The SHORT WAVE Magazine

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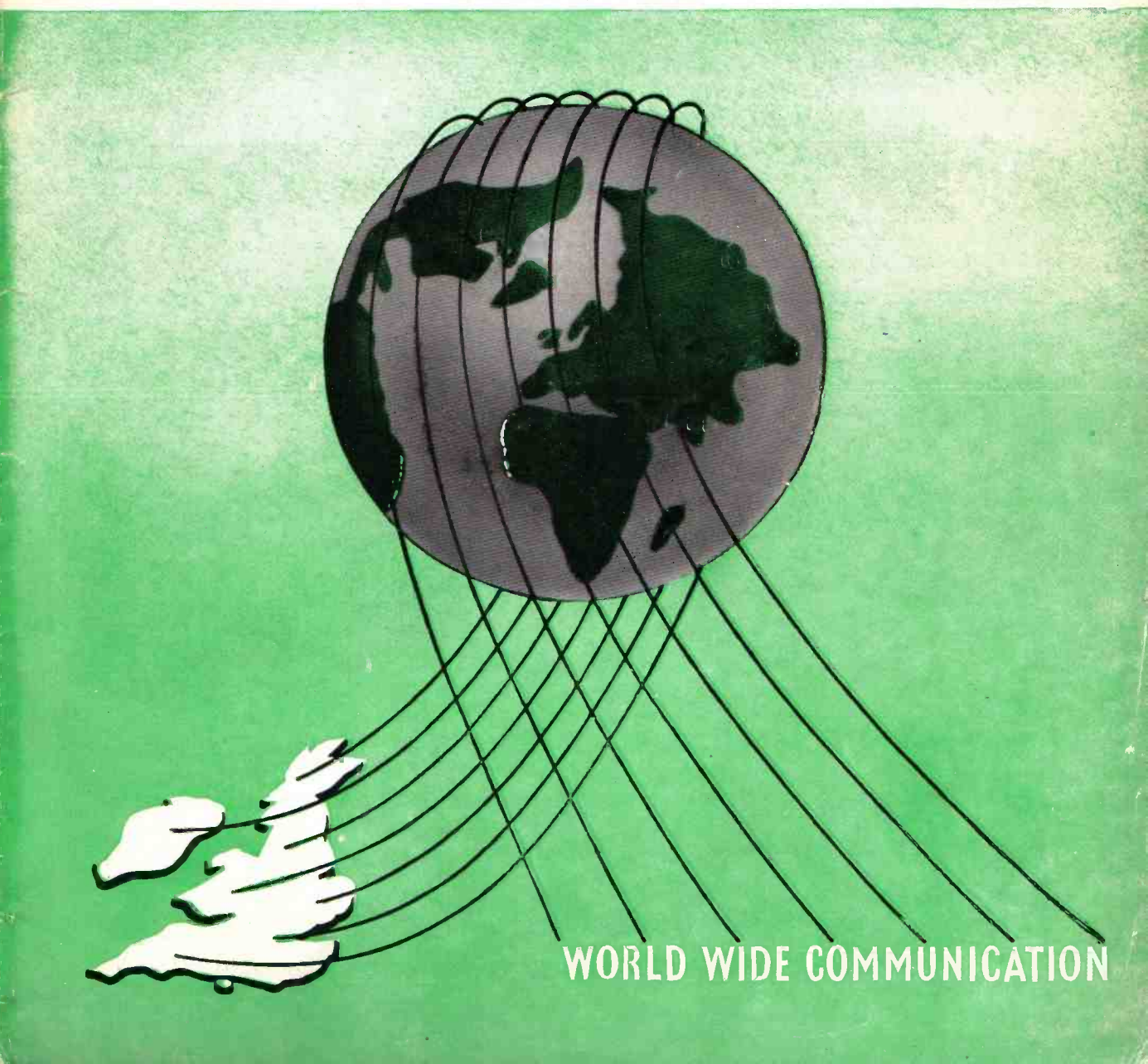
VOL. XIII AUGUST, 1955 NUMBER 6



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Valve requirements of extremely diverse equipments, from servo amplifiers to video modulators, are ideally met by the new Mullard beam tetrode, QV06-20.

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I_h	1.25 A

Limiting Values:

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p_a max.	20 W
V_{g2} max.	250 V
V_{g1} max.	−150 V
f max.	175 Mc/s

Base: Octal.

Typical Applications	V_a (V)	Pout (W)	f (Mc/s)
R.F. Power Amplifier			
Class "C" Telegraphy and F.M. Telephony	600	52	60
	320	25	175
Class "C" Anode and Screen-grid Modulated	400	32	60
A.F. Power Amplifier or Modulator (Two valves).			
Class "AB1"	600	82	A.F.
Class "AB2"	600	90	A.F.

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MVT160A

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SHORT WAVE MAGAZINE

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FOR THE EXPERIMENTER AND THE RADIO ENGINEER

The SHORT WAVE Magazine

EDITORIAL

Occupancy

The distribution of amateur activity over our communication bands is a matter of greater importance than it may seem—for one thing, we keep our bands by making full use of them, and for another, even distribution and the proper use of all bands will help to reduce interference.

It would be agreed on all sides that 80 and 20 metres are heavily over-populated compared with 14 and 10 metres. As things are, however, there is no reason why the 21 mc band should not be carrying a great deal more of our DX traffic. Ten is an attractive proposition from the point of view both of local net working when it is closed and for real DX when it is open—which is quite often as the propagation cycle becomes more favourable.

We are not considering 160 metres or the UHF/VHF's in this brief survey because their potentialities are rather different from those of the DX communication bands, and these upper and lower regions in our spectrum have always been exploited in the manner to which they are best suited.

In considering the DX bands, 7 mc should not be neglected, even though in many ways it is nowadays one of the most difficult of all owing to the presence of illegitimate high-power broadcasters. In spite of this hazard, good use is being made of 40 metres by those who know how to use it, and abundant DX is workable during the small hours when the broadcast stations are shut down.

It can be seen, therefore, that the immediate need is for more sustained activity on both 21 and 28 mc; this will in turn encourage overseas amateurs to make fuller use of them and the result will be a better spread-out of stations over all bands, with the important advantages that would bring.

Austin Forsyth G6FO.

Portable Transceiver for Top Band

DESIGNED AS A ONE-MAN PACK SET

A. D. TAYLOR (G8PG)

This article might have been sub-titled "Portable Without a Car" for it will be of particular interest to those who, while having ideas of portable operation, have no transport of their own and are deterred by what seems the difficulty of going /P without it. The author describes a complete 160-metre station which weighs but 20 lbs. all-up and has already given good results under field conditions.; it consists of an O-V-1 receiver and VFO-PA transmitter running up to one watt input from batteries. This QRP is more than compensated for by the fact that under /P conditions it is nearly always possible to find a site and get up an aerial far superior to the home location. Our contributor also includes a number of ideas and suggestions based upon his own experience in operating a one-man pack station.—Editor.

A NUMBER of Top Band enthusiasts must have thought at one time or another of the possibility of /P operation, particularly from one of the "rare" counties! In many such cases, however, the idea is abandoned because of the lack of a motor vehicle, as the problem of transporting the equipment to and from the site seems insurmountable without mechanical aid.

This is exactly what happened in the writer's case until one day last autumn, when the opportunity came to join G3BNW and G3FDU in an expedition into Merionethshire, transport and batteries being provided. That night on a Welsh mountain settled the matter. G8PG was going portable regularly in future, and with equipment which could be carried on his own back if necessary! This article describes how this result was achieved and besides giving details of the equipment used, also includes many ideas and hints which are the result of the practical experience of the writer and other portable enthusiasts.

Equipment Considerations

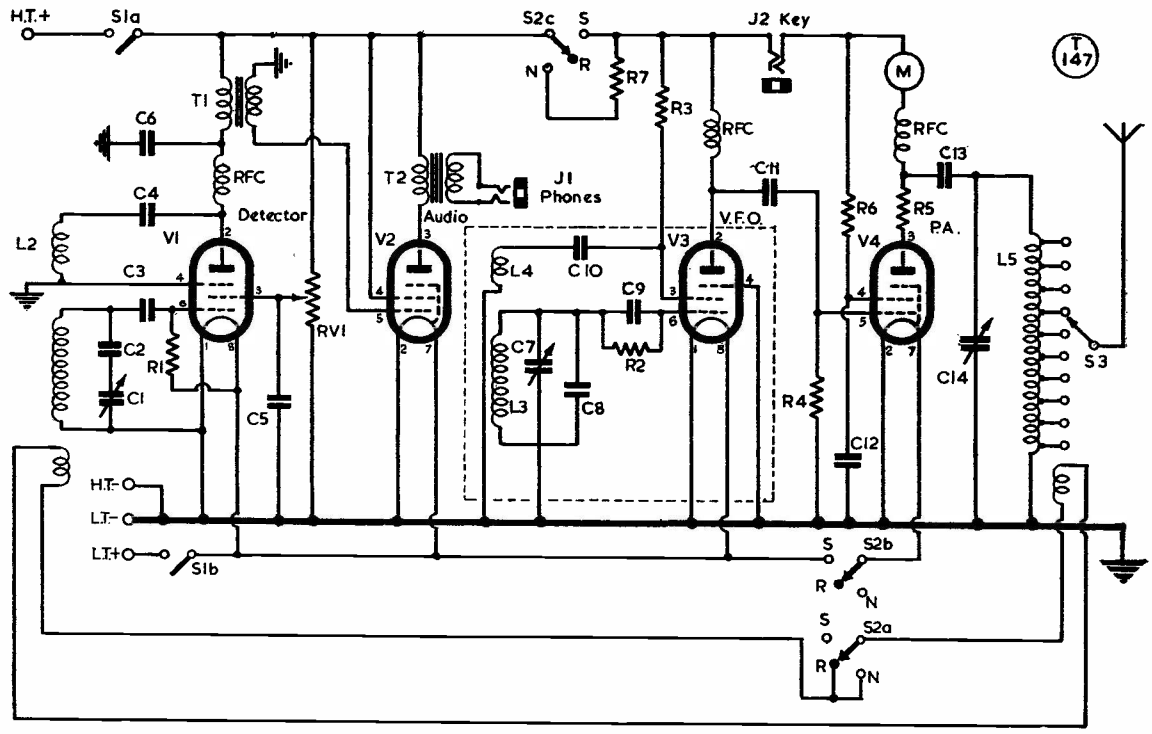
With mains-operated equipment it is usual to design the circuit first, then to provide a power supply of suitable rating. But when man-pack portable apparatus is being designed, the reverse process must be carried out. A suitable power supply must first be decided upon, and then equipment giving the best performance for the permissible battery consumption must be built around it. In the writer's case power supplies ranging from hand generators to light-weight vibrator packs were investigated at various times, but it was eventually decided to use dry batteries, the final choice being a standard 120 volt HT battery plus one of the large 1·5 volt cells used for operating electric bells. This combination was chosen as it gave reliability, good life, reasonable power capability and was not unduly heavy.

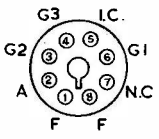
Having decided upon the power supply, work was begun on designing the equipment itself. Economy being a factor, it was decided to use as many components as possible out of the junk box. Examination of the supply of 1·4 volt filament valves available from this source showed several 1LN5's and 1C5's, so the design was based on these two valves. If new valves had been purchased, however, the octal based 1N5 would have been used in place of the 1LN5, being in all other respects identical. The 1LN5 is an RF pentode and the 1C5 an output pentode. Most other components were available from the junk box, the expenditure on the equipment being only a few shillings.

The Actual Circuit

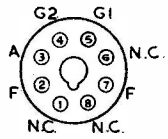
The circuit chosen is shown in Fig. 1. It will be seen that it consists of a 2-valve straight receiver (leaky grid detector followed by a transformer coupled AF stage), and a VFO-PA transmitter. While simple in conception, the circuit has several interesting refinements and is capable of a very good performance.

As far as the receiver is concerned, L1 is the grid coil, being tuned by means of C1, the effective capacity of which is reduced by means of C2, which is placed in series with it. Due to the very low capacity thus obtained, it was found that the coil would tune from 1·8 to 2·3 mc only. The 2·3-2·0 mc part of the range spreads over the lower 35 degrees of the tuning dial and the amateur band over the remainder, thus giving an adequate degree of bandspread. The values of the grid condenser C3 and grid leak R1 have been carefully chosen and should be adhered to; L2 is the reaction coil, fixed feedback being provided by C4, while the actual control of reaction is carried out by means of the potentiometer RV1, which controls the detector screen voltage. Reaction is very smooth and the detector circuit has proved





V1 & V3. 1LN5



V2 & V4. 1C5

Fig. 1. Circuit of the battery portable transmitter/receiver for 160 metres, described by G8PG. The valves are 1.5v. miniatures, V1, V2 comprising the receiver section, and V3, V4 the VFO-PA. The switching gives " send-receive-net " and with a 120v. HT block, the normal input to V4 is about one watt.

very stable in operation. One useful refinement here is the use of a linear potentiometer for RV1, but this is not essential.

As the surrounding noise level is usually fairly high at outdoor sites, adequate audio output is essential. It is achieved in this case by means of transformer coupling between the detector and AF stages, plus the connection of V2 as a tetrode instead of as a pentode.

The aerial coupling to the receiver is unusual and has a great deal to do with the performance obtained. Link coupling is used, being inserted between the transmitter PA tank coil and the earthy end of the receiver grid coil.. At the receiver end a two-turn link coil is used, wound on the coil former below the earthy end of the grid coil, while at the transmitter end a three-turn link coil is put on the earthy end of the PA tank coil. The coupling link at the receiver end should not be tight—sufficiently close to the receiver grid coil only to give reasonable signal strength *plus* good selectivity. Under these conditions it will be found that this type of coupling results in many of the advantages of an RF stage without incurring the additional battery drain of a third valve. In the " send " condition the link circuit is broken by the " Send/Net/Receive " switch, the operation of which is described in a succeeding paragraph.

The transmitter makes use of two valves, V3 being a 1LN5 VFO and V4 a 1C5 PA. The VFO, enclosed in the dotted box in Fig. 1,

Table of Values

Fig. 1. Circuit of the 160-metre Transceiver

C1	=	25 $\mu\mu$F
C2	=	20 $\mu\mu$F, silver mica
C3, C10	=	50 $\mu\mu$F, silver mica
C4	=	10 $\mu\mu$F, mica
C5, C12	=	.002 μF, mica
C6, C13	=	.001 μF, mica
C7	=	100 $\mu\mu$F (*see text*)
C8, C9	=	150 $\mu\mu$F, silver mica
C11	=	200 $\mu\mu$F, mica
C14	=	300 $\mu\mu$F, tuning
R1	=	2 megohms
R2, R3	=	20,000 ohms, ½-w.
R4, R5	=	47,000 ohms, ½-w.
R6	=	27,000 ohms, ½-w.
R7	=	20,000 ohms, ½-w. (*see text*)
RV1	=	100,000 ohms.
L1-L2	=	Wearite PHF7
L3-L4	=	Wearite PHF6
L5	=	40 turns 24 SWG enam. on 1¼-in. diam. former, tapped every four turns.
T1	=	5 : 1 midget AF xformer
T2	=	Headphone xformer
S1	=	Toggle DPST
S2	=	Three-pole triple Yaxley type
S3	=	Single-pole 10-way Yaxley type
M	=	0-15 mA m/c meter
V1, V3	=	1LN5 (or 1N5 octal)
V2, V4	=	1C5

employs a conventional feedback circuit consisting of L3 and L4. With the values of tuning and padding condenser specified a frequency coverage of 1·68 to 2 mc was obtained. This was reduced to 1·8 to 2 mc by removing two of the moving plates from the variable condenser, thus providing a very adequate VFO bandspread.

The PA is also conventional except for the method of aerial coupling. As the VFO runs continuously when transmitting, grid leak bias is employed, while the HT is parallel fed.

The method of PA aerial coupling is similar to that employed in the Army 18 and 68 sets. In effect, the PA tank coil is used as a tapped auto transformer and can thus be used to match into a wide range of aerial impedances. While unsuitable for high powers the system is quite satisfactory for equipment of the type under discussion and saves both weight and space. In practice it has provided satisfactory loading into aerials varying from 12 to 500 feet in length.

Control circuits are provided by means of S1 and S2. S1 is the master "ON/OFF" switch and makes or breaks both the HT and LT supplies. It is essential to break the HT supply, otherwise RV1 would impose a continuous small drain on the battery.

S2 is the "Send/Receive/Net" switch, operation under these three conditions being as follows:

***Send*:—**

S2a breaks the link circuit between the receiver and the aerial.
S2b applies LT to the PA valve filament.
S2c applies normal HT to the VFO.

***Receive*:—**

S2a completes the link circuit from aerial to receiver.
S2b breaks the PA LT supply.
S2c breaks the VFO HT supply.

***Net*:—**

S2a completes the link circuit from receiver to aerial.
S2b breaks the PA LT supply.
S2c applies reduced HT to the VFO *via* R7.

Operation under "Net" conditions is described more fully in a later paragraph.

As a 10in. x 6in. x 3in. chassis was available, the equipment was constructed on this, all components except S2, S3, C14, the meter and the jacks being mounted on the chassis with everything except the valves and L5 "below decks." To complete the assembly a light plywood tray of the same dimensions as the chassis and having a removable bottom was constructed, then turned upside down and screwed to the top of the chassis. Besides protecting the valves this provided mounting space for the two switches, the PA tank condenser, the meter and the jacks. The earth terminal was mounted on the rear of the metal chassis and the aerial terminal on the rear of the wooden tray. With a base-plate added to the metal chassis the whole assembly measured 10ins. x 6ins. x 6ins. and proved to be very light in weight. The wiring and layout was not at all critical and all components were of standard size. If miniature components were used the size could be reduced considerably.

Setting Up

When construction is completed, the receiver should be tested first. Reaction should be smooth with no trace of a "plop" and the aerial coupling link should be adjusted to give good signal strength and reasonable selectivity. The receiver frequency coverage can be checked by adjusting the reaction control until the receiver is just oscillating, then picking up the resultant beat notes on the station communication receiver. Should the tuning prove to be too high in frequency, a small fixed condenser should be added in parallel with C1, while if it is too low the value of C2 should be reduced. Once the correct frequency coverage has been obtained the receiver tuning dial can be calibrated with the aid of the station receiver.

The transmiter should present few difficulties. Initial checks should be carried out with the "Send/Receive/Net" switch in the "Send" position, the first task being to ensure that the VFO has a reasonable degree of bandspread, plates being removed from C7 if necessary. The VFO should then be calibrated with the aid of the station frequency meter. When calibration is completed the aerial should be removed, the key pressed and the PA tank circuit tuned to resonance as indicated by the PA anode current dipping to below 50% of the off-resonance value. At this point a check should be made with an absorption wavemeter to ensure that the PA is actually tuned to 1·8 mc. The aerial should then be re-connected and loaded by varying the setting of S3 and after each variation re-tuning C14 to resonance. It will normally be possible to load the PA to within one or two milliamps of the off-resonance anode current reading. As a guide, aerials of 200 feet or more in length will require connecting to the highest tap on the tank coil while shorter aerials will need to be tapped down the tank coil until satisfactory loading is

obtained. With the full 120 volts of HT an input of about 1 watt should result.

The last adjustment to be made is the setting-up of the netting circuit. The value specified for R7 has proved satisfactory in the writer's case, but may require slight adjustment to suit individual VFO valves. The object of R7 is to reduce the VFO HT until the valve is only just oscillating. Under these conditions it will be found that :

(a) The receiver detector is " blocked " over 15 to 20 kc.
(b) The VFO frequency moves approximately 3 kc higher than when normal HT is applied.

Neither of these changes will be found to be a disadvantage if the following " netting drill " is carried out :

(a) Tune in the desired station on the receiver.
(b) Put the " Send/Receive/Net " switch to the " Net " position.
(c) Swing the VFO tuning dial until the VFO is heard beating with the desired station, then adjust the VFO tuning until a 3 kc beat note is obtained on the *HF* side of the desired station's carrier.
(d) Put the switch to " Send," and quickly tune the PA to resonance.
(e) Return to the " Receive " position and wait for the other station's CQ call to end.

With a little practice quick and accurate netting can be achieved in a matter of three or four seconds by this method. When it is desired to originate a CQ call the receiver and VFO dial calibrations can, of course, be used, if desired.

Transportation and Accessories

When carrying the station, the following method is adopted : The transmitter-receiver is wrapped in a light ground sheet and carried under the arm, being light enough to be carried for several miles without discomfort. For expeditions of short duration, the accessories are carried in an Army small-pack (haversack), sufficient additional room being available for a small amount of food and a map. For expeditions of longer duration the small-pack is replaced by a ruck-sack of larger dimensions, thus allowing additional rations to be packed. When carried on a long journey as luggage, the transmitter-receiver is again wrapped in the ground sheet and put in a suitcase, being wedged in position with socks and other small articles of clothing. The small-pack full of accessories is also placed in the same suitcase and wedged in a similar manner.

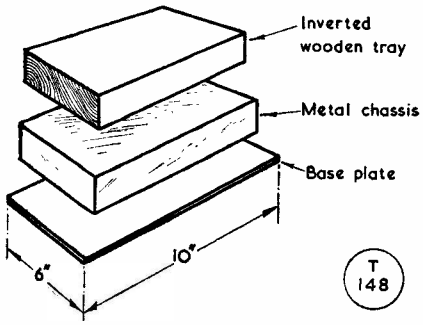


Fig. 2. Mechanical assembly of the portable transmitter/receiver described by G8PG. The metal chassis is fixed to a base plate and the upper part of the chassis is enclosed by a wooden cover. When fitted together, the whole thing can be carried comfortably under one arm.

The actual accessories carried are as follows :

120-volt HT Battery ; 1.5-volt LT Battery ; Morse key (enclosed type); Headphones ; 250 ft. " lifeboat " aerial ; 250 or 500 ft. " expendable " aerial wire ; light-weight earth pin ; roll of red office tape ; light pair of side-cutting pliers ; screwdriver ; small log book ; amateur licence ; small roll of insulation tape and a few feet of PVC wire.

The above kit has proved capable of dealing with all situations yet encountered. The " lifeboat " aerial referred to is the light " fishing reel " type of aerial used on lifeboat and dinghy transmitters, and is available on the surplus market for a few shillings. It is a " must " for serious portable work. The " expendable " aerials merely consist of the requisite lengths made up from 24 SWG enamelled wire, carried to the site wound on a piece of cardboard. They are cheap, light, easy to erect and virtually invisible once hoisted. (They can thus be abandoned on site without leaving an eyesore !) This is an important advantage, especially in wooded, mountainous country where the recovery of an aerial after dark is likely to be difficult if not actually dangerous. The light-weight earth spike consists of 7 or 8 inches of $\frac{3}{8}$in. copper strip with a length of light, flexible wire soldered to one end and the other end cut to a point for easy insertion into the ground. The roll of red office tape (of the type used by lawyers for securing documents) is a vital item and its use is covered in the next paragraph. All other accessories are of standard type. The weight of the transmitter/receiver is 7 lbs. and of the accessories listed 13 lbs., making a total load of 20 lbs. only.

Field Operation

It will be noted that there is no mention of masts in the list of accessories. Such weighty

luxuries have no place in one-man operation, use being made of natural features to support the aerial. Trees are the ideal support, and it is here that the roll of red tape comes into its own. The pliers are tied to one end of the tape, sufficient slack is rolled off and the pliers are thrown over a convenient branch, taking the tape with them. The pliers are then untied and the aerial attached in their place and hoisted. This process is repeated as necessary and allows the aerial to be raised quickly and with a minimum of effort. Where operation in hilly, wooded country is contemplated, there is much to be said for picking a site and erecting the aerial first, then returning with the equipment later in the day, as this greatly decreases the physical effort involved. For this purpose an "expendable" aerial is employed, being invisible when erected and not involving great expense if abandoned at the end of the operating period. In treeless country, such as moorland, a different technique must be employed. The essential additional equipment consists of two stout sticks about 3 feet long. A sharply rising ridge is then found and one stick driven into the ground at the top of the ridge and one at the bottom, the aerial being suspended between them. Provided a ridge having suitable contours is chosen, a surprisingly good effective height can be obtained in this way.

The whole field of aerial support methods provides endless scope for ingenuity. A kite-supported aerial has been used very successfully, while on another occasion good results were obtained from the verge of a country road using an aerial supported at one end by a bus stop sign and at the other by a sign-post. While good effective heights can often be obtained, the writer's experience is that aerial length is *even more* important and that a 250 ft. aerial only 7 or 8 feet high is capable of giving an excellent performance.

Once the aerial is erected, the ground sheet can be unrolled at a suitable spot and the equipment placed on it and connected up ready for operation, the whole process including aerial erection often taking less than 10 minutes.

Results Obtained

The equipment has been operated from a number of different locations during the last few months, and has given excellent results. First tests from the writer's home QTH, using the 270 foot "zig-zag long wire" described in the May, 1955, issue of *Short Wave Magazine* brought an RST 569 report from a station 75 miles away, while many other contacts were obtained, including one at 100 miles using only 30 feet of aerial. Initial portable tests near the writer's home in Cheshire produced good results and proved that distances of 80 miles or so were easily attainable in daylight. During a spell of portable operation in Westmorland a kite aerial was employed and this produced the largest distance contact to date—300 miles, using an input of 0·75 watt. A longer spell of portable activity in Cærnarvonshire allowed working from two sites, one 700 feet a.s.l. and the other on the floor of a valley with hills rising to 1,000 feet or more on all sides. The results from this latter location were particularly interesting, reports of RST 579 being received at distances of up to 150 miles during the evenings and a number of daylight contacts also being made, the best being 120 miles with an input of 0·5 watt.

Conclusion

Low power /P work of this nature has opened a new and fruitful field of interest to the writer, and he cannot too strongly commend it to those who combine an interest in Amateur Radio with a love of the open air. Much advice and assistance has been received from other amateurs both during the planning and the actual testing of the equipment, and the writer would like to express his particular indebtedness to G5PP/P, G3BIX/P, G3EJF/P, G3KEP/P, G3IOX, and G3CSZ/TTX in this connection.

ELECTRICAL STANDARDS and METERING

A special exhibition has been opened at the Science Museum to coincide with the current meeting of the International Electro-technical Commission, and will remain open until October 31. Although the exhibition is of particular interest to those concerned in the problems of metering bulk supplies of electrical energy to large industrial and commercial undertakings, it is intended also for the less specialised visitor and serves to demonstrate the care which is devoted to the accurate calibration of electricity meters. One of the objects of the exhibition is to show the origin and derivation of the various electrical units. An exhibit of particular interest is the complete set of the original B.A. Units of Resistance which were made in 1864 for the British Association; it constitutes the oldest set of accurate electrical standards now in existance.

These "B.A. Units" have been stored for many years at the National Physical Laboratory. It is now hoped that they will be presented formally to the Science Museum, and thus become a part of the National Collection of historic scientific apparatus. The Science Museum is open on weekdays from 10 a.m. to 6 p.m. and on Sundays from 2.30 to 6 p.m. Admission free.

Auto-Keying Mechanism

FOR CLOCKWORK DRIVE

N. P. SPOONER (G2NS)

Here is another ingenious suggestion by our fecund contributor. He describes an automatic keyer which can be built from odds and ends and driven by the motor of an old spring gramophone, or else by one of those fractional h.p. electric motors now to be had so reasonably. Given the basic idea and the general mechanical design, such a keying unit can either be knocked up as a rough but serviceable item, or built into a neat cabinet with speed control, pilot lights and switched circuits for auto-to-hand change over. In any event, the design as described here, and the method of punching the perforated tape, is an entirely practical one.
—Editor.

THERE has no doubt been a time when individual readers would have welcomed some method of automatic calling. What excellent use it could have been put to during those single-handed field strength measurements; that BCI testing with the Post Office; those super-DX Top Band schedules and the launching of tentative CQ's on a thinly-populated VHF band! While the word "automatic" conjures up memories of Wheatstone, Creed, McElroy and other sponsors of effortless speed, it also is liable to raise doubts about constructional ability. Upon this score the mind may at once be put at rest — since June, 1954, amateur-band calling has been reduced to a maximum speed of 12 w.p.m.

In startling contrast and mentioned here purely as an interesting sidelight in the commercial sphere readers may like to be reminded of the Teleion*, a gas relay that produces square-shaped pulses to counteract the rounding of Morse signals during transmission. By permitting speeds of up to *three thousand* words per minute this no-lag high-speed telegraphic development of the thyratron makes normal 200-800 w.p.m. working appear like slow hand-sending!

The life of a simple brass-pounder is, however, likely to prove rather less hurried, so let us return to earth and discuss the construction of a clockwork keyer as a "poor man's

*Electronic Developments, K. G. Britton, p. 202.

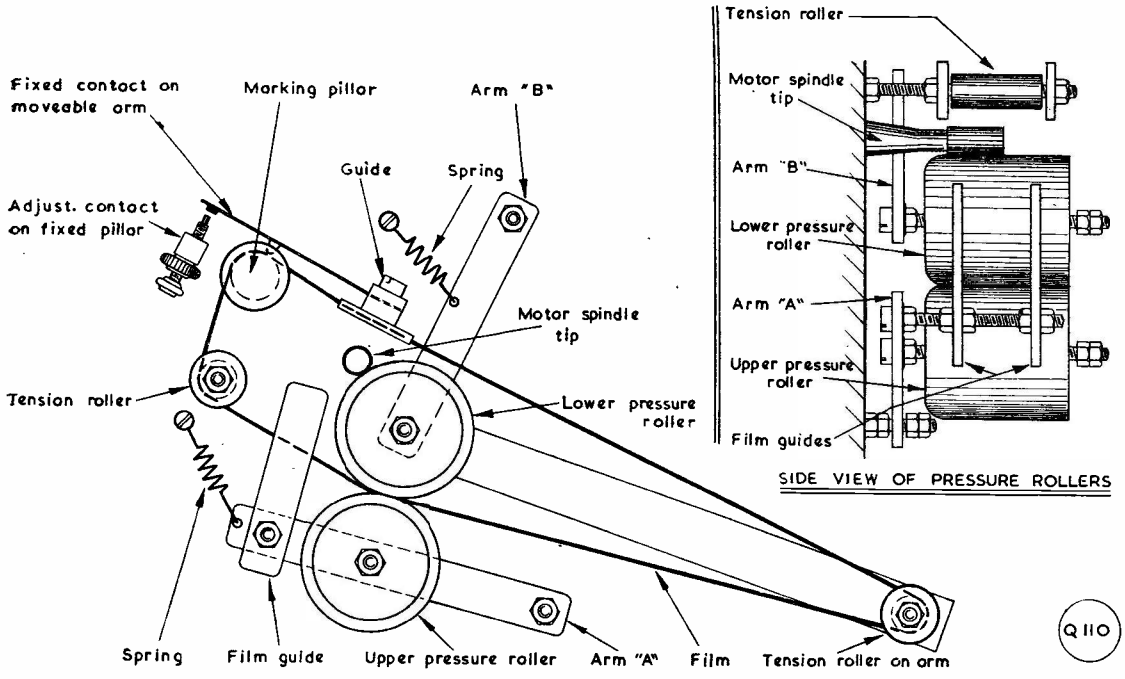


Fig. 1. Detail of the driving mechanism, showing the layout used by G2NS and described in the text. The drive, marked "Motor spindle tip," can be either a (gramophone) spring motor or a small electric motor of the fractional h.p. type. The advantage of using a gramophone motor is that a speed control would probably be already fitted.

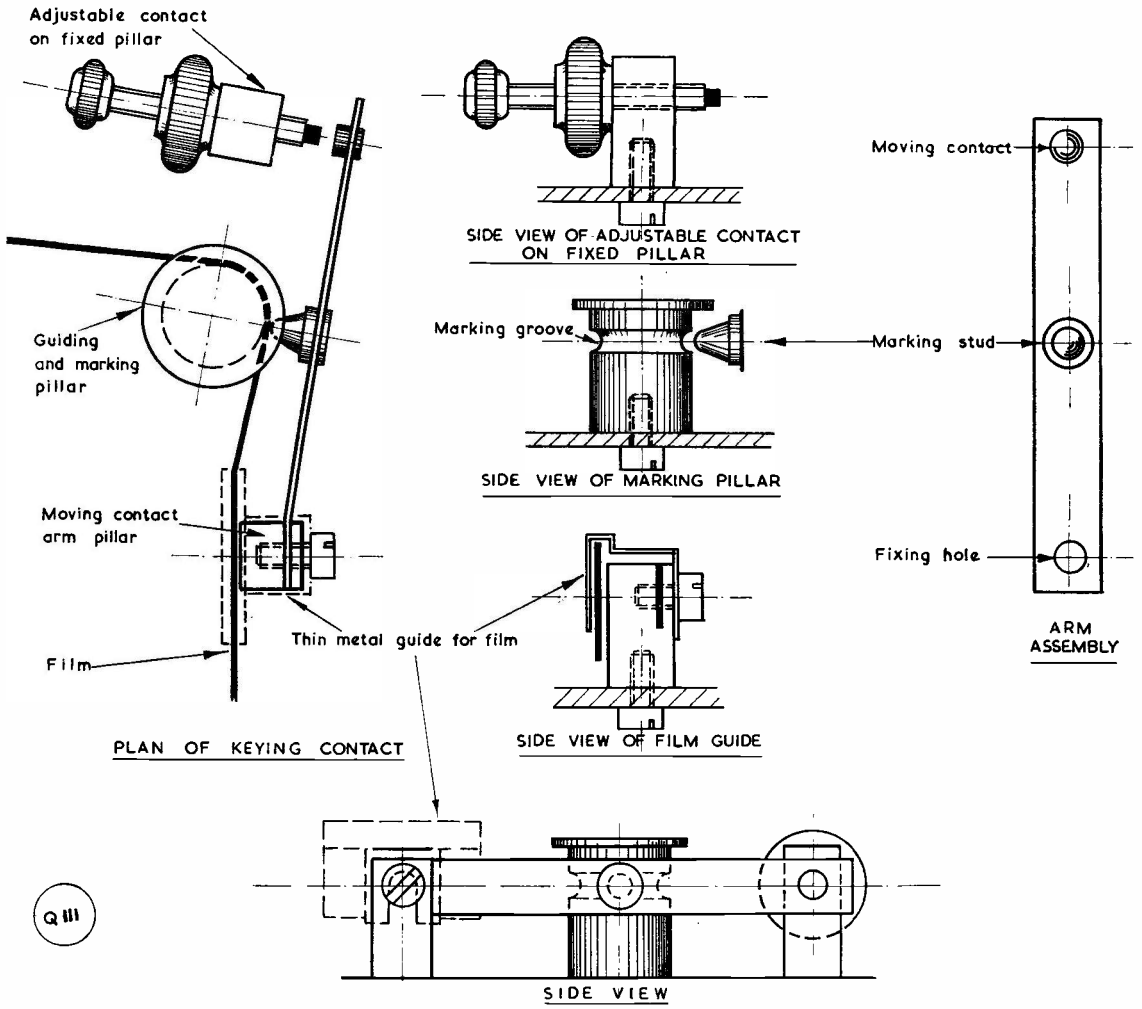


Fig. 2. Arrangement of the keying head, showing how the marking pillar is grooved and the tip of the marking stud rounded to give positive make-and-break at the keying contact; this groove, and the rounding of the marker stud, may be a matter for adjustment, the aim being to obtain sufficient "throw" on the keying arm with no tendency for the marker stud to catch in the tape perforations.

version" of the magnetic tape method used by the writer for a similar purpose. Commercial circles have favoured paper tape, in which dot and dash holes are perforated, to make and break a transmitter keying circuit automatically. The sole reason why the use of this medium is not advocated here is because today the purchase of new tape usually involves considerable delay and entanglement with large telegraphic equipment manufacturing concerns. It is far simpler to follow the writer's example, and to lift the dust-bin lid belonging to the nearest professional photographer! Who knows, with his permission many feet of discarded 16-millimetre home-cinema film, shown to be useless after development, may perhaps be retrieved therefrom. If discarded before development, a hypo bath will remove the thick coating of emulsion to make the film more pliable in action. Not only is this type handy in size and reasonable in wear, but it can also be perforated cleanly and is easy to replace. To delight those who favour constructional refinements and wish to drive the film as an endless band, use could be made of the sprocket holes already stamped evenly along its edges during manufacture.

Perforating

A punch will be required to make dot-and-dash holes down the middle of the film, and this can consist simply of a metal or a perspex upper plate bolted to a metal lower plate. A small dot-hole should be drilled through both

and by its side, but separated from it by the diameter chosen for the dot, should be drilled a dash-hole having a diameter *three times* that of the dot. If before use a narrow metal strip, slightly thicker than the film itself, is inserted between the two plates and held by the same bolts, the separating gap formed thereby will permit the film to be threaded and pulled along by hand. To keep it in position between the plates and to ensure that the perforations are made in a straight line, the assembled punch should be held in a vice so that the front edge of the film butts against its jaw and the rear edge of the film squares against the separating strip. Perforating is carried out by placing either a dot or a dash rod (three times the diameter of the dot rod), in its hole in the upper plate. When resting on the face of the film below, a gentle tap on the head of the rod with a light hammer will punch a clean circle in the film as the rod cuts through and enters its registering hole in the lower plate. The unwanted circle of waste material falls out from the punch and the film can then be pulled by hand into position for the next perforation. It is here that the question of spacing arises.

If both plates are of metal, the film between them at any one moment will naturally be hidden from view. In this event, the film should be pencilled where it emerges from the punch. This would be on the left hand side if the film is being worked through the punch from right to left, and *vice versa*. Having made a perforation and pencilled the film, it is pulled through until the pencil mark has travelled from the edge of the punch a distance, judged by eye, to equal that decided upon as correct for signal, letter and word spacing. In this connection, the P.M.G.'s *Handbook for Wireless Operators* reminds us that: (1) A dash is equal to three dots, (2) The space between signals that form a letter is equal to one dot, (3) The space between two letters is equal to three dots, and (4) The space between two words is equal to five dots. The stamped sprocket holes are unfortunately too widely set to act as spacing reminders and the accuracy of this must therefore be guessed by eye. A more comfortable method is to make the upper plate of perspex so that the whole film is visible and no pencilling is required.

Any size of hole that suits the width of the film and whatever drills that are available can be used, providing, of course, that the dash-hole and rod are three times the diameter of the dot-hole and its rod and that the space separating the two holes is, moreover, the diameter of a dot. Were it not for drilling the punch, the shape of the holes would be of little consequence because the keying contacts are interested solely in the *contrast of time* given to marking and spacing and not in the actual shape of the perforations that govern this operation.

Manual perforating of the first tape by the method suggested is necessarily slow, but as the average CQ, for running as an endless band, only requires about sixteen inches of film, an operator's patience will not be unduly strained. In the writer's case the metal lower plate, purchased and drilled at the local garage for a few shillings, consisted of a 5 in. x 2 in. mild steel flat bar about $\frac{1}{2}$ in. thick, while the two rods were of silver-steel and 1/16th in. and 3/16th in. diameter respectively for dot and dash. The perspex sheet of the same size, and $\frac{3}{8}$ in. thick, was purchased for a few coppers from the nearest plastic raw material merchant.

Driving

As the writer already had an old tape-puller, made up for the "Amateur Fist Analyser" described in the May, 1951, issue of *Short Wave Magazine*, he decided to use it. The present description refers largely to it, but will also cover any other type of old clockwork gramophone to which the present idea can be adapted. There is no need to strip a portable specially in order to obtain the drive

"READERS' SMALL ADVERTISEMENTS"

Sir,—I should be grateful if you would kindly find space to allow me to acknowledge the numerous replies to my advertisement in the July issue of *Short Wave Magazine*.

I have had nearly 100 letters, in addition to telegrams and visitors; as everything was sold to callers, I have returned the money to correspondents who sent cheques, etc., and have replied to those who sent stamped addressed envelopes. But for obvious reasons it was quite impossible to reply to all those enquirers who did not send postage.

I must confess that I was very surprised at the overwhelming response; I could have sold most of my gear many times over.

V. G. P. Williams, G3FYY,
49, Melrose Avenue,
London, N.W.2.

14th July, 1955

mechanism. All that is necessary is to remove the turntable and mount two pressure rollers and keying contacts on a three-ply base for positioning near the motor spindle. It may be found that the brake is a friction-pad pressed against the underside of the now unwanted turntable, and to save the planning of new braking methods, the keying plug can always be removed from the transmitter jack when automatic CQ calling is to be broken off and the motor allowed to run down.

To obtain drive, the film must be gripped by two pressure rollers, between which it passes: these can be plastic 5 ampere sockets with a width of cycle inner tubing slipped over each to provide friction. They turn freely if bored through the centre and allowed to revolve on fixed bolts standing out from the sides of metal arms. A tension spring attached to arm "A" seen in Fig. 1 keeps the upper pressure roller in contact with the lower pressure roller, which, by means of another spring attached to arm "B," is in turn likewise kept in contact with the tip of the motor spindle upon which the turntable originally sat. If this tip is wound with a turn or two of insulating tape, it will drive the lower pressure roller by friction at a uniform speed. After the film has passed through a guide, round the marking pillar and over a tension roller, two strips of metal hanging down from arm "A" on either side of the film keep it aimed at the centre of the two pressure rollers and prevent it from riding out.

Keying

After leaving the two pressure rollers the endless band of film runs over a cotton reel on an extended arm and returns through the guide already mentioned, past the marking stud and pillar and into the rollers once again. Fig. 2 gives closer details of the keying contacts, made up from junk-box remnants. An upright pillar holds a thin metal guide, while it also secures one end of the moving contact arm, made from a length of old clock spring. Rivetted to the centre of this is a small marking stud, rounded at its tip in order not to drag when riding in and out of the perforations, which enters the shallow groove cut into the upright guiding pillar. The top of this pillar overhangs slightly and serves to keep the film steady during its passage. Rivetted to the free end of the springy arm is the moving contact itself which meets the adjustable fixed contact held on its upright pillar whenever the marking stud enters its groove.

Were a simple wiping contact alone to ride in and out of the perforations it would be found that the thickness of the film itself was insufficient for such a small movement to give proper contrast between marking and spacing. To overcome this difficulty, therefore, a marking stud was embodied as described and the added depth of the groove into which it drops after passing through each perforation gives adequate play to the moving contact arm. By screw-adjustment of the fixed contact, clean making and breaking with firm keying of the transmitter is obtained. The film can be joined as an endless band by overlapping and wiring through registering sprocket holes or by overlapping and cementing with seccotine or amylacetate solution.

If claws were arranged to engage with the sprocket holes and thus act as a feeding mechanism, and if a cam would give the required spacing each time, then automatic perforating might be carried out by keying two separate relays that had punching rods attached to their armatures. This would make it worthwhile to prepare long lengths of film for Morse class practice. Five-letter code groups, run forwards and then backwards at gradually increasing speeds, would defeat any repetitive learning "by heart" and no one would have to twiddle fingers because the Club receiver was being used for QSO's and the Morse instructor had not turned up.

MULLARD JUNCTION TRANSISTORS

The maximum permissible collector dissipation of Mullard junction transistors OC70 and OC71 has been raised from 6 mW to 25 mW. The original rating was deliberately made small in order to ensure adequate margins of safety. The increase reflects the experience gained by the practical application of these new devices. The maximum DC collector voltage is 5v., and the maximum ambient temperature is 45°C.

PHOTOGRAPHS

If you have any clear, sharp prints of Amateur Radio interest, let us see them for possible publication in SHORT WAVE MAGAZINE. All those used are paid for on appearance.

XTAL XCHANGE

This space is offered free to those wishing to exchange crystals. Notices should be set out as below, headed "Xtal Xchange — Free Insertion," and all negotiations conducted direct.

G2BVN, 51 Pettits Lane, Romford, Essex.
Has 200 kc bar, ½-in. pins, and 7030 kc crystal, ½-in. mounting. Wants 500 kc or 3500 kc crystals, small mounting.

G3KEP, 27 Woodlands Grove, Cottingley, Bingley, Yorks.
Has STC type 6200, 6317, 6400 and 6525 kc crystals, ½-in. mounting. Wants 100 kc bar, and frequencies 1800-1900 kc, 6900 kc and 8011-8022 kc, any mounting.

Points on Power Supplies

WHEN TO OMIT THE SMOOTHING CHOKE

J. N. WALKER (G5JU)

PROBABLY from habit, it is usual for a smoothing choke to be included in almost any power supply unit constructed by an amateur. But a little thought on the subject will show that there are many cases where the omission of such a choke will do more good than harm.

No one will argue about the real necessity of having a smoothing choke, of fairly high inductance, in the high tension supply to such parts of a radio installation as a receiver, an exciter unit, or a modulator pre-amplifier. In all these, a very low hum level is essential, and it is not uncommon to find two smoothing chokes. However, it has to be remembered that the direct current is comparatively steady and the smoothing choke is working under the conditions for which it was designed—to carry a *steady* direct current and to offer a high impedance to any variations in the current flow.

Cause and Effect

Now, when supplying the power amplifier of a CW transmitter, or the output valves of a modulator working other than in Class-A, the current varies violently and then the smoothing choke cannot do its original job properly. Surges are set up and their existence can often be seen by the peculiar unsteadiness in the glow of mercury vapour rectifier valves or perhaps in a neon stabiliser, whilst a moving coil voltmeter will show kicks over and above those caused only by the normal change in voltage due to the regulation of the power unit. With a CW transmitter, that kick may be the cause of a chirp, click or tail on the keying which is known to exist but which has defied all efforts to eradicate.

The effect may not be so noticeable in the case of a modulator but it is still there and is probably affecting stability, power output and quality.

Supplies for CW Transmitters

The tonal quality of a CW signal (and also the amount of hum in a telephony carrier, not due to the modulating equipment) is nearly always dependent on the purity of the DC supply to the *exciter* stages and on the voltage regulation of this supply. On all counts, it is better to use a separate power unit for the purpose, keeping the current flow as steady as possible. Some variation is unavoidable when a valve in the chain is keyed, and for prefer-

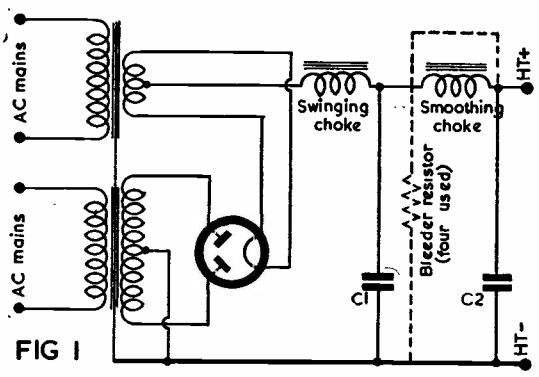


FIG 1

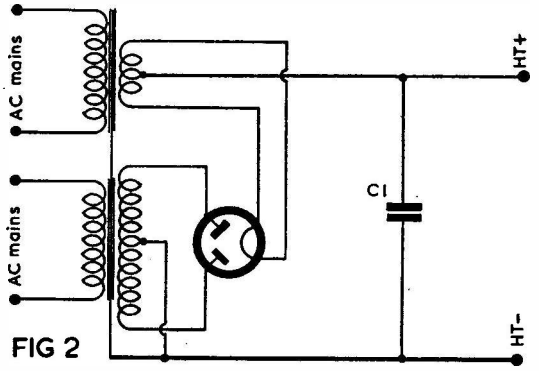


FIG 2

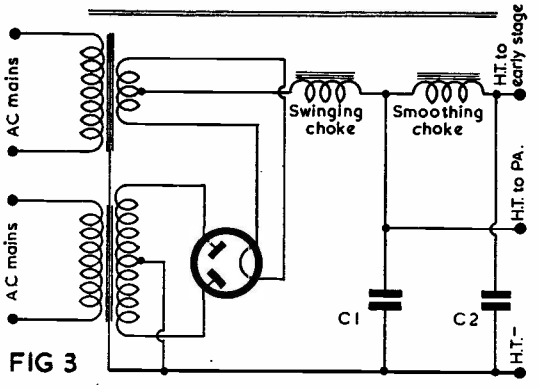


FIG 3

P 11

These diagrams incorporate the points made by G5JU in his article. Fig. 1 is the standard arrangement; in many applications, the smoothing choke can be dispensed with. In Fig. 2 is shown an acceptable arrangement when the anodes of modulator valves only are being supplied. Fig. 3 shows the circuit to use when it is impracticable to run two separate power supplies; this arrangement is preferable to allowing the whole load current to flow through a single arm.

ence, this valve should be the last one before the power amplifier.

There should be *no need at all* for a smoothing choke in the power supply unit feeding the PA stage and it is immaterial whether the latter is a single valve or two in push-pull. Without the choke, the regulation will undoubtedly be improved and a slightly greater output voltage will become available. It is desirable to include a swinging choke and this latter is practically essential if mercury vapour rectifier valves are employed.

The simplest way of putting precept into practice is to short out the existing smoothing choke *in situ,* as indicated in Fig. 1, which shows a typical power supply. Careful study of the resulting note will undoubtedly show that, if any difference is found, it is an improvement rather than the reverse ! Possibly then the choke can be removed altogether for use elsewhere. Of course, the condensers C1 and C2 are now effectively in parallel and this is another factor which will help to improve the regulation.

Modulator Power Supply

Here a similar argument applies. Early stages must have a fully smoothed supply and again a separate high tension unit is indicated, especially as usually a comparatively low voltage—of the order of 250 volts—is required and it is never wholly satisfactory to obtain this through a heavy duty resistor from a high voltage system. Another point which can be brought in here is that, with pentode/tetrode output valves, a steady screen voltage is highly desirable and the low voltage unit can well be used to supply the output valve screens.

The issue is thereby simplified and the supply for the anodes of the output valves can be made to suit the requirement. Two factors apply. For one thing, no amplification occurs of any hum content in the DC supply, and secondly, if the valves are truly balanced in push-pull, the hum will in any case cancel out in the secondary of the modulation transformer. A third point is that an ordinary commercial modulation transformer is not designed for quality reproduction and the response falls off quite a lot at 100 cycles, which is the usual hum frequency. (As an aside, this is probably a good thing, in some instances !)

For these reasons, the smoothing can be elementary and a smoothing choke is certainly a " passenger." Providing the rectifier valve is not being run at or near its limits, the swinging choke can also be dispensed with and the circuit then becomes as in Fig. 2—and anything much simpler can hardly be devised. But it must be remembered that the voltage across the condenser will be higher than when chokes are included, which is good if the increase is acceptable as it will result in greater power output—or, alternatively, the same power output but with a lower degree of distortion. Otherwise steps must be taken to reduce the voltage and one simple way possible in many cases, presuming the mains transformer is supplying DC only as shown, is to move the primary tap up, say, from the 230 volts position to the 250 volt one.

The simple circuit of Fig. 2 will be found to have excellent regulation.

Value of Smoothing Condenser

In the applications envisaged, the combined capacity of C1 and C2 in Fig. 1, or the capacity of C1 in Fig. 2, will probably reduce the ripple voltage to a low enough figure. If not, some additional capacity may be placed in parallel and this is desirable anyway if a swinging choke is used, or if comparatively low value condensers—say 2 or 4 μF—were previously employed. A maximum of 8 μF will generally suffice since otherwise the peak current rating of the rectifier valve may be exceeded, although only during deep modulation or key-down periods. The valve manufacturers generally give information on this point and their advice should be followed.

AC Impedance of a Power Unit

When a power unit of poor regulation is delivering a varying DC current, it means that quite an appreciable AC impedance is introduced and this can reflect back on the load. If this load is one stage only—the power output one—the ill-effects will be a reduction of power output and possibly a slight deterioration in quality, both of which may not be readily apparent. But if several stages are being supplied from this one source, the common impedance may easily cause instability which it will be found difficult to get rid of without extensive decoupling. Any improvement in the regulation reduces this AC impedance and pays dividends, hence the suggestions made earlier towards this end.

The AC impedance of a power unit is not one to be measured directly and the method adopted is to take the voltages and currents at the lower and upper limits. In the typical case of an amplifier/modulator using a pair of 807 valves, a power unit may, in the quiescent state, deliver 50 mA at 500 volts. At maximum output, the current may well be 200 mA with the voltage dropping to 400. The difference

in voltage is 100, in current 150, equal to a resistance/impedance of 666 ohms, which is undesirably high. Modifying in the manner described will quite likely result in figures like 520 volts, 50 mA off load, 470 volts, 200 mA on load, and the AC impedance is then reduced to half its original value.

Combined Power Unit

Some readers may well say "All very fine, this idea of a separate unit, but what if, for one reason or another, such an arrangement is impracticable?" The answer is to modify the existing power unit as shown in Fig. 3, so that two separate arms are formed, branching off close to the rectifier valve, and each filtered in a way to suit the load. This really amounts to decoupling *at the source* and it may well remove difficulties caused by inadequate decoupling elsewhere. Cost and weight may also be reduced since the smoothing choke can be smaller and lighter than if it had to carry the full current of the load.

Parallel Resistor

When a swinging choke is included, about 10% of the full load current must flow under no-load conditions, else the regulation will suffer. In the case of a modulator, this minimum current is provided by the standing current taken by the output valves, but in CW work, a heavy duty resistor (the value can be worked out by Ohm's Law) should be included as shown dotted in Fig. 1. In all cases, it is a useful precaution to place in parallel a resistor of between 100,000 and 200,000 ohms, of suitable wattage rating, to ensure the discharge of the smoothing condenser when switching off. Any resistor should be wired on the valve side of the smoothing choke and not on the load side.

COURSES FOR THE R.A.E.

As in previous years, we are able to announce the formation of a number of classes to be held in preparation for the Radio Amateur's Examination of the City and Guilds of London Institute which takes place next May. These classes are open to all who wish to follow a course of study based on the syllabus of the R.A.E., are usually held one or two evenings a week, are under competent instructors, and will be found to be of great value and interest. In most cases, fees are nominal.

Bradford. In co-operation with the Bradford Amateur Radio Society, classes are being arranged at the Bradford Technical College during the coming winter. Candidates in the district are invited to write to: F. J. Davies, 39 Pullan Avenue, Eccleshill, Bradford, 2.

Huddersfield. Commencing in September, a class will be held in the Dept. of Electrical Engineering, Huddersfield Technical College, with G3IPD (who is on the teaching staff of the department) as lecturer. A non-radiating transmitter (G7CI) is available for instructional purposes. Intending students should apply to the Principal, Huddersfield Technical College.

London (Islington). Once again, the Grafton Radio Society has arranged for R.A.E. classes, Theory and Practical, to take place two evenings a week during the winter months at the Islington Evening Institute, under the L.C.C. as the Education Authority. The full fee is 10s. for the whole session. Morse instruction will also be available. In the first instance, applications should be made to: A. W. H. Wennell, G2CJN, 145 Uxendon Hill, Wembley Park, Middlesex.

London (Wembley). At the Wembley Evening Institute, High Road, commencing on September 19 (enrolment any evening September 12-15), a weekly course will be held under A. Bayliss, B.Sc. (G8PD). In addition to Theory, instruction in Morse will be given.

Glasgow. On September 14, under the Glasgow Education Department, classes will be started at Allan Glen's School, Montrose Street, with GM3AXX instructing in Theory and GM8MJ in Morse. Enrolment is at the School, 7.0-9.0 p.m. any evening during the period September 5-8, and the fee for the whole course is 10s.

HAVE YOU WORKED THEM?

In an interesting note accompanying a photograph of DL2UY and himself, DL2XS remarks that he has held, besides his present call, G3ATH, VS7PH, XZ2HP and ZB2A, while the previous calls of DL2UY have been G3GPE, MP4BAD and Y11X. Both DL2XS and DL2UY are now stationed at R.A.F. Gutersloh, Germany, and are members of the R.A.F. Amateur Radio Society. They wonder if there can be anyone who has worked either of them under all their calls? DL2XS adds, not inappropriately, that "the way to collect WAC in person is to join the Royal Air Force"!

DX ZONE MAP

The price of our *DX Zone Map*, which is a handsome production in colour for wall mounting, is 3s. 9d. post free. It is a great-circle map of the world centred on the U.K., and thus presents the world from the point of view of radio waves originated in this country—for instance, it discloses that (looked at from the U.K.) Moscow, Suchow and Sydney are on the same straight line, and that to work Wellington, New Zealand, from this country you should head your beam a few degrees east of North. The *DX Zone Map*, of which large numbers have been sold (this is the fourth printing), incorporates much other information of practical value and interest to the DX operator. Orders, which can be filled immediately from stock, should be addressed to: Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

DX COMMENTARY

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

GM3IVZ

THE spectacular arrival of summer weather in mid-July sent most of our experts chasing sunburn instead of sun-spots, and this phenomenon is reflected in the diminished amount of correspondence this month. Apart from this external interference by the sun, there was an unfortunate falling-off in conditions, which failed to realise the promise of last month's behaviour. True, we didn't fall back into the 1953-54 doldrums, but the bands were not open so frequently as during June, and the higher-frequency bands became very spasmodic once more.

Summer weather (and we mean the real thing) is a great deterrent to DX-chasing; not only is the call of the open air so loud and clear, but a great percentage of amateur shacks become just about untenable when the mercury climbs up towards the eighties. Our own little domain, almost impossible to keep warm in the winter, now greets us with a blast of hot air as we open the door. If only these clever scientists could evolve a way of bottling some of this precious warmth . . .

CALLS HEARD, WORKED and QSL'd

Openings on Ten

Starting at the highest frequency this time, we are pleased to record ever-increasing activity on *Ten*. Mostly it consists of short-skip, or the familiar paths to South America and South Africa, but the point is that the band is often open.

G3HCU (Chiddingfold) has a new three-element beam only eleven feet off the ground, during the process of pruning and adjusting; but even on this he worked CX, DL, EA, LU, OE, OZ, OD, SM, VQ4, YU and 4X. Reports—on phone—were mostly over S9, and 'HCU looks forward to good things when the beam is finally matched on top of his new 40-footer.

G3IDG (London, S.W.12) heard fourteen countries during the month, but the only DX was VQ4AQ on phone and CN8AF on CW. He has found the band open on 26 days out of 63—more than one in three, compared with one in four last season. G3FXB (Southwick, Sussex) has also opened up on Ten, registering Europeans only, but says the band *is* showing life.

DL2RO (Hamburg) says "occasional openings on this band have brought back memories of the good old days," and he suggests that now is the time to review aerial systems in readiness for the real openings that can't be far away. His contacts on Ten have been with CR6, ZD6, VQ4, PY, LU and a mixed bag of Europeans.

G5BZ (Croydon) raised a G "just to make sure that his beam was still working." It was!

DX stations known to be active on Ten include HC6KI, HR4WH, TI3LA, PJ2AP and 2AO, HP2TP and OA5G—all on phone.

The DX on 21 mc

On *Fourteen* we have a similar story. The band is trying very hard, and a high level of activity would be reflected by an apparent improvement in conditions. The band is frequently open to parts of the world where there is no amateur population on this frequency!

G5VT (Bishops Stortford) comments on some good "non-DX" contacts, such as I1FP/MI, TF5TP and CN2AD. He wonders what happened to ZS8D, who was worked last autumn just after he had got on the band for the first time. No trace of him since, and no card!

G3HCU dug out five new ones on 21 mc—FQ8AK, HR1LW, SP5RK, XE1RY and YN1AA. Other contacts (all phone) were

with CR7, CX, OQ, PY, TI, VP6's, VQ4 and 5, VS1 and 6, W (including W6), YV, ZS and Europeans. Most of these resulted from late evening or even early morning sessions. On June 30 'HCU came on at 2320 GMT and called CQ. This one CQ, on phone, produced the following chain reaction: YN1AA, W8, W1, W2, W4, XE1RY, W3, W3, W2, W2 and W5HZK. The latter contact finished at 0155 GMT on July 1, and there was no break from first to last! 'HCU leaves for Canada shortly, and hopes to be operating from VE3RCS or 3ATU with a special licence, until about September 6. He will be looking for G's on 14 and 21 mc.

G3FXB now spends most of his time on 14 metres and goes up to 101C worked. Coverage is mainly South, West and South-West, and in a big log (for 21 mc) he shows CR6, CR7, CX, FQ8, PZ, VP5, YV, ZD3, ZP among many other nice ones, all on phone; a CW contact was ZD6RM. Phone has been heard from CP, CR4, CR9, HH and VS6. So who can say the band has not been "giving."

But "capricious" is DL2RO's word for 14 metres. As he says, just when you expect a real change for the better, conditions fall off again and you are back where you were. He notes, in particular, the increased number of openings to America, especially late at night, and he has discovered that when VP6FR is strong around 2100 GMT, the band is wide open for North and South America later on. Best of the month for 'RO were CR6's, ZD6, FF8, CX, VQ5, AP, LB9IC (Andoy Is.) and I1BRN/M1 for a new one. KR6LV also showed up, but vanished in the noise after a short time. UA9DN is a good signal, but doesn't work "through the curtain."

Two interesting ones reported by SWL Crawford (Darlington) are YK1AC and KL7ZG, both on phone; the KL7 in particular is a bit of a rarity, and sets us wondering whether 21 mc will be a good band for the Northerly types. Old hands on *Ten* will remember that signals from OX, KL7, VE8 and the like were almost non-existent on that band, even during the best spells of conditions experienced.

It appears, too, that Fourteen is going to resemble Ten in the distribution of phone and CW. The ratio at present seems to be about 10:1 in favour of phone. Interesting phones known to be on, though not necessarily heard over here yet, are CP5EQ, HH2W, HR1KS, YS1RA, ZP5AM, XE1OE, KG4AG, PJ2AR and VP2AD. Note that all of them are in the very area from which signals seem to be most consistent at the present time. Outside this area we hear of such plums as KH6ZA, KW6BB and some VR2's, all worked by W's but not heard in Europe.

Late news of 21 mc comes from GW3AHN (Cardiff), who raised HE1OP and CE3DY (both on phone). New ones heard but not worked were HH7W and M1B. 'AHN also passes along VQ4RF's latest score, which results in their sharing an equal place at the top of the ladder!

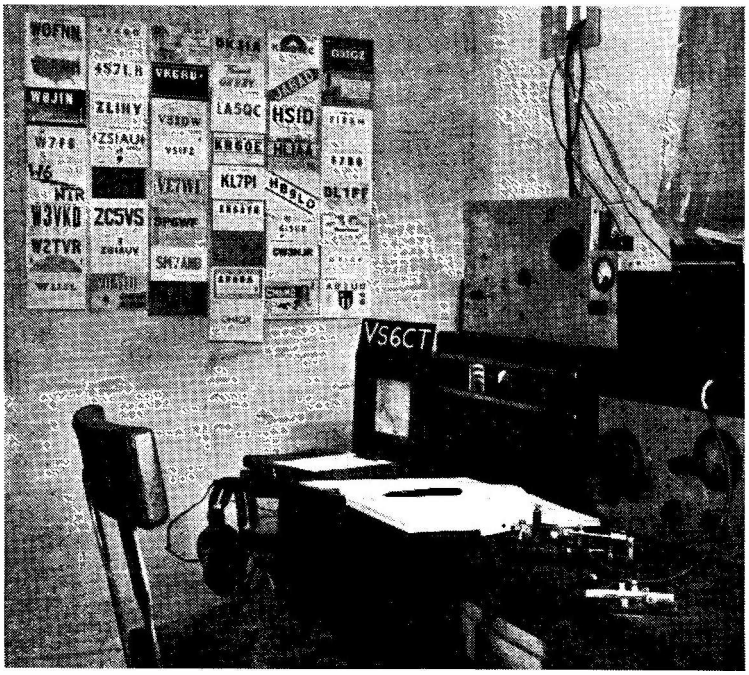
G5BZ (Croydon) worked HA5BU for a new one, also TA3US (phone) and VQ4SS (CW). He has heard W's coming through around mid-day, as well as all kinds of DX which was not new and he didn't bother to call.

Twenty Metres

Still the happy hunting-ground for about 90 per cent. of the world's DX men, *Twenty* seems to have only one disadvantage — the almost continual QRM from short-skip. But this should be falling off before long, and even the DX QRM should diminish as the other bands improve.

Twenty is still open on occasions for the whole twenty-four hours, and if you want CW DX, just switch on at any time and listen. (If it isn't there, switch off again.)

G3IAD (Wakefield) recently collected VP5BM (Turks Is.), W6OXS/VP2 (Leewards), OA4ED, LX1CW and the "pirate" YA6GAL (who may not be a pirate after all)—all on CW. News of the latter is conflicting; he is *not* W6GAL, who knows nothing about the business, but signals do come from the right direction and



VS6CT is located at Little Sai Wan, Hong-Kong, and is actually the station of the local R.A.F. Amateur Radio Club, formed in November 1953. Original members were VS6DE (ex-G3HRY), VE5BQ, G3KGM and G3KLP (when serving in VS6). The receiver is an AR88 and operation is on 40 and 20 metres running 25 watts in a VFO/BA/FD/PA layout, with a selection of aerials.

there seems to be some possible tie-up with globe-trotter W6NZK.

G5VT worked LB8YB on phone and found that he is now using this call from Greenland. He expects to be in Jan Mayen again on his way home in September, but doubts if he will get on the air. QSL's will be dealt with as soon as he gets back to LA.

DL2RO has found things excellent, especially from the Far East. VS1, 2, 6 and JA have been coming in like locals, and XW8AB has been very consistent (he is ex-DL5BS, and you can QSL to Box 6, Vientiane, Laos). VK's and ZL's have been audible as late as 2300 GMT. Extracts from DL2RO's log include FB8BR, FY7's, FO8AC, CR4AL, ET3LF, YV5AO and the aforementioned XW8AB.

G8CO (Grays) has found the W6's and 7's excellent around 0530 to 0700, also some PJ's—but morning conditions are tailing off now. Peak time for early-morning W6's in the "good old days" always used to be April and May, after which a steady falling-off was noticed. They seem to last a little longer these days.

GM3DOD (Greenock) has also found the early mornings good, and has worked PJ2AE, KG1AA, KL7FAP, KH6's, West Coast W's, YV and KP4. But he tells us that in five years at his present QTH he has never yet heard a single VK on Twenty!

Various "strays," all of interest to 20-metre chasers: two OY's are on phone—3CM and 7ML; both operate mornings and evenings between 14150 and 14200 kc. . . . VR3A is on CW, 14080 kc . . . ZM6AS has been heard on 14040 kc . . . KC6UZ works CW on 14045 and phone on 14110 kc . . . KJ6FAA is a good one, around 14220 kc . . . HC8GI (Galapagos) has been heard on 14165 kc phone . . . likewise VR6AC on 14140 kc.

A character showed up signing AC4AH, around 14140 kc—no news yet. VQ8CB (Chagos) has been heard at 0335 GMT, working a ZL. VQ6LQ is back in action again, around 14070 kc at all times.

As reported last month, ZS1PD/ZS8 will be there shortly after you read this. He will be working CW only, Forty and Twenty, for about three weeks only. SVØWM is on Rhodes—CW only. Another slightly doubtful one (à la YA6GAL) is 4W1AR (14035).

G6VC (Northfleet) raised HE1OP (QSL *via* HB9OP) and also worked his first PA on Twenty!

G5BZ collected HI8HG, who was an all-time new one, as well as ZD6RM, LU3ZF and 5ZF, PJ2CJ, MP4JO, KR6OO, ZP5AY, FY7YF, 4S7's and VQ6LQ. Short skip also gave him a 9S4 for a new one on the band.

Top Band Topics

Terrific QRN has been putting a damper on this band, and on the nights of the big thunderstorms in July it was often quite unusable (so was the medium-wave broadcast band, once or twice!) Apart from this hazard, activity seems to be very high for the summer, and county-chasing is still a popular pastime.

G3KEP (Bradford) hopes to do some portable work in some of the "moderately rare" counties in Southern England, with a battery CO/PA and a 1-V-1 receiver. He has collected WABC No. 99, and was the first G3K to qualify.

G2CZU (Bath) has added Anglesey, Argyll, Ross, Carnarvon and Denbigh and is now climbing the ladder nicely. G3GYR (Stoke-on-Trent) found his last English county (Hereford) and now wants to improve his aerial. But he finds summer activity so high that he is afraid to close down in case he misses something!

Portable expeditions have given G3JHH (Hounslow) two new ones in Radnor and Inverness, and he is now hovering on the 80 mark. He echoes our thanks to the portable boys and marvels at the way they stick at the key "through explosive QRN."

GC2CNC (Jersey) sends the full story of the Sark expedition, GC3DVC/P, using a maximum of 0.8 watts input (when the batteries were new!) with a half-wave aerial only 25ft. high. They had 44 contacts with 29 different stations, the best DX being G5JU (Birmingham). Best DX *heard*—GM3EHI, GM3EST, an OK, and a G5 working EA1CP in French! First Sark QSO was with G3FKT (Salisbury), and the best report was an S8 from G3PU (Weymouth). GC2CNC particularly wishes to thank G5JU for the great help he was to GC3DVC/P—and also mentions another

TOP BAND COUNTIES LADDER

(*Starting Jan. 1, 1952*)

Station	Confirmed	Worked
G5JM	97	97
G2NJ	96	97
G3HIS	94	94
GM3EFS	94	94
GM3OM	93	95
GI6YW	93	93
G3JEL	92	94
G6VC	92	92
G5LH	92	92
G3JEQ	90	90
G3HIW	89	92
G3CO	88	90
G2AOL	87	91
G5JU	87	87
G3EUK	85	90
G2AYG	83	84
G3BRL	78	79
G3JHH	77	79
G3GYR	74	76
G3DO	71	72
G3JKO	68	79
G3GGS	67	73
GM3DOD	66	70
G3KEP	64	69
G3HZM	63	68
G3GGN	61	79
G2HKU	61	62
G3JBK	60	71
G3FMZ	60	68
G5FA	60	66
G3FAS	58	71
G3JJZ	57	69
G3JJG	50	67
G8CO	50	65
G2CZU	50	53
G3DGN	47	60
G3FNV	38	66
EI8J	38	48
GM3JZK	38	41
G3JZG	33	49
G3JYV	33	48
G3HQT	30	36
G3JVK	24	39
G3HQT	20	29

operator who was the reverse of helpful!

GC2CNC points out that we can't possibly stretch things and count Jethou (GC) as a "county"—it is a privately-owned estate! If we did that, he says, we should count the former "Kingdoms" of Kent and Sussex as new countries (GK and GS). He makes various useful suggestions for extending the scope of inter-G working, such as a Counties Marathon including the 3.5 and 7 mc bands. (The QRP Society are already running one based on 200 county points with a maximum of 2 watts).

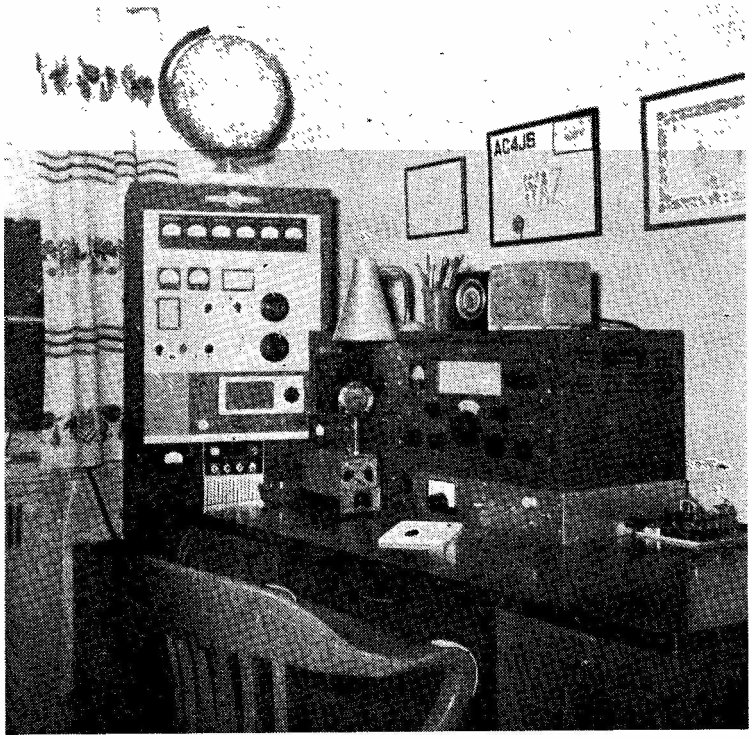
G3GGN (Littlehampton) has at last realised his ambition to make a Trans-Atlantic QSO at mid-summer—he raised K2BWR on sked at 0315 GMT on July 6, despite static and all the other hazards. 'GGN has always felt that the band shows a peak in July and fades out again in August, and hopes his QSO will stimulate an increase in summer-season activity on both sides. He also gives us a flashback to the winter, when he worked OD5LX, and thinks it was the first G/OD5 contact on Top Band (January 23). For full measure, he claims his WABC with 61/79.

G2NJ (Peterborough) goes to the 97 mark, thanks to GM5PP/P in Bute. G5JM (Buckhurst Hill) now has 97 confirmed as well as worked. We don't care to speculate on the first station to reach the 98 mark, which is the maximum under the present scoring arrangement.

The Overseas Mail

K6DV (San Jose) tells us he is the first operator outside Japan to claim the AJD (All Japanese Districts) Certificate, and very nice it looks on his wall. He works Forty only, with a high-power water-cooled 4X150A rig (only one watt driving power). Water-cooling is by a gallon jar of distilled water and a small pump, and the transmitter is quite a midget.

W6AM (Long Beach) joins our Five-Band Table with a score of 253 countries confirmed on Twenty! He also has 205 confirmed on phone. Don sends these figures "so as to get a W into the table." His "score" in the equipment line includes four finals with P/P 250TH's, three receivers, twelve rhombics, two curtains and one 4 mc folded dipole. When he really gets down to the other bands we forsee some re-shuffling at the top of that table.



Station of W2YW, Jamaica, Long Island, who holds DXCC and WAZ and runs a very neat all-commercial layout on the DX bands.

4S7GE (Colombo) is ex-G3JTG, and has been getting cards for contacts purporting to take place with that station; he wants to make it known that anyone using that call is a pirate. In Ceylon he is active with 50 watts to a folded dipole on Twenty, and has worked about 36 G's. Just now he finds them scarce, with the W's in the ascendant; he has also been hearing XW8AB and confirms the news about him (*see* earlier paragraph).

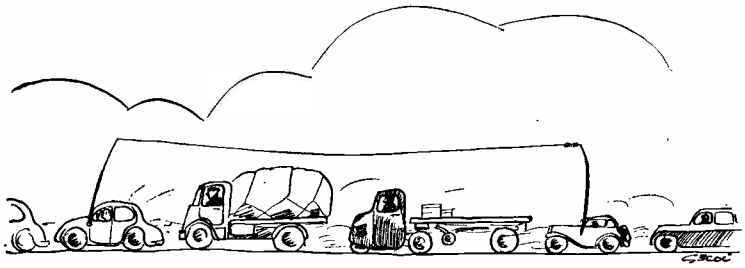
AC3PT confirms (*via* VS2DB) that he and AC3SQ are the only genuine stations in Sikkim. AC3SQ is at present signing AC5SQ from Bhutan, but not for much longer. AC4NC of the Indian Mission to Tibet is at present on leave in Calcutta, but will be returning and active again in about two months.

ZD8AA (Ascension) tells us that he will be inactive for about two more months, returning to Twenty CW about mid-October. So far he has only worked eight G's, and he hopes things will pick up when he comes back on the air. Another DX operator looking for G's is VK9OK on Norfolk Island, who will be there for another year, and similarly ZL1HY hopes to get a signal into the U.K. from his new QTH at Waihi, in New Zealand's North Island.

Miscellany

DL2RO tells us that YU1GM, who is an American in the Embassy at Belgrade, is trying to get permission to take a rig into Albania during the first two weeks in September. If this comes off, it will be the first genuine ZA ever heard (if anyone *does* hear him through the pile-up!)

G3IAD has received his QSL for an 80-metre QSO with TI9MHB (Cocos Is.). G3IDG had



". . . We find an end-fed long-wire just the job for mobile . . ."

a visit from WØPXO (St. Louis), who is on an eighty-day tour of thirteen European countries. He runs 50 watts on all bands from Ten to Eighty, and has a 50-watt mobile in his car, with which, on Ten, he has worked out to California from his home town. The all-band character of the prevailing DX should stimulate interest in the Five-Band Table—what about sending in *your* score?

DX Formula

Harking back to some of the light-hearted efforts of the past two months to define DX, SWL Moore (Lowestoft) submits a formula to do the job. Here it is:

$$DX = \frac{DS \times RK \times N}{F \times P}$$

where DS : Distance between stations
RK : "Rarity constant," arbitrarily settled
N : Number of stations trying to contact desired station at same time
F : Frequency in Mc/s
P : Power in watts.

We quote this because we feel that it is on the right lines! But don't ask *us* to serve on the committee entrusted with working out "rarity constants," or to assist in deciding on the value of N for each QSO!

DX Strays

PX1OP, if you hear him around mid-August, will be HB9OP in Andorra. He hopes to operate on 3.5 mc, 0200-0500 GMT; 7 mc, 0600-1100 GMT; 14 and 21 mc, 1100 GMT to midnight, daily. Don't ask us when he sleeps—we don't know either . . . KJ6BH is reported on phone around 14200—nice if you can get him. . . YA4BBR seems to be same station and operator as YA6GAL.

KH6AIW is planning a possible skirmish in the direction of KS6, KJ6 and KM6, but no details as yet . . . FK8AO is ex-FQ8AE, now running 75 watts and about to build a rhombic.

ZS2MI is said to be active again from Marion Island, fixing skeds with W's around 1200-1300 GMT, Saturdays . . . Don't assume that a new FB8 is on Madagascar—there is a possibility that one will turn up on Comoro Island during September . . .

New Abbreviations

Since the recent discussion suggesting that a new procedure signal is needed to indicate that short QSO's are wanted, several proposals have been made, but the best and the most easily understandable one yet is "SQ," added to a CQ or QRZ call just before the end, SQ indicating "Short QSO." In other words, that a snappy, contest-type QSO is desired. In such circumstances, the operator would be justified in going away and dropping anyone who started telling him their full QTH, all spelt out twice, with weather report and the whole treatment.

We think this is worth adopting; after all, there are many legitimate reasons why any of us should, on occasion, want a few short and snappy ones. It doesn't imply rudeness, lack of interest or inability to chew the rag—one might just have put up a new sky-wire, or one might have only five minutes on the air before collecting the XYL from her hair-do.

So please, if you approve, get these two in circulation so that they become known:

"SQ": Short QSO
"RC": Rag-chew

Don't call "CQ SQ" or "CQ RC," which would merely make your CQ unnecessarily long and complicated. Just insert the letters once or twice before signing.

Don't forget to try these, too, for transmitting QSL information with the minimum waste of time:

"QSLA": Will QSL *after* I receive yours.
"QSLB": Will QSL via *Bureau.*
"QSLD": Will QSL *Direct.*

We are not in favour of introducing a whole gaggle of new abbreviations, but these few should be easily understandable all over the world, and should be potential time-savers.

For the Future

Several correspondents agree with us that operating methods will have to be considerably streamlined as conditions improve. Our bands will become more and

21 mc MARATHON

(Starting July 1, 1952)

STATION	COUNTRIES
GW3AHN	126
VQ4RF	126
VQ4RF (Phone)	125
G4ZU	115
G5BZ	111
G4ZU (Phone)	110
G3HCU (Phone)	107
DL2RO	107
G3FXB	101
GW3AHN (Phone)	100
G3TR (Phone)	98
G2WW	98
G6QB	85
G3DO	84
G2BJY	83
G3FXB (Phone)	81
G2YS	80
ZS2AT	80
G2VD	80
GM2DBX	78
GM2DBX (Phone)	72
G3CMH	71
ZB1KQ	64
5A2CA (Phone)	60

more crowded as the increasing amount of DX attracts still more stations on the air to work it, and the QRM situation will become pretty formidable

As we have said before, a cutting down of natter by fifty per cent. is equivalent in effect to a doubling in width of all our bands. It can be achieved without reducing the interest or friendliness of QSO's in the slightest degree, simply by pruning of unnecessary patter, elimination of repeats, shortening of the "polishing the door-knob" effect when signing-off and (dare we say it?) leaving out all the well's and er's and hi's and things that some phone operators sprinkle over their contacts like pepper.

For the CW fraternity, we suggested some time back that they should use the symbol "P" when all is well. In other words, if a signal is R5 and T9, only report the Strength figure. "P9" would thus mean "RST 599," "P7" would be "RST 579" and so on. If the other man was only R4 or T8, then you wouldn't use the "P" code.

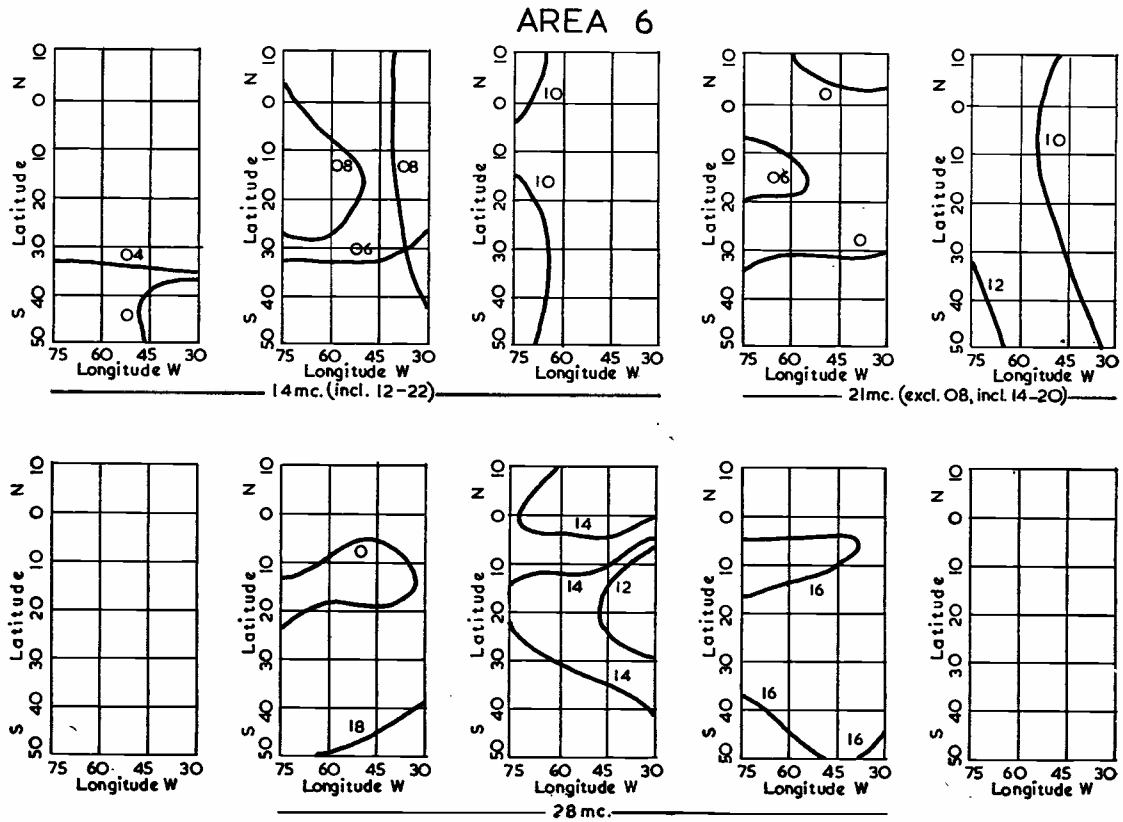
Remember that *anything* that cuts out unnecessary operating time is equivalent to a reduction in QRM, or a widening of bands, or an increase in receiver selectivity. And it can be achieved without spending any money or using any apparatus. Now don't bring up that one about rubber-stamp QSO's, because we are aiming at cutting out the *unnecessary* foliage, the miscellaneous seaweed, the pretty pictures round the edges, and *not* the essential amateur type of QSO.

And so we come to the end of this month's notes and news. More contributions next month, please, and note the deadline is **first post on Friday, August 19.** The following one will be *September 16,* which overseas readers can catch. Address everything to "DX Commentary," *Short Wave Magazine,* 55 Victoria Street, London, S.W.1. Until then, we wish you Good Hunting, Happy Holidays, 73 and BCNU.

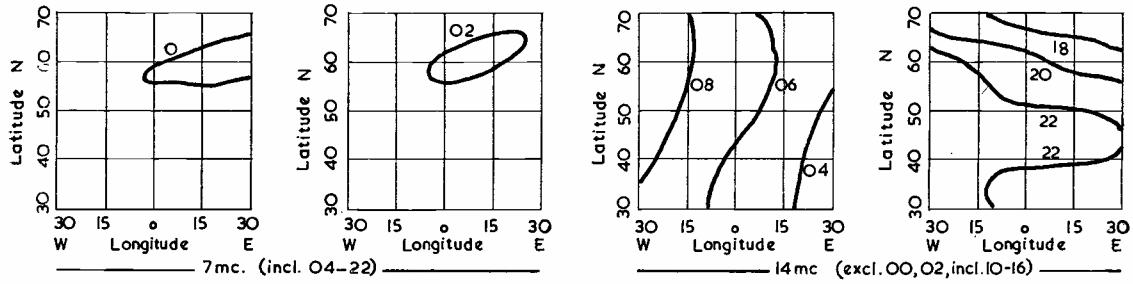
DX COMMUNICATION FORECASTS

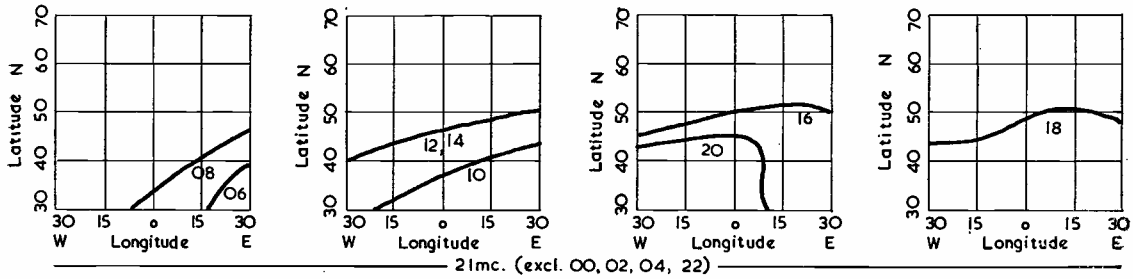
CHARTS FOR SEPTEMBER 1955

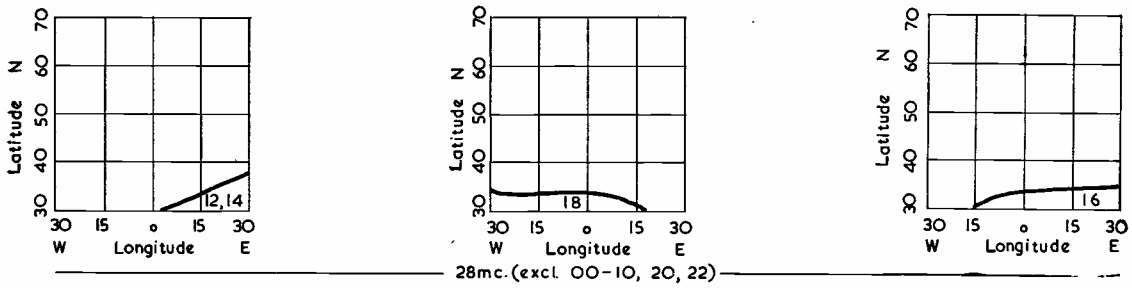
R. NAISMITH, M.I.E.E.



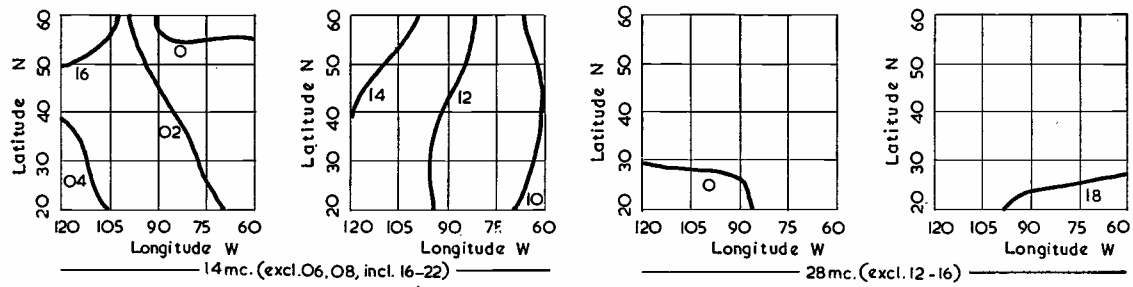
AREA 1

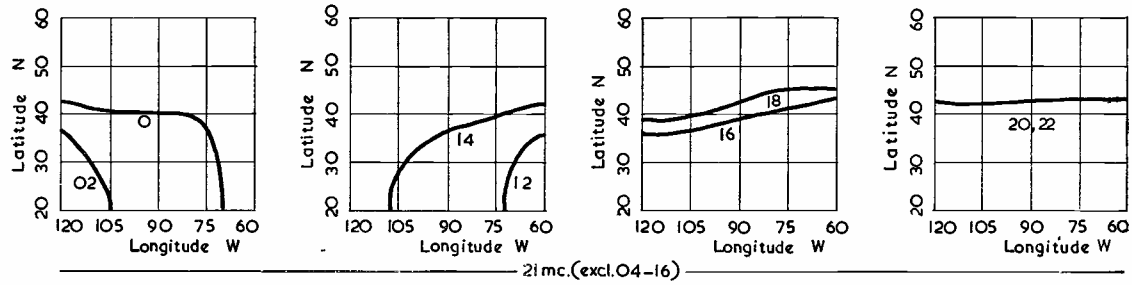

Latitude N
Longitude W E
0
02
08
06
04
18
20
22
22
7mc. (incl. 04–22)
14mc (excl. 00, 02, incl. 10-16)

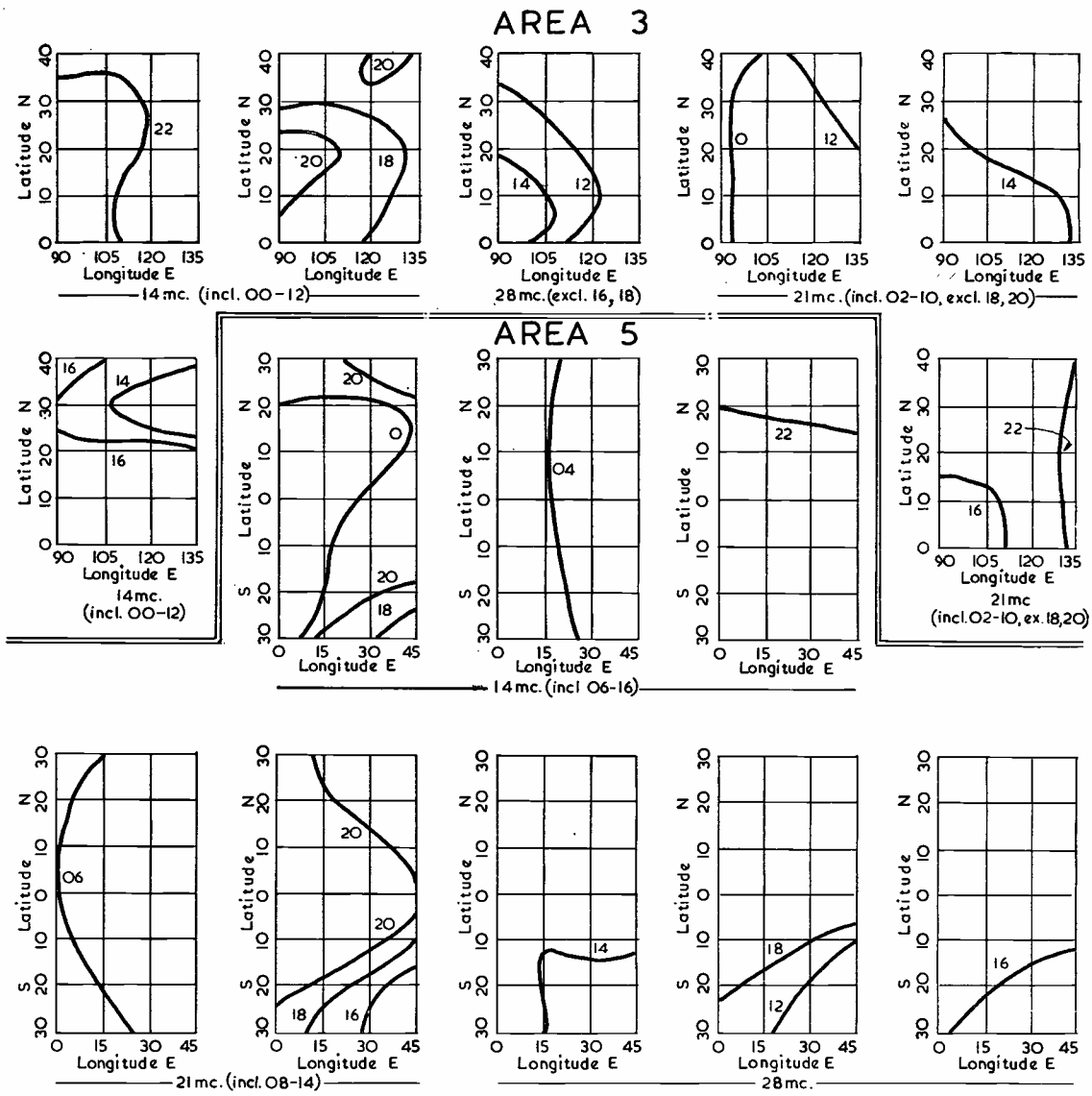

Latitude N
Longitude W E
08
06
12, 14
10
16
20
18
21mc. (excl. 00, 02, 04, 22)


Latitude N
Longitude W E
12, 14
18
16
28mc. (excl. 00–10, 20, 22)

AREA 2


Latitude N
Longitude W
16
0
02
04
14
12
10
18
14mc. (excl. 06, 08, incl. 16–22)
28mc. (excl. 12–16)


Latitude N
Longitude W
0
02
14
12
18
16
20, 22
21mc. (excl. 04–16)



(For method of use of these charts see p. 82, April)

RESULTS — 1954 VK/ZL DX CONTEST

From New Zealand's *Break-In* for April and the Australian *Amateur Radio* dated June we get it that the CW winner for Australia was VK2GW with 2807 points gained on the three bands, 40, 20 and 15 metres, followed by VK9AU with 1472 points. The phone winner for VK was VK5MS, with 1672 points made on 20 metres only. The leading New Zealand CW station was ZL1AH with 3134 points on three bands (he also made the largest score of all entrants), and the winning ZL phone operator was ZL1MQ with 899 points on three bands. For the U.K., G5RI made 403 points and GI4RY 60, both on CW; there was no British phone entry. The largest overseas score was by W8JIN with 2240 points (CW), the next highest U.S.A. station being W6LDD with 1694 points. The 1954 VK/ZL Contest was held under rather poor DX conditions, and the total entry—176 stations under some 30 different prefixes—was low. The American entry nearly equalled that of the VK's themselves and was much greater than the number of ZL operators who sent in scores. A good many operators took part without entering logs.

A Receiver for 25 Centimetres

CRYSTAL-MIXER CONVERTER FOR WIDE-BAND IF AMPLIFIER

F. W. TYLER (G3CGQ)

This article discusses an experimental 25-centimetre receiver, designed from first principles as a micro-wave superhet, which has already given striking results. It can therefore be used with confidence as a starting point for practical work on our 1250 mc band, with the certainty that if the RF section is constructed as described it will give good results over local distances. The effectiveness of this converter for working over longer ranges depends—as is usual in UHF communication links—entirely upon the efficiency of the beam with which it is provided. The G3CGQ 25 cm receiver as described here was that used by him for the successful tests with G5RZ over a blind path of 10½ miles.—Editor.

ONE of the most interesting recent developments in Amateur Radio has been the study of practical micro-wave techniques, and in particular the problems associated with the design of receivers for these frequencies.

On the transmitting side it is possible, with the aid of certain special valves, to develop quite useful quantities of RF power on frequencies as high as 1200 mc (25 cm), as instanced by the fine oscillator designed by G5RZ, built round the "surplus" types ME-1000 and ME-1001 of Mullard origin, and described in the February-March, 1955, issues of *Short Wave Magazine*.

The problem on the receiving side is more complex, and yet can be solved comparatively simply provided extremes of selectivity and sensitivity are not required—in other words, the gain should be obtained from the aerial system rather than from the receiver itself, while selectivity tends to be taken care of by the very nature of a high-gain beam, with its sharp directivity and the careful alignment on the wanted station that is therefore necessary.

Receivers for use on the 25 cm band can be developed in various ways, as follows:—

(1) Super-regenerative receivers.
(2) Superheterodyne with narrow-band IF.
(3) Superheterodyne with broad-band IF.

The first poses many difficulties despite the inherent simplicity of the circuit. The normal self-quench technique is not satisfactory with valves already working at the limits of their oscillation frequency, and the introduction of a separate quench becomes necessary. Here there is a physical problem to overcome, as one must use grounded-grid valves built into cavities—and easy tuning over a band narrow at the frequency in use is extremely difficult with any sort of plunger mechanism. However, these problems can be solved provided valves working well within their frequency range are used and, because of the remarkable sensitivity of a receiver working on the super-regenerative principle, there is scope for much useful and original work on quenched-oscillator detectors for our UHF bands.

Superhet Converter

The converter type of UHF receiver with an IF in the range 26-32 mc, used with a main receiver as IF/AF strip in the usual way, is probably the right approach for the man who intends to develop, from his 70 cm principles, crystal-controlled equipment on 1250 mc.

However, the writer considers this to be a design for the expert. One of the greatest drawbacks to this method is that of cost, particularly as regards valves capable of working within their limits at 1250 mc.

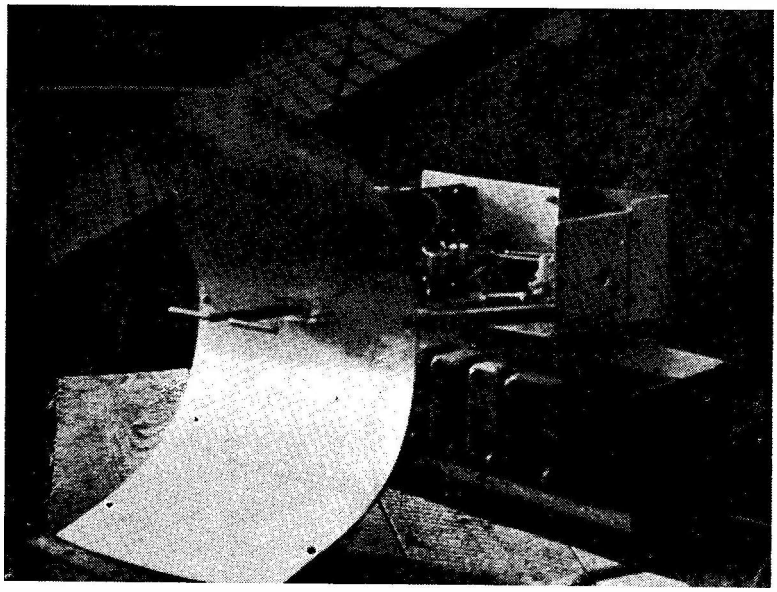
The writer therefore suggests the superhet converter coupled into a broad-band IF amplifier operating above 12 mc to be the most practical immediate solution to the problem of reception on the 25 cm band.

A First Design

With this in mind, the receiver shown in circuit form in Fig. 2 has been developed, and found to be a practical proposition when used in conjunction with the G5RZ transmitter. Both stability and tuning range were found to exceed expectations, and on the bench held a modulated carrier for 30 minutes, without attention. The sensitivity of the receiver was such that it was good enough to bring in the *third harmonic* of G3FUL's 70 cm transmission at S9 from a distance of more than half-a-mile with a two-inch dipole aerial on the bench. Further tests, on 1250 mc, in the garden at G5RZ also confirmed the capabilities of the receiver for local working.

It is designed around a variable oscillator in the 400 mc range, using harmonic mixing with a crystal diode. The third harmonic of the 400 mc oscillator is selected in a resonant cavity and injected from this into the mixer cavity,

this arrangement being adopted so as to attenuate the 400 mc fundamental and prevent "flooding" of the crystal mixer. It will be found that crystal current will vary very little over the whole tuning range and in the writer's case averages 100 microamps.; every effort should be made to keep the current within this range. Injection into the mixer is by inductive coupling from the oscillator cavity, and is found to be adequate for good signal-noise ratio. Dimensions for the cavities are given in the electro-mechanical sketch in Fig. 2 and a detailed layout for the 400 mc oscillator section, with dimensions, at Fig. 5. The 955 will be found to be a very easy oscillator at 400 mc, and could probably be taken to 600 mc without difficulty.



The G3CGQ set-up for 25-centimetre reception, showing the beam array — a cylindrical parabolic reflector — carried directly on the receiver discussed in the text. The whole of the apparatus is mounted on a board pushed out of the window; on the equipment as shown a 25 cm signal has been received from G5RZ at 10½ miles.

The mixer cavity is, of course, heavily damped by the crystal and therefore copes easily with any variation in frequency of the incoming signal as well as with the tuning of the local oscillator; the mixer can be sharpened by tapping the crystal down the cavity but at this stage it is felt that, within reasonable limits, the RF end should be as broad-band as possible. By means of the screw plunger, the cavity is set at a point giving a 30 mc swing either way of a given frequency on the oscillator, *e.g.*, in the writer's model, the tuning range is 1215-1272 mc, so that the cavity tuning is centred at about 1245 mc. A frequency coverage of around 60 mc in the band is the maximum that should be attempted for ease and accuracy of tuning on the oscillator; at the same time it allows sufficient scope within the band for the setting up of the transmitter—these being mainly SEO at the present state of the art, and likely to remain so for some time to come. At G3CGQ an IF of 13.5 mc is used, this being conveniently provided by a Type 194 unit, readily and cheaply available from "surplus" sources, which has six stages using SP61's.

The aerial is connected directly into the mixer cavity, through a full-wave feeder from a dipole focussed in a parabolic sheet, and the IF is extracted through a CV-102 silicon crystal into a head IF amplifier consisting of a low-noise pentode 6AK5 stage. The output from this is taken through a length of coax cable to a standard broad-band IF/AF strip on any frequency above 12 mc. There are several broad-band amplifiers available as "surplus," the commonest being the 45 mc unit of Pye manufacture using EF50's, and the Type 194, already mentioned, with SP61's. Though the latter is found by the writer to be adequate for the job (it is prone to IF break-through under certain conditions) it is considered that the higher frequency of 45 mc as provided by the Pye strip would be better for the purpose. With either unit output can be taken from the anode of the final valve through an 0.1 μF condenser to a headset, no other modification being necessary.

Equipment Layout

The method of assembly of the aerial, converter and IF/AF strip is the layout which has become standard practice for micro-wave apparatus, where the converter and aerial are mounted as one; at G3CGQ, the converter is directly behind the parabolic sheet reflector, allowing feeder length to be kept down to one wavelength, as shown in Fig. 3.

The mounting of the dipole aerial itself at the focus of the parabolic sheet was done by first bending the sheet to the required shape (*see* Fig 4) and then, turning it towards the sun,

poking in a piece of paper at the end of a stick and observing the position at which the rays were focussed in the parabola ; the distance was then measured off, the sheet cut for the entry of the feeder arms, and the dipole mounted so as to be at the focal point. Details of these measurements (in the writer's own set-up) are given in Fig. 4 but they should not be taken as final because the sheet, of dural, that happened to be available was 16 ins. square (rather less than two wavelengths) and the arc was adjusted to give the best result. To make full use of the collecting properties of a parabolic reflector it is really better to adjust the position of the dipole while actually receiving a signal.

So far as construction is concerned a lot must be left to the experimenter and hence the broad principles only are discussed ; but for first results on 25 cm it is suggested that the oscillator-mixer details, as given in Fig. 2 and Fig. 5, be carefully followed, as this will save a great deal of time in " finding the band " and much effort in getting the RF end of the receiver working properly.

Results

While testing on 1250 mc with G3FUL's 70 cm third harmonic and also a transmitter in the band using a G5RZ oscillator at his end, over a distance of half-a-mile (and not line-of-sight), the tuning on the receiver was found to be easy and not unduly sharp, while the bandwidth was such as to allow the signal to be held for long periods without adjustment.

As reported in recent issues of *Short Wave Magazine,* the receiver described and illustrated here is that actually used for the reception of G5RZ's 25 cm signals over a blind path of 10½ miles.

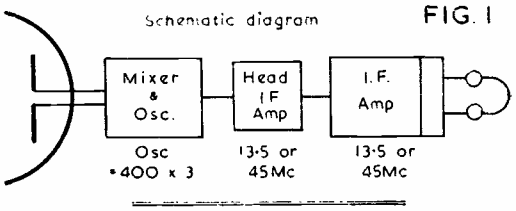
Thus, it will be seen that the RF end of the converter is in effect a tunable broad-band arrangement capable of holding SEO signals, and therefore meets the immediate need for reception on 1250 mc.

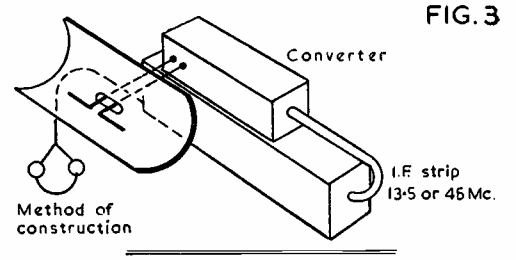
So far as the writer is concerned, experimental work on this band is still in the early stages. It is clear that vast improvements are possible, particularly with aerials on the transmitting side and signal/noise ratio on the receiving. There is no doubt that for short-link work, the 25 centimetre band is of great value, apart from its extreme interest as a field for experiment. The band is greater in frequency width than all our lower-frequency bands put together, so there is plenty of room on it !

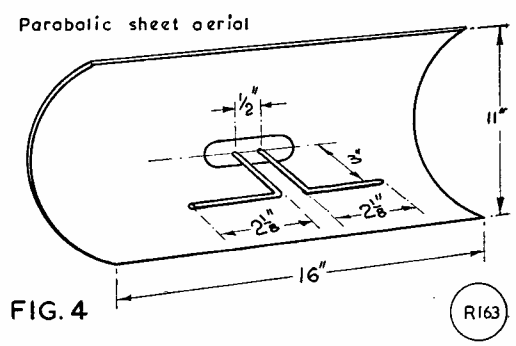
It is hoped that this article will not only encourage many readers to make the journey into the open spaces of the UHF regions but will also help to dispel any previously-held notion that the gear required is too complex for anyone but an expert.

Some Notes on Micro-Wave Aerials

Several beam systems have been developed and tried on the 25 cm band at G3CGQ. The first was a 10-element stack, this being a scaled-down version of that described by G4MW in *Short Wave Magazine* for October 1954, fed through an impedance matching transformer as given in that article, and connected to the receiver through a short length of coax. Tests showed this aerial to be only fairly efficient, due no doubt to the mismatch into the cavity (together with feeder losses), though when put on the G5RZ transmitter it showed quite useful properties. The second beam tried was a 4-element Yagi which again showed much







Showing the general layout of the 25-centimetre superhet converter designed by G3CGQ and described in his article. At present, the IF used is 13.5 mc with a Type 194 IF amplifier (Fig. 1). As suggested in Fig. 3, the units form one composite assembly, with the aerial mounted directly on the converter. Fig. 4 gives the dimensions of the cylindrical parabolic sheet reflector, with the detail for the dipole at the focus of the sheet.

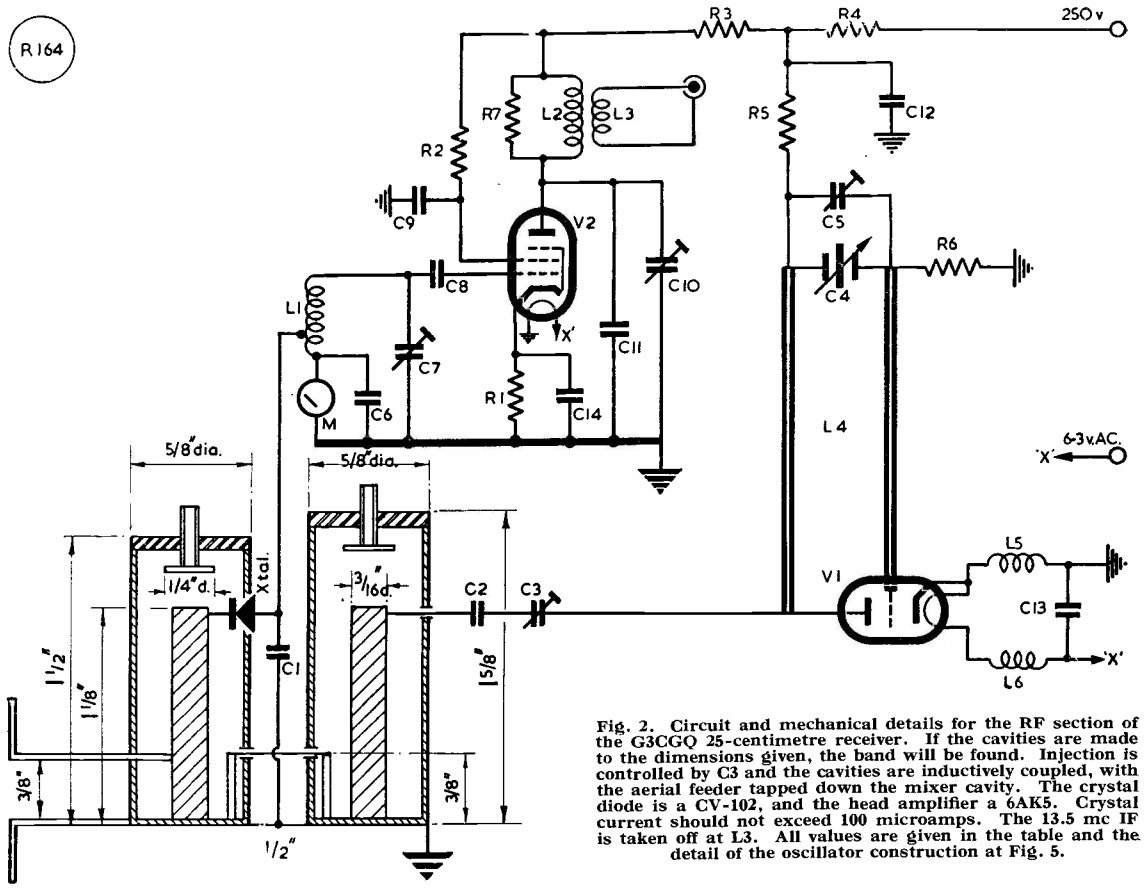


Fig. 2. Circuit and mechanical details for the RF section of the G3CGQ 25-centimetre receiver. If the cavities are made to the dimensions given, the band will be found. Injection is controlled by C3 and the cavities are inductively coupled, with the aerial feeder tapped down the mixer cavity. The crystal diode is a CV-102, and the head amplifier a 6AK5. Crystal current should not exceed 100 microamps. The 13.5 mc IF is taken off at L3. All values are given in the table and the detail of the oscillator construction at Fig. 5.

promise when used for transmission but it left much to be desired when connected to the receiver. It began to emerge that a *large collecting surface* was required to obtain maximum pick-up for the (comparatively insensitive) receiver.

As a result of the foregoing experiences it was decided to try a dipole, backed by a large reflecting surface, with the minimum possible feeder length, all within the station. The result was the arrangement shown in Fig. 4, which was constructed round the largest piece of sheet which happened to be available. The feeder and dipole are made from two lengths of quarter-inch copper tube 10¼ ins. long, 2⅛ ins. of the end of each being bent at right angles to form the dipole, with ½ in. separation between the legs. The remaining 8 inches of the tubing form a full-wave feeder direct into the mixer cavity. This dimension allows the curved sheet of the reflecting parabola to pass behind the dipole and in front of the converter unit.

This arrangement proved to give the most promising results of all tried; a dipole aerial seems to be the most satisfactory to mount and match into the receiver, and all possible assistance should be given to it in the shape of parabolic reflecting surfaces. When beam systems of this type are being constructed the paraboloid should be designed to be as large as it is possible to accommodate within the station

Table of Values

Figs. 2 and 5. Mixer, Oscillator and Head Amplifier Sections of the 25 Centimetre Converter.

C1	= 30 μμF	L1	= 12 turns 20 SWG tapped 5 turns from earthy end
C2	= 3 μμF	L2	= 12 turns 20 SWG
C3	= 3 μμF variable	L3	= 3 turns 26 DCC over L2
C4	= 5 x 5 μμF variable	L4	= Two ¼-in. copper tubes 3 ins. long (*See text and Fig.* 5).
C5	= 5 μμF trimmer	L5, L6	= RF chokes, 6 turns 20 SWG ¼-in. diameter
C6, C9, C13, C14	= .001 μF	V1	= 955
C7, C10	= 30 μμF trimmers	V2	= 6AK5
C8, C11, C12	= 100 μμF	Xtal	= CV-102 crystal diode
R1	= 330 ohms	M	= 0-500 μA meter
R2	= 47,000 ohms		
R3, R5, R7	= 10,000 ohms		
R4	= 15,000 ohms		
R5	= 33,000 ohms		
R6	= 20,000 ohms		

(or on an outside platform capable of carrying the whole apparatus). As in the writer's case, the matter is one of compromise.

EDITORIAL NOTE:

Parabola : A conic section obtained by cutting a cone by a plane parallel to its side. Without going into the intricacies of solid geometry this is not a shape that can be accurately defined unless the aperture and required focal length are given; it can then be derived by calculation or drawing.

Paraboloid : The solid form derived by rotating a parabola about its axis. In beam work, many variations of the paraboloid shape are used, depending upon the radiation characteristics required. The shape illustrated in this article is actually a cylindrical parabolic reflector and, because its main axis is horizontal, the directivity provided by the reflecting surface is in the vertical plane. In other words, there is no great concentration of energy in the horizontal plane because the reflector is not a true paraboloid. Whichever way a cylindrical parabolic reflector is turned there is great wastage of energy in one plane due to " spill-over " from the open ends. It is significant that in the G3CGQ-G5RZ tests, it was found by G5RZ that his vertical angle was the critical one, the horizontal coverage being quite broad. This fits in with the characteristics of the beam array, as described in this article, in use at G3CGQ.

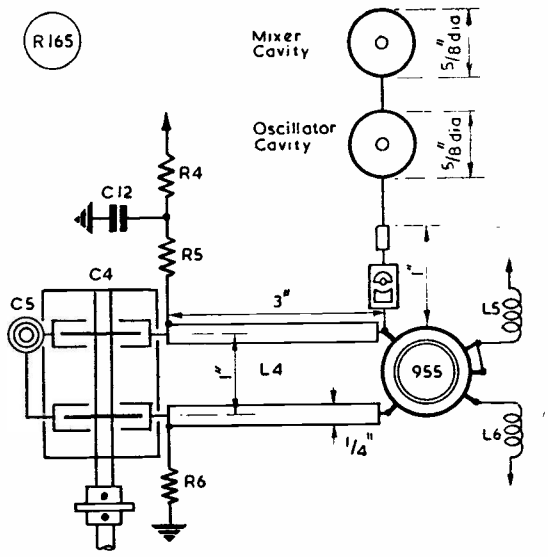


Fig. 5. A 400 mc oscillator is used to give third-harmonic injection in the G3CGQ 25 cm receiver. The layout round the 955, which is an easy and stable oscillator at 400 mc, should be as shown here; L5, L6, are RF chokes (see table of values for winding data) and with a 5 x 5 $\mu\mu$F midget variable at C4 a frequency swing of about 60 mc is obtained on the 25-centimetre band.

MULLARD VHF/UHF TRANSMITTERS for BBC

An order for six VHF experimental transmitters placed with Mullard Limited by the British Broadcasting Corporation has just been completed. The order was finalised by the delivery of a transmitter for use on frequencies in Band V. Two transmitters in each of Bands III, IV, and V were supplied and are being used for some experiments the BBC is conducting in connection with propagation and field strength surveys. These will provide information on which to base plans for the possible use of these frequencies for television at some future date.

The transmitters were specially developed at the Mullard Research Laboratories and are believed to constitute the first complete range of transmitters for Bands III to V inclusive. They are *not* designed for programme transmissions, but as precision instruments for the investigation of the propagation of VHF and UHF signals. Some of the transmitters have already been brought into use by the BBC and are temporarily installed at Sutton Coldfield and Holme Moss.

In order that accurate propagation measurements may be made, the output of each of the Mullard transmitters is kept stable within about a quarter of a decibel over any two-hour period. This has been achieved by extensive power supply stabilisation. All HT supplies are electronically stabilised, and the LT supplies are stabilised by means of transductors on the mains side of the appropriate power supply transformers.

The transmitters will normally be square-wave modulated at 1000 c/s. The stability of the modulating frequency is most important, since highly selective receivers are employed, and frequency drift would cause spurious variations in signal strength. The modulating frequency is derived from a 128 kc crystal oscillator, the output of which is divided by seven binary stages to give 1 kc ± 0.01 per cent. Binary dividers were chosen because they are more reliable than high-order multivibrator dividers. The stability of the carrier frequency, which is also crystal controlled, is ± 0.01 per cent. over 48-hour periods. The CW power outputs of the transmitters are as follows: Band III, 300 watts; Band IV, 200 watts; Band V, 100 watts.

The transmitters can also be pulse modulated at a repetition frequency of 1000 c/s, the pulse duration being 0.5 microsecond, with a peak pulse power of more than 10 kW at all frequencies.

The output stage of each transmitter is used as a self-oscillator when under pulse conditions. Careful design of tuning elements ensures that the carrier frequency stability is better than 0.1 per cent. Oscillation is obtained by introducing internal feedback between the output and input resonators of the final stage.

★ ★

NATIONAL RADIO SHOW

This opens at Earl's Court, London, on August 24 and will continue until September 3. As usual, the BBC will have a large " living exhibit."

VHF BANDS

A. J. DEVON

Conditions Hold with the Weather—

Many Good EDX/GDX Contacts—

Twelve Countries Workable—

Station Reports and News—

Calls Heard and The Tables—

SINCE our last appearance, it has been within the bounds of possibility for an efficient two-metre station, located almost anywhere in England east of a line Nottingham-Bristol, to have worked DL, EI, E, GC, GI, GM, GW, LA, ON, OZ, PA and SM—that is the measure of the general level of conditions during the period.

Of course, to work all this would have meant being on almost daily, at all sorts of hours up to 0100 BST; and even at that, it does not necessarily follow that every such station could have worked all 12 countries; the point is that at different periods during the month, the EDX listed was there to be worked, and all these countries have, in fact, been raised by a number of G's collectively.

The long succession of hot, almost windless, days with a high, steady glass and cooler evenings developed just the sort of conditions to produce reliable GDX or EDX all through the period.

Results Generally on Two——

Signal levels have been remarkably high, but sometimes over the longer north-south paths fading was deep and fairly rapid. Looking north from almost any station in the south of England, G6XM up in York remained a remarkable signal, loud and steady, followed closely by G5YV and a group of stations in the Cheshire-Lancashire area, of which G3GPT (Nr. Preston) and G3IUD (Wilmslow) are good examples.

So far as Continental Europe is concerned, stations in the London area, south-east England and East Anglia have again had the best of it, with DL, ON and PA workable night after night, though on some occasions there were also good EDX opportunities for the rest of the country. The F's penetrated into the Midlands area, an outstanding signal being F9CQ, heard as far north as G2FJR (Sutton Bridge, Lincs.). F9CQ was /P at the time, so he may have been well placed for working G's.

On July 18, there was a late-evening development across the North Sea, giving—at long last—his 15th country to Harold of G5YV, who was successful with LA1KB; he worked OZ1PL, OZ2IZ and SM6ANR as well that evening, making a nice catch of real EDX; he says the phone signal from OZ2IZ was "terrific at midnight, S9+40 dB." On July 21, the SM's were coming through again and GDX conditions were also good in the N-S line.

During the period, interesting GDX appearances were those of EI2W, EI6A, GC2FZC, GC3EBK, GI3CWY (Co. Antrim), GI3GXP (Co. Down), GM2FHH and GM3EGW, as well as GM5KW/P in Roxburghshire and G6AG/P in Westmorland. All these have been heard or worked across the whole country. From North Devon, G2ADZ had a private party with EI4E, GI3GQB and GI3GXP, as well as working some of the other stations mentioned. G6NB (Brill, Bucks.) was very successful with GM2FHH (Aberdeen), worked on several occasions; G2AIW (Twickenham) also got one in with GM2FHH, at 2320 on July 10.

Another interesting occurrence was on July 14, when G3DO/M, stationary near Walsall, Staffs., but strictly /M so far as the aerial was concerned, worked EI6A in Dublin for an RS-56 report. (But G3DO cannot take this into his counties-worked totals, though EI6A can, because the county tables are based upon scoring from the home QTH only—pity, but there it is!).

This contact was then capped by G2HCJ/M, who raised EI2W while actually under way between Dartsbury and Warrington. The next of it will be that these mobile boys will be working country-to-country QSO's while running up the Great North Road—given the conditions, it would be quite possible.

Another EDX result of interest is that EI2W/ON4BZ were in contact again in the early hours of July 15, with signals peaking S7-8 both ways, and ON4UD was also heard in Dublin at about the same time; on July 11, EI2W was getting a workable signal from DL3VP, though unable to attract his attention.

Away down in the sunny Channel Islands, GC3EBK snicked another "First," with PAØHA at midnight on July 16, while the log from G3FGT (Birmingham) shows 30 counties worked, and six countries, between July 1st and 16th.

——And on 70 Cm

For Henry of EI2W, it has been an eventful month, for on July 14 he worked G5YV for the EI/G "First" on the 70 cm band. Signals were not strong, but were R4 both ways for a solid QSO. EI2W is now testing with G2ADZ (Woolacombe, N. Devon) on 430 mc, and there is also a schedule going with some of the London 70 cm stations, at 2130 BST nightly.

On this band, G5YV has been obtaining some remarkable results: PE1PL logged regularly (over there they are now using a 104-element stack with 130 watts RF into it, and diversity reception!) and G2WJ/T received strongly enough to make the ATV picture resolvable. And *see* the stations h/w in G5YV's 70 cm list. The

430 mc beam at G5YV is two sets of 4/4's side-by-side, giving a gain of some 18 dB over a dipole at the same height; the QQVO3-20 tripler feeds 6w. RF into this array, and the converter is a CC job with two switched crystals, to obtain wide tuning of the band 432-438 mc on the 28 mc BS range of the HRO used as IF/AF amplifier. At EI2W, the beam is a 5/5 spaced full-wave.

G5ML (Coventry) is on 435.1 mc with a QQVO3-20 PA and a 48-element stack at 25 ft.; the receiver is a G3BKQ converter with the addition of a GL446A RF amplifying stage, and the IF/AF section is an AR88 tuning 23-29 mc. G3WW (Wimblington) is going on 70 cm, too, and has worked, among others, G2HDY (London) and G5YV.

In parallel with two metres, conditions have been very good on 70 cm, but by no means on every occasion when 144 mc has been open, and *vice versa*.

Activity

It is difficult to assess the real level of activity, which to some people has seemed poor—except during the field-day event, July 2/3, when conditions were at about their lowest ebb for the whole of the period!

However, the record shows that G6TA (London) actually worked 103 different stations in the month to July 17, compared with 89 the previous period, and G3WW managed for his full log (not shown in the Activity Report) 107 stations, of which 26 were non-G's, with another 26 different stations heard; his countries worked total 9.

These figures suggest quite a high level of general activity, since it is clear that they cannot include a large number of stations not often heard much outside their own local area but who, nevertheless, are on quite regularly. For instance, your A.J.D. could name three or four stations, not shown in anybody's calls h/w list this time, who come on at least once a week and work locals.

GW2XV/P, Snowdon

Gerry of G2XV says that their Snowdon trip over July 2/3—he

TWO-METRE ACTIVITY REPORT

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

GC2FZC, Guernsey, C.I.

WORKED: G2ADZ, 2AIM, 2DDD, 2HDZ, 2HGR, 2HIF/P, 2MV, 3AUS, 3BOC/P, 3DLU, 3FAN, 3FIH, 3GOP, 3GOP/P, 3GPT, 3HBW, 3IOO, 3JHM, 5DS, 5KW/P, 5LK, 5MR, 6OX, 6TA, 8AL, 8BP, 8DA, 8UQ/P, GW2ACW, 3EJM, 8SU, 8UH.
HEARD: G2BAT, 2DSP, 3CQC, 3GSE, 3FGT, 5TZ, 6JK, 6MX, 6NB. (*May* 16 *to July* 16).

GW5BI, Cardiff, Glam.

WORKED: G2AIW, 2HIF/P, 3BOC/P, 3EXW, 3FAN, 3FWW, 3GHO, 3GOP/P, 3GPT, 3JZG, 3KHA, 5TZ, 6OX, 6XM, 8BP.
HEARD: EI2W, 2BAT, 2BMZ, 2BRR, 2BVW, 2DVD, 2UJ, 3AUS, 3CQC, 3CCH, 3DA, 3DMU, 3EPW, 3FGT, 3FRY, 3GB, 3HTY, 3IOO, 3IUD, 3WW, 3XC/P, 5YV, 6AG, 6JK, 6NB, 6TA, 6XX, 8AL, GC2FZC.

G3IIT, Cambridge.

WORKED: G2BVW, 2DVD, 2FJR, 2HCG, 2HDZ, 3DGI, 3DMU, 3GOZ, 3HBW, 3JGY, 3JMA, 3KBL, 3XC, 3XC/P, 3XC/M, 4AU, 4OT, 4JJ/P, 5TZ, 5UM, 6AG, 6AG/M, 6OU, 6TA, 6ZP, 8BP, 8UQ/P, GC3EBK, GW8UH.
HEARD: F8GH, G2AUD, 2BDP, 2DSP, 2FRG, 2HIF, 2UJ, 3EGV, 3FD/P, 3GDR, 3IIA, 3IOI, 3ION, 3IRA, 3IUK, 3JZM, 3WW, 5BM/P, 5MA, 5YV, 8AL. (*All over* 25 *miles; June* 1 *to July* 17).

G3DO/M, Nr. Walsall, Staffs.

WORKED: EI6A, G2ATK, 2COP, 2HGR, 3ASC/P, 3CKQ, 3DLU, 3GPT, 3IOO, 3IWJ, 6PC, 6XM. (*July* 14-15).

G3DO/P, Uppingham, Rutland.

WORKED: G2FJR, 3DKF, 3GHU, 3HAN, 3HTY, 5ML, 6NB, 6YU.
HEARD: G5TZ, 6XM. (*July* 16).

EI2W, Dublin, Eire.

WORKED: EI5Y, 6A, G2ADZ, 2CBR, 2HCJ/M, 2HCJ/P, 2HGR, 3BOC/P, 3BPJ, 3DA, 3DMU, 3EPW, 3GHO, 3GPT, 3IUD, 3IWJ, 3JZN/P, 3WW, 5YV, 6KK, 6LC, 6MI, 6NB, 6XM, 6XX, 8BP, 8SB, GM3DDE, 3EGW, 6WL, GW2XV/P, 8SU.
HEARD: DL3PV, 5TZ, 6XV. (*July* 2 *to* 14).

G3DLU, Weston-Super-Mare, Somerset.

WORKED: G2BAT, 2CBR, 2CVD/P (Nr. Birmingham), 2FJR, 2HIF/P (Nr. Blandford), 3ASC/P (Oswestry), 3BOC/P (Dartmoor), 3DO/M (Nr. Walsall), 3EXW, 3FIH, 3FWW, 3GOP/P (Ashburton), 3GPT, 3HSD, 3HTY, 3IER, 3IIT, 3IUD, 3JPJ, 3JZG, 3KHA, 3LP, 3WW, 3YZ/P (Nr. Cusop), 5LK, 5ML/P (Nr. Coventry), 5YV, 6AG, 6CW, 6OX, 6TA, 6XM, 8DA, 8KW/P (Nr. Bristol), 8QY/P (Nr. Birmingham), GC2FZC, GW2ACW, 2XV/P (Snowdon), 3KEN.
HEARD: EI2W, G2AIW, 2ATK, 2BMZ, 2BRR, 2CZS, 2FTS, 2HCG, 2HCJ/P, 2MV, 2UJ, 3AUS, 3BPM, 3CC, 3CCH, 3CKX, 3CLW, 3CYY, 3DA, 3DMU, 3DQQ, 3ENY, 3EPW, 3FAN, 3FD/P, 3FKO, 3FMO, 3GB, 3GVF, 3HXS, 3IWJ, 3KBL, 3MA, 3NL, 4AP, 4GR, 4JJ/P, 4SA, 5BM/P, 5KW/P (Berks.), 5TZ, 6JK, 6KK, 6NB, 6RH, 6WF, 8AL, 8BP, GI3CWY, GW5BI, 8UH. (*June* 18 *to July* 15).

G3IER, Cheltenham, Glos.

WORKED: G2ATK, 2CVD/M, 2CVD/P, 2DUG, 2FJR, 2HIF/P, 3ASC/P, 3DLU, 3DMU, 3FGT, 3FIH, 3FMI, 3FRY, 3GBJ, 3GMN/P, 3HTY, 3HXZ, 3IRA/P, 3JDJ/P, 3JGY, 3KFT, 3MA, 3NL, 3XC/P, 3YZ, 4JJ/P, 4SA, 5BM, 5BM/P, 5KW/P, 5ML/P, 6CW, 6JK/P, 6WF, 6XM, 6ZP, 8KW/P, 8QY/P, 8UQ/P, GW3GWA/P, 5KW/P, 8SU.
HEARD: EI2W, G2ADZ, 2BAT, 2BMZ, 2IQ, 3ATZ, 3AUS, 3CCY/P, 3DA, 3FD/P, 3FMO, 3GPT, 3IOO, 3IRA, 3IVF, 3IWJ, 3JZG, 3KBL, 3WW, 4GR, 5TZ, 5YV, 6JK, 6NB, 6OX, 6TA, 6XX, 6XY, 8SB, GC3EBK, GW2XV/P, 3EJM, 8UH.

GW3GWA, Wrexham, Denbs.

WORKED: G2ATK/M, 2BVW, 3CUZ, 3DMU, 3IOO, 4SA, 5BM/P, 8SB/P, GW2XV/P, 3BOC/P, 3INV (Wrexham).
HEARD: EI2W, G3DGI, 3DLU, 3DO, 3EPW, 3FAN, 3FGT, 3GHO, 3GPT, 3IUD, 3JPJ, 3KFD, 4GR, 5YV, 5TZ, 6XM. (*June* 18 *to July* 13).

GW3GWA/P, Vroncysyllte Hill, Denbs.

WORKED: G2AK/M, 2ATK, 2CBR, 2CVD, 2FCL/P, 2HGR, 2NY, 3AGS, 3ATZ, 3DO, 3EJO, 3ENY, 3EPW, 3FD/P, 3FTN, 3FWW, 3GGR, 3GPT, 3GYV, 3HTY, 3IER, 3IWJ, 3JDJ/P, 3JGY, 3JPJ, 3JZG, 3JZN, 3KBL, 3KFD, 3KFT, 3LP, 4JJ/P, 5AU, 5ML/P, 5YV, 6FK, 6KK, 6SN, 6TA, 6WF, 6ZP, 8QY/P. (*July* 3 *only*).

G2DHV, London, S.E.13.

WORKED: G3CZY, 3GZJ, 4AU, 5LK, 8GP.
HEARD: F8AA, 8ME, 9CQ/P, 9EA/P, G2ABD, 2DTO/P, 2HDZ, 2MV, 2RD, 2RV, 3AUS, 3BSU, 3COJ/A, 3DGI, 3DO, 3EYV, 3FAN, 3FD/P, 3FGT, 3FRG/P, 3GHE, 3GHO, 3GOZ, 3GSE, 3GSM/A, 3HBW, 3ISA, 3ITF, 3JOH, 3JJH, 3KTF, 3VI, 4GR, 4JJ/P, 4SA, 5DS, 5MA, 5QI/P, 5YV, 6AG, 6NB, 6NF, 6OX, 6TA, 6ZP, 8AL, 8VN.

GC3EBK, Guernsey, C.I.

WORKED: DL1LB, F8ME, 8MW, 8RK, 8TZ, 9JY, G2AIW, 2BDQ/M, 2DDD, 2DSP, 2DVD, 2HDZ, 2HIF/P, 2IT, 2JF, 2MV, 2YB, 3BII, 3BMU, 3BNC, 3CBU, 3CGE, 3COJ/A, 3FAN, 3FGT, 3FIH, 3FRG/P, 3GDR, 3GHU, 3GJJ, 3GOP, 3GSE, 3GVF, 3HBW, 3IIT, 3ION, 3JFR, 3JHM, 3JVY, 3JXN, 3WW, 3XC/P, 4PS, 5BM/P, 5KW/P, 5LK, 5MR, 5TZ, 5US, 5YV, 6AG, 6NB, 6OX, 6RH, 6TA, 6XM, 8AL, GC2FZC, PAØHA.
HEARD: F9CQ, G2IP, 3DLU, 3DVQ/P, 3GOP/P, 4KD, 6JK, 8BP, 8UQ/P, GW3ENJ. (*June* 13 *to July* 17).

G3WW, Wimblington, Cambs.

WORKED: DJ1XX, DL1KM, 1FF, 9BD, 9LU, 9MZ, 9QV, EI2W, F8MX, G2ADZ, 2ANS, 2BMZ, 2BVW, 2CIW, 2CVD/P, 2DUS, 2DVD, 2FJR, 2FNW, 2HGR, 2UJ, 2XV/P, 3AEX, 3ARL/P, 3BXF/A, 3CCH, 3CGQ, 3CZY, 3DLU, 3DMU, 3EGV, 3ENY, 3FNL, 3FW, 3GGJ, 3GHP, 3GJJ, 3GPT, 3GSO, 3GVK, 3IIT, 3IRS, 3IUK, 3IUL, 3IWJ, 3JZN/P, 3JZG, 3KHA, 3XC, 3XC/P, 4GR, 4JJ/P, 5BD, 5BM/P, 5CP, 5KW, 5MR, 5YV, 6JK, 6KK, 6LC, 6OU, 6XM, 8MW, 8RW, 8SB, GC3EBK, GW3EJM, ON4BZ, 4DW, PAØBN, ØDSW, ØES, ØFC, ØFS, ØGER, ØHRX, ØLBS, ØMEL, ØVLM, ØYZ.
HEARD: G2AIW, 2COP, 2CZS, 2WJ, 3EPW, 3FAN, 3FUL, 3GHU, 3HBW, 3HTY, 3ISA, 3KBL, 3KEQ, 3KFT, 5TZ, 8BP, 8KW, PAØCAP. (*May* 31 *to July* 15).

G3JXN, London, N.6.

WORKED: F8AA, G2CZS, 2DDD, 2DSP, 2DVD, 2FQ, 2KF, 2MV, 2WS, 2UJ, 3AEX, 3ANB, 3BSU, 3CCH, 3CLW, 3COJ/A, 3CVO, 3CZY, 3DGI, 3DVQ, 3DVQ/P, 3EYV, 3FAN, 3FNL, 3FUL, 3FYU, 3GHU, 3GJZ, 3GZJ, 3ISA, 3KFT, 3VI, 4FB, 5BD, 5DS, 5YV, 6OX, 8AL, 8GP, 8KW/P, 8UQ/P, GC3EBK, ON4BZ PE1PL.
HEARD: F9CQ/P, 9EA, G2AHY, 2BMZ, 2BVW, 2DTO/P, 2FJR, 2HCG, 2HIF, 2WJ, 3ARX, 3BPD, 3CC, 3CGQ, 3DLU, 3ENS/P, 3EPW, 3FD/P, 3FGT, 3FIH, 3FKJ, 3FRG/P, 3GPT, 3HXS, 3IOO, 3JHM, 3MI, 3WW, 5BM/P, 5MR, 5TP, 5TZ, 6CW, 6FO, 6XM, 6XX, 8PX, GM2FHH, GW8UH. (*June* 30 *to July* 14 *only*).

G5AM, Witnesham, Ipswich, Suffolk.

WORKED: G3HTY, 5TZ.
HEARD: G2CIW, 3CZS, 2WJ, 3DJQ, 3FNL, 3IIT, 3KEQ, 3WW, 4KD, 5YV, 6NB, 8BP, 8KW, 8VN. (*June* 24 *to July* 11).

G3CKQ, Rugby, Warwicks.

WORKED: G2ATK, 2CVD/P, 3BJQ, 3DO/M, 3ENS/P, 3FD/P, 3IVF, 3JZG, 3KHE, 4JJ/P, 4SA, 5KW/P, 5ML/P, 8QY/P, 8VN.

HEARD: G2ANS, 2BVW, 2HCG, 2HGR, 2MV, 3BPD, 3CGQ, 3DBP, 3DKF, 3DLU, 3FMI, 3FUL, 3FUW, 3GHO, 3GPT, 3GVK, 3IOO, 3IRA, 3IRS, 3JGI, 3WW, 5TZ, 5US, 5YV, 6XX, 6XM, 8UQ/P. (*To July* 16).

G3FIH, Bath, Somerset.

WORKED: F8MW, G2ADZ, 2BAT, 2DDD, 2DTO/P, 2DVD, 2HDZ, 2HIF/P, 2MV, 2UJ, 2YB, 3CGE, 3DLU, 3ENS/P, 3EYV, 3FAN, 3FD/P, 3FGT, 3FKO, 3FWW, 3GHO, 3GJJ, 3GMN/M, G3GMN/P, 3GOP, 3GOP/P, 3GSM/A, 3IER, 3IRA/A, 3IRA/P, 3ITF, 3JHM, 3KFT, 3KHA, 3LP, 3YZ, 3XC/P, 4JJ/P, 5BM/P, 5JU, 5KW/P, 5LK, 5MA, 5ML/P, 5YV, 6AG, 6JK, 6JK/P, 6OU, 6OX, 6TA, 6XM, 6ZP, 8AL, 8DA, 8KW/P, 8QY/P, 8UQ/P, GC2FZC, 3EBK, GW3KEN, 5BI, 8UH.

HEARD: F8AA, 9CQ, G2AIW, 3FMO, 3GJZ, 3WW, 4SA, 5TZ, GW8SU. (*June* 20 *to July* 14).

G3GHO, Roade, Northants.

WORKED: EI2W, G2ABD, 2AIW, 2ANS, 2BDQ, 2CBR, 2DDD, 2DTO, 2DVD, 2FWW, 2HDZ, 2HIF, 2MV, 2NY, 2YB, 3AOO, 3CGQ, 3DGI, 3DKF, 3EGG, 3EPW, 3EYV, 3FAN, 3FD/P, 3FIH, 3FQS, 3GB, 3GDR, 3GOZ, 3GPT, 3GSM, 3GWB, 3HXS, 3HZF, 3IVF, 4GR, 4JJ/P, 5KW/P, 5ML/P, 5YV, 6AG, 6JK/P, 6LC, 6NF, 6OX, 6TA, 6XM, 8AL, 8UQ/P, 8VN, GI3CWY, 3GXP, GM2FHH, GW2XV/P, 5BI, 8UH.

HEARD: G2DRA, 2FO, 4LX, GM3EGW, 3IBV, ON4BZ, 4DU, PEIPL. (*June* 17 *to July* 16).

G6TA, London, S.W.16.

WORKED: DL3QH, 9QV, F9CQ, G2ABD, 2AHL, 2AHY, 2ANS, 2BAT, 2BDP, 2BMI, 2CBR, 2DTO, 2DVD, 2FWW, 2FZU, 2HCG, 2HCJ/P, 2HGR, 2HIF/P, 2MV, 2YB, 3AEX, 3BJQ, 3BPM, 3CAS, 3CGE, 3CGQ, 3CQC, 3CZY, 3DGI, 3DLU, 3DO, 3DOV, 3DVQ/P, 3FAN, 3FGT, 3FIB, 3FIH, 3FKJ, 3FNL, 3FQS, 3FRG/P, 3FYY, 3GAV, 3GHO, 3GJJ, 3GJZ, 3GOP/P, 3GPT, 3GSM, 3HZJ, 3IJW, 3IKW, 3IOO, 3IIT, 3ISA, 3ITF, 3IWJ, 3JGY, 3JZG, 3KFT, 3KHA, 3MI, 3XC, 3XC/P, 4FB, 4GR, 4JJ/P, 4SA, 5DS, 5KW, 5KW/P, 5LO, 5MA, 5ML/P, 5MR, 5TZ, 5YV, 6AG, 6FK, 6JK, 6OU, 6SG, 6XM, 6YP, 6ZP, 8AL, 8DA, 8GP, 8KW, 8PX, 8PX/P, 8UQ/P, 8VN, GC2FZC, 3EBK, GW2XV/P, 3GWA/P, 8UH, ON4DW, PAØLBS, ØWO, ØYT. (*June* 17 *to July* 17).

G8VN, Rugby, Warks.

WORKED: EI2W, G2ABD, 2CBR, 2COP, 2HCJ/P, G3ARX, 3BJQ/A, 3CGQ, 3CKQ, 3CZY, 3DKF, 3DO, 3EJO, 3FD/P, 3FMI, 3GHO, 3GPT, 3GSE, 3GUD, 3GVK, 3HHD, 3ISA, 3IUK, 3JDJ/P, 3JZG, 3JZN/P, 3KBL, 3KHE, 4JJ/P, 5BD, 5BM/P, 5JU, 5ML/P, 5YV, 8AL, GI3CWY.

HEARD: G3AON, 3BPD, 3BW, 3CCH, 3ENS/P, 3FGT, 3GHU, 3GSO, 3IWJ, 3KFT, 4GR, 4SA, 5TZ, 6AG/P, 6KK, 6TA, 6YU, 8UQ/P, 8SB/P. (*June* 19 *to July* 16).

G3JZG, Willenhall, Staffs.

WORKED: G2ADZ, 2FJR, 3CLW, 3DGI, 3DLU, 3DMU, 3DVK, 3EPW, 3GHU, 3GPT, 3HBW, 3HXS, 3IUD, 3JPJ, 3KEQ, 3WW, 4GR, 5US, 8YV, 6AG, 6OX, 6TA, 6XX, 8AL, 8IL, 8UQ/P, GW2XV/P, 3GWA/P, 5BI, 8UH. (*All over* 50 *miles; June* 19 *to July* 16).

G3IUD, Wilmslow, Cheshire.

WORKED: EI2W, G2ADZ, 2CBR, 2FJR, 2FO, 3ATZ, 3AUC, 3DLU, 3ENS/P, 3FGT, 3GPT, 3GQR, 3GYV, 3IWJ, 3JPJ, 3JZG, 3JZN/P, 3KFD, 3KFT, 3XC/P, 5AU, 5US, 6FK, 6KK, 6LC, 6MI, 6OX, 8SB/P, GI3CWY, 3GXP, GM3EGW, 3IBV, GW2XV/P, 3FYR.

HEARD: G2HDZ, 3FRY, 3GDR, 3GGR, 3GSE, 3KHE, 3WW, 4GR, 8KW, 8MW, 8QY/P, GC3EBK, GM3DDE, 6KH, 6WL, GW8UH, PEIPL. (*June* 13 *to July* 10).

G2CZS, Chelmsford, Essex.

WORKED: DL1LB, F8AA, G2CIW, 2FJR, 2FWW, 3ANB, 3BJQ, 3CGQ, 3CVO, 3DGI, 3ENS/P, 3FAN, 3FKJ, 3FUL, 3GJZ, 3IIT, 3IJW, 3ISA, 3JXN, 3KFT, 3VI, 4JJ/P, 5KW/P, 5YV, 6FO, 6XX, 6YP, 8KW, 8KW/P, 8LN.

HEARD: EI2W, G2DSP, 3ARX, 3CLW, 3EPW, 3EYV, 3FQS, 3GGJ, 3GHO, 3GOP, 3INU, 3KEQ, 3WW, 5ML/P, 5MR, 5TZ, 6LL, 6NB, 6TA, 8IL, 8MW, 8RW, 8VN, PAØROB. (*June* 21 *to July* 16).

G2HDZ, Pinner, Middx. (NGR. 51/111895).

WORKED: F3LP, 8GH, 9CQ/P, 9NW, G2ANS, 2BMZ, 2DDD, 2DVD, 2FJR, 2FNW, 2FO, 2HIF/P, 3CGQ, 3DVQ, 3EYV, 3FAN, 3FGT, 3FIH, 3FKJ, 3FRG/P, 3FYY, 3GGJ, 3GHO, 3GJJ, 3GOP/P, 3GPT, 3GSM/A, 3IIT, 3IUD, 3KHA, 4FB, 4JJ/P, 5ML/P, 5TZ, 5YV, 6JP, 6ZP, 8BP, 8KW, 8PX, GC2FZC, 3EBK, GW3EJM, PE1PL.

HEARD: DJ1XX, DL1AH, 3QH, 9MK, 9MR, EI2W, F8MW, G2DSW/P, 2HGR, 3AGS, 3AUS, 3BPD, 3CCH, 3COJ/A, 3CYY/P, 3DLU, 3DO, 3GGZ, 3IWJ, 3KFT, 4GR, 8QY/P GM2FHH, GW8SU, 8UH, ON4CP, 4DW, 4LN, 4PA, PAØBLP, ØBN, ØDSW, ØGER, ØHAP, ØHRX, ØLBS, ØROB, ØVLM, ØWA, ØYZ. (*June* 21 *to July* 16).

G3FGT, Shirley, Nr. Birmingham.

WORKED: EI2W, 6A, G2AIW, 2AK/M, 2ATK, 2BAT, 2BMZ, 2CVD, 2DCI, 2DSP, 2DVD, 2FJR, 2FWW, 2HCJ/M, 2HDZ, 2HIF/P, 2NY, 3AGS, 3ATZ, 3DJQ, 3DTG, 3ENY, 3EPW, 3FAN, 3FIH, 3FMI, 3FTN, 3FTN/A, 3GBJ, 3GHU, 3GPT, 3GQR, 3GSO, 3HAN, 3IIT, 3IOO, 3IRA, 3IUD, 3IWJ, 3JDJ, 3JZM/P, 3JZN/P, 3YZ, 4GR, 4JJ, 5BD, 5TZ, 5YV, 6KK, 6OX, 6SN, 6TA, 6XJ, 6XX, 6ZP, 8AL, GC3EBK, GI3GQB, 3GXP, GM3EGW, GW2XV/P.

70 CENTIMETRES ONLY

G5YV, Leeds, Yorks.

WORKED: EI2W, G2BVW, 2FNW, 2WJ, 3GMX, 3IOO, 3JZY, 3KEQ, 3WW, 5LL, ON4HN, PAØWAR, PE1PL.

HEARD: DL9QV, G3GDR, 5ML, PAØFP. (*June* 1 *to July* 16).

G3WW, Wimblington, Cambs.

WORKED: G2BVW, 2FNW, 2HDY, 3KEQ, 5YV.

HEARD: G2XV, 3CGQ. (*May* 31 *to July* 15).

For next issue, lists should consist only of EDX and GDX calls heard and worked.

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was accompanied by G4MW and a friend—gave rather better results than last year. Some 65 stations were worked, with G5TZ as best DX, while EI2W "had to be heard to be believed"; he was stronger on Snowdon off the back of the GW2XV/P beam than any Cambridge local would have been. Gear used was a 4-ele Yagi, with another (fixed) beam right on the summit permanently headed SE; this proved to be useless, due to the very long feeder—it further embarrassed them by filling with water which spouted out into the shack. The receiver was a 6BQ7A-6AK5 CC into a modified BC-454, and the transmitter a pair of 6C4's running about 7w. input, modulated by EL32's.

Those who may have imagined G2XV huddled over the gear in a tent on the summit in a howling gale of rain might be interested to know that actually the party enjoyed "hotel comfort," with a very nice room, carpet on the floor, three easy chairs, big table on which to spread out all the equipment, and four obliging young ladies to minister to their needs!

Notes from GC

GC2FZC and GC3EBK both write in from Guernsey. GC2FZC says "conditions good but activity disappointing"; he is able to keep up his end of the G2ADZ schedule at a comfortable RS-59 when nobody else can be heard on the band, though a very good contact for him during the period was G3GPT for Lancs.

GC3EBK worked DL1LB on July 16, the evening he scored with PAØHA, and says that "the spell of good conditions has boosted the morale of the Guernsey stations," so much so that a third one has appeared, GC3KAV; so look out for him, too.

Some Individual Reports

Among other good contacts to the north, G2ADZ (Woolacombe) reports GM3EGW (Dunfermline) and also mentions G3JPJ (Liverpool), whose RF output is just the one watt; EI4E, of Killarney, who is on 145.1 mc, looks for CW and is very keen. London stations heard well in North Devon are G6AG, G6RH and G6TA.

GW5BI (Cardiff) says he hears a lot more than he can work, but has been able to raise G6XM; GW8UH has had to take one of his three Slots down, due to excessive whip on the mast in wind. G3CCH (Scunthorpe) climbs steadily up the Counties ladders, and G3EGG (Middle Claydon, Bucks.), who puts out a very nice signal with an indoor beam, goes up two more in both Tables.

G3FGT (Shirley, B'ham), having given up chasing 14 mc DX for the time being, is very pleased with his results and experiences on two metres in a few weeks of operating; he uses a 12-ele stack and is getting out well with about

TWO METRES

ALL-TIME COUNTIES WORKED LIST

Starting Figure, 14

From Fixed QTH Only

Worked	Station
72	G5YV
68	G3BW
64	G6NB
62	EI2W (209), G3BLP (630), G5BD
60	G3CCH
59	G3EHY, G3GHO, G4SA
58	G3IUD (247), G8OU
57	G2FJR, G2OI (349), G8SB
55	G2HIF, G3WW, G5BM, GW5MQ
53	G2AJ (519), G2HDZ (416), G3FAN, G4CI
52	G2NH, G3IOO, G5DS (571), G6XX, GW2DZ
50	G3ABA
49	G5MA
47	G5ML, G5WP
46	G3HAZ (315), G4HT (476), G5BY, G6YU (205)
45	G2XC, G5JU, G6XM (356)
44	G3BK, G8DA
43	G2AHP (500), G3BA, G3COJ, G4RO, G5DF, G6TA (465)
42	G3FIH, G3GSE (424)
41	G2DVD, G2FQP, G3DO, G3DMU, G6CI (184)
40	G3BNC, G3CGQ, G3HWJ, G8KL
39	G2IQ, G3BJQ, G3GBO (434), G3HBW, G3VM, G8IL (325)
38	G2FCL (234), G3APY, G3WS (183)
37	G2DDD, G2FNW, G2FZU (180), G3DLU
36	G2DCI (155), G2HOP (161), G3CXD, G3IER (159), G3IIT, G6CB (312), G8IP
35	G3FZL, G3FYY (235), G3HCU (224)
34	G3BKQ, G3DLU*, G5MR (286), G8IC
33	G2CZS (209), G3HHY (125), G8VN (173)
32	G2FVD, G8QY, G8VR
31	G3HXO, G5RP
30	G3FRY, G3GOP (208), G3GVF (129), G3IRA, G5NF, GM3DIQ, GM3EGW, GW8UH
29	G3AGS, G3AKU, G3FIJ (194)
28	G8DL, GC3EBK, GM3BDA
27	G3DAH, G3ISA (160), G6GR, GI3GQB, GW3GWA
26	G3AEP, G3CFR (125), G3SM (211), G4LX, G4MR (189)
25	G3JMA, G5SK, G6PJ
24	G3CVO (190), G3FD, G3FXG, G3FXR
23	G3CKQ, G3CWW (260), G5PY
22	G3AGR (135), G3ASG (150), G3BPM, G3HIL, G3JHM (113), G3YH
21	G2AOL (110), G3DVQ, G3IWJ, G6XY
20	G3EYV, G3HSD, G3IOE, GC2FZC
19	G3FEX (118), G3GCX, G3JXN (115), G5LQ (176)
18	G3DBP, G3JGY, G8NM, GC2CNC
17	G3EGG
16	G3FRE, G5AM
15	G2BRR, G2DRA, G3IWA
14	G2DHV, G3CYY

100w., the receiver being a CC Cascode. G3IUD (Wilmslow, Ches.) likewise reports a successful month, with a lot of new GDX worked and heard, while PE1PL was raised but lost in QSB. G3IUD has a peculiar local hazard of his own—an incubator farm with auto-electrical control which, when the eggs are warming, produces an S7 hash; so he has to time the periodicity of the thermal switching and slip in his QSO's during the "off" period. Makes it tricky, one would think!

G3IIT (Cambridge) is a two-metre-only man and is making steady progress in the Tables, exclusively on phone. The converter is a 4-stage CC job, the transmitter runs an 832 in the PA, modulator is a pair of 6V6's, and the beam four stacked Slots, which makes him quite a potent signal.

ON4BZ (Brussels) reports that when he was working EI2W on July 15 the G's along the path were noticeably weak, though EI2W was a good RS-57 at best. G2HDZ (Pinner) says the month was "somewhat eventful" for him, the highlight being hearing GM2FHH of Aberdeen, whom he vainly tried to raise—the first GM he has ever heard in five years on the band! Vernon G5MR (Hythe, Kent) remarks that though he himself did not achieve anything spectacular, he was in the thick of it and worked a number of new stations, with GW3EJM heard and called without success; a good phone QSO was with F8ME, at 245 miles, on July 3, when the F was blocking his IF's. G2FJR (Sutton Bridge) is now using a stacked array with a reflector 7ft. square, and says that with him the Continental openings have not been quite so good as during Whitsun; he also suggests that those operators who, when they do use CW, do it at 20 w.p.m. or more, should realise that they are losing contacts by making themselves unreadable.

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

New QTH

G3HAZ (Birmingham) reports that "mysteriously" he has found no Continentals, nor has he heard anyone working them—however, he did raise GM3EGW for the first GM ever, with EI2W heard at the loudest he has ever been received.

Swiss Enterprise

G3HAZ has been discussing VHF matters, by correspondence, with HB9RO, who is interested in 70 cm and is also operational on two metres; indeed, being a friend of HB9RM, who is engineer-in-charge of the TV station on Mt. Döle, he is using the 130ft. tower as his beam support, and they are on most Tuesday evenings, looking for G's; the pin-point is 46°25′ N, 6°05′ E, and apparently the path is clear in the direction of the U.K. From this site, from which TV is radiated on Channel 4 (Sutton Coldfield in this country) with 10 kW into 32-element stacks, HB9RO is running 100 watts in his own transmitter, and has a good converter. So you have all the information to make it worth beaming south-east on Tuesday evenings!

G2CZS (Chelmsford) gives July 10 as the evening when conditions were "super" to the north and north-west, with the Lancs. stations at colossal strength; on the 14th, EI2W was heard for the first time in two years, and on the 16th, G2CZS was glad to make it with DL1LB, 599 both ways. G3JZG (Willenhall, Staffs.) found himself outside the Continental influence, but has notched up nine more for Annual Counties and mentions EI2W as being a consistent signal, up to S9 at times.

G3DO (Sutton Coldfield) had a very successful /M outing on the evening of July 14, and G3DLU (Weston-s-Mare) considers that much of his own recent success is due to having pushed the beam up another 18ft.; at any rate, he shows a good list in the Activity Report. G3IER says that "even in Cheltenham" they have been getting a good result, with EI2W and GC3EBK coming over the hills and stations from easterly directions, not normally heard, audible at good strength.

All three active Rugby stations write in this time: G3BJQ, G3CKQ and G8VN. G3CKQ, being QRM'd, QSY'd to another (crystal) frequency, only to be QRM'd again; quite like Eighty, as he says! G8VN, now fully recovered, is in action again and has been catching the openings; *still* with that indoor beam, he worked EI2W and GI3CWY on phone on July 15, and heard GI3GQB. More than a dozen new stations were worked for the first time during the period; the Sunday morning schedule with G6TA has been resumed. G3BJQ says that Rugby seems to be a blind spot for GC, never yet heard by any of the group, though stations like G3AUS (Torquay) come in well. For the B.T.H. Sports Day on July 9, G3BJQ was concerned with G3BXF/A, a joint effort by the local VHF men which resulted in about twelve stations being worked on. Two in the course of the afternoon.

From Our SWL's

SWL Ball (Shenfield, Essex) is pleased with his new QTH and the stack up at 27ft., which was pulling them in on July 16; a portable receiver will shortly be taken "out and about" from here. SWL Drybrough (Coventry) shows a very good log of stations heard, including G6AG/M from near Bedford, and G3DO/P when in Rutland; he asks how one reckons for /M's heard (or worked). The answer is that a /M, or /P, counts as one station, but scores for each county from which he is heard. SWL Drybrough has the "parasitic radiator" system under test, and is prepared to concede that results seem to be better, but of course it will only be possible to prove the point after more extensive tests.

SWL Bastin, also Coventry and not to be out-done, says he is ½-mile east of SWL Drybrough, on a better site and free of car QRM, but has to be content with a roof-space beam; his receiver is a CC G2IQ and, following the G2HCG/PE1PL schedule at 1315 BST daily, SWL Bastin can always hear PE1PL, though signal level varies from S1 to S9; EI2W, GC3EBK and the GI's have been heard during the period. Also equipped for 70 cm reception, he has a G2DD converter with GL446A RF stage, this having produced six different 430 mc stations, with G3WW at about 70 miles as best DX.

In London, SWL Cox heard a good batch of Continentals—including DL, F, ON and PA—on July 9/10 and during one of the severe storms over Kent was getting DX of another sort; he could hear static coincident with the lightning when the beam was headed in the direction of the storm, a most unusual effect on VHF. At the moment, SWL Cox is doing tests between a 4-ele Yagi and a single Slot, the aerials being switchable for direct comparison.

More Station Reports

G5ML (Coventry) stakes claims in both Tables, and GW3GWA (Wrexham) is having his activities somewhat curtailed owing to medical treatment; as he has to be "fast a'bopeep" by about 10.30 p.m., he misses the late-evening activity. However, some new ones have been worked, and

STOP PRESS ** **GOOD SPELL CONTINUES**

Conditions for EDX/GDX remained very good at least until July 25, the night July 24/25 being exceptional in the North to South line. Sunday, July 24, was a day of 10/10's cloud over practically all England; this suddenly cleared completely in a matter of a few minutes about 1500 GMT, during which time nearly all signals were subject to extreme QSB. Conditions built up to a peak around midnight on July 24/25, when stations at all distances were loud and steady. Some outstanding contacts were made by F8MX (St. Valery-en-Caux), who worked GM3EGW at 2310 GMT, and by F9JY (Cherbourg), who was in QSO with Lancashire stations after midnight. GC3EBK, a very strong signal all the evening, came on at 2030 and was working GDX continuously for about five hours. During the session, GM6AG/P, on the Mull of Galloway, worked stations in southern England, and GM5KW/P, accompanied by GM2FHH, was on from near Aberdeen. An interesting newcomer was LX1AS, worked by G5MR for the G/LX "First" at 2047 on July 23 and by G5TZ during the morning of Sunday, July 24; he also heard HB and SP! As this issue closes for press, the sustained period of good conditions shows signs of breaking.

G2XV in action as GW2XV/P on Snowdon during the week-end July 2/3, when 65 stations were worked. It will be noted that, for a /P occasion, the station was operated in comparative comfort! G2XV was accompanied by G4MW.

as much time as possible is being put in; local GW3INV on 145.6 mc is being coached along, and GW3GWA's painstaking and self-sacrificing efforts in helping GW3INV with his contacts when the band has been open have not gone unnoticed by several VHF operators. Good show.

G6TA (London, S.W.16) moves on in the Tables and maintains a consistently high level of activity. G3GHO (Roade, Northants.) keeps up in front and worked his full share of Continentals and GDX during the month, including the GI's and GM3EGW. As an aside, he remarks that his small girl, aged about three, found her way into the shack, fired up the machinery, and proceeded to put out a "Seecoo too," which he wonders if anybody heard; it is now a matter of hidden master switches at G3GHO! G3FIH (Bath) worked 48S during the July 2/3 field day, under fair to poor conditions. G2BRR (Wootton Bassett) is "unfortunately, on 145.8 mc," as he puts it, until a new rock is obtained; so he enters a special plea for QHL and QMH tuning! With his 4/4 at 25ft. he can hear the GDX, so feels he should be getting out.

Another request for a little more attention comes from G5AM (Ipswich), who says he "puts out a large number of calls but rarely gets a reply," and though when people do head their beams his way he can work them, it does not seem to happen often enough! As an instance, G5AM called G8VN for well over an hour, off and on, during the evening of July 10, but could not get him back, whereas two stations he did work were over 140 miles away. However, such minor frustrations neither sap G5AM's enthusiasm nor reduce his activity.

G3JXN (London, N.6), on returning to the two-metre band after his exercises in obstetrics (*see* p.148, May), was delighted with what he found; some good GDX worked, GM2FHH (Aberdeen) heard, ON4BZ and PE1PL accounted for, and G3KFT (Cheltenham) brought in from what, for G3JXN, is his "hopeless" direction; he also says "one excellent thing about two metres is the number of DX stations who consistently use CW." But G3JXN gives us a problem: His postal address is N.6, but rates are paid to the borough of Hornsey, Middlesex. *Q.*: Is he in London or Middlesex? The easy answer is "We don't know," but as that is hardly good enough, the right one seems to be to keep to the geographical definition and say Middlesex.

In a comprehensive report, G3WW (Wimblington) covers a good deal of ground, and not all of it /M on the Top Band, either. He has been in full cry on two metres throughout the period, with a long tally of EDX and GDX worked, including G3JNZ/A, operating from a caravan near Fleetwood, Lancs.; F8MX on three weeks' holiday on the French coast, from where he hoped to be on 70 cm with the help of F9CQ; G6AG/P in Westmorland; and numerous ON's and PA's. Among other comments in his report, G3WW asks why a new station should insist on Christian names on a first contact, an American (HF band) custom quite foreign to G's on VHF; he also remarks that, on July 10, G2FNW (Melton Mowbray) was asking whether G2AIW was calling G2FO on two metres or 70 centimetres, as he was a strong signal on the latter band! A.J.D. does not know the answer to this one, either!

TWO-METRE FIRSTS

G/DL	**G3DIV/A-DL4XS/3KE**	**5/6/50**
G/EI	**G8SB-EI8G**	**23/4/51**
G/F	**G6DH-F8OL**	**10/11/48**
G/GC	**G8IL-GC2CNC**	**24/5/51**
G/GD	**G3GMX-GD3DA/P**	**29/7/51**
G/GM	**G3BW-GM3OL**	**13/2/49**
G/GW	**G5MQ-GW5UO**	**22/10/48**
G/HB	**G6OU-HB1IV**	**12/9/53**
G/LA	**G6NB-LA8RB**	**29/6/53**
G/ON	**G6DH-ON4FG**	**25/9/48**
G/OZ	**G3WW-OZ2FR**	**1/6/51**
G/PA	**G6DH-PAØPN**	**14/9/48**
G/SM	**G5YV-SM7BE**	**1/6/51**
GC/DL	**GC3EBK-DL3VJ/P**	**22/3/53**
GC/EI	**GC2CNC-EI2W**	**8/10/51**
GC/F	**GC2CNC-F9OK**	**17/11/53**
GC/GW	**GC2FZC-GW8SU**	**16/6/54**
GC/ON	**GC3EBK-ON4BZ**	**4/3/53**
GC/OZ	**GC3EBK-OZ2FR**	**2/3/53**
GC/PA	**GC3EBK/PAØHA**	**16/7/55**
GD/EI	**GD3DA/P-EI2W**	**30/7/51**
GD/GM	**GD3DA/P-GM3DAP**	**29/7/51**
GD/GW	**GD3DA/P-GW5MQ**	**28/7/51**
GI/EI	**GI3GQB-EI2W**	**13/6/51**
GI/GD	**GI2FHN-GD3DA/P**	**29/7/51**
GI/GM	**GI2FHN-GM3OL**	**1/7/49**
GI/GW	**GI2FHN-GW3ELM**	**8/7/49**
GM/DL	**GM2FHH/DJ1XX**	**29/5/55**
GM/EI	**GM3BDA-EI2W**	**12/6/51**
GM/ON	**GM3EGW-ON4BZ**	**21/11/53**
GM/PA	**GM3EGW-PE1PL**	**22/4/53**
GW/DL	**GW5MQ-DL4XS**	**22/9/51**
GW/EI	**GW2ADZ-EI8G**	**19/4/51**
GW/F	**GW2ADZ-F3LQ**	**14/5/50**
GW/HB	**GW2ADZ-HB1IV**	**14/9/53**
GW/ON	**GW2ADZ-ON4YV**	**13/5/50**
GW/PA	**GW2ADZ-PAØHA**	**13/5/50**
GW/SM	**GW2ADZ-SM6QP**	**1/7/53**
DL/OZ	**DL6SW-OZ2FR**	**4/3/51**
DL/SM	**DL2DV-SM7BE**	**10/3/51**
EI/DL	**EI2W-DL3VJ/P**	**29/8/52**
EI/ON	**EI2W-ON4BZ**	**21/9/51**
EI/PA	**EI2W-PAØFC**	**10/10/53**
ON/LA	**ON4BZ-LA1KB**	**4/7/53**
ON/LX	**ON4TR-LX1MS**	**? ?**
ON/OZ	**ON4BZ-OZ2FR**	**3/6/51**
ON/SM	**ON4BZ-SM7BE**	**2/3/53**

The Tabular Matter

Not unexpectedly, this has assumed unusual proportions this time; with deep regret, a number of calls h/w lists had to be cut or eliminated entirely in order to ensure a good spread in the geographical sense; in particular, A.J.D. wish to apologise to our SWL's for not showing, on this occasion, any of their very full lists.

A good deal of material came in late, after the tabular matter had been prepared for setting, at which stage it is not easy to make additions or adjustments; we do our very best to cover everybody and everything, especially when the going has been so lively, but there comes a moment when the copy cannot be held back any longer and must go to the printer if we are to publish on time.

Some 40 movements are recorded in the Tables this month. Harold G5YV is on top in both Counties lists, with a handsome lead in the Annual—which brings us to an important point: Annual Counties for this year closes at midnight on August 31, and re-opens immediately for the year 1955-'56. Please let us have final entries for this Table as at August 31; the placings for the year

1954-'55 will then appear in the October issue.

With the reopening of Annual Counties on September 1st, all the counties will be there to work all over again, with the usual starting-line figure of 14. We hope to receive claims for the new Table for the November issue, and also to see the call-signs of many of the newer stations on the two-metre band figuring in it. Remember, these Counties tables are primarily a record of progress; any competitive value or interest they may have is purely a secondary consideration. Many stations with good operating records do not claim at all, but there is no reason whatever why they shouldn't, and every reason why they ought to be in.

TWO METRES

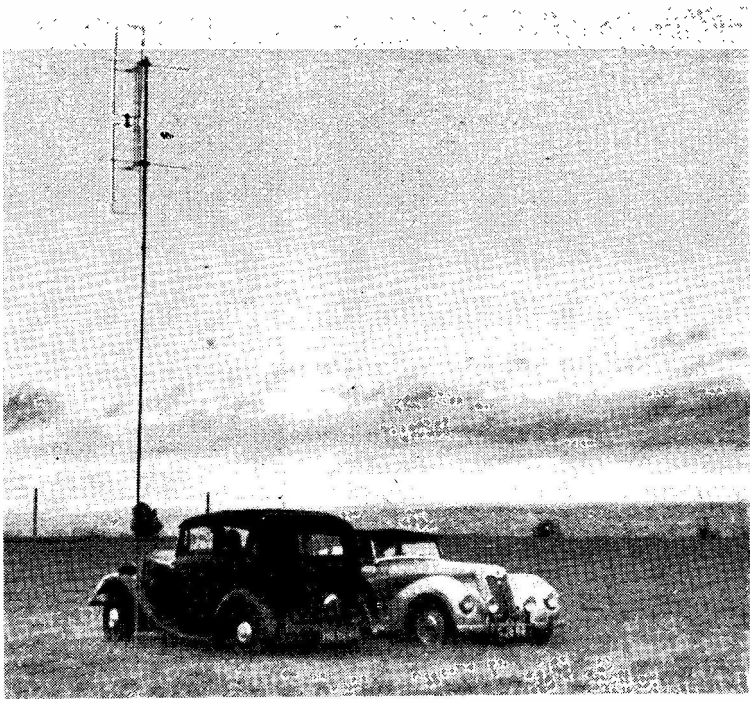
COUNTIES WORKED SINCE SEPTEMBER 1, 1954

Starting Figure, 14

From Home QTH only

Worked	Station
56	G5YV
46	G3GHO
44	G3CCH
41	G3IUD, G6TA
38	G2FJR
34	G5MA
33	G3BJQ
32	G2HDZ, G3IIT
31	G3IRA, G5ML
30	G2ADZ, G3DO, G3FGT, G3FIH
29	G3FYY, G3WW, G8VN
27	G2CZS, G3JZG
26	G3IER, G5DS
24	G5JU
23	G2DVD
21	G5MR, GW3GWA
20	G2AHP, G3CKQ, G3DVQ, G3HWJ
19	G3HHD, G3ITF, G3JXN, G5BM
18	G3DBP
17	G3EGG, G3HBW
14	GM3DIQ

Note: This Annual Counties Worked Table opened on September 1st, 1954 and closes at midnight GMT on August 31. All operators are asked to send in, as soon as possible after that, claims to complete the Table for the year; final placings for 1954-'55 will appear in the October issue. The Table re-opens for 1955-'56 w.e.f. September 1st, 1955.



G8PX/P on Two Metres, with a portable Skeleton Slot assembly which put out a very potent signal from a site near Oxford on the field day of May 1st.

VHFCC Election

Latest member of the VHF Century Club is G3JHM, Worthing, who gains VHFCC Certificate No. 181, with cards for both 70 cm and two metres, his list also including 10 F's and two ON's. His total of stations worked since October 1953 is 124 on both bands, so G3JHM has not done too badly with his QSL's.

Manchester VHF Meeting, September

This is arranged for Saturday, September 17, at the Grosvenor Hotel, Deansgate, and is being organised by G8SB. Tickets are 15s. each, obtainable from: G3GB, 10 Deal Street, Newton Heath, Manchester, 10; or G3AGS, 101 Grange Drive, Manchester, 9. Overnight accommodation can be arranged for those making long journeys. A large attendance is expected, and now is the time to get your own booking in, as there is always much "back-room" work involved in laying on these events. The chair will be taken by the Editor of SHORT WAVE MAGAZINE, and it is hoped that the programme will include

SEVENTY CENTIMETRES

ALL-TIME COUNTIES WORKED

Starting Figure, 4

Worked	Station
26	GW2ADZ
23	G3BKQ
18	G2XV
16	G6NF
15	G4RO
14	G3HBW
13	G3IOO, G5YV
12	G2HDZ
7	G2HDY, G3IRW
6	G3FAN, G3JMA
5	G3FUL
4	G2DDD, G3JGY

On working four Counties or more on the 70-Centimetre band, a list showing stations and counties should be sent in for this Table, and thereafter new counties worked notified as they accrue

70-CENTIMETRE FIRSTS

G/DL	G2WJ-DL3FM	10/8/53
G/EI	G5YV-EI2W	14/7/55
G/F	G3DIV/A-F8GH	5/9/51
G/GD	G2JT-GD3DA/P	26/8/51
G/GW	G4LU-GW2ADZ	5/7/50
G/ON	G3DIV/A-ON4UV	15/10/51
G/PA	G3DIV/A-PAØPN	15/10/51
GD/GW	GD3DA/P-GW5MQ	29/7/51
GI/GD	GI3GQB-GD3DA/P	14/6/53
GM/GI	GM6WL/P-GI3FWF/P	9/9/53
GW/EI	GW2ADZ-EI2W	10/7/54
GW/ON	GW2ADZ-ON4UV	3/3/53
GW/PA	GW2ADZ-PAØNL	1/7/53

something to interest everyone, apart from the pleasure of making personal contacts, which is always the main theme of these affairs.

Cable for UHF/VHF

As a result of some recent researches, it has been found that the "surplus" coaxial cable known as Uniradio 4 has spectacular advantages over the more usual types for 25 cm working. Uniradio 4 has lightish blue outer covering, is 7/16 ins. diameter overall, has a stranded 7/22's inner conductor, a flaky type of insulant which can be crumbled, and a braided copper sheath. Its attenuation *at 1000 mc* is only 10 dB/100 ft., the impedance is 46 ohms, capacity 45 $\mu\mu$F/ft., velocity factor 0.66 and power handling capacity 100w. RF at 1000 mc.

In keeping a look-out for this cable, it can first be identified by its blue outer covering ; the inner conductor and the insulant should then be examined to see if it conforms to the specification above, and the outside diameter measured. It is unlikely to be offered as Uniradio 4 as such, which is why we have described it in some detail here.

Conclusion

And that, *mes amis*, is that for this time. A heavy mail, a big improvement in conditions—sustained by the glistering heat of a great summer for one of the longest periods ever known on VHF—the promise of increased activity and more DX on both bands, and exciting results for almost everybody, have together made this a memorable month.

Your A.J.D., who has been at this piece at various times from sunrise till after midnight over several days, now has a breathing space until **Monday, August 22,** for the September issue, by which time, one has the feeling, more may well have happened. So send it all to A. J. Devon, "VHF Bands," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. With you again on September 9, all being well.

ACTIVITY REPORT - SEPTEMBER

For next issue, please send lists of European calls and GDX heard or worked only, giving date areas. The definition of GDX is a matter for individual assessment. Thus, we shall have an accurate record of the DX occurrence. All such lists received by the due date are assured of publication.

NEW OSRAM KT55

The General Electric Co., Ltd., has introduced a new valve, the Osram KT55 beam tetrode, which is designed primarily for use as an audio frequency amplifier in DC/AC equipment using a series-connected heater chain. Two of these valves used as pentodes in push-pull are capable of an output of 25 watts from a DC mains supply of 220 volts — double that hitherto obtainable from valves in this class. The Osram KT55 is the first of its kind to give this performance and should find wide application in sound equipment suitable for operation from DC or AC mains.

An octal based valve, the KT55 heater rating is 0.3 amp 52 volts, and the maximum anode dissipation is 25W. As a pentode, the valve attains the remarkable 'slope' figure of 16 mA/volt, and as a triode it has the unusually low anode resistance of 410 ohms.

In a recommended amplifier circuit two KT55 valves are used in conjunction with the Osram low-noise pentode Z729, and a triode such as the L63. Such an amplifier circuit has a high sensitivity and in "ultra-linear" operation gives an output of 22 watts with a distortion of only 1.5% from a 55 mV input, which is increased to 300 mV by the application of degeneration.

When unusually low DC supply voltages are found, as for example in marine applications, the KT55 valve is particularly suitable. It can be used in conjunction with a 305 barretter for supply voltages from 150 to 200 volts and with a suitable resistor for voltages from 125 to 150 volts. Below 125 volts two chains are recommended, the two KT55 valves being connected in series in one chain with a small resistor, if necessary, and a barretter with the remaining valves incorporated in the second chain.

"THE OTHER MAN'S STATION"

We are always glad to have contributions for this feature, which has appeared regularly for many years. The requirements are a good photograph and a detailed description, which can be in your own words. Payment is made for all descriptions published, immediately upon appearance in print.

MINISTRY OF SUPPLY APPOINTMENT

The Ministry of Supply announce that Dr. R. Cockburn, C.B., O.B.E., has been appointed Deputy Controller of Electronics in succession to Rear Admiral G. Burghard, C.B., D.S.O. (retired), whose tour of duty has expired. Dr. Cockburn, who is 44 years of age, has been Principal Director of Scientific Research, Guided Weapons and Electronics, since 1st March, 1954. Before that he was Scientific Adviser to the Air Ministry. He will be remembered for the great contribution he made in connection with the development of radio-countermeasures during the last war.

AMATEUR RADIO — For The Beginner

PART V

PRACTICAL GRID DIP OSCILLATOR

By **A. A. Mawse**

ONE of the chief difficulties facing the average beginner is the necessity for "measuring intangibles." Whilst it is true to say that most of these measurements need only be approximate, some can be relative and a few no more than an indication, the fact remains that some form of machinery is necessary with which to make such measurements.

Queries of the following kind are constantly cropping up:—What is the resonant frequency of a certain coil-condenser combination? What is the tuning range covered by a given coil and variable condenser, or a slug-tuned coil? Is there RF radiation in the vicinity of a particular circuit? What is the approximate frequency? Is the transmitter putting out undesirable harmonics? If so, which and of what degree of intensity? What are the keying characteristics of the transmitter? Is the carrier hum-free? And if modulation is eventually applied, what does it sound like? In addition, there are many occasions when it is very useful to have some means of *generating* moderate amounts of RF at a *known* frequency.

Fortunately, means are available for answering all these questions. It is done with the aid of one simple and cheaply-built piece of equipment, and it will be seen that a device of this kind is an absolute "must" in every amateur station.

Grid-Dip Oscillator

This device consists of a single valve oscillator capable of being tuned over a wide range of frequencies, calibrated by reference to some reasonably accurate source—such as a good communication receiver.

When a valve is in an oscillating condition, for a part of the cycle the grid is driven positive and consequently grid current will flow. This can be indicated by the inclusion of a low range milliameter in the DC grid return. Now, if a tuned circuit is loosely coupled to the coil of the oscillator and the two are brought into resonance, some energy will be transferred from the latter to the former and the grid current will dip. It is important to note that the circuit under test does not require any external excitation for this effect to be observed.

Conversely, if the test circuit *is* excited and the same conditions are applied, energy will be transferred in the reverse direction and there will be a corresponding *rise* in grid current at the point of resonance. This, then, is briefly the principle upon which a Grid Dip Oscillator works, and we may therefore proceed to details concerning the construction of such an instrument.

Circuitry

Reference to Fig 1 shows this to be a triode valve connected as a Hartley oscillator with the plate at earth potential as regards RF; the cathode is tapped up the coil a number of turns from the earthy end to provide the necessary feed-back. This tapping point is not critical, but best results are usually achieved if the cathode-grid portion contains approximately twice the number of turns of those contained in the cathode-earth section. The coil is pluggable and the complete frequency coverage is obtained by winding a series of coils to cover whatever range is desired. The choice of valves is a wide one; any triode or triode-connected pentode will serve, using either octal or B7G based types according to the degree of miniaturisation decided upon.

Design

For the sake of compactness, the writer decided upon miniaturisation, and the instrument is therefore

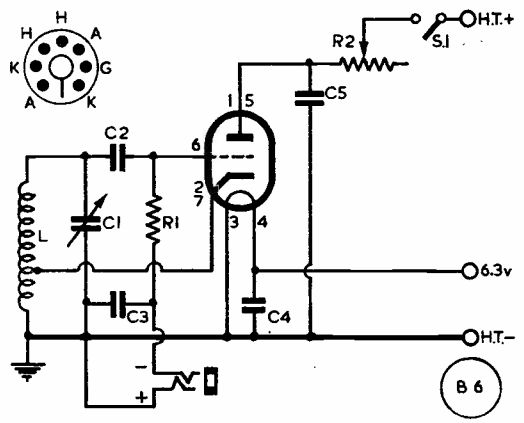


Fig. 1. Circuit of the Grid Dip Oscillator, for which full details for construction, calibration and uses are given in the article. The valve is a 9002 miniature triode, few parts are called for (see table for values) and the circuit is of the simplest — yet it is safe to say that, when it comes to the building of transmitters, without a GDO you can hardly find your way about the bands.

Table of Values

Fig. 1. The Practical Grid Dip Oscillator

L	=	See text.
C1	=	100 $\mu\mu$F variable condenser, Eddystone 585 or similar.
C2	=	100 $\mu\mu$F ceramic condenser
C3, C4, C5	=	.01 μF disc ceramic condensers
V	=	9002 triode, B7G base, or 9003/6AK5 triode connected
R1	=	22,000 ohms, ½-watt
R2	=	250,000-ohm miniature carbon potentiometer
S1	=	On-off toggle switch

designed around a small chassis measuring but 3" x 5" by 2½" deep. The coils are wound on Eddystone-type 763 four-pin formers, which are only ¾" in diameter; the W177 base is mounted on one short side of the chassis, so that the coil, when in position, projects away from the operator and is conveniently placed for probing in the direction of the apparatus under test. The valve selected is the miniature 9002 triode, which is available very reasonably on the "surplus" market, but a 9003 or 6AK5 (which are interchangeable) would serve just as well if triode connected. The valve-holder (B7G type) is mounted on a small bracket, so positioned that the valve protrudes slightly through a suitable hole cut in the chassis adjacent to the coil-holder, thereby economising in space internally. The tuning condenser is mounted on the top of the chassis and is fitted with a suitable dial calibrated 0-100 divisions. On the side opposite the coil is the variable HT control and a Bulgin-type J6 closed circuit jack socket; provision is made for leading out the four supply cables—heaters, positive and negative HT, these being terminated in a Bulgin octal plug for plugging-in to the power pack already described. On one remaining side is fitted an on-off toggle switch for controlling the positive HT supply.

Wiring-up

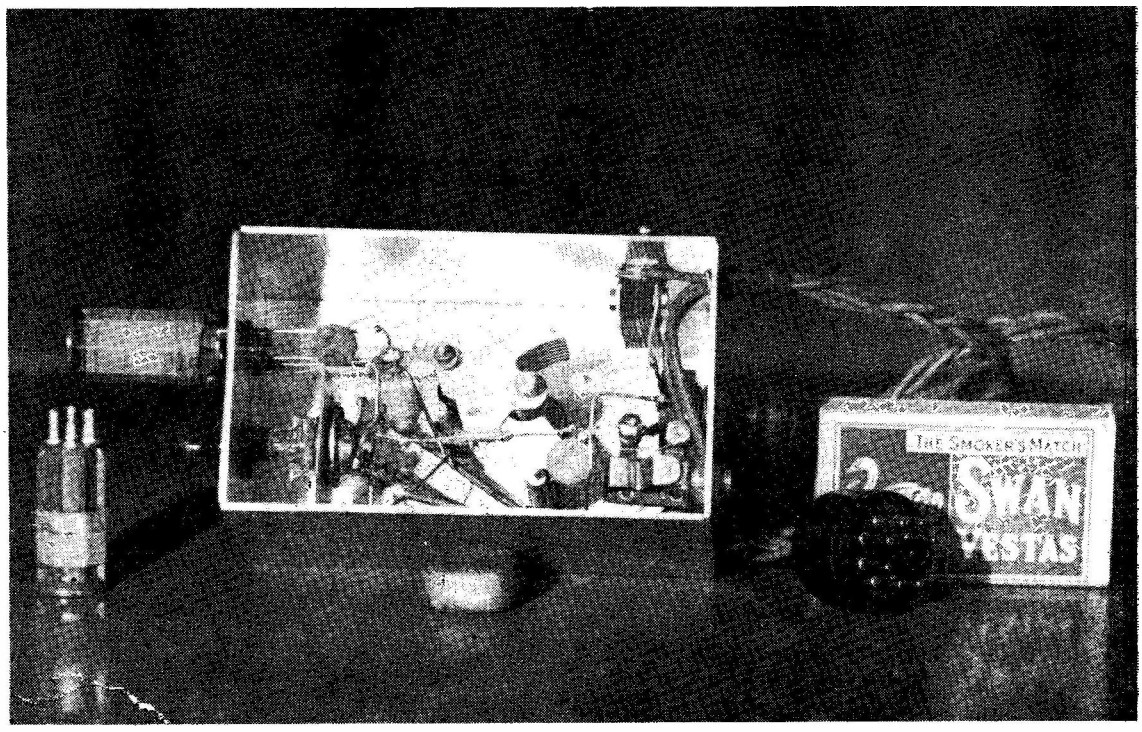
This calls for no special comment beyond stating that, apart from the supply cables, it can conveniently be carried out in 18 SWG tinned copper, and that the shortest route should be chosen for those leads connecting the valve base, coil-holder and tuning condenser.

Frequency Range

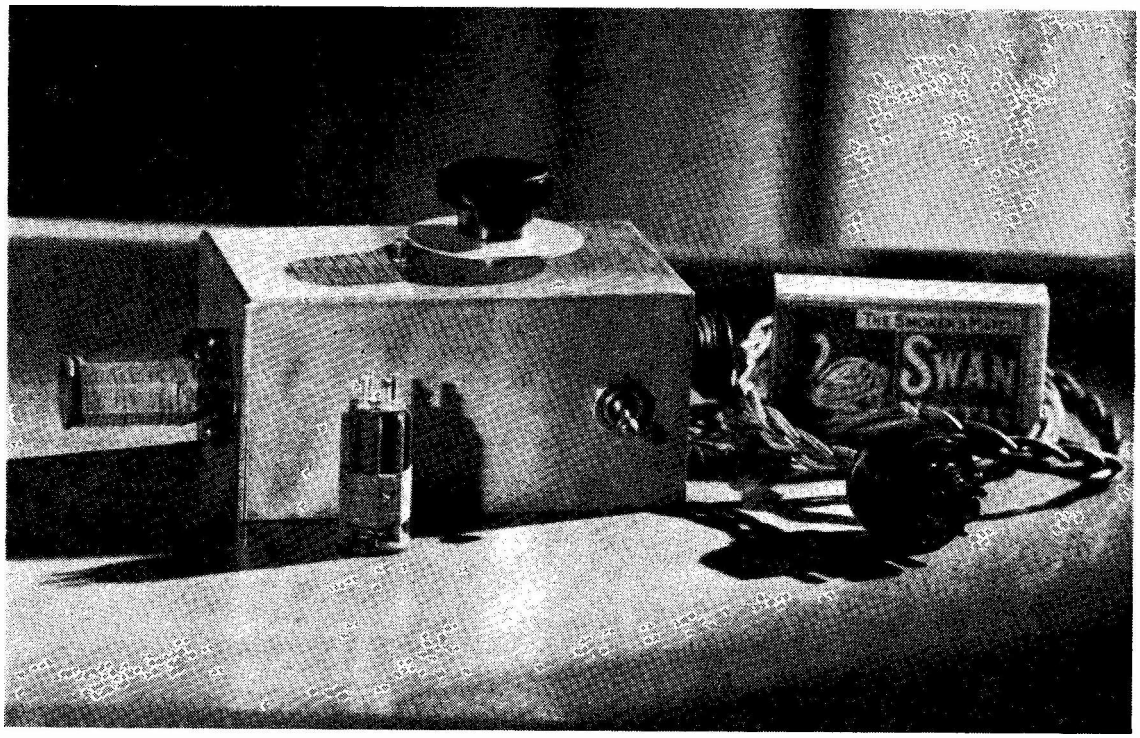
The lower limit is fixed, to some extent, by the small size of the coil former, but so long as the Top Band (160 metres) can be covered—and that is not difficult if care is taken—this is all that matters. The upper frequency limit will be governed by other factors, and it would probably be unwise to expect satisfactory results at a frequency much higher than about 45 mc. For the present, however, the three amateur bands most likely to be of interest to the newcomer are 160, 80 and 40 metres, and as continuous coverage can be obtained over this range with only two coils, it is not necessary at this stage to go further than this.

Coil Construction

The wire used is 30 SWG single-silk covered (taken from an old RF choke from "surplus" equipment) which runs about 70 turns per inch. Taking the low-frequency coil first, about 120 turns will be required, and since the winding length available is only 1¼", some degree of over-winding will be required. Drill three small holes in the side of the coil former, the first as near as possible to the pin corresponding to the earth connection, the second about ¼" up on the side corresponding to the cathode tap, and the final one right at the top on the side



Inside the Grid Dip Oscillator — the valve mounting can be seen lower left, with the tuning condenser (C1 in circuit diagram) at the centre. The octal plug takes HT and LT supplies from one of the sockets seen on the Beginner's Power Pack on p.267 of the July issue.



General view of the Beginner's Grid Dip Oscillator, as described in the article. With two coils, the three LF bands are fully covered (160, 80 and 40 metres), with continuous coverage from 1.7 to 7.4 mc. This instrument has a multiplicity of practical uses, as explained in the text, and is an indispensable adjunct to the active amateur station. As designed and illustrated here, it is intended to operate from the Power Pack described in the July issue.

corresponding to the grid tap. With the aid of a fine file (a nail file will do), gently nick the former ribs in line with the base hole. This will prevent the initial turns from slipping off as winding proceeds. Starting at the base or earthy end, thread the wire through the hole, and thence through the earth pin; bare the insulation at the end and neatly solder to the pin. Wind on, scramble fashion, 40 turns, slowly working up the former to the second hole. Without breaking the wire, slip a loop through this second hole and thence through the cathode pin and make it secure round one of the other pins, not forgetting to make the necessary soldered connection and to cut off the surplus wire later on when winding is complete! Continue winding single-layer fashion until another 82 or 83 turns are in position; thread through hole and grid pin in the same manner as before and solder-up.

Testing

Now for a trial run. Plug the coil into the holder, fit the valve, connect heater and earth leads to the power pack and HT positive to the 150-volt tap. Plug your meter into the jack socket, making sure that positive meter is connected to the earthed side; set the meter to the 0-1 mA scale, and, with the HT toggle switch in the "off" position, switch on the power pack. If the GDO valve filament lights up, switch on the HT supply and watch the meter for a reading, adjusting it by means of the potentiometer until about half a milliamp. shows on the scale. (If there is no reading, refer to the paragraphs headed "Trouble-shooting"!) Switch on the station receiver, select the range and tuning to give you something between 1.7 and 3.0 mc and, with the BFO on, swing the GDO tuning until you pick up the beat. Gradually tune both receiver and GDO towards the low frequency end until the GDO tuning condenser is right home at 100°. Make a note of the frequency and, in like manner, work down to the other end.

The object of this exercise is to adjust the number of turns on the coil until the LF end just clears the 1.8 to 2.0 mc allocation in our 160-metre band. It is probable that, with the data given here, the range will be from just below 1.7 mc to just below 3.5 mc. Unsolder the wire attached to the grid pin, remove a couple of turns, re-connect and test again. The writer finished up with a range of from 1720 kc to just over 3500 kc, which he considered to be satisfactory.

The second coil is then wound in exactly the same manner, except that 43 turns are wound on, single layer, with the cathode tap 13 turns from the earthy end. This coil, in turn, is tested in like manner until the low-frequency limit just overlaps the high frequency limit of the previous coil, the figures finally achieved by the writer being 3460 kc to 7380 kc. Thus, it will be seen that all three bands are adequately covered by only two coils. Finally, to make all secure, apply a smear of Durafix or

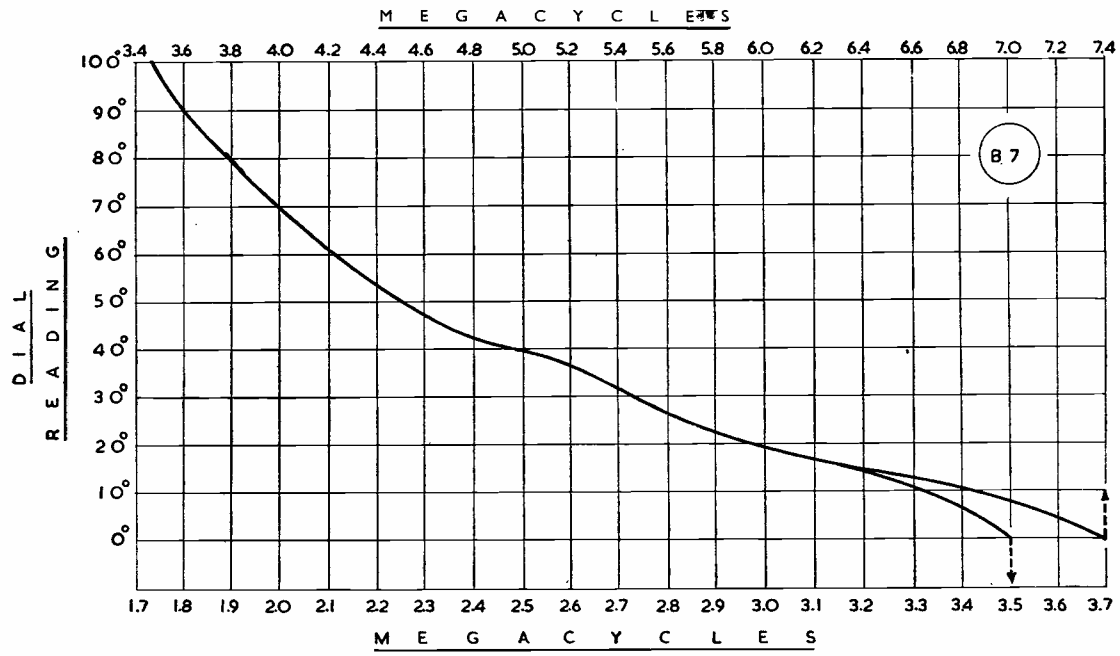


Fig. 2. Calibration curves obtained on the Grid Dip Oscillator as described and illustrated in the article. By chance, in A. A. Mawse's version the curves for the two coils coincide over almost the whole tuning range; this is not at all likely to happen in many cases and usually the curves will be much the same shape, parallel to one another but separated by a few degrees in terms of dial readings. The calibration is anyhow only approximate because a GDO is not designed to measure frequencies; it is intended merely to be a reliable guide to where you are with your coil-condenser combinations.

similar adhesive to the first few turns at each end of both coils.

Calibration

The final operation is now just a question of calibrating both coils. Start at one end and make a note of the frequency as shown on the receiver dial every ten divisions, and do the same for the second coil. Then prepare a graph along the lines of Fig. 2, which represent the results actually obtained by the writer on the instrument as illustrated here. In this case it is of interest to note that, apart from the first ten divisions or so, the two coils are in direct harmonic relationship. In addition to the graph, it is a good plan to mark out the results obtained on a piece of card, which can be cut to size and stuck on to the top of the instrument, as can be seen from one of the photographs.

Trouble Shooting

The circuit is so simple that, if no grid current is shown, the trouble will most certainly be due to a fault in the wiring or a faulty valve. For example, the writer got no joy at the first attempt. A careful check-over of the wiring showed nothing wrong, but still a meter in the anode lead revealed no anode current. Finally, the fault was traced to the valve itself. The 9002 has duplicated plate and cathode pins, as it is intended for high-frequency use, and since only relatively low-frequency operation was intended, the cathode return was made to only one pin—and this happened to be open-circuited inside the valve! Connecting up the second cathode pin effected an immediate cure. The circuit will oscillate down to a very low value of high tension, and, with 105 volts, the anode current is in the region of only 5 mA and the grid current about 0.5 mA.

Stability

Extreme stability is neither required nor intended, but after an initial warming-up period of a minute or so, there is very little drift, particularly towards the lower frequency end of the tuning range. The instrument is not meant to be used as a frequency meter, and consequently calibration need be only approximate; under these conditions the degree of stability obtained is considered quite satisfactory.

Applications

For determining the frequency of an unknown coil/condenser combination, with HT on, align the probe coil with the coil under test and rotate the dial, watching for a sudden *dip* in grid current if the test circuit is "dead" or a sudden upward flick if it is "live" in terms of RF. Back off the coupling between the two circuits until a just perceptible flick of the meter can be noticed, and read off the frequency as shown by the chart or graph. Used as an absorption meter for testing RF radiation from the plate circuit of an oscillator, for example, switch off the HT; the valve then acts as a simple diode rectifier and the instrument is tuned for peak grid

current, when the frequency can be read off the graph as before. Under these conditions, the meter is not very sensitive and the tuning is relatively broad. If the frequency requires determining, it is better to switch on the HT and tune for peak grid current as previously described.

For monitoring a CW transmission, replace the meter with a pair of high-resistance headphones, switch on the HT and tune for a beat whilst the transmitting key is depressed. Remove the meter from the vicinity of the transmitter until rather a weak signal is heard—to avoid overloading and simulate reception of your transmission at a distant point—and check your keying characteristics.

For monitoring a modulated signal, use the valve as a diode rectifier (HT off) with headphones as before. It will be necessary in this case to increase the coupling between the instrument and transmitter until a signal of comfortable strength can be heard.

Finally, to check for undesirable harmonics, replace the meter and, with HT on, tune to one-half, one-third and one-quarter the fundamental frequency, coupling fairly tightly to the transmitter tank coil or the aerial lead-in ; watch the meter for any warning upward flick, which will tell you that you are wasting RF power in unwanted harmonics.

The time spent on the construction of this instrument will be repaid many times over when other equipment is being built or tested. At a later stage, its use can be extended to cover the higher frequencies, if this should be required, simply by the addition of one or two more coils wound and tested in the same manner as already described. Where the TVI problem may have to be tackled, a coil to cover Band I (41-68 mc) is worth trying.

(Part VI will describe a CO Transmitter)

THE AMATEUR TRANSMITTING LICENCE

HOW TO OBTAIN IT—CONDITIONS AND EXEMPTIONS—THE RADIO AMATEURS' EXAMINATION AND MORSE TEST—FEES AND LICENCE CHARGES—STUDY AND RECOMMENDED READING

WE are frequently asked for guidance and advice on the business of actually obtaining an amateur transmitting licence—the procedure, regulations, conditions, fees and so forth. This article has therefore been prepared with the idea of bringing all the relevant information together under one heading.

The authority for the issue of Amateur Radio licences in the U.K. is the Postmaster-General, who acts through the Engineer-in-Chief of the Post Office; he in turn delegates his authority to the appropriate department in his branch. The first step to be taken by a candidate aspiring to the privilege of an amateur transmitting licence is to write to: Wireless Telegraphy Section, Radio & Accommodation Dept., Union House, General Post Office, London, E.C.1, asking for a copy of the pamphlet relating to the issue of a licence. This is most comprehensive and gives a great deal of valuable information.

Exemptions

Though, in general, licences are only issued to applicants who can pass the prescribed (quite simple) examinations in Radio Theory and Morse, it will be found that there are numerous exempted categories from either the theoretical examination or the Morse test, or both. These exemptions apply mainly to Service personnel holding certain minimum trade classifications or ratings in the communications or radar branches, and, in the case of civilians, to those with degrees or certificates in radio or electronics.

Some examples of exemptions from both the theoretical examination and the Morse test, taken from the very long list contained in the GPO pamphlet referred to above, are as follows: Commissioned Communications Officer, R.N. or R.N.V.(W)R.; Signals Officer, R.A.F.; Leading Telegraphist, R.N. or R.N.V.(W)R.; Telegraphist II, Navigator Wireless or Wireless Operator D/F in the R.A.F. Applicants with such qualifications would be granted a full transmitting licence without examination, though for personnel in these categories now out of the Service there is a time limit of 12 months, within which the licence must be obtained if advantage is to be taken of the Service exemption.

As regards civilian exemptions from both the theoretical examination and the Morse test, these include holders of 1st and 2nd Class PMG Certificates and certain grades of the Ministry of Transport and Civil Aviation radio operator's licence.

Exemptions from the theoretical examination only—candidates having to pass in Morse—include, among many others, B.Sc.'s who have taken radio or electronics, graduate members of the Radio Section of the I.E.E., holders of a National Certificate in Electrical Engineering endorsed Electronics ; a Sub/Lt. (L) R.N., and above ; Officers and NCO's of the Royal Signals who have passed the Part II Course ; Telegraph Mechanics, R.Sigs.; and in the R.A.F., radar officers, air and ground radar mechanics (S.A.C.) and certain fitter trades.

Similarly, where civilian qualifications or Service classifications apply, certain candidates would be excused the Morse test, but would have to take the theoretical examination.

All exemptions, together with the conditions applying to the establishment of an amateur transmitting station, are given in the pamphlet issued by the GPO on application to the address given in the second paragraph above.

The Radio Amateurs' Examination

For those who have to take it, the theoretical examination, known as the Radio Amateurs'

Examination (R.A.E.), is held early in May each year, at centres throughout the country. It is set and marked by the Department of Technology of the City and Guilds of London Institute (31 Brechin Place, London, S.W.7), and is Subject No. 55 in the Institute's examination curriculum. Applications to sit the R.A.E., which can be made either direct or through the local Education Authority, must be in by March 31.

The syllabus for the R.A.E. is of an elementary standard. It covers the essentials of electricity and magnetism; simple radio principles; propagation of radio waves; basic theory of valves and circuits; essentials of a receiver; simple types of aerial; low-power transmitter circuits; the avoidance of interference by amateur transmitters; radio frequency measurements and quantities; and the conditions of the licence. The standard can be roughly defined as "Fifth Form Physics"—in other words, anyone at this standard should be able to cope with the R.A.E. after having done the necessary reading on the radio subjects.

In the expectation that they will be of use to intending candidates, whether studying alone or in a class, and to R.A.E. instructors, we give here a selection of questions from R.A.E. papers actually set for recent Examinations. It will be seen that they tend to fall under several clearly defined head-

RADIO AMATEURS' EXAMINATION

Examples of Questions as Set

(1) Transmitter Circuit Theory

(A) (*a*) Explain why neutralisation is necessary when a triode valve is used in the RF power amplifier stage of a transmitter.
(*b*) With the aid of a diagram, show how neutralisation is effected.

(B) What is meant by modulation? Describe a method of modulating a typical low-power RF amplifier.

(C) With the aid of a diagram, describe the essential features of a crystal-controlled radio transmitter suitable for the 14 mc frequency band and indicate the method of keying.

(2) Interference

(A) How can the following types of interference be minimised :—
(*a*) at the transmitter,
(*i*) over-modulation,
(*ii*) harmonics, interfering with television reception,
(*iii*) spurious oscillation ?
(*b*) at the receiver,
(*i*) image response,
(*ii*) blocking ?

(B) How is a low-power transmitter likely to interfere with broadcast reception ? What steps would you take to prevent such interference ?

(C) State what requirements have to be met under the non-interference conditions of "The Postmaster-General's Licence to Establish An Amateur Wireless Station."

(3) Use of Formulae

(A) An alternating voltage of 10 volts at a frequency of $\frac{100}{2\pi}$ mc is applied to a circuit consisting of the following elements connected in series .
(1) an inductance of 10 micro-henrys ;
(2) a capacitance of 10 pico-farads ;
(3) a resistance of 10 ohms.
(*a*) What current flows through the circuit ?
(*b*) What voltage appears across the inductance ?

(B) With the aid of a diagram indicate the magnetic field associated with an air-cored cylindrical coil through which direct current is flowing. How does the strength of the magnetic field depend upon :
(*a*) the magnitude of the current,
(*b*) the number of turns ?
What is the effect of inserting an iron core in the coil and why are laminations used for the core when AC is used ?

(C) Two inductors of 10 and 20 microhenrys are connected in series ; two others of 30 and 40 microhenrys are also connected in series. What is the equivalent inductance if these series combinations are connected in parallel ? Assume that there is no mutual induction.

(D) What is the effect of connecting two condensers (*a*) in series, and (*b*) in parallel ? What is the total effective capacitance when four condensers, each of 100 pf, (or $\mu\mu$F) are connected in a series-parallel arrangement consisting of two parallel paths, each of which contains two condensers in series ?

(4) Frequency Measurement

With the aid of a simple diagram, describe a heterodyne frequency meter and explain how it is used to measure the frequency of a transmitter.

(5) Aerial Theory

(A) Explain briefly why standing waves are undesirable in a feeder system connecting a transmitter to an aerial. How would you detect their presence and minimise them ?

(B) What is understood by "radiation characteristics ?" With the aid of diagrams, describe the radiation characteristics of a horizontal dipole with and without reflector.

(6) Definition of Terms

(A) (*a*) What is the relation between the frequency and the wavelength of a radio wave ?
(*b*) What are the frequencies corresponding to wavelengths 30 km, 150 m. and 10 cm. ?
(*c*) Why are wavelengths shorter than 5 metres generally unsuitable for long distance communication ?

(B) (*a*) State the relationship between the frequency and the wavelength of a radio wave.
(*b*) What are the frequencies corresponding to wavelengths of 150 m., 2m. and 75 cm. ?

(C) Define the following terms :—
(*a*) mutual inductance,
(*b*) amplification factor,
(*c*) AC resistance (anode slope resistance).
State the relationship between them.

(D) What is meant by the term resonance ?
If an inductance of 50 microhenrys is in series with a capacitance of 500 pico-farads, what is the resonant frequency ?
(π^2 may be taken as 10.)

(E) Explain : either (*a*) the meaning of Class A, Class B and Class C amplification, or (*b*) the method of neutralizing a power amplifier.

(7) Licence Conditions

(A) State what requirements have to be met under the frequency control and measurement conditions of the Postmaster-General's licence to establish an Amateur Wireless Station, and say why these conditions are necessary.

(B) What type of message may be exchanged with other amateur stations ? For what purposes is the use of the station prohibited ?

(8) Receiver Theory

(A) Describe a superheterodyne receiver suitable for the reception of CW signals over the frequency range 1 to 20 mc. Illustrate your answer with a bleck diagram.

(B) Describe a method of obtaining high-tension supply from alternating current mains. Include particulars of the smoothing circuit. Illustrate your reply with a diagram.

(C) Describe with the aid of a block schematic diagram a superheterodyne receiver suitable for continuous wave reception and state briefly the purpose of each stage of the receiver.

ings. Usually, there would be only one, or perhaps two, questions of the type of (A), (B) or (C) under each heading, making 8-10 questions in all, of which one or two might be free-choice questions; the time allowed for the paper is three hours.

During the last ten years or so, we have regularly published the R.A.E. question paper, sometimes with a set of specimen answers. The only one of our publications remaining in print with R.A.E. questions and answers is the September 1953 issue of *Radio Quarterly*, of which there are a few copies left at 4s. 3d. post free. Readers of *Short Wave Listener* who may have kept their copies (we have none) will also find the R.A.E. dealt with in the issues dated around March and April most years.

While not attempting to anticipate the questions to be set for the R.A.E. next May, it is evident that they cannot be very different from the type of question set for previous examinations. Specimen question papers and the syllabus in full can be obtained direct from the Dept. of Technology, City and Guilds of London Institute, address as above.

Recommended Reading

Much towards the R.A.E. syllabus will be learnt subconsciously by regular reading of SHORT WAVE MAGAZINE itself and by following the series of practical articles, "Amateur Radio for the Beginner," now running, which started in our April 1955 issue. But there are also a number of text books, with one or two of which every radio amateur should be familiar. These are: *Notes for Wireless Operators* and *The Admiralty Handbook of Wireless Telegraphy*, Vols. I and II, both published by the Stationery Office; Ladner & Stoner's *Short Wave Wireless Communication*, published by Chapman & Hall; Scroggie's *Foundations of Wireless* (Iliffe & Sons); and Vol. 1 of Reyner's *Modern Radio Communication* (Pitman). These can either be purchased, or borrowed through almost any library.

Pre-eminent, however, is the ARRL *Radio Amateur's Handbook*, which, while American in emphasis, is still without question the standard manual for the amateur, and is sold throughout the world. Published in a fresh edition each year, it not only covers all the basic theory but is also a source of reference for the design, construction and operation of apparatus of every kind for the Amateur Radio station. The *Radio Amateur's Handbook* (the 1955 edition of which is obtainable direct from us, from stock, at 31s. post free) is truly an essential aid—to buy, keep and to refer to constantly. (It is more than an inch thick and runs to nearly 600 pages!).

Useful articles on the subject of the R.A.E. appeared in SHORT WAVE MAGAZINE dated March, July, August and November last year.

The Morse Test

When a candidate has passed the R.A.E., or if his theoretical qualifications are acceptable to the Post Office without examination, the Morse test is arranged on application by him. In the GPO pamphlet referred to in para. 2 will be found a series of addresses, these being of a number of GPO Coast Stations and the Radio Surveyor at Belfast, Cardiff, Falmouth, Glasgow, Hull, Liverpool, London, Newcastle and Southampton, as well as the Head Post Office for Birmingham, Cambridge, Derby, Leeds and Manchester. The one to choose is, of course, the centre most convenient for the candidate.

The Morse Test standard for the radio amateur licence is 12 w.p.m., sending and receiving, for a period of five minutes each. An article on how to set about learning Morse appeared on pp.98-100 of the April 1955 issue of SHORT WAVE MAGAZINE.

Fees

The sitting fee for the Radio Amateurs' Examination is 15s. The charge for the Morse Test is 7s. 6d. Annual fee for the transmitting licence itself is £2.

Conditions of the Licence

These are set out in full—including the power limitations, the frequency bands available to amateurs, and the general operating regulations—in the GPO pamphlet obtainable as given in para. 2.

Valuable information on the frequency bands as actually used by British amateurs can be found on p.278 of the July 1954 issue of SHORT WAVE MAGAZINE. This is a break-down of the bands in tabular form and explains their usage under operating conditions.

Studying for the R.A.E.

Preparation for the R.A.E. can either be at home on one's own with the aid of the books already listed, or it can be by correspondence course as regularly advertised in the *Magazine*, or by attending classes organised either by the local Amateur Radio Club or the Technical College. Details of all organised R.A.E. classes notified to us are published in SHORT WAVE MAGAZINE.

While all large centres of population support a Technical College or Evening Institute, by no means all of them offer the Radio Amateurs' Examination as a study subject—usually because nobody has asked for it. If, however, a small group of students can be formed, the Principal of the local Technical College should be approached with a request to organise a one-evening-a-week course based on the R.A.E. syllabus (Subject No. 55 in the City & Guilds of London Institute's examination curriculum). There may sometimes be a difficulty due to lack of a suitably qualified instructor (who should, if possible, be a licensed amateur himself).

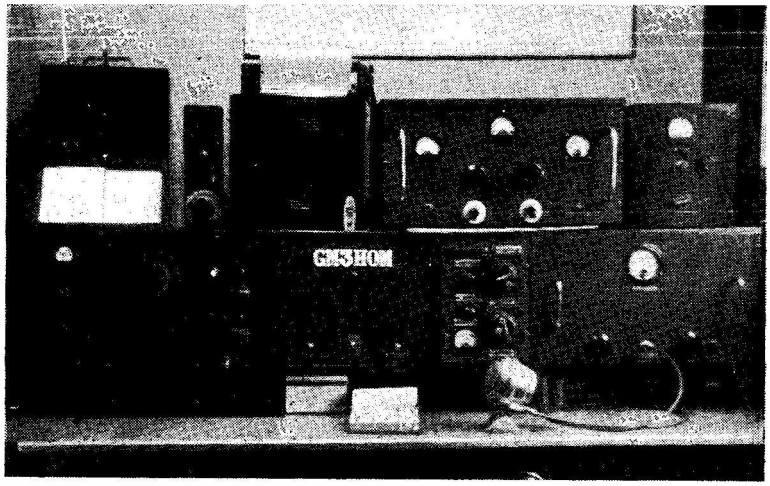
However, in many cases this approach has resulted in an active and successful class being formed, where previously nothing of the sort had ever been attempted. Since such courses would come under the local Education Authority, fees are usually no more than a few shillings for the whole session.

On the other hand, it is true to say that large numbers of licensed amateurs have qualified themselves for the R.A.E. (and the Morse Test) merely by home-study and reading within the syllabus for the Examination; this is by no means difficult.

Incidentally, it should also be added that the GPO will issue transmitting licences to juniors between the ages of 14-20 over the counter-signature of parent or guardian.

THE OTHER MAN'S STATION

GM3HOM



PICTURED this time is GM3HOM, owned and operated by J. Reilly at 20 Ornsay Street, Glasgow, N.2, who "began in June, 1951." Most of his time since has been spent on Twenty with occasional appearances on 80 and 14 metres.

At top left in the photograph is a BC-221 frequency meter, with a phone monitor/field strength meter alongside, then the speaker with a desk light, next the main transmitter, with the aerial tuning to the right on the top deck. Below, left to right, is the HRO receiver, the control panel (with call letters) containing the relays and relay supply and also a stabilised power unit for the Wilcox-Gay "surplus" VFO beside it. Alongside the latter is the modulator, the microphone being a deaf-aid crystal insert in a D.104 case.

The transmitter runs 65 watts to a single 807 as PA, driven by a band-switched exciter using wideband couplers. The PA output is taken to the aerial tuning unit, designed to feed either a 20-metre ground plane or a dipole on 14 metres. The aerial for Eighty is, however, a "random length" due to site difficulties.

An interesting feature of the station is the modified HRO, in that only two of its original valves, the 6D6 IF's, remain! The new arrangement is two 6BA6 RF's, 6BE6 mixer and 6C4 oscillator with stabilised supply; a Q5'er is incorporated after the IF section, using a 6BE6 mixer and two 6F12's at 85 kc IF, into a DH77 as det-AVC-1st audio, the new output valve being an EL91; a second DH77 is fitted with one half used as an S-meter amplifier, while the BFO has been changed to a 6F12. These modifications were embarked upon mainly because of the difficulty in getting replacements for the now-oboslete valve types used in the original. In due course the 6D6's will also be changed.

The modulator section consists of 6SJ7-6J5-6SN7-p/p 6J5's into p/p 807's in Class-AB2, with 650 volts on the plates. This gives ample modulating power for a single-stage PA and in fact a second 807 has recently been added to the RF amplifier, with a pi-section tank circuit; one result is that whereas before GM3HOM was TVI-proof, he has now run into some trouble on Twenty. However, he says his main interest "seems to be constantly modifying the rig" so he will probably have had the transmitter cleared again by the time this is in print.

SUMMER CALL BOOK

The current (Summer) Edition of the *Radio Amateur Call Book* runs, in the full version, to no less than 528 pages; it gives the name and address, alphabetically by country-prefix and call-sign, of every known amateur in the world, and is right up-to-date. In addition to being the only complete directory to the radio amateurs of the world, the *Call Book*, in all editions, is also a mine of DX information. It gives the American call areas by States; the ARRL Countries List, which is accepted as "official" all over the world; the international prefix lists, alphabetically (*a*) by Country, and (*b*) by Prefix; a standard time chart; the international Q Code; and an outline map of the world showing the geographical location of all Amateur Radio prefixes.

In the current issue of the *Radio Amateur Call Book*, 338 pages are devoted to American call-sign/addresses, the radio amateurs of the rest of the world being covered in the remaining 170 pages. The U.K. listings run to 22 pages, and include all new QTH's and changes of address as published in SHORT WAVE MAGAZINE up to and including our issue for May 1955.

The price of the Full Edition of the *Call Book* is 31s. post free, and the special Abridged Edition (which is the full edition less only the American listings) is 15s. post free. Both are available from stock on order, with remittance, to: Publications Department, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

THE MONTH WITH THE CLUBS

By *"Club Secretary"*

(Dead-line for September Issue : AUGUST 19)

SOME Clubs treat this as the closed season, others as an opportunity to combine radio with fresh air, and just a few continue running according to their normal routine. Portable work, as Club members soon find out, can be whatever you care to make it. What, to one gathering, is a highly organised test of equipment, may be to another a frolic in which nothing works and no one is surprised. Certainly we have seen small-scale field days that would have been a wonderful opportunity for a cartoonist and a humorous writer — and they were just as enjoyable as those that were run in deadly earnest.

The hot weather in July certainly did bring the portable and mobile experts out, and we hope that many enjoyable functions will be described in Club minute-books before the end of this summer.

Sutton and Cheam appear to have hit on a good idea, for they do not normally meet in August, but this year, on August 16, they are running a "1.8 mc Portable Evening." This will take place between 8 and 11 p.m.; several /P and /M stations will take part, and it is hoped that other Clubs will join in. This is not a contest, but just an evening in the open air — weather permitting, of course. The Annual Outing will be to Arundel and Worthing, probably on September 11. **Barnsley** do not meet again until September 9, when they hold their A.G.M.

R.A.E. COURSES

Bradford have an informal meeting on August 23, and start their new session with an "Any Questions?" gathering on September 13. In collaboration with the society, R.A.E. classes are being held at the Bradford Technical College during the winter session.

This is the sort of useful undertaking that might well be investigated by many other Clubs. Every large centre of population has a Technical College and most of the smaller ones an Evening Institute; since the establishment exists to serve the needs of local people, the Principal is usually only too glad to have suggestions for a new course of study, and in many cases classes are formed with as few as six students. The approach, therefore, is for representatives of the local Club to interview the Principal, to find out if an R.A.E. course can be fitted in one evening a week, whether a suitably qualified instructor is available (he should, *if possible,* hold a licence himself) and what minimum number of students should be enrolled. Club members wanting to take the R.A.E., *plus* a little local advertising, will almost certainly make up the numbers.

The Principal should be referred to the R.A.E. syllabus, which is Subject No. 55 in the City and Guilds of London Institute examination curriculum. Apart from the value of a properly organised course of study, if the class is formed on the lines suggested here, one of the advantages is that it would come under the local Education Authority, so that fees are usually no more than a few shillings for the whole session. Instructors are paid for their services by the Education Authority.

There is no reason why organised R.A.E. courses, with proper teaching facilities, should not be going on at every Technical College in the country during the coming winter, and local Radio Clubs can do a great deal to get them going.

We shall be very glad to hear of R.A.E. courses formed on these lines, and will give them supporting publicity in these pages.

B.A.T.C. CONVENTION

The **British Amateur Television Club** will be holding their own convention at the Bedford Corner Hotel, London, W.C.1, on October 1st from 10 a.m. until 6 p.m. Members' equipment will be displayed and demonstrated, and there will be a film show. Full information from the Hon. Sec. (*see* panel), or from the assistant secretary, D. S. Reid, 4 Bishop Road, Chelmsford.

SWINDON — NEW CLUB

A meeting is to be held on August 31, with the object of forming a radio Club in the town. Radio amateurs, constructors, SWL's and all others interested are asked to attend — 7.30 p.m. at the Connaught Cafe, 34 Cromwell Street, Swindon. G3AYL and G3IDW are the moving spirits, and will be there.

Clifton have constructional evenings on August 5 and 19, and a Junk Sale on August 12. A very comprehensive library is being got together by Mr. D. Bennett, consisting of the numerous magazines and books donated to the Club.

Norwich appear to be "in recess," their next meeting being a "Konstructors' Krazy Knite" on September 30. We hope to hear more of this in due course! **Stockport** recently heard a lecture on An Electronic Balance from Mr. P. H. Briggs, B.Sc. On the cards for future meetings are a series of Lecturettes on "My Station."

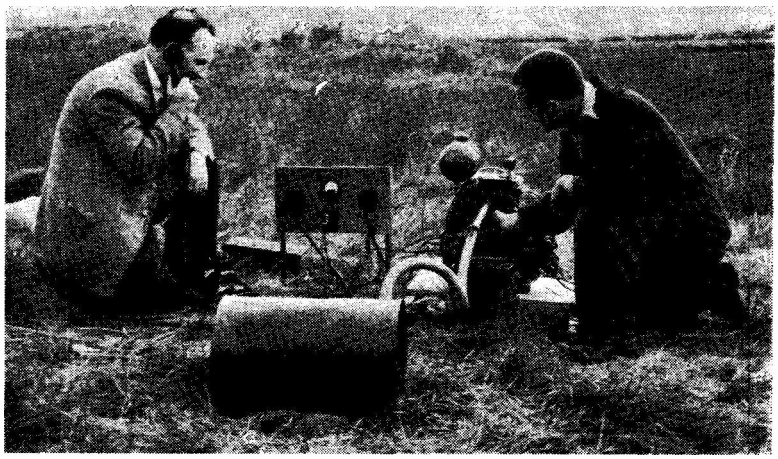
West Hartlepool, though a newcomer to these columns, is not a new Club. They have a first-class

Clubroom, a call sign (G3IDV) and a fully organised summer programme, and they are exhibiting a station on August 13 at the Annual Show in the Ward Jackson Park. The call allocated to them for this is GB4WH. Local transmitters or SWL's are cordially invited to the Club meetings at 7.30 p.m. every Monday. See panel for Hon. Sec.'s address.

East Kent meets fortnightly at The Two Brothers. Northgate Street, Canterbury, and many new members have been enrolled, including a YL. Morse classes are given by G2BBT and transmitting lectures are being arranged by G3FCT. New members will be welcomed.

Coventry have switched to their summer programme with a Field Day on August 7 and a Night on the Air on September 1. **Purley** were in action at the local Summer Fair on July 23, and at the previous meeting they had a talk from G2KU about his experiences as VS5KU.

Slade are running a Brains Trust on August 5 and will be hearing about Transformer Design from Mr. N. B. Simmonds on August 19. Their Club station at Church House, High Street, Edrington, is now open every day of the week for the use of members, with lectures on Station Operation and Procedure every Monday, Morse Practice and talks on Equipment Design every Wednesday, and a series of RAE lectures every fourth Friday.



When the Wirral Amateur Radio Society went out on field day recently, they ran a " power station " to supply their A and B transmitting points and also installed a field telephone ; this was to link up the transmitters with the cookhouse and the power station. The cookhouse, incidentally, was manned by a gallant band of XYL's who assumed full responsibility for this most important duty.

NAMES AND ADDRESSES OF CLUB SECRETARIES REPORTING IN THIS ISSUE :

BARNSLEY : P. Carbutt, G2AFV, 33 Woodstock Road, Barnsley.
BOURNEMOUTH : J. Ashford, 119 Petersfield Road, Boscombe East, Bournemouth.
BRADFORD : F. J. Davies, 39 Pullan Avenue, Bradford 2.
BRADFORD GRAMMAR SCHOOL : D. M. Pratt, G3KEP, 27 Woodlands Grove, Cottingley, Bingley, Yorks.
BRITISH AMATEUR TELEVISION CLUB : D. W. E. Wheele, G3AKJ, 56 Burlington Gardens, Chadwell Heath, Romford, Essex.
CHESTER : N. Richardson, 23 St. Mary's Road, Dodleston, Chester.
CLIFTON : C. H. Bullivant, G3DIC, 25 St. Fillans Road, London, S.E.6.
COVENTRY : J. H. Whitby, G3HDB, 24 Thornby Avenue, Kenilworth.
EAST KENT : D. Williams, G3JES, Llandogo, Bridge, near Canterbury.
HASTINGS : W. E. Thompson, 8 Coventry Road, St. Leonards on Sea.
LOTHIANS : J. Good, 24 Mansionhouse Road, Edinburgh 9.
NORWICH : P. J. Gowen, 71 Links Avenue, Hellesdon, Norwich.
PURLEY : E. R. Honeywood, G3GKF, 105 Whytecliffe Road, Purley.
QRP SOCIETY : J. Whitehead, 92 Ryden's Avenue, Walton-on-Thames, Surrey.
SCARBOROUGH : P. Briscombe, G8KU, 31 St. Johns Avenue, Scarborough.
SHEFFORD : G. R. Cobb, G3IXG, 7 Hitchin Road, Shefford, Beds.
SLADE : C. N. Smart, 110 Woolmore Road, Birmingham 23.
STOCKPORT : D. Hall, 13 Hallam Street, Heavily, Stockport.
SURREY (CROYDON) : S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon.
SUTTON AND CHEAM : F. J. Harris, G2BOF, 143 Collingwood Road, Sutton.
WEST HARTLEPOOL : J. Thompson, 27 Chester Road, West Hartlepool.
WIRRAL : A. C. Wattleworth, 17 Iris Avenue, Claughton, Birkenhead.

The **Bradford Grammar School** Club consists mostly of boys of the school, but visitors are always welcomed to their meetings, which are on Wednesdays and Fridays, 4.20-5.30 p.m. The Club is often on the air, on 160 and 80 metres during the day, with the call G3KEP/A.

Bournemouth no longer hold their former call G3FVU, since, under the new regulations, the Club station may be operated by any member using his own call and the suffix /A. In the Two-Metre Contest on July 2-3 their performance surpassed all expectations. 69 contacts being made, up to 196 miles. The *average* distance was 93.5 miles, and the Club give special credit to G3HLW for his energy and operating ability. Next meeting, on August 5, is devoted to the Society's entry in the next field day on August 7. The station will again be at Okeford Hill, near Blandford.

The **QRP Society** is still open to accept entries for the Portable Amateur Radio Equipment contest, as announced last month. Their president, GC2CNC, is now the proud holder of the world's transistor DX record—532 miles to HB9T. The QRP Society now has six affiliated Clubs, and membership in fifteen countries.

The Clubhouse at **Shefford** (Digswell House) is open every Friday evening, and new members and visitors will always be welcome. (Refreshments available !) On August 12 Mr. J. H. Brunt talks on Radio Measurements, on August 19 G3IXG expounds on Electro-Chemistry, and on August 26 G2FFG lays bare the Fundamentals of Electronic Computers.

Surrey (Croydon) meet at the Blacksmith's Arms, South End, Croydon, on August 9, and as no fixed programme has been arranged, there will be an informal ragchew. At the July meeting the members heard short talks on a Grid Dip Oscillator, 70-cm. activity, and Band-Pass Crystal Filters.

Wirral continues to meet on the first and third Wednesday of each month, at the YMCA, Whetstone Lane, Birkenhead. Visitors and SWL's will be warmly welcomed at any of these meetings.

Hastings had a very successful session with G6HH on the air from the Hobbies Exhibition during Carnival Week. Apart from the 80-metre station, members' gear was exhibited, constructional work was taking place on the spot, and various electronic gadgets to amuse the non-technical public were included in the display.

Chester said farewell to G3HPM, who is going to Gough Island as ZD9AD. On August 16 there is to be an auction, followed by a discussion. Outings are proposed to a BBC station, a radio research establishment, and to Llandudno, the latter being purely a social event.

Lothians notify us that their opening meeting will be held on September 8 at 25 Charlotte Square, Edinburgh, when all prospective new members will be made welcome. It is hoped to arrange a very full programme of lectures, and meetings will be held on alternate Thursdays at 7.30 p.m. throughout the season. At the AGM, last June, GM3BDA was elected President, GM3FGJ Vice-President, and Mr. J. Good Secretary and Treasurer.

G3HPM/ZD9AD also turned up at **Scarborough** as the guest of G2YS. Mr. L. Dale has taken over the office of President. A recent event was a "Penny-on-the-Drum" Quiz in aid of Club funds.

At recent meetings **Stockport** heard a talk from ZS5MM on Radio in the Union of South Africa, one from G3AOO on Communication Efficiency, and another from G3IVR about his own station.

Dead-line for next month's reports is **Friday, August 19.** They should be addressed to: "Club Secretary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

NEW 25 WATT HIGH QUALITY AMPLIFIER

The General Electric Co., Ltd., has introduced a new high quality amplifier for use in sound reproduction systems where critical and accurate listening is essential. It has an output of 25 watts and is suitable for professional recording; it is of particular interest to high-fidelity enthusiasts and musical connoisseurs since it provides an exceptionally high standard of reproduction at true natural volume.

Known as the BCS2415/6 amplifier, the assembly comprises two units: A pre-amplifier with control unit, and a power amplifier; the two units are connected by means of a multi-way cable and plug-in connection. The complete assembly is priced at 60 gns., and, at its maximum power output of 25 watts, has only 0.4 per cent. total harmonic distortion; it covers the audio frequency range from 30 c/s to 20 kc, the output being level to within ± 0.5 dB from 40 c/s to 15 kc. The amplifier is designed for three alternative inputs: microphone (2.4 mV at 200,000 ohms); gramophone, 10 mV, with correction networks for British long-playing, British 78 E.M.I. and 78 *Ffrr* (Decca) records; or radio receiver (100 mV).

Operation is from 100-130 or 200-250v. AC mains, and the equipment incorporates six user controls. A selector switch covers the various inputs (radio, long-playing gramophone record, etc.), with which the amplifier can be used. A bass selector provides up to ± 18 dB in 7 steps, while a treble selector gives from − 25 to + 10 dB in 7 steps with cut-off filters at 9 kc, 7 kc and 5 kc. A continuously variable treble rate cut can be used to give from + 5 dB to − 50 dB per octave.

In addition to the five controls already detailed, the amplifier incorporates a continuously variable presence control. This can be used for adjusting the performance of the amplifier to simulate the conditions existing at, for example, either the front or the back of a concert hall. It enables the listener to suit the equipment to his own particular mood or requirements, and thus more completely recapture the atmosphere of the original performance.

THE TELEVISION SOCIETY

The Television Society was founded in 1927, and is the first society in the world for the study and furtherance of research in television and allied subjects. Its membership now numbers over 1000, drawn from professional engineers and the television industry, and it has active centres in Bristol, Bedford and Manchester. A selection of books and reprints of papers by members, including the newly published *Introduction to Colour Television* by G. G. Gouriet, of the B.B.C. Research Staff, will be on the Society's stand (No. 315) at the National Radio Exhibition.

Members of the council and staff will be available throughout the exhibition period to welcome members and visitors and answer technical queries. The honorary secretary of the Television Society is G. Parr, M.I.E.E., 164 Shaftesbury Avenue, London, W.C.2.

SMALL ADVERTISEMENTS

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

APPOINTMENTS

TRINITY HOUSE, LONDON

RADIO MAINTENANCE ASSISTANTS WANTED. — Radio Maintenance Assistants are required to maintain radio and radar equipment in Light Houses and Light Vessels. Candidates must possess a knowledge of the fundamental principles of radio and radar and must have had practical experience in the maintenance and use of such equipment. When not engaged at out-stations, successful candidates will be required to work at the Trinity House Depot, Blackwall, London, E.14. Salary scales £565, rising to £695 (Minimum linked to age 26) or £452 10s., rising to £610 (Minimum linked to age 25) depending on qualifications and experience. Applications to be made in writing to The Secretary, Trinity House, London, E.C.3, not later than 15th August, 1955, stating age, present occupation, qualifications, experience, and enclosing copies of testimonials.

JUNIOR WIRELESS OPERATORS required by the FALKLAND DEPENDENCIES ADMINISTRATION for service in SOUTH GEORGIA for one tour of 30 or 36 months. Commencing salary in the scale of £330, rising to £420 a year. Free board and accommodation. Free passages. Leave on full salary. Candidates, UNMARRIED, must possess a P.M.G. Certificate of Proficiency in Wireless Telegraphy and should have some knowledge of postal telegraphs and ships W/T services.—Write to the Crown Agents, 4 Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience and quote M2C/41076/SQ.

TRADE

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

WANTED: **TUNING UNITS** TN17, TN18, TN19, and R54/APR4 ; £50 each offered.—Box 1383, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

LEARN IT AS YOU DO IT.—We provide practical equipment combined with instruction in Radio, Television, Electricity, Mechanics, Chemistry, Photography, etc.—Write for full details to E.M.I. Institutes. Dept. S.W.47, London, W.4.

QSL's and **LOGS** by **MINERVA.** The best there are.—Samples from Minerva Press, 48, Queen's Road, Brentwood, Essex.

MORECAMBE HOLIDAY. — Overlooking Bay and Lakeland Mountains. Ham Shack.—Write, brocure, G3AEP, Ferncliffe, Drewton Avenue, Morecambe.

METERS REPAIRED: Accuracy and craftsmanship at reasonable charges. AVO Specialists.—G3HSC, Handy Shop, 109a Church Street, *Croydon 5432.*

WANTED: BC-610 Hallicrafters, ET-4336 Transmitters and spare parts for same. Best prices. —P.C.A. Radio, Beavor Lane, Hammersmith, W.6.

SMALL ADVERTISEMENTS, TRADE—*continued*

WANTED: Output Meter, Signal Generators, Valve Testers, of American type, and Capacitance Bridges.—R. Gilfillan & Co., Ltd., 7 High Street, Worthing, Sussex. *(Telephone: Worthing 8719).*

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.

EXCHANGE for CR100 good condition, 1155A Rx, 6V6 output, AC mains; MCR1 Rx, 4 coils; cash balance. Callers only considered.—Cann, 10 Southfield Crescent, Goatbridge, Scotland.

TWO Eddystone Receivers, mint condition, sell or exchange Eddystone 750.—Call or phone *Amberley 3130,* Fawkes, St. Chloe, Amberley, Stroud, Glos.

HRO SENIOR, 4 GC, bandspread coil covering 100 kc-30 mc, complete with power pack and phones, £25. Unused Valves: 813, 30/- each; 829, 20/- each.—Mills, 19 Walnut Avenue, Weaverham, Northwich, Ches.

SX24, in good condition, £24; also Truvox Mk. III Tape Deck, as new, £18 (or offers?)—Write Frankham, 19 Thomas Street, Trowbridge, Wilts.

FOR SALE: Hallicrafters S27-S27C, FM-AM, 230 AC; Canadian VRL, 19-valve Rx; Hallicrafter World Portable 1954 model, battery/mains. Also handbooks.—Offers to Box 1609, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Two-metre Converter with power pack, 6J6's, by 2IQ.—Particulars: James, 1 Hillside Terrace, Blackwood, Mon.

REAL BARGAIN: Portable 0-V-1 SW Bat. Receiver; will cover all bands, fitted set, spread calibrated, very economical, excellent condition, very cheap; s.a.e. for particulars.—Box 1606, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

STABILISED Power Pack, 350v. HT at 150 mA, 6.3v. 3A LT and stabilised voltages of 70v., 140v., 210v., 280v. at 55 mA max. Complete in metal case, £8. Please state mains voltage.—Box 1607, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: BC-348N, built-in power pack, good condition, £12; pair 27ft. steel masts with guys, £3. — Brown-Greaves, Halfacre, Croft Avenue, Dorking.

VQ2SK wants for cash: Transmitter (commercial) with 813's in final, such as ET4336. Must be in mint condition and, if possible, complete with speech amplifier and VFO. Anything good considered; also AR88D.—Please send full details to: S. Kirkbride, c/o Monze Station, N. Rhodesia, and also to Box 1608, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

CR100 FOR SALE, recently professionally lined, first-class condition, £20 (o.n.o.); AR88LF, fitted with S-meter, in first-class condition, unmodified in any way, £40; Webster Wire Recorder with 4 spare reels, tip-top condition, just the thing for recording your QSO's; giving away at £25 (o.n.o.).—Sanders, Chineside, Carbis Bay, St. Ives, Cornwall *(Tel.: St. Ives 659* before 9.30 a.m., after 6.30 p.m.).

SMALL ADVERTISEMENTS, READERS—*continued*

NATIONAL NC98, new at list, £70 10s.; some makers' manuals at 15/- each.—Box 1477, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

TVI-PROOF enclosed rack mounting Transmitter, VFO, 6C4, 6SJ7, 6AG7, 6V6, pi-section 807, clamp 6F6, stabiliser VR/150, metered, bandswitched 80, 40, 20, wideband couplers, £10; Top Band Transmitter VFO/PA 6SG7, 6V6, £3; UM2 Modulation Transformer, £2; Acos Desk Microphone 22-2, £2 10s.; new 813, £2 10s.; 805, 15/-; 810, £1; EHT Transformer, 13250v., 10 mA, 6.3v. 0.6A, 0-2-4v. 2A, £1—12 Portfield Road, Christchurch, Hants.

FOR SALE: Hallicrafters S40, 4-band, 550 kc-45 mc, perfect, £25; also 9-valve 5-band 500 kc-28 mc Communications Rx, new condition, needs lining-up, 15 gns.; s.a.e. for details. — Peck, 184 Back Hamlet, Ipswich.

S27, re-valved, re-sprayed, manual. Offers? Prefer buyer makes appointment to inspect. Delivery within reasonable distance. WANTED: SX28 spares.—G2BVN, 51 Pettits Lane, Romford.

PREMIER Electrostatic 6in. TV Rowridge Enlarger, cabinet, £10. Buyer collects evenings. —Ackroyd, 3 Wilson Road, Parkstone, Dorset.

G3IDG needs *CQ*, January, March, April, June 1945; any *Radio* before November 1935; any *R/9* before November 1934; any *QST* before August 1923; *Calling CQ* (de Soto). Overseas Ham magazines, old or new, any quantity.—95 Ramsden Road, London, S.W.12.

CR100, less case, £10 10s.; 16mm. Agfa Ciné Camera, f3.5, exchange for any reasonable piece of ham gear.—Box 1610, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: Seven 829B's, one 808, 35T, pair DET12, CNY2, power pack, RF unit; offers? WANTED: Pair TZ40. — G3DLG, 27 Weymouth Bay Avenue, Weymouth, Dorset.

WANTED: Complete file *Short Wave Magazine* from Vol. IV; No. 1, March 1946, to Vol. IX, No. 12, February 1952 inclusive. In first instance, state condition and price required by postcard, or ring: Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1 (*ABBey 5341*).

6IN. TV, perfect order, £6; 5CP1 in APN4, less valves and tag strips, brand-new, £1; P25 Band III Receiver, mains power pack, G9AEO S9. £1 15s.; 726A (two), 17/6. Postage extra.—V. Cedar, 9 North Drive, London, S.W.16.

COMPLETE STATION, 100w. CW Tx, 80/40/20 metres, Exciter 25w. B/Switched. Two Units in black metal cabinets. Power pack, Antenna tuning unit, xtals, Rx S640, S-meter, speaker, etc.—Offers to: 8 Harthall Lane, Kings Langley (*2773*), Herts.

HRO RACK MOUNTING, Collins TCS10 25-watt. Trans./Recr., mobile; AVO testmeter, Taylor 60 signal generator, Taylor 45A valve tester, Morse teacher with tapes, 1132A and 1481 Receivers, Type 3 power unit, condensers, resistors, etc. Low prices to clear surplus gear.—123 Hele Road, Torquay.

NATIONAL HRO Senior, unmodified, six coils, 10-600 metres, power pack, speaker, tubular rack, 200-40 A/C, good condition, £22.—Young, 119 Green Road, Bournemouth.

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