phone, with a pair of 805's in the modulator. Receiver was an SX-28, aerials various (including a beam for Ten), and the operator of ZC1AZ is now G3GTA (Bath).

G3IGZ (Eltham) was pleased to notch up 4W1MY, and other good ones were PJ2CC, TI2PZ and 2TG, KZ5, VP9 and a lot of miscellaneous stuff. 'IGZ heard VP1AA and a few VK5's coming in round about midnight, but no luck with them yet. (He must be one of the very few to enter Yemen in the log before ever working a VK!)

G3ABG worked MP4BBD for a new one, and collected EA9DC last month, but nothing startling came his way. Phone raised a couple of LX's and a mysterious MD5AP. He lost his main pulley during a recent storm, and now his five outside aerials are tied to the XYL's clothes-line . . . .

G5VT thinks many people have overlooked the fact that VS1 and VS2 now count separately; he found VS2DB putting in a good signal round about 1700, using 65 watts. 'VT was another snapper-up of 4W1MY on phone. Two peculiar CW calls heard were G3PGH/MM and 2Z2L — both called CQ but did not come back.

G6QX (Hornchurch), on his midnight spells, worked PJ5FN, YV5AB and 5BZ, VP8AT (South Orkneys), PJ2CC and FY7YB. G3CMH (the Yeovil Club) worked SU3JQ, who was a member of the club when at home; he now runs 10 watts to a midget Tx. Phone brought in HZ1TA, PY's, TA and YI, as well as ZD2TTE and ZP5DC. All ZP calls, by the way, have been changed now that Paraguay is numerically divided into districts.

G2DPY (Shoreham) went over to an extended double Zepp and found results much improved. He had never worked W7 before, but got 10 or them in a month on the Zepp, as well as 16 W6's and VE5, VE7, VE8 and the rest. Best of the month were FB8BE (1620), ZD6DU (1630), CR6PI (0745), OQ5, OY, IT and CE.

Unusual CW Contact

G3IRE (Portslade) finds the band erratic, but managed 67 countries in his first year with 25 watts (although he *had* hoped for a DXCC). Recent ones were KG4AF, YI, VK, KV4, and he had a chat with FP8AJ, who was in VE3CCK's shack and said he would be active from FP8 after August. 'IRE says his most interesting QSO since being licensed was with W8EKK. After enquiring whether his keying was OK, the W8 disclosed that he has lost the use of his hands and "speaks" the dots and dashes into a special voice-control relay equipment, his XYL tuning the receiver and making other adjustments as required. In other words, he enunciates the Morse characters. A solid QSO lasting for about an hour and W8EKK gave a detailed description of his equipment. He could use phone,

of course, but prefers CW on occasions. Another of those gallant chaps who have succeeded in overcoming a physical disability.

G3CMN (Hastings) reports his best as being FB8BE, VS7YL, CE5AW, AP2K, ET3Q, CP1AE, YV5BJ, ZD6DU, FI8BK, VQ5CK and quite a few more. He runs a 132-ft. Zepp running roughly E-W, and makes the fourth Marathon entry from the Hastings district.

G8FC (Locking) rakes them in on both phone and CW, his best being CE3NG, CO8MP and LX1DO (phone) and HS1WR, KG6ACJ, VK5DP and ZA2AB (CW). Gotaways were YK1AH, OY2Z, FP8AM, HH3L, YP2FC, HC2OS and VQ8CB—a nice-looking lot! G6LX (Croydon) clicked with 4W1MY and FP8AM.

G2NS (Bournemouth), who was driven out into the garden last month, has now been driven back into the house for re-decorating duty and still sends a *nil* report!

GM2DBX (Methilhill) is rapidly establishing a reputation as the Phone Wizard, and reports QSO's with ZK1AA, PJ5FN and HR1SO for three new ones. CR4AI and HC1FG were also worked.

G3GUM (Formby) says the band has been so bad at times that a W2 would have been DX, his only DX catches being CR4AD, KV4AS, CE5AW and OX3SJ, with ZC2MAC as Star Gotaway. G2AJ (Biggin Hill) had a little phone session and emerged with VP7NM, VP9BC/P, YN1AA, CP1BK and HI6EC.

The Overseas Mailbag

CN2AJ is President of the Tangier Radio Amateur Club, and informs us that the International Administration has now licensed the local amateurs with calls from CN2AA to CN2AZ. EK1CW, for instance, is now CN2AP, and the Club call is CN2AL.

A VQ5 correspondent tells us that the active stations in Uganda are now VQ5AU, 5BVF, 5CB, 5CK, 5DQ and 5DM. VQ5CK is going to VQ4; VQ5BVF and 5CB are at present on leave in the U.K.

VS2DB writes in to say that he operates (from Penang) on most days between 1430 and 1600 GMT —14120-14180 kc phone. He is always searching for U.K. contacts—particularly GI's.

ZE2KQ (Buluwayo) is ex-GM2FWK, and is at present on CW only, although phone is coming up soon. DL2SR is also G3IDR, so he was a little mad when a friend in DL2 told him that he had heard "G3IDR" on the air on 20-metre phone. The genuine one is not yet licensed for Phone. Incidentally, he was suspicious about OD5AB, but will doubtless know by now that the OD5's are all right.

DL2SU has just opened up, and enters himself at the bottom of the Marathon table. He will be in DL2 for two years, and was a little hurt when a DL6 told him that his note sounded too good for a British-built amateur Tx . . . DL2SB is a Radio Club (7 Armoured Divisional Signal Regt.) and has been working a lot of G's. He asks us to state that his QSL's will soon be ready and will be sent out in bulk.

Pleasant Topic

No fewer than three people tell us about 9B3AA this month. They are G5BZ, G3GUM and DL3FM, and all confirm that he is absolutely genuine, that he sends out cards (sometimes by direct air mail) and—according to 'GUM—that he is a "nice friendly soul whose ham ethics are above reproach." He runs only 10 watts.

A lot of news of the 80-metre band comes in from a good friend who, unfortunately, insists on remaining anonymous. He tells us that the folk with the highest totals on the band should be DL1FF, G8JR and G6ZO (all of whom also remain veiled in mystery). Our correspondent has 66 confirmed and awaits cards from four more. Some of the more interesting ones mentioned as being on the band are MP4BAE, AP2K, YI3BZL, CX1FY, LU's, ZB2I, CT2BO and IS1AHK.

General Patter

The recent Danish Jubilee Contest produced lots of contacts, but very few logs were sent in to the organisers. The full summary of results, received from OZ2NU, reveals the following interesting facts: G8KP was the highest scorer outside Denmark, with 322 points. OH2YV and OK1HI were second and third. G5XY was the second British station, being placed seventh in the general list.

Although foreign stations sending in their logs lamented that there seemed to be very few Danish stations active, figures show that even the highest scorer —G8KP—worked less than half of those known to be on the bands.

FOUR BAND DX TABLE

POST WAR

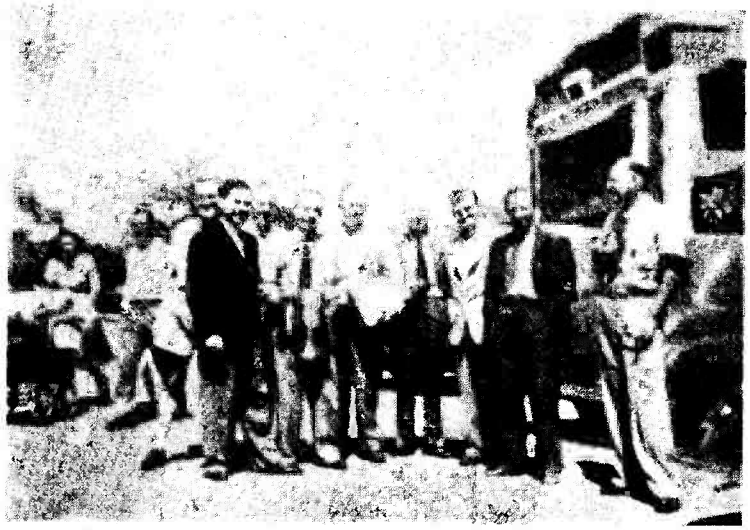
Station	Points	3.5 mc	7 mc	14 mc	28 mc	Countries	Station	Points	3.5 mc	7 mc	14 mc	28 mc	Countries
W2QHH	501	93	92	210	106	210	G2BW	262	24	57	144	37	150
G6QB	490	51	94	208	135	226	G8VG	259	34	76	123	26	140
G2AJ	433	42	81	192	118	211	G2YS	249	40	45	124	40	138
G5BZ	415	54	89	208	64	212	GM2DBX	229	5	31	112	81	132
G2VD	405	42	80	175	108	183	G3GUM	218	31	38	148	1	159
G6LX	392	58	56	172	106	194	G6TC	215	17	58	112	28	120
G5FA	365	33	111	148	73	163	GM3EDU	197	37	41	96	23	116
G3FXB	341	48	94	160	39	168	G3FXA	193	22	46	117	8	124
G6QX	326	47	82	141	56	160	G2HKU	185	4	48	119	14	129
G6YR	303	19	43	140	101	160	G3FPQ	168	41	19	101	7	107
G3ABG	286	35	79	142	30	149							

Small prize for the Father of All Clots, encountered by G3GUM. This one, hereinafter known as The Blot, battens on a nice piece of DX and calls him endlessly, all through the Nice Piece's various contacts. He starts by signing I1CMG, then changes his call to something else (OE, DL and the like). G3GUM has called him by his collective call-signs and given a few words of pained surprise—and he replies, too, with "R AR" and then goes on with the mad work. What *can* one do with Things like this?

WAZ MARATHON, 1952

Station	Zones	Countries
G5BZ	35	136
G2VD	34	115
G3FXB	34	113
G6QB	34	109
G8FC	34	100
G2DPY	33	102
G3FXA	33	90
G6QX	32	86
GM2DBX (Phone)	29	86
G3DOG	29	75
G6YR	28	77
G3CMN	27	55
G3GUM	26	84
G3FPQ	26	66
G2BW	25	85
G3TR (Phone)	24	70
G3ABG	23	81
G3BDQ	23	66
G5FA	22	68
G5GK	17	24
G3HDL	15	51
G3IGZ	14	45
G2BAM	13	46
G3HZL	13	41
G2CMQ (Phone)	13	28
G6TC	12	36
G3FPK	11	31
G2BJN	10	37
G2VJ (Phone)	8	12
G3IHI	4	20
G4QK	4	7
DL2SU	2	14
G3GVY	2	9

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



Some members of the Northern Rhodesia Amateur Radio Society after presentation, at Nkana, of the "Wally Pope" Trophy to VQ2NS, winner of the N.R.A.R.S. Birthday Contest. Left to right: VQ's 2DT, 2DC, 2HA, 2NS (holding Cup), 2HW, 2JM, 2IM, 2AH (author of an article in this issue), and 2QC. The N.R.A.R.S. active membership now stands at 37, mainly licensed operators, but distances make a large get-together difficult. Close contact is, however, maintained airwise by regular Sunday morning meetings on 40-metre phone.

Does It Matter?

G6QX says "I seem to remember a contributor jibbing at some of us counting Russian Zones in the 1952 Marathon and suggesting that 36 is all that should be counted. My reaction is that we should not take Marathons, ladders and so on too seriously—after all, they promote friendly rivalry and encourage activity.

"If we get too serious about it all, we may have the situation where we will be sabotaging each other's stations to gain our ends . . . ."

We quote this piece of wisdom because the last-named event has actually occurred in one authenticated instance. Not in this country, we hasten to add. But it just shows that a spare-time hobby *can* turn into a full-time obsession. We are of the opinion that competitive ladders and suchlike are popular with most people, *not* for the purpose of showing what a good score they have, but for finding out how others are getting on (and, therefore, how their own achievements stand by comparison). Opinions invited.

Signs of the Times

It is a slightly depressing thought (as well as rather a shock) that the FCC are said to be considering the following carve-up of the 21 mc band, for U.S.A. amateurs: *Phone*: 21000-21100 and 21350-21450 kc; *Novice*: 21150-21300 kc; *FSK*: 21100-21350 kc. This goes hand-in-hand with the proposal to allocate 7 mc as follows: *Phone*: 7200-7300; *Novice*: 7175-7200; *FSK*: 7000-7200 kc.

Other territories suggested for opening to *FSK* are 3500-3800 and 14000-14200 kc!! In other words as *CQ* observes, this means "Teletypewriter Jinglebells in all exclusively CW parts of 80, 40 and 20." Certainly a sign of the times, constituting a serious threat to amateur occupancy of these bands.

The above are, of course, only notices of proposed rule-making and will obviously be the subject of much scrutiny and discussion before anything happens. They are, however, worthy of note by all concerned—and that means all of us.

Certificate Issues

Two more to gain WNACA are G3CVG (Wakefield, No. 6) and GW4CX (Flint, No. 7). All certificates awarded under the

rulings appearing in this space in our June and July issues have now been sent off, and we are open to receive as many claims as readers care to put in. Parchments will be posted and cards returned within a few days of receipt of the claim. *See* the panel on p.288, July, for necessary details.

And this seems the right place to draw attention to the fact that in the Prefix List on pp.282-283 of the last issue, you should read ZD6 for Nyasaland, and not as given. Apologies for this one having been allowed to slip through.

Contests

The CQ DX Contest is being fixed for two week-ends in November, but at the time of going to press we have not got the final details. The All-European DX Contest is settled, the dates being December 6-7 (CW) and December 13-14 (Phone).

In next month's issue we hope to announce definite dates for another series of *Short Wave Magazine* Top Band Trans-Atlantic Tests. We are assured, once again, of the support and organising capacity of Stewart Perry, W1BB. He considers that the Tests should be continued right through until the sunspot cycle reaches its peak, and we heartily agree. We are not yet convinced that the Top Band was not even better in 1946 than it was in 1951!

And on that thought we leave you. Next month's deadline is **first post on August 13,** and the following one will be first post on *September 10.* Address everything to "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. Good Hunting 73 and BCNU.

EXCITING LF CRYSTALS

Rocks ground for frequencies around 75 or 100 kc sometimes refuse to take off, for no apparent reason. G3CVO has found that one cure, with both Pierce and straight CO's, is to insert an RF choke in series with the cathode resistor and remove the by-pass condenser. If then the circuit will not fire, the crystal is a dud.

PORTABLE/MOBILE IN SWEDEN

Arising from the Old Timer's comments in the July issue, SM7BOA (Lund) writes that he has fitted his Ford Vedette for operation /PM on 144.77 mc. A 24 mc overtone crystal is tripled in a 6AG7 to drive an 832 as a push-push doubler taking 8-9 watts, modulated by a pair of 6AQ5's. The aerial is a bi-directional two-element beam, fixed 20 ins. above the roof of the car, and the receiver a 6AK5 RF, ½-6J6 mixer, 6AK5 IF and 6C4 oscillator into a battery receiver, to save the load on the car accumulator. HT for both Tx and Rx is obtained from vibrator-converters. Results have been very satisfactory. Driving along the coast road near Lund, SM7BOA can work across the 25 miles or so to the OZ's in Copenhagen quite easily, and in the course of many tests carried out with SM7JA and SM7AEB over distances up to about 10 miles, it has been found that built-up areas, and even high buildings, affect results very little.

NEW SOUTH AFRICAN ORGANISATION

We are informed that a new national society for South African amateurs is being organised, with the prospect of many members transferring from the old S.A.R.L. (South African Radio League). The first steps were taken in Durban early in July, and the new organisation will probably be known as The Radio & Television Society of South Africa. It arises from the formation of local radio societies, like the Durban Radio Club, which is now to take over the QSL Bureau for all amateurs in Natal. The idea is to federate these Clubs, and to break away from the S.A.R.L. If the support expected is forthcoming, IARU recognition will be sought in opposition to the S.A.R.L.

CARDS IN THE BOX

We are without forwarding addresses for the stations listed below, for which we are holding card(s) at the Bureau. Please send a large stamped addressed envelope, with name and call-sign, to: BCM/QSL, London, W.C.1—which is a full and sufficient address from any part of the world, guaranteeing delivery of G and SWL cards. If publication of the call-sign/address is required in our "New QTH" feature, and subsequently in the *Radio Amateur Call Book*, that should be mentioned when claiming the cards. As the G department of our QSL Bureau is cleared at regular fortnightly intervals, there may be a few days' interval before the cards are sent off.

G3AJL, 3FY, 3GUU, 3HUQ, 3IDQ, 3IEG, 5PN, 8AG, GM3DBK, 3HZX.

XTAL XCHANGE

If you have a crystal, with fundamental or harmonics in any of the amateur bands, which you wish to exchange for one of some other frequency, it can be offered in this space free of charge if sent us in the form shown below on a separate slip headed "Xtal Xchange — Free Insertion." Negotiations between interested parties should, of course, be conducted direct.

G2FCA, 26 Northolme Gardens, Edgware, Middlesex. Has QCC Type P5 crystals 7002, 7025, 7069, 7185, 7275 kc and Brookes Type S 7009 kc, all certificated. Wants similar types for frequencies in 3.5 mc band.

G3FNZ, 28 Canadian Avenue, Catford, London, S.E.6. Has crystals 1845, 1902, 7125 and 7250 kc. Wants frequencies 7000-7100 kc.

SWL, 1 Hillington Road, Edgeley, Stockport, Cheshire. Has crystals 2230 and 2950 kc, 3/4-in. pin spacing, and FT243 types, ½-in. pins, 6500, 6600, 7175, 7600 and 7775 kc. Wants frequencies for 3.5 and 7 mc CW bands, in ½-in. or 3/4-in. mounting.

Construction and Testing of Audio Amplifiers

SOME OF THE PRACTICAL CONSIDERATIONS

PART II

J. N. WALKER (G5JU)

The first article in this series appeared in our March issue. Here, the author discusses the construction of small high-quality AF amplifiers for domestic use and outlines simple methods by which faults can be traced.—Editor.

ALTHOUGH greater liberty can be taken with equipment used purely for audio frequency amplification, as opposed to radio frequency work, nevertheless a certain amount of care is called for to ensure a thoroughly satisfactory and reliable job. The points which require looking after are dealt with in the following paragraphs.

Layout

It is wise to choose a chassis of fair size for the particular equipment envisaged, rather than to try and cramp all the components together. The output transformer should be well separated from *(a)* The input circuit to avoid instability, and *(b)* The mains components to avoid hum being induced. Because the iron-cored components are inevitably heavy, the chassis should be of a sturdy, rigid type—thin sheet metal which flexes when the amplifier is moved will eventually lead to trouble.

The valves must have reasonable separation and follow in natural order so that the first stage is well away from the final stage. The output transformer should be conveniently near the output valves. If the amplifier is enclosed in a cabinet, ample ventilation should be provided.

Choice of Components

For high reliability, it is wise to choose new components of reputable make. Ex-Government surplus components can, of course, be pressed into service, but since probably they will have been manufactured many years ago and very likely stored under conditions far from ideal, it is strongly advised that such components be thoroughly tested before being included in newly-built equipment. In particular, condensers which have developed only a " slight leak " can sometimes alter the operating conditions drastically ! Where used for anode-to-grid coupling, only condensers possessing extremely high insulation—which means a hundred megohms or more—should be chosen.

Valveholders also should be known to be reliable. A single poor contact between a valve pin and its socket can lead to all sorts of trouble, often difficult to locate and perhaps eventually blamed wrongly on the valve itself. In fact, quality and reliability should be the keynote throughout.

Wiring

All connections should be soundly made. Soldered joints are much to be preferred and due care should be taken to avoid dry joints. Incidentally, that does not mean using an excessive quantity of solder, as is only too frequently seen, but it does mean making sure the surfaces to be joined are really clean and using correct grades of solder and flux. A common cause of dry joints is the removal of support from the joint before the solder has quite set.

It is important that all " earthy " connections are of extremely low resistance — such leads should terminate in soldering tags, the latter then being firmly bolted to the chassis (using washers). Just twisting the wire underneath a nut or under the head of a bolt will not do. (Elementary perhaps, but still often done.)

It is advisable to use screened leads for some of wiring on the input side, partly to maintain good stability but mainly to prevent the pick-up of hum and noise. Stability is also assisted if all components and all wiring carrying signal currents are well separated from other parts and wiring, and from each other. The other wiring can well be carried out with PVC insulated wire, and, if desired, it can be bunched together to obtain a neater appearance.

Even the best resistor develops a very small noise voltage and this may be greatly increased if excessive heat is applied when soldering the lead-out wires—there is also the danger that the marked value of the resistor may be permanently changed. Condensers may suffer through the solder running on an internal joint or from damage to the insulation. An open circuit is bad enough, but a short circuit may bring about damage to other components and valves.

Controls

The controls, or at least those likely to need frequent adjustment, should be conveniently placed, be arranged for fairly short wiring and present a neat external appearance. Potentiometers should be of good quality (definitely not surplus) as any noise introduced from one in poor condition will be magnified in each succeeding stage.

Testing

Testing is largely a matter of what equipment is available for the purpose. If the tests are to be comprehensive, an oscilloscope and a variable audio oscillator are required and as many of those who construct amplifiers for home use will not be in possession of these instruments and also because the subject would require treatment at some length, it will not be pursued further here. Suffice to say that lack of testing equipment is all the more reason for the construction of a published design, the prototype of which has been thoroughly tested and which can be expected to function well from the start. The hints which follow apply to any amplifier, bearing also in mind that, with new equipment, there is always the odd case here and there where peculiar effects are experienced and the reader may wish for assistance in tracing the fault. It is assumed that a testmeter is available, preferably reading both AC and DC—without such a meter, little can be done.

The ear will prove the first and last judge of results—if quality is poor, including perhaps some frequencies markedly overstressed or absent, volume insufficient noise or hum in evidence, the ear will detect that something is wrong, but a meter will be necessary to ascertain the reason for the trouble.

It is difficult to be definite about possible faults or to tabulate them in any consecutive manner. For example, a valve which has lost emission will affect both quality and volume, but the same apparent result will pertain if a bias resistor is of an incorrect value—it is easy to mistake a colour coding and inadvertently put in, say, a 47,000 ohm resistor where a 4,700 ohm is called for. It may also prove a more difficult matter locating a fault in a new piece of equipment found unsatisfactory on initially putting it into service, compared with the rectifying of a fault which has developed in a previously faultless instrument.

In the first place (and thinking of a new unit) the wiring should be checked carefully, and if no obvious bloomer is discovered voltage checks should be made at anode, cathode and screen (if any) of each stage. Although definite figures may not be available, any serious discrepancy will probably come to light, due allowance being made for the possible drop in voltage caused by the resistance of the meter itself. If an ohmmeter is available, it is well to include continuity checks where applicable and to test the values of the various resistors. The heater voltage should be measured—if it is much below 6 volts, performance will suffer.

It should be noted that a grid coupling condenser having low insulation will affect simultaneously *all* potentials on the electrodes of the following valve. The grid bias will be less negative than it should be (it may even be positive), the anode will be abnormally low (assuming a resistance load), screen voltage in a pentode also low, whilst the voltage across the cathode resistor will be higher than it should be. Also as a leaky condenser will permit current to flow through the grid leak, it is probable the noise level will be unduly high and severe distortion is almost certain to be evident.

Trouble may be caused by a blob of solder having become lodged between valve-holder tags and a thin and not easily seen strand of wire may have got caught up somewhere.

Testing With Telephones

Presuming everything is found in order on the DC side, investigation must be made at audio frequencies and a simple yet excellent device which can assist here is a pair of high resistance telephones. One lead should be earthed to the chassis, the other taken *via* a condenser of 0.1 μF (fairly high working voltage) to a crocodile clip or test prod. Care is obviously required to avoid shocks from or short circuits to the HT line.

Ideally a constant tone signal, say, of 1,000 c.p.s., should be injected and a simple audio oscillator, as used for Morse code practice, will serve. Lacking anything of the sort, a gramophone record or radio programme must be used, making allowance for a possible pause coinciding with a blank finding whilst testing the amplifier.

A weak signal should be audible on the telephones at the input point and a considerably stronger signal at the anode of the first valve. The testing process is carried on along the chain, ensuring that amplification does occur where it should occur. Although not so easy, it may also be possible to detect the point at which any serious distortion is being introduced. This test can also be made to include points at which there should be no

audio frequency potential, for example, across a cathode bias resistor. In such a case, if the signal is audible then the by-pass condenser is either defective (open-circuit or capacity lost through age) or else it is not large enough.

By this time any existing fault should have been located and corrected—at least the amplifier should be giving results, even if not wholly satisfactory. If quality is deficient, the trouble may be due to one or more valves, to a lack of balance in the driver or push-pull output valves, to shorted turns in the output transformer, to incorrect matching of the loudspeaker speech coil or to a defect in the loudspeaker itself.

Hum

If hum is in evidence, it may be due to insufficient smoothing—it may well be that the actual capacity of an electrolytic condenser, of uncertain age or which has been lying idle for some time, is much less than the value marked on the case. A heater to cathode leak may exist in one of the valves. It is possible for hum to be introduced into an iron-cored component from the mains transformer even when well separated if both are mounted direct on to a steel chassis. The remedy is to lift the components slightly away from the chassis with spacing washers. Doing this will also in many cases reduce any mechanical hum which may be present.

In most makes of potentiometer the metal cover is automatically earthed when the component is bolted to a metal support, but this is not invariably the case, hence it is well to make sure as otherwise hum may be introduced. Earthing each grid in turn, commencing at the output stage and working back to the first valve, will enable the exact point (or points) at which hum is being introduced to be traced.

Balancing Push-Pull Stages

Mentioned earlier as a possible cause of distortion is unbalance in push-pull stages. One symptom of this is that results are good at low audio levels, but deteriorate as the volume is increased. Again, telephones can be made use of as an indicating device, but as it will not be possible to differentiate between signal strengths at say two opposite anodes, a null system must be adopted.

Fig. 1 is a circuit of a pair of valves (which may be driver or output) in which a common bias resistor is used and no signal voltage should be present across R4 if the valves are properly balanced—it should be noted that no

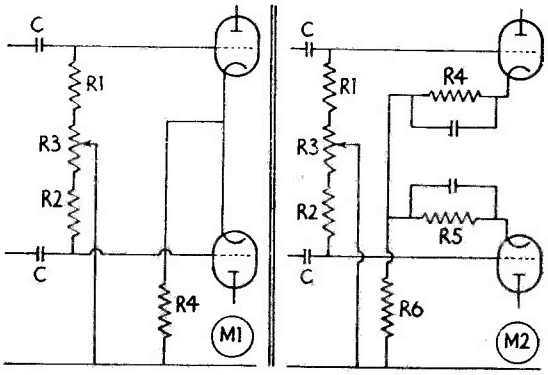


Fig. 1. No signal voltage should be present across R4 if the valves are properly balanced. R3 can be made variable to obtain balance. Fig. 2. Tests for balance are made with a headset across R6 — see text.

by-pass condenser is therefore required. The telephones are connected across R4, and if any signal is audible, adjustment to the values of the resistors in the input circuits is necessary. Ordinary resistors have a tolerance of plus or minus 20% and two resistors (R1 and R2 in Fig. 1) in the grid circuit, although nominally equal, may actually differ to a degree which will throw the circuit out of balance. Generally some juggling with different resistors of the same marked values will put matters right. Or, as shown in Fig 1, a variable resistor can be inserted and adjusted until the signal in the telephones becomes inaudible. Once set this variable resistor will not often require readjustment, and it can therefore be fitted in what might otherwise be a rather inaccessible position. A value of 50,000 ohms for R3 will generally prove adequate, but in a bad case, a 100,000 ohm potentiometer may be required.

Should there be separate bias resistors (when by-pass condensers are essential) an additional resistor (R6) can be added as in Fig 2, of a value between 100 and 470 ohms, according to whether the stage is a driver or output one. Tests as above are then made with the telephones across R6, and, when correct balance has been achieved by adjustment of R3, the added resistor is removed.

Output Transformer Faults

If only a single turn in an output transformer develops a short, a heavy current will be induced in it and the effect will be to reduce the primary inductance. This in turn will cause a reduction in the low frequency response of the amplifier as a whole to a degree which will be quite marked even though the action

of negative feedback will offset it to some extent.

It is unusual for a secondary turn to short, except perhaps if the insulation is defective (*e.g.*, cracked enamel). On the primary side, the trouble can be caused by permitting the output valves to operate without a load and with a strong signal voltage present at their grids. High peak voltages can then be generated, particularly at the higher frequencies, and the insulation between turns or sections of the transformer primary may break down. Once the insulation fails, breakdown can thereafter occur at much lower voltages. Carbonisation may result, causing a permanent leak and a gradually worsening of the fault until a definite short-circuit develops. This is the reason for the warning often given not to operate a driven amplifier without a load — another reason is that the valve insulation may suffer whilst, with pentode valves, the screen current may rise to such a value as to damage the valve permanently.

If quality is poor and all other efforts at improvement have failed, the only thing to do is to change the output transformer.

The Loudspeaker

The faults which can happen to a speaker unit generally show up very definitely. If the speech coil is open-circuit, no sound will be produced—and no load will be presented to the amplifier either. The coil may have warped or become off-centre, so that it touches the pole pieces. The quality of reproduction will then be very noticeably affected over the whole frequency range. A rattle or burr is often due to the same fault existing to a lesser degree—that is, the coil touches the pole pieces only at one or two points or perhaps only at certain frequencies.

Naturally care should be taken when mounting the speaker to ensure it is clamped evenly and no strain placed on the frame, or the latter may warp in time.

(To be continued)

Exploration of the Universe

GIANT RADIO TELESCOPE

(The following statement and notes concern the construction of a steerable radio telescope for Manchester University. This instrument will be the largest in the world and will enable regions of the universe to be explored for the first time by the new techniques of radio astronomy. It should be possible to find out a good deal more about the Milky Way, the galaxy of which the solar system is part, and it is hoped the equipment will enable new information to be obtained about the sun, meteors, the moon and some of the planets. It will also be possible to pursue further the mysterious, invisible "radio stars," the existence of which was not suspected until it was found that these "stars" were emitting radio waves which could be picked up on Earth.—Editor.)

THE Government, through the Department of Scientific and Industrial Research and the Nuffield Foundation, have decided jointly to provide a steerable radio telescope for Manchester University. The total cost is expected to approach £336,000—half of which will be paid by the Nuffield Foundation and half borne on the vote of the D.S.I.R.

The Requirement

In Great Britain, climatic conditions severely handicap visual astronomy. Since the war the techniques of radar and radio, applied to astronomy, have yielded a series of discoveries about the universe. (See *Short Wave Magazine*, pp. 226-228, June, 1952.) In this field of radio astronomy the pioneering work of research scientists at Manchester and Cambridge Universities has given Great Britain a prominent, even pre-eminent, position. This work has been financed in the past both by the D.S.I.R. and the Nuffield Foundation. In 1945 the Foundation made a five-year grant to the Physics Department at Manchester University, part of which was used to develop research in radio astronomy at an experimental station at Jodrell Bank in Cheshire. In 1947 D.S.I.R. began, from its money voted by Parliament, to support the work both at Manchester and Cambridge. At Cambridge important results have already been obtained using interferometric methods, while at Manchester a fixed radio telescope (a fixed paraboloid aerial), 220 feet in diameter, has been used to pick up radio waves reaching the earth from sources as far distant as the great spiral nebula of Andromeda, 750,000 light years away. At both Universities radio waves have been re-

corded from sources in space which do not coincide with known visible stars and existence of these sources has presented a problem of interest to laymen as well as scientists.

The present fixed radio telescope at Jodrell Bank, though the biggest in the world, is inadequate to carry this research to all regions of the sky. Manchester University therefore asked the D.S.I.R. for a substantial grant to pay for a large steerable radio telescope, which could be directed at will to scan any part of the sky or to follow the course of any particular star, and could also be used for research on meteors, aurorae, the sun, moon and the planets.

Although D.S.I.R. was anxious to help, it seemed likely that in view of existing commitments, the need for economy in Government expenditure might make it necessary to postpone the project.

At this stage the Nuffield Foundation approached the Lord President of the Council with an offer to bear half the cost. This offer was gratefully accepted by the Lord President. The staffing and part of the running expenses of the Jodrell Bank Experimental Station will remain as before the responsibility of Manchester University. The work of constructing the world's largest radio telescope should begin this summer and will, it is hoped, be completed in less than four years.

The Projected Design

Dr. A. C. B. Lovell, Professor of Radio Astronomy at Manchester University, will be in charge of the research at Jodrell Bank, Cheshire, where the radio telescope will be constructed. The Consulting Engineers, who have designed the radio telescope, are Messrs. Husband and Co., of 388 Glossop Road, Sheffield, and 70, Victoria Street, London, S.W.1.

The diameter of the paraboloid aerial will be 250 feet. The diameter of the platform on which the radio telescope will rotate will be 310 feet. The height, to the top of the horizontal axis, with be 185 feet. When the beam from the aerial is horizontal the total height will be 300 feet. Experimental work in relation to wind pressures on the structure has already been carried out at the National Physical Laboratory. The total weight of the radio telescope carried on the rails will be 1,270 tons.

The two main elevating racks at each end of the horizontal axis have already been reserved from the battleships *Revenge* and *Royal Sovereign*, which were recently broken up.

"THE OTHER MAN'S STATION"

This has for long been a regular *Magazine* feature, and is always popular. It is not necessary to be either high-powered, good-looking or clever with the DX to get a showing as "The Other Man's Station." All we ask for are one or two good, clear photographs and a general description of the equipment, the line of activity, the results obtained, and such personal notes as the writer may care to give. The writing of the story round these details is a staff job, but we pay usual contributor rates for the material.

NEON VOLTAGE INDICATORS

Philips Electrical, Ltd., have re-introduced two Neon Voltage Indicators, for testing low and medium mains installations. The Q.5000 is priced at 5s., and can be used on AC or DC between 110 and 500 volts. It is in pocket-pencil style, with a clip. The Q.5005 Voltage and Polarity Indicator is a much larger version, suitable for 80-750 volts AC and 100-750 volts DC; it can also be used for indicating DC polarity. Fitted with moulded test prods and a yard of tough-rubber cable, the list price is 30s.

NATIONAL RADIO EXHIBITION, 1952

We are informed that the Nineteenth National Radio and Television Exhibition will take place at Earl's Court again this year, the dates being August 26 - September 5.

BOOK SALES DEPARTMENT

With immediate effect, the business formerly conducted by Gage & Pollard at 55 Victoria Street, S.W.1, is being taken over by Short Wave Magazine, Ltd. In future our new Publications Dept. will handle all radio book sales, including the *Radio Amateur Call Book* and other agencies operated by Gage & Pollard. Orders and enquiries for British and American radio books and periodicals should henceforth be addressed: Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1. Good stocks are being carried of all the best books, and sterling subscription orders can be accepted for American radio magazines such as *QST*, *CQ*, *Audio Engineering*, *Proc.I.R.E.*, *Radio & Television News* and *Radio-Electronics*.

THE CLUB CONTEST

The *Short Wave Magazine* 1.7 mc Club Transmitting Contest ("MCC"), now an annual event in its seventh year, will take place over the period November 15-22 next. Rules will be circulated direct, as always, to all Clubs known to us to be active. This year, there are some changes in the rules to make the Contest more open—for instance, any Top Band station can be worked once to score, which should keep the going pretty fast for the entire period.

Beginner on VHF

FINDING THE BAND AND MAKING THE CONVERTER WORK

A. G. WOOD (G5RZ)

This article is a faithful account of personal experiences in commencing operation on the two-metre band. It sets out the practical problems faced by all VHF beginners and shows how they were overcome. No reader contemplating a move into the VHF region could fail to profit from our contributor's ideas, suggestions and advice.—Editor.

THESE remarks are intended for the newcomer to VHF in the earnest hope that he will obtain some guidance in steering his way through the somewhat bewildering and difficult initial stages such as confronted the writer so short a while ago.

Many excellent and interesting articles have been written on this absorbing topic and much benefit may be obtained by reading them through time and again. Yet, in the writer's humble opinion, nearly all of them lack something which is essential to the newcomer, but which is, of course, elementary to the more advanced student.

The object of this article is, therefore, to deal with just those points so puzzling to the beginner and which, without the aid of a local VHF expert (denied to so many of us) will cause so much frustration and loss of sleep. Once over the initial stile the newcomer must turn to more mature brains for guidance, and let it be said without hesitation that the writer will be found well up in the queue !

Given that the new starter in these regions is equipped with the usual amount of spare bits and pieces, the odd meter or two, some sort of an aerial and a reasonable communications receiver, personal experience suggests that the approach should be made in four distinct stages and in the following order :—

(1) Location and identification of the two-metre band.
(2) Some means of receiving signals.
(3) Suitable aerial design.
(4) The transmitter.

It is hoped that the comments following, dealing with the first two stages, will help the newcomer to avoid some of the pitfalls the writer has encountered.

Location

The first piece of equipment, and considered to be absolutely essential, is the VHF grid-dip oscillator. This little instrument will show resonance of any L/C combination within its tuning range whether or not it is " dead " or " alive " with RF.

Basically it is modelled on a design appearing in the *ARRL Handbook*, to which due acknowledgment is made, and construction of the writer's version is as follows :

The frame is made from aluminium sheet measuring 8ins. x 2½ins. bent into the form of a U, such that the base measures 2ins. and each side 3ins. Screwed firmly to the base is a short length of broomstick to serve as a handle, with a hole drilled right through both base and stick to bring out the supply cables. An Eddystone 25/25 $\mu\mu$F split-stator condenser is fixed to one side of the U-frame near to the open neck, the outside of the panel being covered with a piece of thick card upon which is engraved in Indian ink a suitable scale divided into 5° or 10° divisions.

The condenser tuning knob has a pointer attached to register with this scale. On the opposite side a ceramic two-pin socket is soldered directly to two of the stator pillars and positioned so that the search coil when plugged in will project beyond the instrument in line with the handle assembly. A further small piece of aluminium is cut and bent to form a bracket which will fit snugly across the throat of the U and bolted firmly into place just below the condenser. Before fixing, a hole is taken out in the centre to accommodate the B7G valveholder and the bracket is so positioned that a valve of the 9003 type will sit in this socket without the tip projecting beyond the edge of the panel. Fig. 1 gives the circuit and parts list, and Fig. 2 a side elevation of the instrument. Wiring up is simple in the extreme but care must be taken to make everything as compact and as rigid as possible, with short leads and components mounted close to the valve holder.

Various coils can be made to extend the range of the instrument but for a start 3 turns of No. 16 SWG tinned copper wire ¼in. internal diameter and ½in. across will serve our purpose admirably. The two ends of this coil, which plug directly into the two pin socket, should not exceed 1in. in length.

If these directions are followed *closely* the range of the instrument will eventually be found to be about 80 to 155 mc.

Some form of stabilised power supply be-

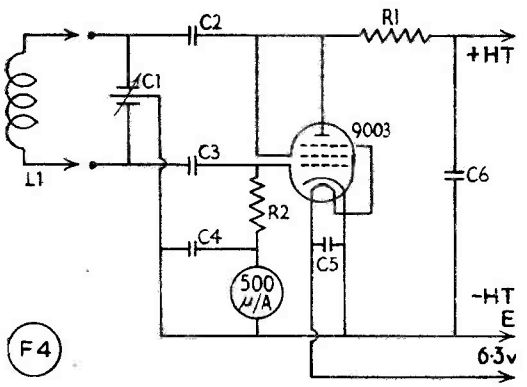


Fig. 1. Circuit of the two-metre GDO used by G5RZ. It was found to be absolutely essential for all tests and exploratory work on the 144 mc converter.

Table of Values

Fig. 1. Circuit of the VHF Grid Dip Oscillator

C1	= 25-25 μμF split stator (Eddystone)	R1	= 68,000 ohms, ½-w.
C2, C3	= 50 μμF silver mica	R2	= 22,000 ohms, ½-w.
C4, C5, C6	= .001 μF mica	L1	= 3 Turns 20 SWG tinned, ½ in. dia.
		V	= 9003 triode connected.

tween 105 and 150 volts, a 6.3 volt filament supply and a 0-500 μA meter complete the whole apparatus.

Identification

The instrument just described must now be calibrated, and let it be said at once that extreme accuracy is not intended. The sole purpose is to *identify*—just like an absorption wavemeter. Calibration can be carried out very simply by means of Lecher wires, and even at the risk of being accused of being *too* elementary the process will be described in detail. Select two points in the shack a convenient distance apart—8 to 10 feet will be quite suitable for the purpose. Between these points string up a pair of bare copper wires spaced about 2ins. apart and pulled as taut as possible. At the end nearest the test bench solder on a piece of co-axial cable of sufficient length to reach the test-bench and terminate this cable with a two-turn loop ½in. in diameter. Construct a shorting bar from a scrap length of sheet metal with a short wooden handle to form a T and cut two Vee-grooves spaced 2ins. apart in the underside of the shorting bar (*see* Fig. 3).

All is now ready for calibration. Switch on and warm up the oscillator; set the pointer at some convenient dial reading and position the pick-up loop about 1in. away from the oscillator coil. Then with one eye on the grid meter run the shorting bar along the Lecher wires until a sudden dip in the meter reading denotes resonance. Mark this point on the wire with a paper clip and proceed as before until a second point is reached. Measure the distance between these two points — which is a half wavelength—and this measurement in inches divided into 5905 will give the resonant frequency of the oscillator in megacycles.

Loosen the coupling to a degree until only the barest perceptible flicker can be seen on the meter when the resonant point is reached,

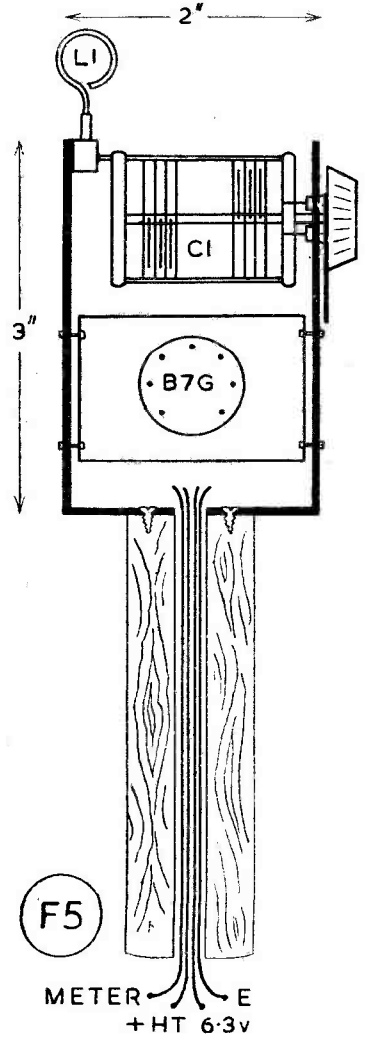


Fig. 2. This sketch shows the form of construction adopted by G5RZ for his VHF GDO.

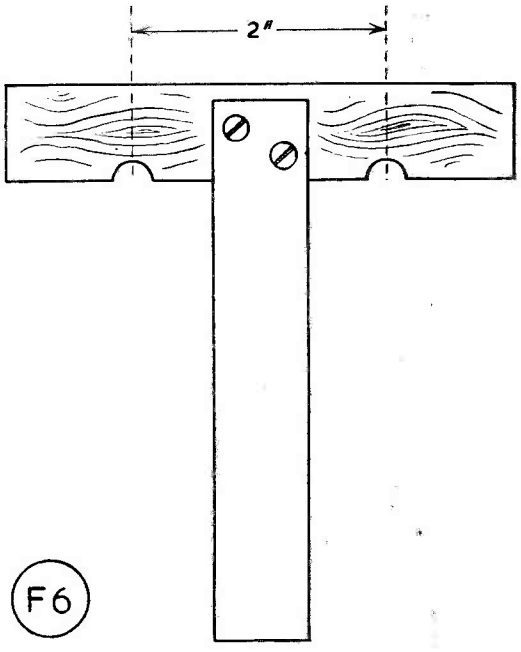


Fig. 3. The Lecher-line runner. There are, of course, other ways of making up this simple tool, depending rather upon how the wires for the Lecher are strung up.

and check the measurement again as accurately as possible. Repeat this process for various dial settings and graph the results. You will now have an instrument which will repay its initial cost over and over again.

Receiver Design

With the first stile now crossed we are entering upon dangerous ground because there are several schools of thought on this subject, and the writer does not feel competent, at this stage, to voice an opinion ! Briefly, the choice rests between a complete VHF receiver (which seems a formidable undertaking for anybody) ; a conversion job on an ex-Government set (which can have lots of snags of its own) ; a converter feeding into the station communications receiver with a crystal controlled local oscillator and a tuned IF ; the Wallman Cascode converter with a tuned local oscillator and fixed IF ; and the famous G2IQ push-pull 6J6 converter, which has been described in these pages. To be frank, the writer tried the Wallman circuit but without success—and with the knowledge he now possesses it would have been little short of a miracle had he succeeded in making his particular version function ! This is not to say that the Cascode will not work, but it is evidently *not* the job for a VHF beginner. Efforts were then turned to the G2IQ 6J6 design and the remarks that follow deal with the particular problems which were encountered before success attended these prentice efforts. They should be read in conjunction with the original article by G2IQ, which was published in the August, 1949 issue of *Short Wave Magazine*.

In general, all writers on VHF stress the need for short, direct wiring and it is felt that this point requires very special emphasis. The advice is not given idly. In wiring up a two-metre circuit which you want to work consider most carefully every step, decide how you can save a *quarter of an inch* here or a quarter there by careful arrangement of the components. Let this basic fact be engraved on your mind. Never forget it. Pay the most careful attention to the supply leads, particularly those carrying heater voltages. Keep these right up against the panelling and by-pass them to earth as close as possible to the valve holder tags. The low inductive T.C.C. " Micadiscs " are very useful in this connection. They provide at one and the same time a feed-through connection at chassis level and a low inductive capacity to earth. Bond all earth leads, valve holders and so on firmly to the chassis. A single earth lead fed through a bare hole in the chassis will cause untold trouble with unexplained and sudden alterations in oscillator frequency. Follow most carefully the advice given with regard to coil size and gauge of wire advised. To those accustomed to the more usual frequencies these coils are microscopic in size and look utterly absurd !

Turning now specifically to the 6J6 converter in the G2IQ version, the oscillator gave little trouble once the above-mentioned points were grasped and firmly understood. Trouble was encountered in the first place due to obtaining oscillation which was beyond the range of the grid-dip instrument, but which showed up on the Lecher wires to be within the range of 270-300 mc ! A bit higher than expected ! Tuning alteration made little difference, and in fact it was only when it was discovered that *shorting out* the inductance also made little difference that it was realised what was wrong. The wiring itself contained sufficient inductance to form its own oscillatory circuit at this much higher frequency ! One of the first lessons was thereby learnt and a re-arrangement of the components cured this particular trouble. The oscillator is now remarkably stable once the initial warming up period is over, albeit it is still rather more T8 than T9 in character.

The next trouble came, rather naturally, from

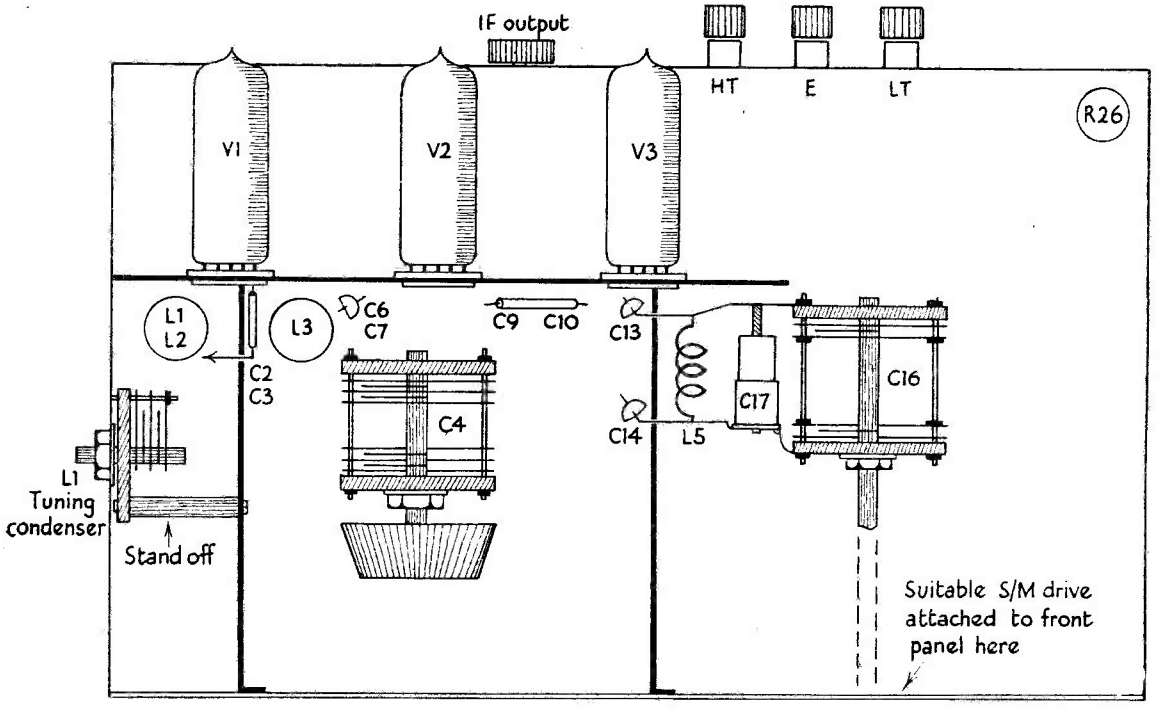


Fig. 4. Disposition of parts in G5RZ's version of the G2IQ 144 mc converter. References are to circuit elements as given in the original article—see August, 1949, issue.

self-oscillation of the RF stage. The exact neutralising condensers specified by the designer were not available and many were tried without success. Eventually success was attained by realigning the valve holder slightly in relation to the dividing screen so that the plate lead tags on the valve holder were completely screened from the remaining elements. The grid leads were fed through small grommetted holes in the dividing screen and small home-made neutralising condensers attached directly from these points to the opposite anode leads—that is to say, the cross-over takes place on the mixer side of the dividing screen. The home-made condensers each consisted of two lengths of No. 20 gauge enamelled wire overlapping each other to an extent of 1in., pushed into a 1in. length of Systoflex from opposite ends. A certain amount of careful juggling is necessary to attain stability and in this connection some form of load should be applied to the grid coil—preferably the aerial ! The grid coil was settled finally as a six-turn, with four aerial turns overwound in the centre. A 350-ohm resistor was temporarily fixed across the latter during neutralising operations, to form the load. No grid tuning condenser is fitted but until such time as the existing long-wire end connected aerial is replaced by balanced feeders to the projected beam, considerable benefit was obtained by using a two-plate midget condenser across the aerial coil itself. (This will be discarded when the beam feeders are connected.)

Approximate resonance of the RF anode coil and the local oscillator was checked by the aid of the grid-dip oscillator, the former as near as could be judged in the centre of the 144-146 mc band and the latter at 135 mc, to give the IF of 10 mc which was selected ; final touches were effected using the grid-dip oscillator as a signal generator on 145 mc and peaking up on the communications receiver S-meter.

Even then no signals could be heard from outside, and what was equally ominous was the complete lack of car ignition noise—with a main road not far away. Followed a period of intense cogitation to decide upon the next move. The only unknown factor left for investigation appeared to be the degree of injection from the local oscillator.

[over

Success !

The original injection consisted of a quarter-inch overlap of bare wire air-spaced about 1/32in. on each grid cricuit. This was increased to an inch, using the same technique as was employed in the construction of the neutralising condensers and — Lo ! ignition noises became apparent. Signals rapidly followed and we felt that we had really arrived on Two Metres at last. There is some degree of regeneration occurring in the RF stage because the RF anode tuning is *very* critical and with the degree of injection now applied some pulling of the oscillator is noticeable. However, this is not really serious as once the RF anode is peaked it need not be touched.

Lastly, a word on the physical lay-out employed. The writer has departed, somewhat unwisely perhaps, from the original G2IQ layout, but the design appears to lend itself to neatness and a clean arrangement. The chassis is 6ins. in depth with 1in. clearance below. A back vertical panel carries the three valves with their bases facing the front and the valves in a horizontal position. The two dividing screens are suitably disposed and their front ends form supports for the front panel which contains only the slow motion drive to the local oscillator. It is thus possible, by removing the front panel, to carry out innumerable adjustments without difficulty with all RF wiring in full view. All feed leads drop straight down and through the chassis, suitably by-passed as recommended, and the IF transformer is located under the chassis just below the mixer compartment with a screened take-off to the co-axial socket for connection to the main receiver input. No IF break through is experienced and only the barest trace of IF pick-up, and then only on very strong signals.

In conclusion let it be said that the easy way to VHF reception is to ask " the chap down the road " to fix up one's converter and to make it work. In the writer's case there was no " chap down the road " (nearer than 15 miles) and in consequence, willy-nilly, he has had to plough his lone furrow. Having done so (and in all humility it can be said that by so doing) he has probably learnt a great deal more about VHF technique in a given time than could possibly have been hoped for had the easier path been available. There is a moral in that somewhere.

And now you are handed over to the man who really knows something about VHF for *your* next move in the game. The writer will be right alongside you !

CALL BOOK, SUMMER EDITION

The 20-page G Section of the *Radio Amateur Call Book*, the world directory of amateur stations, contains in the Summer 1952 edition the call-signs, names and addresses of nearly 7,000 licensed amateurs in the British Isles. All QTH's and changes of address as published in " New QTH's " up to and including the May 1952 issue of *Short Wave Magazine* are included in the listings. And we have already prepared amendment lists, for the autumn issue of the *Call Book*, containing about 300 additions or changes of address. All amateurs, as they become licensed or if they change their address, should inform us immediately for a new entry to be made in the earliest edition of the *Radio Amateur Call Book*, which is published four times a year and for which we are agents for Europe and the U.K.

SMALL ADVERTISEMENTS

Readers having particular wants, or useful items for disposal, can with profit and satisfaction use our Small Advertisement columns, which for years have been interesting reading and a guide to ruling prices for private sales. The rates are low, the coverage is virtually world-wide — and all we ask is that the advertisement be drafted clearly and succinctly. If there is any doubt as to how it is charged, a request to our Small Advertisement Dept., with the copy, will bring a prompt reply.

CLASSES FOR THE R.A.E.

As in previous years, classes for the Radio Amateurs' Examination will be held at the Wembley Hill Evening Institute, covering both Theory and Morse, each sitting being on a Monday evening, divided into two sessions between 7.0 and 10.0 p.m. Enrolment takes place at Park Lane School, Park Lane, Wembley, any evening from September 15-19 next, 7.0 - 9.0 p.m. A. J. Bayliss, B.Sc. (G8PD) will be in charge.

FIRST-CLASS OPERATORS' CLUB MEMBERSHIP

The pre-war F.O.C. was first supported by *Short Wave Magazine*, and revived again by us after the war. A harmonious and mutually satisfactory relationship continued till the end of last year, when it was decided that the F.O.C. was big enough and strong enough to stand on its own feet. Membership as at the end of June, 1952, totalled 340 in 32 countries, of whom 246 operate under the G prefixes.

PIRACY NOTE

G8RB (Chaddesden, Derby) is receiving QSL cards from stations he has not worked on Ten, nor, indeed, on any other band, as he has been temporarily QRT for more than two years. The station now signing " G8RB " is, therefore, a phoney, and should be avoided.

VHF BANDS

A. J. DEVON

EDX on July 4—
Comment on Contests—
Conditions and The Activity Index—
Station Reports and News—
VHFCC Elections and The Tables—

WITH another large, but never too large a, pending tray your perspiring precentor has had to strip to his pants to get this month's story sorted out and into print. And here it might be remarked that glistering heat and an arid garden are not necessarily the signs for Good Conditions on VHF. Though we have had weeks of hot, bright weather in the South, conditions generally have been little better than "average for the time of year," with one or two sparkling bursts, when the two-metre band did open wide.

One of these was the evening of July 4, which produced good European contacts — DL, F, ON, OZ, PA — for those who were there to make the most of rather a late opening; and at this time of year, under the weather conditions we have been having, it is probable that propagation does not become really effective until after 2300, or even later. That the EDX is there to work when conditions are right is proven by some of the calls lists in the Activity Report this month, with SM7BE and some unidentified LA's also heard; the latter were apparently getting into Northern Europe, and might have been workable from this country had they looked this way.

Some of the successful stations who actually worked the stuff on this July 4 occasion were: G2PU, G3GDR, G3GHO, G3WW, G6NB, G8SB and GW5MQ—but, as we know, there were many others, who in the course of their report-letters have merely generalised about the EDX on this particular evening without specifically mentioning the stations they worked. Of particular interest is the number of operators who report reception of SM7BE (144.7 mc), who on July 4 was called by many G's but failed to respond. Was he being heard off the back of his beam, unaware that the band was open? As we know, SM7BE is a follower of this piece and is anxious to work G's—so perhaps he is beating his breast over what he may have missed!

Contest Events

The International Contest over the week-end July 5-6 was marked by quite good conditions and an encouraging level of activity, but many operators probably felt that the sting had been taken out of the event by reason of the fact that the peak of conditions (during that particular period) had passed. Busy and successful G's were G3BLP and G5YV, and EI2W did very well to chalk up 210 points for 17 contacts, averaging 206 miles per QSO.

Recent experiences suggest that the whole question of VHF contests needs taking in hand. Ultimately, the success of any VHF event must depend on conditions, which no man can predict in advance. If they are good, then activity seems to be high because there are more stations about to work; if conditions are "off," and the 100-mile stations are not coming through, the band sounds quiet, and people lose interest because they feel that there is not enough doing—though there may be quite a large number of stations actually on.

Too many contests tend to be a drug on the market. Anybody can book a date and lay on a contest, but they fail in what should be the main objective—promoting activity and encouraging progress—if the result is to split the available effort, confuse the issue, and exhaust the group of consistent operators who feel it their decent duty to come on for *all* such contests "in order to give the boys a point."

Our own Marathon Contest has been offered as a solution to some of these problems — but not all. Your A.J.D. would be the last to try to predict conditions, and the first to agree that no VHF Contest rules can be made watertight, uniformly fair to all entrants, and sufficiently attractive to produce the maximum effort from all who are able to operate on Two Metres. There is always something about a contest which does not suit someone. On the other hand, it is true to say that the only criticism we have had in regard to the Marathon VHF Contest is on the question of its length — but the idea here was, partly, that by scheduling four week-ends, spread over four months, we might be lucky enough to strike one really good session in terms of conditions.

If everyone reading these lines were to make it a date to be on for the week-ends August 23-24, September 27-28, and October 25-26, it is probable that EDX and GDX would be worked, that activity would be high, and that out of the whole boiling would emerge some valuable data on VHF activity and propagation—so what about being there for the next leg of the Marathon, August 23-24, prepared to call "CQ MVC" and to work all comers?

"CQ MVC."—It is suggested that for the next three legs, all who are on to score points in the Marathon VHF Contest should call "CQ MVC" (or "QRZ? MVC"). This will identify them as participants, ensure snappy QSO's, and help to make it clear that A Contest Is In Progress.

The Activity Index

We are sometimes challenged, not unreasonably, on the matter of VHF activity, it being alleged that the number of stations to be

heard on the band at any time does not reflect the total said to be operating on Two Metres. Here are some facts, and some thoughts on the subject:

G3BLP (Selsdon, Surrey) has now worked a total of 567 stations on Two. This time last year, his total was 459, and in August 1950 it was only 300—G3BLP is quoted because he has always been a consistently high scorer, is well placed to work new stations as they come on, and has regularly turned in a stations-worked total.

From these figures, it is a reasonable assumption that at any given time some 300 stations, spread over the country as a whole, are available to operate. This is indirectly borne out by the striking fact revealed by the "Counties Worked Since September 1st" Table, from which we see that in the last twelve months only, four operators have succeeded in working 45-51 counties; this compares with but 20 operators who have worked 45-58 counties *All-Time*—and the band has now been open for nearly four years, with our statistics maintained month-by-month from the day it opened. For the year ended August 31, 1951, the comparable figures for the Counties Tables are: Seven operators working 45-53 counties All-Time, but only one reaching 43C in the annual table.

All this must mean (and the figures cannot be contested) that during the last twelve months activity has been on a higher scale than ever before, with more stations to work and more new counties available. Why, then, does the band sound so quiet so often? The answer is that the activity is spread over a large area in terms of time, frequency and distance. The available total of 300 stations is not enough to make the band sound populated unless conditions are particularly good, enabling more than the usual number of stations to be heard. If an analogy is permissible, it is rather like visiting one of those very large show gardens opened on occasions to the public view. You arrive to find about 100 cars parked, and expect a milling crowd. But the place is so big that, as you walk round, you

TWO-METRE ACTIVITY REPORT

G4JJ/P, Poole Hill, nr. Barnsley, Yorks., NGR 44/248088; and Champney Hill, NGR 44/300048.

WORKED: G2AJ, 2BCG 2DKH/P, 2FJR, 2FNW, 2IQ, 2NH, 2PU, 2UQ, 2XV/P, 3AGS, 3AMM, 3APY, 3BJQ, 3BLP, 3BW, 3CC, 3CCH, 3CGQ, 3CHY, 3CSC, 3CYY, 3DMU, 3DVK, 3EDD, 3FFV, 3FUL, 3FZL, 3GEA, 3GCX, 3GGJ, 3GHO, 3HBW, 3HII, 3HWC, 3MY/P, 3VM, 3WW, 4CI, 4HT, 4LX, 5DS, 5MA, 5RW, 5UM, 5WP, 5YV, 6LC, 6LI, 6NB, 6XX, 8IC, 8GL, 8NM, 8QY, 8VZ, GI2FHN/P, ON4BZ, PAOFC, ØHA, PE1PL.

HEARD: EI2W, G2AHP, 2FCL, 2FQP, FZU, 2HOP, 2HGR, 2XV, 3BK, 3BPD, 3GMU, 3IEX, 4DC, 4MW, 5ML, 6CI, 6KS, 8DV/A, 8SB, GM3EGW, GW5MQ (*June* 20 *to July* 7 *inclusive*).

G3BW, Whitehaven, Cumberland.

WORKED: G2AJ, 2ANT/A, 2FKZ, 2FNW, 2FQP, 2HCG, 2NH, 3ABH, 3AGS, 3AOO, 3BJD, 3BJQ, 3BK, 3BLP, 3BOC, 3CCH, 3CHY, 3DA/P, 3EDD, 3EHY, 3FAN, 3FRY, 3GMX, 3GZM, 3HAZ, 3HII, 3HWC, 3WW, 4HT, 4JJ/P, 4MW, 5BM, 5DS, 5MA, 5MA/P, 5TP, 5VN, 5YV, 6NB, 6NB/P, 6XM, 8DA, 8DV/A, 8OU, 8SB, 8VZ, GI2FHN/P, 3GQB, GM2DRD, 3BDA, 3DIQ, 3EGW, 3FOW, 6KH, 6LS, 6WL (*June* 13 *to July* 13)

GM3DIQ, Stevenston, Ayr.

WORKED: EI2W, G3BW, GM2DRD, 3BA, 3BDA, 3DDE, 3EGW, 3FOW, 4HX, 5VG, 6WL, 6ZV, GW5MQ.

HEARD: G3AGS, 8SB, GI2FHN, 3BIL, 6VU, GM6KH.

GM3EGW, Dunfermline.

WORKED: G2DKH, 2DKH/P, 2FQ, 3BPD, 3BW, 3CC, 3CCH, 3CCY, 3DVK, 4LX, 5BD, 5YV, 6LI, 8GL, 8IC, GI2FHN/P, 6VU (*Over* 100 *miles only. June* 1 *to July* 6).

G3FIH, Radstock, Somerset. NGR 31/684559.

WORKED: F9IY, G2BAT, 2HDZ, 2YB, 3AGA, 3AVF, 3BLP, 3CGE, 3CQC, 3CWW, 3DLU, 3EHY, 3FAN, 3FKO, 3FKO/P, 3GHO, 3HAZ, 3HSD, 3HXJ, 3HXS, 3WW, 5DF, 5DS, 5JU, 6XM, 8DA, 8DM, 8IL, 8PX, GW8UH.

HEARD: G2NH, 2OI, 2FTS, 2HCG, 3AUS, 3BHS, 3IWA, 4HT, 4MW, 5LK, 6CI, 6NB (*June* 12 *to July* 16).

G5MA/P, 1 mile S/W of Storrington, Sussex.

WORKED: F8NH, 9JY, G3BOC, 3BW, 3CSC, 3CWV, 3ENI, 3FFV, 3GHO, 3HAZ, 5ML, 6AG, 8IC, 8VZ.

HEARD: G2AK/P, 2FNW, 3GMX, 4JJ/P, ON4BZ (*June* 28 *and* 29).

G6NB, Aylesbury.

WORKED: DL6SV, EI2W, F9AE, G2FQ, 2IQ, G2FCV, 3AGA, 3AOO, 3BOC, 3BW, 3CC, 3DA, 3DA/P, 3GCX, 3HII, 3HWC, 3MY/P, 5YV, 6XX, 8OO, GM3BDA, GW3ENY, 5MQ, ON4BZ, PAFOP, ONL, OYO, PE1PL (*DX calls only: June* 16 *to July* 16).

G2HDZ, Pinner, Middlesex.

WORKED: DL3TD, EI2W, F8BY, 9AE, 9JY, G2AHP, 2AIW, 2ANT/A, 2AOK/A, 2BCB, 2BMI, 2BN, 2DTO, 2FTS, 2HCG, 2HIF, 2PU, 2UN, 2YB, 2YC, 3ABA, 3ANB, 3BCY, 3BLP, 3CCP, 3CDJ, 3CGQ, 3CVO, 3CWW, 3ECA, 3EHY, 3ENI, 3EOH, 3EYV, 3FAN, 3FD, 3FIH, 3FSD, 3FSG, 3FUM, 3GBO, 3GDR, 3GHO, 3GWE, 3HAB, 3HAK, 3HBW, 3HSC, 3MI, 4AP, 4DC, 4MR, 4SA, 5DF, 5DS, 5LK, 5LN, 5QL, 5SZ, 5TP, 5YV, 6AG, 6JP, 6TA, 6XM, 8AO/MA, 8DM, 8IK, 8OU, 8PX, 8VZ, ON4BZ, PE1PL

HEARD: DL6SV, F8MX, 8NH, G2FNW, 2FUW 3BPD, 3BW, 3CC, 3DA, 3DVK, 3FGT, 3VM, 4JJ/P, 5BD, 5JU, 5MR, 8DA, 8SB, GW8UH, ON4HC, 4LN, PAOWI (*June* 12 *to July* 7).

GM2DRD, Forfar, Angus.

WORKED: G3BW, GM3BA, 3BDA, 3BDA/P, 3DIQ, 3EGW, 3FGJ, 3FOW, 3IBV, 3NG, 6KH, 6SR, 6WL/P, 8FM.

HEARD: DL3??, EI2W, G13BIL, GM3BBW, 3FYB, 5VG, 6LS, 6ZV

G3EHY, Banwell, Somerset.

WORKED: EI2W, G2BAT, 2COP, 2FCV, 2FNW, 2HDZ, 2HGR, 2JT, 2NV, 2OI, 2PU, 3AOO, 3BGR, 3BJQ, 3BOC, 3BW, 3CSC, 3DA, 3DA/P, 3EKL, 3EKN/P, 3EUP, 3FD, 3FGT, 3FIH, 3FKO, 3FMI, 3FUM, 3GMX, 3HAZ, 3HII, 3HSD, 3HWC, 3HXO, 3MA, 3MY/P, 4GR, 4SA, 5CP, 5DS, 5ML, 5YV, 6AG, 6RH, 8DA, 8GL, 8IK, 8OU, 8SB, 8SM, GI2FHN/P, 3GQB, GM3BDA, GW2ADZ, 3ENY, 3FYR, 5MQ, 8UH.

HEARD: ON4BZ (*June* 13 *to July* 15).

G2DKH/P, Stanley, Co. Durham. NGR 45/210532.

WORKED: G2AJ, 2FNW, 2FQP, 2PU, 3AGS, 3AJP, 3AMM, 3BK, 3BLP, 3BPD, 3CC, 3CCH, 3CGQ, 3DA/P, 3DIJ, 3DXZ, 3EDD, 3FFV, 3GCX, 3GGJ, 3WW, 4CI, 4JJ/P, 4MW, 5BD, 5QU, 5YV, 6LI, 6UJ, 6XX, 8AO/MM, 8GL, 8NM, GM3BA, 3BDA, 3EGW, 3IBV, 6KH, GW5MQ.

HEARD: G3BVU, 3EHY, 3HII, 3VM, 5MA, 5RW, 6NB, 8AO/MA, GW3ENY, PAOIKS, PE1PL (*June* 11 *to July* 10).

G4SA, Drayton, Berks.

WORKED: DL3TD, EI2W, G2AOK/A, 2BN, 2BAT, 2DTO, 2HDZ, 2HIF, 2YB, 3APP, 3EHB, 3DKZ, 3FAN, 3FUM, 3FMI, 3GZM, 3HAK, 3HAZ, 3HXS, 4AP, 5BM, 5DF, 5RW, 5TP, 5YV, 6KB, 6NB, 6NB/P, 6RH, 8DM, 8PX, GW2ADZ, 8SU.

HEARD: G2HCG, 3ABH, 3BLP, 3BW, 3EHY, 3GMX, 3HII, 4CI, 5DS, 8GM, 8VZ.

G2PU, Cambridge.

WORKED: DL3QA, 3TD, 6FX, 6SV, EI2W, G8AO/MA, 8AO/MM, ON4BZ, 4XB, OZ2IZ, 7WA, PAOBAL, OEO, OEQ, OFC, OFP, OIKS, OWT, PE1PL (*July* 4 *to* 6, 10 *only*)

G8SB, Chorlton-cum-Hardy, Lancs.

WORKED: EI2W, G2AJ, 2AIN, 2ASR, 2BNZ, 2CBR, 2DLP, 2FCL, 2FCU, 2FJR, 2FZU, 2FZX, 2HCG, 2HCJ/P, 2HCR, 2HGR, 2HIF, 2OI, 2PU, 3ABH, 3AOO, 3BK, 3BLP, 3BOC, 3BPD, 3BW, 3BY, 3DA, 3DA/P, 3DKH/P, 3DMU, 3EDD, 3EHY, 3FFV, 3GB, 3HII, 3HWC, 3WW, 4JJ/P, 4MW, 5BM, 5HB, 5JU, 5ML, 5YV, 6JD, 6LI, 6NB, 6NB/P, 6OT, 6UJ, 6YU, 8DA, 8GL, 8HK, 8IC, 8ML, GI2FHN/P, 3BIL, GM3BDA, GW2ADZ, 3ENY/P, 3ENY, 3FYR, PAOFP, OIKS, PE1PL.

HEARD: G2AOK/P, 2JT, 2MV, 2XS, 3CC, 3CGQ, 3CXD, 3EAN, 3FMI, 3FUM, 3GHI, 3GMX, 3HXO, 4JJ, 4SA, 5DF, 5MA, 5WP, 8DV, 8VZ.

G3GDR, Watford, Herts.

WORKED: DL3VPJ, 6FX, 6SV, 9MK, F8AA, 9JY, G2FJR, 2UN, 2XV/P, 3AJP, 3HMH, 8AO/MM, ON4BZ, 4HN, PAOFC, ONL, PE1PL.

HEARD: DL3TD, 9SY, EI2W, G2BAT, 3AGA, 3AUS, 3CCH, 3HVO, OZ2IZ, 7WA, PAOWI, SM7BE.

MARATHON VHF CONTEST
SECOND LEG
Week End August 23-24
See Rules pp. 296-297 July Issue
Logs by September 3 for Second Table in October issue

actually see at any one time barely 20 of the 300 or so people who must have paid to come in, and who must be in the place somewhere. This is as when conditions are not good on Two — the "garden" is big; the stations are there, but you can only hear a small proportion of them. But if conditions are very good, in effect our "garden" is reduced in size, so much so that nearly all the 300 start becoming visible, and the place begins to get crowded. People are then talking about high activity!

The Tables

Well, there must have been a great many more than 20 stations on Two Metres during the month to July 18, because for this issue the movements notified for the Counties and Countries Tables alone total more than 50 — yes, *fifty!*—with some operators able to claim six or eight new counties worked. Yet it is also true that on quite a number of occasions the band sounded very dead.

However, to check the facts and support the theories put forward in the foregoing discussion, at our behest a particular operator (who he was does not matter, as it has no bearing on the point we are making) chose two ordinary weekday evenings and, opening about 7 p.m., was able on both occasions to QSO without a break until he retired exhausted at midnight. Of course, this was not contest - style working. No "QRZ??" and quickly picking the next one out for a snappy point-scoring QSO. The contacts were obtained by judicious CQ'ing and answering of CQ calls, combined with careful searching over the whole band. Each QSO was worked out to its logical conclusion, and the rate of working was probably not more than three stations an hour. But the point is that the stations were there to work, and all through TV, too. And this was done not just once, or in the London area, nor even by pre-arrangement, but on two evenings selected at random, from a location in the South Midlands, when there was no contest on and conditions were no better than average.

If a few others would care to try the same thing it would be very interesting to hear of their experiences.

The Zone Plan

Several correspondents have drawn attention to the fact that the Zone scheme is tending to fall into disrepute by reason of the number of stations not now conforming, and a migratory tendency towards the LF end on the part of some of those who, quite understandably, feel that they are being left out of it because there is not enough searching above 145 mc.

This is a problem which has also been worrying us, and the Zone Plan has been re-examined to see if any sort of modification seems to be necessary. But the conclusion remains the same as before—That, as they stand, the Zone grouping and the suggested frequency areas (*see* p.49 "VHF Bands," March 1952) constitute a workable plan which, if accepted by everybody, would confer the benefits we have always claimed for the Plan: Activity spread over the whole band, geographical areas grouped into frequency areas to make searching and DX working easier and quicker, the minimising of local QRM on DX stations, and guidance as to a suitable working frequency for new stations opening up on the band. These are considerable advantages, and, taken together, constitute an unanswerable case for the general adoption of the British VHF Zone Plan. Of course, there never has been (nor could there be) any compulsion about it, nor any pressure put upon those who have seen fit to proceed independently in the matter, very often to the hurt of their neighbours. If a Zone G station is trying to work a GM, it seems unnecessary and, indeed, anti-social, if a local comes up in

The neat /P set-up operated by G5MA on his portable expeditions. Everything is in or on the car, making possible a single-handed job. The beam is a 4-ele. Yagi, and the mast extends to 26 feet. This photograph was taken on the occasion of the GW5MA/P excursion to Llanybyther, Carmarthenshire, April 12-13 last.

Zone A and proceeds to call CQ on the GM. And what makes it worse is if the GM then works, in Zone A, that station which should be in Zone G. The offending operator may argue, not without reason, that had he not been in Zone A, he would probably not have worked the GM. Fortunately, most people are reasonable about these things and see the whole problem as a matter of common courtesy, like raising one's hat to a lady. There is no compulsion about that, either.

We have continued to advocate general adherence to the Zone Plan because we believe, with the majority of VHF operators, that it is a Good Thing and in the best interests of all concerned, for the reasons already stated. Until certain jealousies are removed and misunderstandings eradicated, we cannot expect it to have all the backing it should be getting. But

as about 80% of active operators are recognising the Plan, and practically all new stations coming on are appearing in their correct Zone areas, it is evident that the British VHF Zone Plan has adequate support. And it is in the interests of all who benefit from the Plan that they search the whole band. Just think how chaotic it would be if everyone went LF.

EI2W to Move into Zone D

Reflecting on these matters, we were considerably heartened to hear from EI2W (Dublin) that, recognising the essential importance of the Zone Plan and wishing to co-operate in making it a success, he has decided that, with effect from September 15, he will operate on 145.810 mc. This takes him to the HF end of the band and is just 10 kc inside Zone D, the All-Ireland allocation being 145.8-146.0 mc. EI2W naturally hopes that the GI's will follow suit—at any rate, it is certain that after September 15 there will be much diligent searching round the HF end of Two, and those who are now above 145 mc need no longer feel that they are being neglected.

EI2W is one of our most consistent and sought-after DX stations, and his frequency shift into Zone D involves him not only in alterations on the Tx side, but means also that the beam will have to be rebuilt for the new frequency. We feel sure that his example will steady those who have been wavering about the Zone Plan, and your A.J.D. would like to acknowledge EI2W's public-spirited action in this matter.

VHF Century Club Elections

This month's parchments go to the following who, having shown cards for 100 VHF stations worked, thereby achieve VHFCC membership: G8PX (Oxford, No. 114); G4SA (Drayton, Berks., No. 115); GM3BDA (Airdrie, No. 116); and EI2W (Dublin, No. 117). The cards from G8PX included no less than 60 for contacts made on the old 5-metre band in the 1947-48 period, and are of great historic interest. GM3BDA is only the second Scot, out of all the 117 VHFCC members, to qualify, his predecessor being GM3OL. And, of course, there can be no question that EI2W has had to work very hard to make VHFCC from his location.

Station Reports — Scotland

Five reports from North of the Border include a very useful contribution from GM3BDA (Airdrie) who lists as active GM's 3EGW, 3ENJ in Dunfermline; 3BBW, 6LS, 6SR and 8FM in Edinburgh; 3FOW, 6WL and 6ZV in Glasgow; 4HX in Paisley (Renfrewshire); 3DDE, 3DIQ in Ayrshire; 3BA, 3BDA and 3IBV in Lanarkshire; and GM6KH in Hamilton. Stations soon to be on, if they have not already appeared, are GM2BLP (Glenboig, Lanarks.), GM3GDX (Nr. Motherwell) and GM6MD (Glasgow). There are apparently about ten Scottish counties in which there is, or can be, VHF activity. GM3BDA himself has now gone to a 16-element rotary stack, with open-wire feeder, and the beam-head is rotated with its pole, which rests on a 2½-in. steel ball "liberally coated with grease" in a tube supporting the lower end of the mast. Results have been well worth the materials used in its construction and the labour expended on its erection. Contacts have been achieved as far as EI2W, G3EHY, G3WW and G6NB, with many other new stations heard or worked in the southerly direction.

GM3DIQ (Stevenston) was pleased to find he could claim 14C worked, and goes into the Table thereby; he has succeeded with GW5MQ and remarks that "Activity in GM is on the up-and-up, with 144.1 mc sounding like Forty on a Sunday afternoon"! Another good QSO for GM3DIQ was with GM2DRD (Forfar, Angus, 104 miles).

GM3EGW (Dunfermline) confirms '3BDA's GM activity list with the addition of GM3FGJ in Edinburgh and GM3FYB in Dunfermline; he remarks on the consistency of G2DKH/P from Co. Durham and reports reception of G3WW (March) as "the best GDX heard, but not yet worked." During July 19-21, GM3EGW became G3EGW/P when, with GM3FYB, he operated from Ambleside in the rare county of Westmorland. We certainly heard them being called by several of the southern DX kings.

GM2DRD (Forfar, Angus) comes forward with a useful calls list, and explains that until he invested in a 24-element stack, rotatable and tiltable and fed with Telcon 300-ohm ribbon, VHF contacts were few and far between and very difficult for him; even now, GM2DRD wonders what a local signal sounds like on Two, as his nearest neighbour is 50 miles away over the hills. However, the 24-ele. job has been scooping the stuff in during the last month, and G3BW at 150 miles has become a consistent contact, audible most nights and workable even in daylight.

GM3BA (Motherwell) comes in again to confirm the level of activity reported by the other GM's and says "The boys hopefully beam South in the evenings when TV finishes." As in other parts of the country, '3BA remarks on the reluctance of most people to come on before 2000. He is trying to encourage the use of stacks instead of flat-tops, and remarks on the signal now being put out by GM2DRD with his new stack. GM3BA is also continuing his vigorous missionary activity in regard to the design and construction of converters, and in that respect has another "satisfied customer" in GM3FVX who, from the bottom of a deep valley at Auchinleck, Ayrshire, has heard G3BW—no mean feat in view of the distance and the location.

— And Notes from Dublin

With EI2W, the most consistent signal on the band is G3EHY (Banwell), who is never less than S7 and "mostly booms in at S9+." This is on a new 5-over-5, which seems to be doing better than the stack. On the stocks is a 7-over-7, and EI2W says that he will be retiring from beam building after *this* effort! He has cards on hand for the following, and would be glad to have an address for direct mailing: G2JT, G3AOO, G3AUS, G3AUU and G3DUP. During the period June 11-July 6, 20 new stations were worked from

EI2W, of which the most interesting in terms of DX or power used were probably G2UQ, G4MW, G5ML, G6YU and G8VZ. EI2W comments again upon phone-calling procedure, suggesting that instead of making it "EI2W EI2W EI2W *ad nauseam*" till the signal fades down into the noise before the calling station's c/s is made, it be "G9XX Gumster calling EI2W," "G9XX Gumster calling EI2K," *et seq*, so that both call-signs come out on the peaks of QSB. Many good phone contacts have been lost because the usual "Calling EI2W" business has been kept up for too long, the calling station sinking into a fade just as he gave his own call-sign.

— and the North of England

Having become what he calls a "permanent portable," G4JJ (Barnsley), who has been doing a lot of /P work lately, says that two-metre success seems to him to depend 80% on location, 10% on gear, 5% on operating ability and 5% on luck! He was on for the International Contest over July 5-6, with 10 watts and a 3-element beam at 26 ft., and was amazed at the results obtained at a good /P site, stations at 150 miles and over coming in solidly all day. Several more could have been worked if some of the phones that were on had used CW. An amusing sidelight on G4JJ's /P activities is that though in the ordinary way his peace has been disturbed only by starry-eyed couples, on one occasion they could not have been so starry-eyed, because evidently he was reported to the local police. Eager for promotion, the bluebottles came buzzing up, duly to be confronted with the necessary credentials; the twist in the story is that the instructions on G4JJ's Mk.19 generator are printed in Russian!

G8IC (Stainforth, Doncaster) uses a Cubical Quad at 30 ft., with 17 watts into the 832 PA, and on the evening of July 5 worked EI2W, GI2FHN/P and GM3EGW, enabling him "to clutch the bottom step of Countries Worked with 8," as he puts it, and to move up to 30C in the Counties table. From Sheffield, G6PJ reports as 100% active on Two, frequency 144.306 mc. PA 829 with 55 watts, CW only, with a 16-ele. stack at 40 ft. The receiver is a G2IQ-type 6J6 job, and G6PJ is there during the 1800-2000 period, and after 2230; he wants schedules South for the 0730-0830 breakfast hour. G2FCL (Shipley) goes up to 30C, with 21 new stations worked, including two PA's and G3DA/P in Westmorland.

G8SB (Chorlton-cum-Hardy) raised three PA's on the evening of July 4, and says that G3EHY is his most consistent signal, there to be heard or worked nightly. The G8SB totals are high, with 56C and 8 Countries worked and some interesting items in his current calls list. G3HII (Liverpool) has built himself what he describes as a "TVI-proof ? rig," and has pushed up to 67 different stations worked: his aerial is a City Slicker at 40 feet, which looks very high—until he remembers the height of the beam head at G5YV! In answer to G3HII and others, a particular station worked, both from his home QTH and at a /P site, counts as two different stations and also scores as a county when /P.

G2FZU (Ilkeston, Derbys.) is 270 ft. a.s.l. and at present is using a 12-element stack; he proposes to change this to a 6-over-6 in due course. Receiver is a G2IQ-type converter, the Tx runs 25 watts into an 829B, and some 120 stations have been worked on Two. GM3BDA has been heard. G2AJ is a consistent signal from the South, and G3FAN in the Isle of Wight has been worked. G2FZU finds the 12-element stack susceptible to car-ignition QRM, and tests against a 6-ele. Yagi have shown that on GDX there is little to choose between them.

GW5MQ (Rhosesmor, Flints.) found the band alive with PA's on the evening of July 4, and managed to work six of them before conditions went off. To the North, the path has been open to the GM's, with GM3DIQ worked and the Glasgow stations coming through well. Another useful QSO was that with G3DA/P operating from Great Dun Fell, Westmorland, and once again opening up new territory.

Into the hot seat for All-Time Counties goes G3BW (Whitehaven, Cumberland) with a comfortable lead of two over all comers; but the four stations sitting in second place will press him hard, and it will be interesting

TWO METRES

ALL-TIME COUNTIES WORKED LIST

Starting Figure 14

From Fixed QTH Only

Worked	Station
58	G3BW
56	G2OI, G3BLP (567), G3EHY (365), G8SB
54	G6NB, GW5MQ (188)
50	G5YV
48	G2AJ (408)
47	G2NH, G3WW, G5WP
46	G3ABA (274), G4CI, G4HT (476), G5BY, G5MA
45	EI2W (126), G5DS (370), G6XM (356)
44	G2HDZ (307), G2XC
43	G3COJ, G5DF
42	G3BK, G5BD
41	G3BA, G3DMU, G5BM, G6YU (170)
40	G3CGQ, G3FAN (264), G8OU
39	G2IQ, G4SA
38	G2FQP, G3APY, G3VM (208)
37	G2FNW, G8IL
36	G3CXD, G6CB (312), G8IP
35	G2FZU (118)
34	G2AHP (295), G3AVO/A, G3HAZ (113), G4RO, G5JU
33	G3FZL
32	G8QY
31	G2HIF, G3HBW (115), G5RP
30	G2FCL, G5NF, G6CI (114), G8IC
29	G2FVD
28	G5ML, GM3BDA
27	G3BNC, G3DAH, G3FIJ (126), G3GSE, G3HCU (152), G6GR
26	G3CFR (125), G3FIH, G3GBO (268), G4MR (170), G6TA (162)
25	G5SK, G8VR
24	G3BJQ, G3FD, G3FXG, G8KL
23	G5PY
22	G3AEP, G3BPM, G3CWW (221), G3GOP (100), G3HII, GM3EGW
21	G3AGS, G3GHO (136), G5MR (102), G6XY
20	G2HOP, G3EYV, G4LX
19	G3SM, G5LQ (176)
16	G2AOL, G3FEX, G3FRE, GC2CNC
15	G2DVD, G3IWA
14	G3CYY, GM3DIQ

Note: Figures in brackets after call are number of different stations worked on Two Metres. Starting figure for this classification, 100 stations worked.

to see how matters stand in a couple of months' time. The scoring advantage is now tending to pass to the leading Northerners, who have some useful GI and GM counties within reach. It does not seem so long ago that it looked impossible for any Northern station to get into the same bracket as the top-scoring Southerners, who had all the advantages when activity was mainly in the South. The fact that G3BW, G2OI, G8SB and GW5MQ are where they are shows that activity is much more evenly distributed than it was a couple of years ago. Anyway, congratulations to G3BW on his fine performance—though he says himself that he is already beginning to feel uncomfortable! During the month, outstanding QSO's for G3BW have been with G3ABH (Poole, Dorset), G3FAN (Ryde, Isle of Wight) and G5MA/P in Sussex, all good long-haul contacts. While G3BLP and G3EHY will be looking to GM for new counties, G3BW wants Cornwall and Suffolk for his new ones—there are, of course, active and DX-worthy stations in both these counties.

G2DKH/P (Stanley, Co. Durham) goes out /P only ½-mile from home, and from this site has worked 19C this year. Noteworthy QSO's were with G3DA/P and G8AO/MM, contact with the latter being held for some 12 hours on July 4, phone both ways.

Reports East

G3IIT (Cambridge) is now on 144.8 mc. with acknowledgements for the help he has received from the local group. G3FIJ (Colchester) is on again, entering the Tables with 18 and 27C, and DL3TD (Hamburg) as his best DX at 410 miles; six countries have also been worked. The G3FIJ transmitter runs 25w. to an 832, the Rx is an all-6J6 CC job, and the aerial a 4-over-4 at 45 feet. The best GDX is G5YU, who is a strong and consistent signal in this direction, too.

The report from G2PU (Cambridge) shows no less than six countries worked in four evenings during the July 4-10 period; he also gives some useful EDX station frequencies. These are: DL3TD, 144.81 mc; DL6FX, 144.24; DL6SV, 144.90; OZ2IZ, 144.21; OZ7WA, 144.36; PAØFP, 144.79; and PE1PL, 144.01.

Over the six weeks to July 14, the log at G3WW (March, Cambs.) shows no less than 145 different stations heard or worked, 20 of them being new contacts; of the latter, the best as DX are probably F8JR, G2BAT, G3AYT, G3HII, G3HVO, G6NB/P, GM3BDA and GW3ENY. The gains are three counties and one country. G3WW says that though he and several of the Cambridge group are heard and called almost nightly by G4LX (Newcastle), none of them can receive G4LX—nevertheless, the latter is able to work into PA. This proves that the gear at G4LX is all it should be, and suggests some unusual skip effect from his end on transmission.

London and Home Counties

The G2AJ expedition to the Scillies, which was to have taken place at the end of July, had to be postponed, due to the sudden posting overseas of G2AHC; now, the intention is that G2AJ/G3DAH will make the trip over the August 23-24 week-end of the Marathon Contest, and operation will probably be on VHF only. G2AHP (Perivale) has no particular DX to report, but suggests a sustained contest "for QRP bods only," to last a full week. On the QRP theme, G2AHP reports QSO's with G3ISA (Beckenham, Kent) using 3.5 watts and G3CAT (Edgware) with 0.8w. only. He remarks also that the disturbances on TV during the spell of abnormal conditions resulted in a larger-than-usual number of calls from neighbouring TV owners; as G2AHP had nothing more radio-active at hand than a wet paint-brush, they departed nonplussed and with apologies!

G6TA (Balham, London) reports six new counties in the bag, and G3ENI (Richmond) writes that he is active again after a complete re-build; the transmitter is 6AG7 - QQVO4/7-QQVO4/7-832, with screen modulation and controlled carrier. His receiver is 6AK5-6J6-6J6 in cascode, and the aerial a Tri-Square beam. G5MA (Ashtead, Surrey) has worked G3BW both from his home QTH and when out /P at Storrington, Sussex, but had no luck with G3DA/P, heard at home on July 9. Good QSO's from the portable location have been with F8NH (Paris) and F9JY near Cherbourg.

G2HDZ (Pinner) says he much regrets that, in spite of the most earnest efforts, he is still unable to add either GI or GM to the Countries total! He would like to know if 6BQ7's are obtainable in the U.K.. We suggest trying Brimar—*see* p.305 of the July issue. G3BVG (Ealing, W.5) has had to be off for a month, and G3BLP (Selsdon), writing from a holiday address in GC, asks G2OI to move over in the hot seat, as Johnnie is now at 56C, too; but, as he rightly surmised, other things happened while he was away—so there will be some pretty intensive searching of the GM territory from G3BLP! His 56th was GI3GQB in Co. Down on July 5, a fine QSO for both of them. G3BLP mentions that his Cascode gives a noise factor of 3.5 dB. in comparison with ON4BZ's 3.3 dB for his 6BQ7 design. These are astonishing figures, and it might be added that G3BLP's version is the normal 6AK5-EC91 arrangement for the Cascode; it has, however, been properly neutralised, which is the point on which some constructors appear to have slipped.

G3GDR (Watford) had a good share of the EDX during the July openings, with 11 stations worked in four countries, and EI2W, OZ2IZ, OZ7WA and SM7BE

TWO METRES

COUNTRIES WORKED

Starting Figure, 8

12	**G3BLP** (DL, EI, F, G, GC, GD, GI, GM, GW, ON, OZ, PA).
	G5YV (DL, EI, F, G, GD, GI, GM, GW, ON, OZ, PA, SM).
11	**G6NB** (DL, EI, F, G, GC, GD, GM, GW, ON, OZ, PA).
10	**G2HDZ, G3WW, G5DS, G6LI, GW5MQ.**
9	**G2FQP, G3ABA, G5BD, G6XM.**
8	**G2AHP, G2XC, G3BK, G3EHY, G3VM, G5BY, G5MA, G5UD, G8IC, G8SB.**

TWO METRES

COUNTIES WORKED SINCE SEPTEMBER 1, 1951

Starting Figure, 14

Worked	Station
51	G3EHY
49	GW5MQ
48	G5YV
45	G3WW
42	G5DS
41	G2HDZ, G3BK, G3BW, G5MA
39	G6YU
38	G3FAN
37	G2OI
36	G4HT
35	G2XC
33	G4SA
32	G2NH
30	G2FCL, G2FQP
29	G2AHP
28	G2FVD
27	G2FNW, G3VM
26	G3AVO/A, G6TA, G8IL
23	G3BJQ, G5ML
22	G3FIH, GM3EGW
21	G3BNC, G3GHO, G3HII, G6CB
20	G4MR, G6CI
19	G3CWW, G3HCU
18	G3FIJ, G8VR
15	G3GOP, G3IWA
14	GM3DIQ

Note: This Table will be closed for the year 1951-2 on August 31st and final placings given in the October issue. All movements to August 31st must be notified by September 12th. The Table for 1952-53 opens with effect from September 1st.

heard. His transmitter runs but 20 watts to an 832, the aerial is a 12-element stack, and the receiver a 6J6-6J6-6J6 CC converter into a BC-348 Straightforward gear, which is giving him excellent results, with a good signal in all directions.

The Midlands News

G8NM (Lincoln) is still alone on the band in his district, which has made things slow for him when conditions have been flat. On the high nights, GDX was heard from useful distances, and to the North, G2DKH/P was raised for a 130-mile contact. Generally, conditions have been better to the South with him than in other directions, probably due to the lie of the ground. But G8NM can hear G5YV, and would very much like a contact with him!

G6CI (Kenilworth) moves up one in the Tables, having worked G3AUS (Torquay) for a new county. G6YU (Coventry) heard a number of Continentals during the July opening, but could not raise any of them; he was, however, very pleased and rather surprised to work E12W—at 1100 one Sunday morning; some portable operation is in prospect at G6YU. G3BJQ (Rugby) had his beam down (for modications for increased height) just about the time the Europeans were coming through, so missed them; but since then he has worked 7 new counties, which is some compensation. He finds G3FAN (Ryde) a consistent signal, even under poor conditions. G3ABA (Coventry) scored two good ones with E12W and GM3BDA, never expecting to work the former through the heavy local screening in that direction. G3ABA is now trying hard for Cornwall (G2BAT and G3AGA), and on one occasion hung on to G2BAT for two hours trying to raise him.

G3GHO (Roade, Northants.) found his morale greatly improved by a CW QSO with DL3MH, and G3MA (Gloucester) worked for a new county also helped to push the score along. Just as things began to look up for him, he had to start moving into a new house —only 50 feet away, it is true, but the disturbance was none the less for that!

Further South, from Aylesbury, G6NB reports again after a long absence from these pages—though it has not been due to inactivity, as we well know. He is, in fact, one of the most regular performers on the band, and is equipped for /P besides; on portable occasions, the input is only 4 watts, but G3BW and GM3BDA have been worked from the Herefordshire site, which is very good going. The scoring is high at G6NB, with 11 countries and 54 counties, while his calls list in this month's Activity Report shows 28 DX stations worked in eight countries—nice going!

Recently on the band, G6FO (Maids Moreton, Bucks.) has an 829 in the PA, a three-stage CC converter, and an extraordinary-looking beam assembly, suspended from the main aerial, which he calls a 12-element stack; it has been likened by puzzled observers to a Flying Birdcage or Starling Trap. Nevertheless, the thing does seem to work, as F's and ON's have been heard, and of the latter ON4BZ (Brussels) raised for a QSO.

G3CVO (Gerrards Cross, Bucks.), well-known for his amateur TV activities and the responsibility he discharges so well as secretary of the British Amateur Television Club, is rebuilding his aerial mast and putting on a 4-over-4 head; he also is keen on QRP for Two.

South and West

G2XC (Portsmouth) hopes to be regularly on the band again before long, and has quite a lot of ground to make up. G2HIF (Wantage) asks for contacts with Shropshire and Suffolk—counties he has not even been able to hear yet — and puts in a word for the brethren above 145 mc, asking especially that the Continentals should remember to tune beyond 148.8 mc when the band is open for G's. Commenting on the E12W-GW3FYR-G3EHY phenomenon mentioned last month, G2HIF says that he frequently encounters much the same sort of thing with Northerners like G2OI and G3BW, who are often much steadier than stations in the Midlands. In fact, it is becoming most noticeable that deep QSB tends to occur more on signals at 60-100 miles distant that on those further away—when conditions are such as to bring in the GDX.

G3HVO (Parkstone, Dorset) came in just too late for last month's dead-line, but it is worth recording that in the seven months to July 1st, he had worked 103 stations in 16 counties and three countries, on 145.210 mc, using a 12-element stack, an 829 PA, and a CC converter with neutralised RF stage. A regular

schedule is maintained with G2DTO (Tooting) at 100 miles and—with G3ABH (Sandbanks, Dorset)—G3HVO is looking for more GDX in a northerly direction; G3ABH is on 145.350 mc. G3HVO can hear at good strength about 30 stations he is quite unable to raise, in spite of repeated and frequent calls; they include F's, GW's and some distant G's. He believes that some of the phone operators have no BFO!

Writing from Gloucester, G8DA reports that G3FSL, G3MA and himself are regularly active on Two, on every evening before and after TV and sometimes through it as well, and would very much like more of the Easterly stations to aim their beams South-West—when not looking for LA and SM, of course! The best at G8DA recently have been EI2W, G3BW and the Cornishmen G2BAT and G3AGA.

G3IWA (Bath) enters the Tables for the first time, with 15C worked since he came on Two early in April; he feels justifiably pleased about it, as he uses only 15 watts and is badly screened — anyone who knows the Bath district will remember that one is bound to be cut off by near high ground in one direction or another. As an instance, G3IWA is quite unable to work Gloucester, in spite of scheduled attempts. On the other hand, G3WW at 160 miles is a very consistent signal with him, under all conditions. G3FIH (Radstock), in the same district as G3IWA, reports F9JY (Nr. Cherbourg) as his best for the month, and adds the very interesting note that he has heard F9JY calling both G3BW and G5YV—so the Frenchman evidently has the gear and is hearing the GDX; he would be a nice QSO for either of them!

A comprehensive budget from G3EHY (Banwell) once again records that "200-mile DX was the uninterrupted feature of the month, with EI2W S9 on phone at all times"—so G3EHY now looks upon him as a local, and expects something over the 300-mile mark for real DX. Accordingly, he worked GM3BDA at 335 miles on five occasions, and nearly succeeded in doing it three nights running! On one particular evening, GM3BDA was being read off the back of his beam; a little later, G3BW was working GM3BDA, and could be read in Banwell off the back of *his* beam! Other interesting items from G3EHY are that on July 6 he worked GI2FHN/P, and on July 10 GI3GQB, both around the 260-mile mark. G3DA/P in Westmorland was raised for a solid QSO on July 10, and ON4BZ has been heard several times. With 56C, G3EHY is beginning to wonder where the others are coming from—as it was, he was pleased and surprised to get the two new ones in Antrim and Westmorland, in the short space of four days.

Some Seventycem Items

G3CVO (Gerrards Cross) is getting going again with re-vamped gear. GW5MQ up in Flintshire now has G3DA/P at 100 miles as his best DX on 70 cm, and the total of counties worked from GW5MQ goes up to seven. G3EHY has been heard on Seventycems by G2DD and G8SM in the London area, and the 105-mile path G3EHY-GW2ADZ is still open, with an improved 430 mc receiver at the GW2ADZ end.

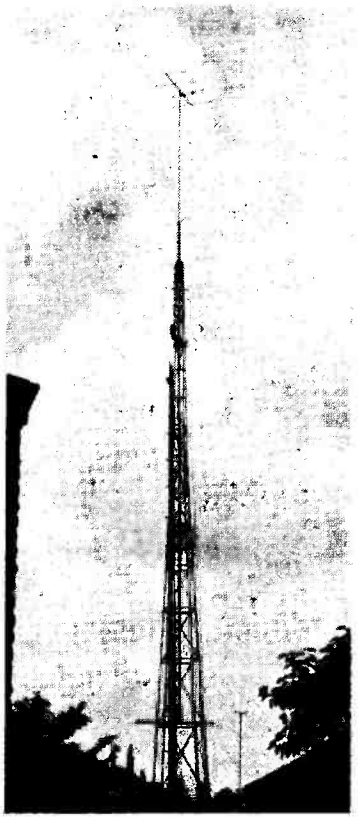
Otherwise, there is a distinct paucity of news about this band, though we know that there are centres of regular activity, with interesting local work going on. And about it we should like to hear more.

And Finally

With time and space running out, and the Editor wondering if he will be able to get all this in, we must bring the story to a close for this month, though there is much else we would like to have been able to discuss. At this season of the year, "VHF Bands" is always pressed for space, and the volume of mail very heavy. Your exhausted and bleary-eyed A.J.D. once again records his grateful thanks for so much assistance in the compilation of this feature and hopes that the dose will be repeated next month!

Don't forget the Contest week-end, and to call "CQ MVC"—and send in your log irrespective of scores made, because without your log we cannot check somebody's entry.

Dead-line for the September issue is **August 15** certain, at the office, addressed A. J. Devon, "VHF Bands," 55 Victoria Street, London, S.W.1. And so till our next appearance on September 5, 73 and GL for MVC.



The G5YV beam head at the 62-foot level—still with 30 odd feet in hand to wind up. In other words, the beam can be pushed up half as far again! The "thickness" up the mast (which actually tapers gracefully and is a first-class engineering job) is a 42-ft. pole in the background which happens to coincide with the camera angle.

MARATHON VHF CONTEST

SECOND LEG

Week End August 23-24

See Rules pp.296-297 July Issue

Logs by September 3 for Second Table in October issue

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.

EI3H, C. J. Ardiff, Baily Cottage, Bailey, Co. Dublin.

G2ALO, R. P. Munn, 163 Dollis Hill Lane, London, N.W.2.

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

G2CDN, R. J. Toby, BM/CVWK, London, W.C.1.

G2YU, S. R. Lowe, 45 Camp Road, Norwich, Norfolk.

G3EJH, R. Peatman, The Bungalow, Marton Road, Chilwell, Notts.

G3GQJ, J. I. Turnbull, 46 Barrasford Street, East Howdon-on-Tyne.

G3HKD, D. C. Money, 309 Aylsham Road, Norwich, Norfolk.

G3HOD, E. Bridgwater, 78 Stonerwood Avenue, Hall Green, Birmingham, 28.

G3HSJ, A. K. Head, B.A., B.Sc., 10 Chertsey Road, Bristol, 6. *(Tel.: Bristol 34749).*

GM3HUZ, D. C. Millar, 55 Marywood Square, Strathbungo, Glasgow, S.1. *(Tel.: Pollok 1594).*

G3HWF, Yatesbury R.A.F. Amateur Radio Society, No. 2 Radio School, R.A.F. Yatesbury, Calne, Wilts.

G3HZP, H. D. James, 74 Woodland Road, Leicester.

G3IBM, C. Cooper, 23 Potters Road, New Barnet, Herts.

G3IDE, West Raynham Amateur Radio Society, R.A.F. West Raynham, nr. Fakenham, Norfolk.

G3IDY, R. Robson, 26 Ottawa Road, Grove Hill, Middlesbrough, Yorkshire.

G3IDZ, Aircraft Apprentices' Radio Club, No. 6 Radio School, R.A.F. Cranwell, Lincs.

G3IEZ, S. Bates, 64 Rosebery Road, Muswell Hill, London, N.10.

GI3IFD, T. Carlisle, 29 Thomas Street, Carrickfergus, Co. Antrim.

G3IFJ, G. S. Parmenter, 2 Sherwood Street, Reading, Berks.

G3IFL, J. Pridmore, 44 Leys Avenue, Cambridge. *(Tel.: Cambridge 4686).*

G3IFZ, D. Ford, 6 Johnson Road, Short Heath, Willenhall, Staffs.

G3IGE, Dr. P. F. Donnelly, 8 Stanmore Road, Tottenham, London, N.15. *(Tel.: Bow 3227).*

G3IGK, W. W. Humphries, 4 McBean Road, Wolverhampton, Staffs.

G3IGL, C. J. Lovelock, 361 Greenford Avenue, Hanwell, London, W.7.

G3IGM, R. G. Hindes, 51 Rusthall Avenue, Bedford Park, Chiswick, London, W.4.

G3IGP, J. G. Pearce, 75 Eltham Park Gardens, Eltham, London, S.E.9. *(Tel.: ELT. 7342).*

G3IGU, SAC. K. H. Coates, Hooton Pagnell, Doncaster, Yorkshire.

G3IGZ, D. W. Bruce, 39 Dunkery Road, Grove Park, London, S.E.9.

G3IHB, J. Russell, 49 Strathmore Avenue, Hitchin, Herts.

G3IHI, D. W. Auton, 36 Elborough Road, Moredon, Swindon, Wilts.

G3IHJ, L. E. Hasler, 3 The Oval, Chester Moor, Chester-le-Street, Co. Durham.

G3IHQ, G. Magee *(ZE3JL),* 246 High Street, Felixstowe, Suffolk.

G3IIY, E. C. Clayson, The Mansion, Harrold, Beds.

G3ISG, S. E. Green, 28 Cowper Road, Bristol, 6.

CHANGE OF ADDRESS

G2BM, G. R. Foster, 67 Chauncy House, Sish Lane, Stevenage, Herts.

G2FDF, W. F. Limehouse, Audley, London Road, Great Missenden, Bucks. *(Tel.: Gt. Missenden 241).*

GM2FXN, A. J. Wylie, 2 Roxburgh Terrace, West Park Road, Dundee, Angus.

GW2UW, W/Cdr. A. J. S. Wilson, Officers' Married Quarters, 10 Llantwit Road, R.A.F. St. Athan, Glam.

G2XV, G. A. Jeapes, 129 Cambridge Road, Trumpington, Cambridge. *(Tel.: Trumpington 2139).*

GM3BA, S. P. Douglas, M.B.E., c/o 31 Quarrelhead Avenue, Salsburgh, Motherwell, Lanarks.

G3CDE, Dr. G. A. Jackson, c/o 32 Phipps Hatch Lane, Enfield, Middlesex.

G3CHE, L. H. Brown, 16 Neville Grove, Almondbury, Huddersfield, Yorkshire.

G3CWI, F. K. Rawson, 117 Aylestone Drive, Leicester.

GM3DFM, R. N. Redfern Smith, Rivaldsgreen, Linlithgow, West Lothian. *(Tel.: Linlithgow 274).*

G3DHF, R. H. T. Rylands, 32 Kings Road, Fleet, Hants. *(Tel.: Fleet 217).*

G3ERG, J. Pickup, 1 Courtenay Road, Wantage, Berks.

G3FDA, E. D. Abrams, 5 Deanswood Place, Moortown, Leeds.

G3FDA/A, E. D. Abrams, 5 Deanswood Place, Moortown, Leeds.

G3FGT, L. F. Crosby, 35 Robin Hood Estate, nr. Streetsbrook Road, Shirley, Warks.

G3FME, J. C. Scott, 14a Crabton Close Road, Boscombe, Bournemouth, Hants. *(Tel.: Boscombe 34473).*

G3FME/A, J. C. Scott, 138, Brockhurst Road, Gosport, Hants.

G3GQK, J. Wall, 21 Vancouver Road, Forest Hill, London, S.E.23. *(Tel.: FOR. 4449).*

G3HJK, B. J. Mitchell, 46 Ashfield Road, Longsight, Manchester, 13.

G3HMR, G. B. Moser, 6 Hodge Howe, Windermere, Westmorland.

G3HUL, D. M. Mallett, 12 Gristock Road, Marlpit Lane, Norwich, Norfolk.

G3IIO, D. R. Harriott, 16 Bancroft Road, Bexhill-on-Sea, Sussex.

GW5FN, S. A. Howell, 7 Homelands Road, Rhiwbina, Cardiff, Glam.

THE opening of the new 21 mc band has been a real tonic for a rather jaded set of keen DX men in this country. The short-wave bands have been behaving so badly that many have deserted them for the last few months, and even the LF bands have not been up to standard. So it was in a spirit of happy exploration that old-timers and new-timers alike descended on the newly-opened band precisely at 0001 on the night of June 30. As luck would have it, the most freakish short-skip conditions prevailed, and so a real band-warming party rapidly got under way. G's, GI's, GM's and GW's were hearing each other at S9 and more, and the band sounded rather like 1.7 mc on an exceptionally good night. Rapid QSO's were the order of the day, and "firsts" between the various countries were being hopefully chalked up by all and sundry—so much so that the real "firsts" will take a lot of sorting out (if that really matters, anyway).

MORE ON MODULATION

This scribe has more than once made a scornful allusion to the strange sounds that purport to be a reproduction of the human voice (as heard on the popular phone bands). Now I have come to the conclusion that there is a deep-laid plot afoot, together with a desire to obtain secrecy of transmission. Some of the manifestations heard recently would seem to be caused by the interposition of a small diode between the speech amplifier and the modulator — or even between the modulator and the PA. Two practically unintelligible stations were recently heard smoothing each other's backs about speech quality. One told the other that his modulation was "pretty full," but the second one interpreted these words as "pitiful," and quite an argument ensued, with no honours on either side. One would have thought that the elementary problems (if, indeed, they can even be called problems nowadays) of amplifying the output from a microphone without introducing complete unintelligibility had been solved two decades ago. Some of to-day's exponents are apparently set on learning things the hard way, by starting with a system that does not, and probably cannot, work and endeavouring to squeeze high-fidelity speech from it.

AERIALS FOR 21 mc

Some lucky ones have found that their aerial system suits the new band with no alterations whatever; others (such as those with 14 mc folded dipoles) have not. Another, and rather less obvious point has also come to light. People using 600-ohm line (whether as a Zepp or a centre feeder) have usually managed to rationalise the length of feeder for the bands previously in use, but the new band has just turned awkward and presented them with a brand-new set of conditions. For instance, it has always been a popular scheme to use about 44 ft. of feeder, with which one can use series tuning on 3.5, 7, 14 and (sometimes) even 28 mc. But on 21 mc this is very nearly one wave-length long, bringing a voltage loop right down to the lead-in and necessitating parallel tuning. Not a serious matter, admittedly, but one that has already caused a little trouble, judging by comments read and heard.

SAFETY IN THE SHACK

One hears from time to time of a most regrettable fatality in the course of operating or (more usually) adjusting a transmitter, but surely it is a miracle that such cases are not far more numerous? One would say that the most important single feature of any shack should be the safety precautions taken therein. DX is illusory, but death is permanent, and anyone who will risk the latter in his seekings for the former is surely unbalanced. Many of us take the most appalling risks without realising, until afterwards, how near we were to that high-voltage terminal when we undid so-and-so — *with the volts on*. The most dangerous possibility is surely the medium-voltage power packs; everyone respects his 1000 or 1500-volt supply for the PA, but there are numerous occasions on which 500 or 600 volts can be lethal, and those buffers or doublers are too often treated with off-hand contempt. The three straightforward precautions are (i) switch off; (ii) make sure condensers are always discharged through bleeders; and (iii) remove headphones and keep one hand in your pocket.

THE WALL-PAPER

One presumes that the purpose of a call-sign in very large type on a QSL card is to make it easily readable when pinned up on the wall. That, at any rate, was the idea behind the very first cards, and in the old days every card that came in was handed immediately to the drawing-pin department. Nowadays, when the active ones receive far more cards than any shack wall can possibly accommodate, it is interesting to note the various schemes of storage and stowage that are adopted. Some high-minded individuals regard it as sacrilege to allow their rare DX cards to become sunburnt or faded, and file them all. Others put only the best ones on the wall—one from each DX country, or some similar scheme—and relegate the rest to a file or an album. And recently I met a third type, who put only what he called "the rubbish" on the wall, carefully preserving the good ones in an album that a philatelist would not have despised!

G3GUM

The Other Man's Station

HEREWITH the story of G3GUM—F. N. Baskerville, Briarwood, Green Lane, Formby, Lancs.—who was first licensed in August, 1950, though he had been an active SWL since 1924. Of particular interest is the fact that *all* the gear at G3GUM is home-built, including the receiver, which is a 10-valve double super-het having each amateur band-spread 180° on the dial. And if anyone, looking at the photo-graph, should say "What about that Wilcox-Gay VFO I can see," the answer is that it has been superseded by a home-constructed Clapp drive oscillator. Other such items include a 100 kc multi-vibrator, a heterodyne wavemeter and a grid dipper.

The main transmitter runs 130 watts to P/P 807's, and there is also a Top Band transmitter fabricated from a TU5B box, and consisting of an EF91 driving a TT11. The all-band aerial is a 137-ft. long-wire, end-fed, 36 ft. high and well in the clear.

G3GUM is, of course, well-known as one of the more successful DX operators, and he gained his DXCC in his first 12 months on the air. The station total at the beginning of March, 1952, stood at 153 countries worked in 37 Zones, with 118C confirmed. Yet, with the present aerial, it has not been possible to raise JA, though VS6's can be worked off the cuff. Another interesting fact is that, though licensed for it since he came on the air, G3GUM has never used phone—he is a confirmed CW-only man. This may be because he has had eight years at sea as a radio officer in the Merchant Navy (now compulsorily on the beach through disablement), and so G3GUM's greatest enjoyment in Amateur Radio is working stations in those ports, the world over, of which he has pleasant recollections.

Cards visible on the left-hand wall in this photograph are of great antiquarian or "prehistoric" interest because they are trophies of the SWL chase in G3GUM's early days. Included are many well-known stations of the middle 20's, home and overseas, and No. 1 in this collection is a QSL from Australian A2CM dated January, 1926.

Since the photograph was taken, station G3GUM has undergone some reconstruction, so that as heard on the air at present it is not quite as shown here.

The Month With the Clubs

In spite of summer weather, holiday absences, attenuated Club programmes and all the other hazards of this period of the year, we have received activity reports from 32 Clubs this month, which we take as a sign that the movement is in a healthy and virile condition.

We are glad to note that at least one Club has succeeded in persuading the local Education Authority to organise a course of instruction especially for the R.A.E. This leaves the local group free to pursue Morse instruction with greater vigour and to continue running its normal lectures of general interest to all members, rather than a specialised course for the beginners.

This year's MCC (the Seventh MAGAZINE *Club Contest) will run from* **Saturday, November 15, until Saturday, November 22,** *occupying the period of 1830 to 2230 each day. The rules have been changed in two significant ways. First, the whole of the 32 hours available may be used by every Club (previously there was a restriction on total operating time). Secondly, although the accent is still on inter-Club working, additional points may be gained by working* ANY *station on the band. Inter-Club contacts are permitted to take place each day, scoring three points each time. Other stations may be worked once only during the whole period, scoring one point. The Contest takes place, of course, on the 1.7 mc band, on which inputs are limited to 10 watts.*

As stated last month, Rules for the Seventh MCC will be posted to all Club Secretaries in good time.

This month we acknowledge receipt of Newsletters from Clifton and Wirral. May we again appeal for Club-interest photographs and general news items from all Club Secretaries who read this feature?

Next month's deadline is FIRST POST ON AUGUST 13, and the following month, September 10. All Club reports and other matter for this space should be addressed "Club Secretary," SHORT WAVE MAGAZINE, *55 Victoria Street, London, S.W.1.*

Gravesend Amateur Radio Society

The summer programme is mainly informal, and has already included an outing to Brighton. The Club Tx is being prepared for operation in the winter, and will participate in MCC "provided that the rules meet with the approval of the committee" (!) Meetings are on Wednesday evenings at the Clubroom, 30 Darnley Road, Gravesend.

Surrey Radio Contact Club, Croydon

The S.R.C.C. request to the Education Authority for an RAE Course in the winter has been met, and Croydon Polytechnic is prepared to open such a course, starting in September. More than one class will be run if sufficient interest is shown (a class must comprise about 20 persons). Classes will meet on Wednesday evenings, and the enrolment dates are September 15, 16 and 17. Next Club occasion is on August 12 and is a non-radio meeting, with a show of Travel films and a general rag-chew. The September meeting will take the form of a Junk Sale.

Clacton Radio Club

This Club has been re-formed, and the first two meetings were devoted to re-organising the future activities. A successful Junk Sale and a talk on The History of the Electron have already been held. The Club licence has been renewed, and it is hoped to put G3CRC on the air again shortly. The meetings will be on the first Thursday of every month, at the Queen's Hall Cafe, Holland-on-Sea.

Brighton & District Radio Club

As last year, the month of August will be informal throughout, and visitors from any other Clubs will be welcome to join in. Meetings will be held on Tuesday evenings, as usual. For the autumn a very attractive programme is being arranged, and talks already on the list include the BBC and Thermionic Products (Sound Mirror).

Coventry Amateur Radio Society

To foster interest in VHF activity, G5ML has presented a fine cup to the Society, and details of a contest for its award will be announced later. Club nights continue at the YWCA, Queen's Road, at 7.30 p.m. There is no meeting on August 4, but on the 18th Ray Bastin will talk on Two-Metre Receivers.

Eastbourne & District Radio Group

At the last meeting the NFD results were discussed and criticised, after which a general rag-chew took place. The summer meetings will be held monthly instead of fortnightly, and the next are on August 7 and September 4.

Eccles & District Radio Society

Weekly meetings continue—Mondays at 7.30 p.m.—at Eccles House Club, Abbey Grove, and a cordial invitation is extended to all interested persons to attend. Full workshop facilities are now available, and also access to test gear at nearby premises on Wednesday nights. Members hope to visit Holme Moss TV station in the near future.

Grafton Radio Society

The Field Day was an unqualified success, with the work of G2CJN as chef described as the

outstanding event! Grafton are now closed for "a well-earned rest" until Friday, September 5, when the AGM will be held.

Hastings & District Amateur Radio Club

Recent meetings have been occupied by technical discussions, subjects varying from Superhet Tracking to informal talks by members on their own personal problems. There was also a talk by G6QB on Aerial Fundamentals. It is hoped that in the near future the Club will derive some benefits from the Union of Sussex Radio Clubs, an organisation which the Hastings Club supports. Next meeting, August 12 at Saxon Cafe, Hastings.

Hoffman Gloucester Athletic & Social Club (Radio & Electronic Society)

As a section of the parent organisation, this Society was formed a year ago to promote discussion and experiment, lectures and demonstrations, and to cater for the interests of all members in Radio, Electronics and kindred subjects. Membership is restricted to the firm's employees, and a full programme of practical and theoretical instruction, together with Morse classes, has been carried out. Meetings are on Tuesdays at 7.30 p.m. on the firm's premises, and separate locations are available for operating, lectures and workshop practice. The Club Tx, G3IFH, operates on the Top Band most Tuesday evenings. See panel for QTH of Secretary.

Leicester Radio Society

Lectures on D-F equipment (with demonstrations) and a 150-watt Transmitter were given during July. At the meeting on August 18, full details will be given of a D-F day to be held on the 30th. On September 1 there will be a lecture on the Ediswan CR Tube, and on October 6 the subject will be Modern Cinema Sound Recording Equipment. Meetings are on the first and third Mondays at the Holly Bush Hotel, Belgrave Gate, 7.30 p.m.

Midland Amateur Radio Society

This Club's Field Week-End was held on June 28-29 and was a great success, in perfect weather. A total of 20 countries was worked. Following the usual practice, there will be no meetings during August.

QAU Club, Jersey, C.I.

At the mid-July meeting the visitors outnumbered the residents, and an interesting evening was spent in the company of G2KU, G3BFP, G3HMT, G6LX and G8JC. Still more are expected during the next fortnight. Members GC2CNC and 2FMV went over to Guernsey for a recent contest and thoroughly enjoyed themselves.

Ravensbourne Amateur Radio Club

The Exhibition of home-built gear, held recently, was a great success, and the Club Tx, G3HEV, was in operation on 160, 80 and 20 metres. G2WI recently brought his own transmitter to some meetings (Wednesdays at 8 p.m.) and some local contacts were made on 160 metres. No meetings are being held between July 10 and September 23, but new members will be welcomed after the latter date.

South Manchester Radio Club

A very successful D-F Contest was held on June 29, and at the following meeting there was a talk on the Design of Chokes and Transformers. A lecture on Pulse Communication Systems is scheduled for August 1, to be given by G3ESK.

Wanstead & Woodford Radio Society

Activity continues, but at a much reduced scale on account of summer weather and holidays. Mr. J. Binning, who has served as Secretary for a long time, has reluctantly had to resign on account of pressure of work. See Panel for new Secretary's QTH.

West Raynham Amateur Radio Society

Rainham is now licensed as G3IDE, operating on 7040 kc. Much time is spent on constructional work, and Morse classes are being held. More members are needed, but now that the Club is on the air an increase is expected.

Army Apprentices' School Radio Club

This Club is arranging skeds with its opposite number in Australia, of which the Commandant is VK3FB. In the meantime, skeds with a view to improving Morse proficiency are run with St. Richard's School, Middlesbrough, G3GUV. An aerial farm is developing, and a successful Constructional Competition has been run. Waiting list for membership is growing, and it is difficult to fit everyone in, with the facilities available. G3HOS will be closed during summer leave, re-opening on August 28.

Bournemouth Radio & Television Society

Forthcoming events: August 8, Visit to Electricity Generating Station, Poole, 7.30 p.m.; August 15, Junk Sale; September 5, Regular Meeting. It is hoped to arrange visits to Dorchester Radio, the Hurn School of Air Traffic Control and other places of interest. Holiday visitors will be welcome to the meetings at the Cricketers' Arms, Windham Road, Bournemouth, on the first and third Fridays at 7.45 p.m.

Chester & District Amateur Radio Society

At recent meetings, more attention has been turned to the newcomers, and talks have been given by several members describing their own equipment and giving useful tips. During the winter months lectures will be given, with particular reference to the R.A.E. Next month there will be a display of Amateur Radio equipment. Meetings are on Tuesday evenings, 7 p.m., at the Tarran Hut, YMCA Grounds, Chester.

Clifton Amateur Radio Society

Recent events have been a talk on Hi-Fi, a constructional evening and a lecture on TV Construction. Forthcoming: August 1,

G3ESY/A was operated at a Hobbies Exhibition at the Shirehall, Hereford, from May 15 to 18 last. This is a view of the stand, with G3ESY on the left. Equipment was provided by G2DFL, G3ESY, G3EYH and G3NA, with a home-built tape recorder lent by SWL M. Conu. Over 100 contacts were made on different bands during the period of the Exhibition, and the results achieved reflect great credit on the small band of amateurs in the Hereford district.

Lecture on Power Supplies; August 8, Lecture-Demonstration on Component Testing to Destruction; August 15, Junk Sale. A film show is being arranged, and the Morse class continues to flourish.

East Grinstead & District Amateur Radio Club

Meetings are now held on alternate Thursdays at Portland Hall, Portland Road, the next two being on August 14 and 28. New members will be cordially welcomed, or they may write to the Hon. Sec. for further information.

Hounslow & District Radio Society

Recent meetings have included talks on Aerial Matching and an explanation of the R.A.E. questions. There will be no meetings in August, but the Club will be open on September 11 and 25. A demonstration will be staged to show the generation and detection of Standing Waves.

Ixworth Radio Club

Recent events have included a Party, an AGM, a visit to a Servicing Department and a lecture on Superhets and Crystal Filters. Interest in Two Metres is increasing, and it is hoped to provide Suffolk contacts for some of the other stations before long.

Purley & District Radio Club

A recent talk on Oscilloscopes proved very interesting, and at the next meeting, on August 28, G2FKZ will lecture on Tropospheric Propagation. Arrangements are also in hand for a visit to the BBC Receiving Station at Tatsfield. Meetings are on the fourth Thursday, 7.30 p.m., at the Railway Hotel, Purley.

Rochdale Radio & Television Society

This Club has just obtained premises for use as a Club room, and all activities are now con-

NAMES AND ADDRESSES OF SECRETARIES REPORTING IN THIS ISSUE

ARMY APPRENTICES' SCHOOL: B. C. Stocker, "A" Coy., AAS, Arborfield, Reading.
BOURNEMOUTH: J. Ashford, 3 Stevenson Court, Alum Chine Road, Bournemouth.
BRIGHTON: R. T. Parsons, 14 Carlyle Avenue, Brighton, 7.
CHESTER: W. Lloyd, 124, Tarvin Road, Chester.
CLACTON: R. F. E. Bliss, 67 Salisbury Road, Holland-on-Sea, Essex.
CLIFTON: R. E. Brown, G3GZH, 210 Edward Street, London, S.E.14.
COVENTRY: K. Lines, G3FOH, 142 Shorncliffe Road, Coventry.
EASTBOURNE: W. A. Allwright, G2AON, 333 Seaside, Eastbourne.
EAST GRINSTEAD: F. J. Glynn, G3GVZ, The Mount, 13 Station Road, East Grinstead.
ECCLES: A. Gray, 2 Egerton Road, Monton Green, Eccles.
GRAFTON: W. H. C. Jennings, G2AHB, Grafton LCC School, Eburne Road, London, N.7.
GRAVESEND: R. E. Appleton, 23 Laurel Avenue, Gravesend.
HASTINGS: G. W. Spray, G3FXA, 255 London Road, Bexhill.
HOFFMAN GLOUCESTER: S. R. Boakes, Hoffman Gloucester Athletic and Social Club, Hoffman Works, Stonehouse, Glos.
HOUNSLOW: J. Clarke, 124 Springwell Road, Heston.
IXWORTH: P. G. Wright, Thurston Road, Great Barton, Bury-St.-Edmunds.
LEICESTER: L. Milnthorpe, G2FMO, 3 Winster Drive, Thurmaston, Leics.
MIDLAND: G. W. C. Smith, 84 Woodlands Road, Birmingham 11.
PURLEY: A. Frost, G3FTQ, 18 Beechwood Avenue, Thornton Heath, Surrey.
QAU CLUB, JERSEY: Miss Valerie Hunt, c/o 5 Valley Gardens, Bel Royal, St. Lawrence, Jersey, C.I.
RAVENSBOURNE: J. H. F. Wilshaw, 4 Station Road, Bromley, Kent.
ROCHDALE: J. Riley, 1 Darley Bank, Britannia, Bacup.
SALISBURY: V. G. Page, G3IVP, 32 Feversham Road, Salisbury.
SLADE: C. N. Smart, 110 Woolmore Road, Birmingham 23.
SOUTHEND: G. Chapman, B.E.M., Bell Hotel, 20 Leigh Hill, Leigh-on-Sea, Essex.
SOUTH MANCHESTER: F. H. Hudson, 21 Ashbourne Road, Stretford.
SURREY: S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon.
WANSTEAD: C. Stevenson, 45 Dacre Road, London, E.13.
WESTERN: R. F. D. Moir, 18 Haldane Street, Glasgow, W.4.
WEST MIDDLESEX: P. W. Smith, 121 Richmond Avenue, Hillingdon, Middx.
WEST RAYNHAM: Cpl. M. Allenden, C.R.W., RAF West Raynham, Fakenham, Norfolk.
W.F.S.R.A. (Bedfast Club): J. Beavan, G3GBL, 296 Fore Street, Edmonton, London, N.9.

cerned with decoration. Meetings are on Friday evenings, 7.45 p.m., at 1 Law Street, Sudden, Rochdale.

Salisbury & District Short Wave Club

A D-F Day on June 13 proved so successful that another was held on July 13. Great originality has been shown in equipment design, and ingenuity on the part of the solo motor-cycle owners. Club-room and Shack are being re-decorated, and the latter is now operational on all bands, including Two Metres. New members will be welcomed on all Club Nights—Tuesdays at 7.30 p.m.

Slade Radio Society

Slade R.S. are now installed in new Headquarters at Church House, High Street, Erdington. The first meeting there took the form of a lecture on Electronic Digital Computers, and a midnight D-F Test was another very successful venture. During August there will be an evening D-F Test on the 15th and a Junk Sale on the 29th.

West Middlesex Radio Club

They are meeting on the second and fourth Wednesdays at the Labour Hall, Southall Broadway. Visitors will be welcomed at the August meetings, which are on the 13th (recorded talks on The Ether and The Ionosphere, followed by discussion) and the 27th (lecture on Principles of Radar).

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

The Club's work is in full swing, with a scheme to assist all Bedfast members by putting them in touch with other members willing to help them with personal visits, repairs to their gear and so on. Many other Clubs have also helped them in this way. It has been found that the BC 453, suitably modified, is ideal for members in hospital, and offers of these units (either for sale or donation) would be gratefully accepted. Reading matter, also, is still urgently needed.

Western Short Wave Club

The Club meets on Monday and Thursday evenings at 7.30 p.m., at its own premises, The Skaterigg Farm, Skaterigg Road, off Crow Road, Glasgow. Morse classes are in progress and the Club is licensed as GM3HYI, active on 14 mc CW. In conjunction with the Drumchapel Motor Club, a D-F contest is to be held on September 30. Intending participants should apply at the Club or to the Hon. Secretary —QTH in panel. And W.S.W.C. will also welcome new members.

Southend & District Radio Society

There will be no further meetings of this Society during the present session, as the Municipal College is to be closed for the summer vacation. But during the period August 9-16, G5QK/A, the Club station, will be in operation for the Jamboree at Belchamps, regarding which further details will be issued to members.

OUR ACHIEVEMENT CERTIFICATES

Certificates covering amateur operation on all bands from the Top to the VHF regions are now offered by *Short Wave Magazine* to all who care to apply for them in accordance with the rules and conditions — *see* recent issues. These awards are carefully designed to be attainable, without being too easy to get, and they are therefore well worth having as certificates of achievement. It should be noted that they can be applied for by anybody ; like our Contests, they are open to all comers.

BBC VHF ALLOCATIONS

Five years ago, it was agreed at Atlantic City that the VHF broadcasting and TV allocations for the European Region would be 41-68 mc (Band I), 87.5-100 mc (Band II) and 174-216 mc (Band III). To sort out and try to reach agreement upon the use of these bands, a European Conference of 31 countries sat in Stockholm for the whole of the month of June. So far as the U.K. is concerned, the BBC ideas for Band I (the TV channels) were approved, but there was appparently some havering about Bands II and III. The Conference eventually produced a plan for each of the three bands, incorporated in an agreement signed by 21 of the 31 countries, the Russian lot, of course, standing out. The U.K. delegation signed with reservations preserving complete freedom of action as to the use, in this country, of frequencies in Bands II and III. Broadly speaking, therefore, a great deal of time was spent in achieving practically nothing, no doubt because of the comforting assumption that VHF propagation being line-of-sight, it did not matter a great deal anyway. In any case, the BBC and the GPO are far ahead of the rest of Europe in their thinking about the practical application of these frequencies, so that the Conference can only have been a clearing ground for ideas.

ARRANGING R.A.E. CLASSES

There is a need, all over the country, for properly organised courses of study for the Radio Amateurs' Examination (both Theory and Morse) at local centres. They can be arranged by most Technical Colleges and Evening Institutes where there are enough potential students to make it worth while and a qualified teacher (preferably holding an amateur licence) is available. It is only a matter of approaching the Principal of the local institute, and he will make the necessary arrangements. Many such Courses are already organised, and have done much to assist amateurs and promote Amateur Radio interest. We would be glad to give publicity to these Courses, if those concerned would send in the necessary details.

SMALL ADVERTISEMENTS

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TRADE

METALWORK: All types cabinets, chassis, racks, etc., to your own specifications.—Philpott's Metal Works, Ltd. (G4BI), Chapman Street, Loughborough, Leics.

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

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

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

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

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

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

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

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

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

WANTED: U.S.A. Radio Compass R5/ARN-7; Plugs PL 112, 118, 122, mounting FT 224; Indicators I 81A and U.S.A. Transmitter Collins ART-13 (ARC-1).—Box No. 1124.

VALVES: 6J6, 12AT7, 10/-; EF91, 6AM6, 7/6; 6C4, EF92, EAC91, 6AL5, D77, 6/6.—Skillman, Franchise Street, Weymouth.

READERS' ADVERTISEMENTS

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

PREMIER 6in. TV SET, in cabinet with magnifier, £14; Eddystone 640, EF54 RF and stabiliser, plus S-meter, £16; Williamson Amp. power transformer, perfect. £1; BC.455 Command set, less valves, £1.—72 Manor Road, Barnet, Herts.

R107, added output stage, stabilized, £12; R1132, 50/-; two 1355's, valved, £2 each; ASB8, 450 mc, £7; Tx-T28/APT1, containing 832 and 829, £4; Tx-14/APT, 4E27's, push-pull, VHF, 50/-; Receiver (Marconi), 8 valves—1.8 to 5 mc—£4; Converters. Type 27 converted 28 mc, with power supply, £3; Type 27, and 26, 30/-; Type 24 and 25, 15/-; SCR522, Receiver valved, part converted and Tx, £3; VHF Wavemeter, Type 1642, £1; General Radio Absorption Wavemeter, 50-400 mc, 30/-; R1147, 7 valves, 240 mc, £2. £45 the lot (or offers?). —G3SV, Havering, Romford, Essex.

WANTED: To borrow or buy, Handbook on Canadian Marconi No. 52 Communication Receiver.—T. Evans, 18 Cecil Street, Boughton, Chester.

R1355 modified AC, £3; RF25, 15/-; RF26, 30/-; R3601, time base, 45/- each; Ferranti 12in. CRT (brand-new), £12; EMI 10in. CRT, used, perfect, 90/-. Valves and components cheap for clearance.—Box No. 1113.

BRT 400 RECEIVER in mint condition, operating handbook, £100 or nearest; Labgear Power Pack, Prim. 230v., Secs. 700-0-700v., 1000-0-1000v., 250 mA, £10; Labgear Crystal Calibrator, 100-1000 kc, internal power pack, £6 10s.; Hallicrafters HT6 Tx, 25 watts, CW and Telephony, with all coils for 7 and 14 mc, less crystals; Internal power packs, also mains step-down transformer for above, £20 or nearest. Goodman's 12in. Loudspeaker, 15 ohms, £4. *Short Wave Listener*, Vols. 1-6 (to date), less No. 10, Vol. 1, £2, or offers? £135 the lot for quick sale.—GM2FXN, 2 Roxburgh Terrace, West Park Road, Dundee, Angus.

VALVES 6C4, 6AG5, 6SL7, 2050, 2051, PEN46, 7/6 each; CRT 5FP7, 10/-; Wavemeter W1117 and charts, £5; Pressure Gauge, 0-200 lb./sq. inch, 8/6. Post Free.—Sevenoaks, Davenham, Cheshire.

URGENTLY Required: BC221 or Class D frequency meter, in good condition, with manual.—108 Coombe Road, Brighton, Sussex.

FOR SALE: AR88 Receiver in mint condition; for quick sale £50 (no offers).—GD3UB, Beach Cafe, Port Moar, Ramsey, I.O.M.

FIVE SHILLINGS EACH: 2051, 6AQ7, 6AL5, 6X4, 6X5GT, 26A7GT, 7F7, 6AR6, 12A6, 1625. 7/6 EACH: 5R4GY, 6L6G, 6J6, VR105; also 832, 17/6, and 832A, 20/-. Please add 3d. each post and packing. — 129, Cambridge Road, Trumpington, Cambs.

BARGAINS: Selling up Ham magazines, handbooks, British/American Tx/Rcvr components. S.A.E. lists.—Smith, 26 Pumpmead Close, Southminster.

SMALL ADVERTISEMENTS. READERS—*continued*

EDDYSTONE 740, still under maker's guarantee; maker's box and instructions; as new. Sent passenger train. All enquiries answered. £30 (or nearest offer?)—Bastow, 2 Denstone Street, Wakefield, Yorks.

PAIR 58 SETS, unused, comprise: Transceiver, vibrator, spares, accessories, manual. Best offer over £12, or exchange what-have-you? — Mason, Dowlans Road, Gt. Bookham, Surrey.

FOR SALE: NC-200, National Receiver, 230v., £45; HRO Receiver with four amateur coils and 230v. power supply, £25. Quantity of American components.—Harris, The Huon, Branksome Hill Road, Bournemouth.

WANTED Urgently to Purchase or Borrow: Theoretical circuit of Hallicrafters Sky Buddy using 6P7 as IF valve.—Addyman, 27 Lion Street, Hay, Herefordshire.

FOR SALE: S740, S-meter, speaker, as new. What offers?—G3GQK, 21 Vancouver Road, Forest Hill, London, S.E.23. *(Phone FOR. 4449).*

FOR DISPOSAL: Wilcox-Gay VFO 6in. CRT, new; valves various. WANT: 2-Metre Tx, 8mm. Ciné Camera.—G3ECU, Landford, Salisbury.

BC221 with self-contained, stabilised, 230v. AC supply, new condition, £20; BC348 with 230v. AC supply, £16 10s.—Box No. 1115.

WANTED by Ham: AR88 or HRO; also S27 and BC221; or would consider complete station. Will collect.—Box No. 1116.

LATE G2SY Transmitter and Receiver for Sale; 100 watts single 35T, modulator 807's AB2, Type 53 VFO; all power supplies HRO; receiver, bandspread, general coverage coils, complete set; power pack available. Offers?—Further details: G5NN, Daventry.

BARGAINS: G3DHB going VQ4; AVO Model 7, £12; AVO Universal Minor, with leather case, £6; Three 813's (new), £8 the lot; Two 866A, £1 the two; Three 807's, £1; One 832, 12/6; Three 5Z3, £1; Woden U.M.1 Mod. Trans., 30/-; Thermador, 250 mA, streamline HV choke, 15/-; Lubra Octal cutter, 5/-; Q-Max Absorption Wavemeter, 14 mc coil, 17/6; 24 *Short Wave Magazines*, £1; 24 *Bulletins*, £1. All these are give-away bargains.—Capt. D. H. Baynham, R.Sigs., 9 Oak Avenue, Pennypot, Harrogate.

813 WITH BASE, £2 10s.; 832, HK24 (2), 803, 25/- each; 35T (2), 240, 805 (4), 15/- each; PT15 (4), 6AKS, 10/- each; 807 (2), IT4, 6K8, 6N7, 9002, 6/- each; SP61 (6), 9003 (2), 9004, 7V7 (2), 4/- each. Xtals: 100 kc, 1000 kc, 10,000 kc, 7010 kc, 10/- each. Vibroplex Lightning Bug, £2 15s.; Two 0-50 mA M/C Meters, 3in., 6/- each; TPX159, VHF Frequency Meter, 135-168 mc, 230v., 50 c/s., £8, or offers? Resonant Line Oscillator, Type G44, 55-125 cms., 30/-.—G. Robbins, 2 Jamaica Street, Liverpool, 1.

VQ2 in U.K. Sept./Dec., wants AR88, BC221 (Mains) sturdy 150-watt CW/Phone Tx, with good quality components. Well-built Tape Recorder. Quote lowest cash price. Will arrange collection.—Box 1122.

SMALL ADVERTISEMENTS, READERS—*continued*

SALE: Super 3.5 mc VFO and NBFM Modulator; 6 valves, plus stabilizer; complete with built-in power supplies; £6.—G3BPE, 35 Bladindon Drive, Bexley, Kent.

COLLINS TCS11 Rx, 1.5-12 mc, brand-new; metered, P/pack; LS, space OP or VR; separate cabinet; £15. New RF26: one 28 mc, one unmodified; 45/- each.—Box No. 1118.

AR 88-D with speaker, manual, eight spare valves; complete and perfect; £60 (or nearest offer).—Cutts, 22 Caterham Ave., Ilford, Essex.

SCR522; all new valves and spare 832 (complete except for meter and switch) and companion BC-624-A Rx (modified) with diagram; the lot, £9. Type 145 Oscillator with Power Unit, Type 392; 2 spare barretters and fitted milliammeter; the lot, £6 10s. New Q-Max Modulation Indicator and instructions, £1. New Brown's "F"-type lightweight high-resistance telephones, £1. Crystals (QCC P5), 9,600 kc; 9,482 kc; 7,163 kc; 7,118 kc; RCA 100 kc unit; £1 each or £3 10s. the lot.—Box No. 1117.

VRL Rx, £25; W1117 Wavemeter, £2 10s., less charts; 2 x R1355, £2, or exchange for BC221 AK, modulated; also manuals for Wilcox Gay VFO, HRO Senior. All letters answered.—Box No. 1123.

SUPER PRO., with power pack 110/230 AC; good condition throughout; £25 (or offers?) Black crackle cabinet, 21in. x 13½in. x 10½in.; takes 19-in. panel; £1 10s.—Ingram, 49 Lime Tree Avenue, Broadway, Worcestershire.

AR 88 in excellent condition, with separate S-meter; nearest £50. McElroy Senior Bug, £2. Genuine AR88 cabinet speaker, new, £3. Pair 3in. Magslips, 10/- each. Q5'er with internal power supply (new). New PR Xtals, ½-in. spacing, 7 and 3.5 mc, 10/- each. 100 kc bar, new, 17/6. 4in. compass, new, boxed, £1. Avominor in leather case, £3 15s. AVO valve-tester for all modern types, £10. Absorption wavemeter for 144 mc, calibrated, 12/6. All carriage extra.—G8KP, 125 Oakwood Avenue, Wakefield.

BC348 RCA, modified 230v. AC, RF gain, S-meter, 3-ohm speaker or phones output, £16. National 1-10; coils 100 to 300 mc, with P/pack, speaker, two spare valves; £12. VCR131 12-in. CRT, similar to VCR97 electrically, with rubber mask, £6. New boxed 250TH, 70/-. Callers only. WANTED: SX28 Cabinet. — G3CTR, 29 Aspinden Road, London, S.E.16. *(BER. 2540).*

HOMELAB Signal Generator, Type 5; bought in 1951; used only a few hours; guaranteed as new; complete with output lead, calibration chart (100 kc - 130 mc) and instructions. Cost £14. Offers, please?—Jamison, 46 Pound Street, Larne, Co. Antrim.

VALVES: 24/955, 24/9004, 28/954, 36/6C4, 36/VR92, 36/VR54, 24/6J5G, 36/VR65, 24/VR116, 2/CV5, 2/CV74, 4/CV22, 2/CV13, 12/EF50 Red Sylvania, 12/CV118; 150 various ex-Govt. Best offer for the lot? R1355, £1; Responsor Unit, 25/-; Variac 200 CUH, £3. Callers preferred. Wanted: DST100. — Barron, 20 Second Avenue, Halifax.

SMALL ADVERTISEMENTS, READERS—*continued*

S. 640, as new; two 807, 829B; two 10 Hy. chokes; three conds.; suitable 500v. P/pack. AM-pattern key; glass insulators; 0-5 amp. RF meter; useful oddments; £23 (carr. paid).—Box No. 1120.

FOR SALE: RCA Communication Receiver, Model AR77E; recently overhauled by Webb's Radio; set of spare valves; £40 (or nearest offer). Reason for selling: gone blind.—W. Green, 53 St. Alban's Avenue, East Ham, E.6.

SALE: Army Type Ten set; working excellently on 6-7 cms.; bargain, £5.—O'Dell, 203 Hawes Lane, West Wickham, Kent.

AMATEUR SURPLUS: Transmitting and receiving components, valves, coils, condensers, QCC crystals, etc., for sale. S.A.E. for list.—Box No. 1121.

BC221, BC348.—Details, offers: Huggett (G2PF), Barlavington, Petworth, Sussex.

SALE: Eddystone 750; immaculate condition; one owner; still under guarantee; £40.—Write: Hooper, Walnut Tree Cottage, Cookham Dean, Berks.

G.E.C. BRT 400 Receiver; indistinguishable from new and hardly used; £85 (or offer).—Box No. 1125.

WANTED: Recorder for Morse signals; must be first-class. Please give full specification and price.—Box No. 1126.

QTH FOR SALE. Ideal VHF location; 700 feet up. Three bedrooms; detached brick and concrete house; ½ acre garden with wonderful views. Some masts could be left in position. Green Line Coach to Victoria in one hour.—G2AJ, Biggin Hill, Kent.

WANTED: First-class Post-War Receiver, Collins 75A-HRO-SX28, etc.; also 814 valve and two Weston Thermo-Couple ammeters, 0-4 or 5 amps.; Model 425.—Offers to G5HK, Manor Farm, Brimington, Nr. Chesterfield.

HALLICRAFTERS 5-10 Receiver for sale, complete with S-meter; in first-class condition; £25 (or near offer). — G5HK, Manor Farm, Brimington, Nr. Chesterfield.

WANTED: AR88D; must be in clean condition —not one that has been altered.—G8TN, 104 Croxted Road, West Dulwich, London, S.E.21.

We Pay up to £30

for BC-312 receivers in good original condition complete with dynamotor. Box No. 1119.

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