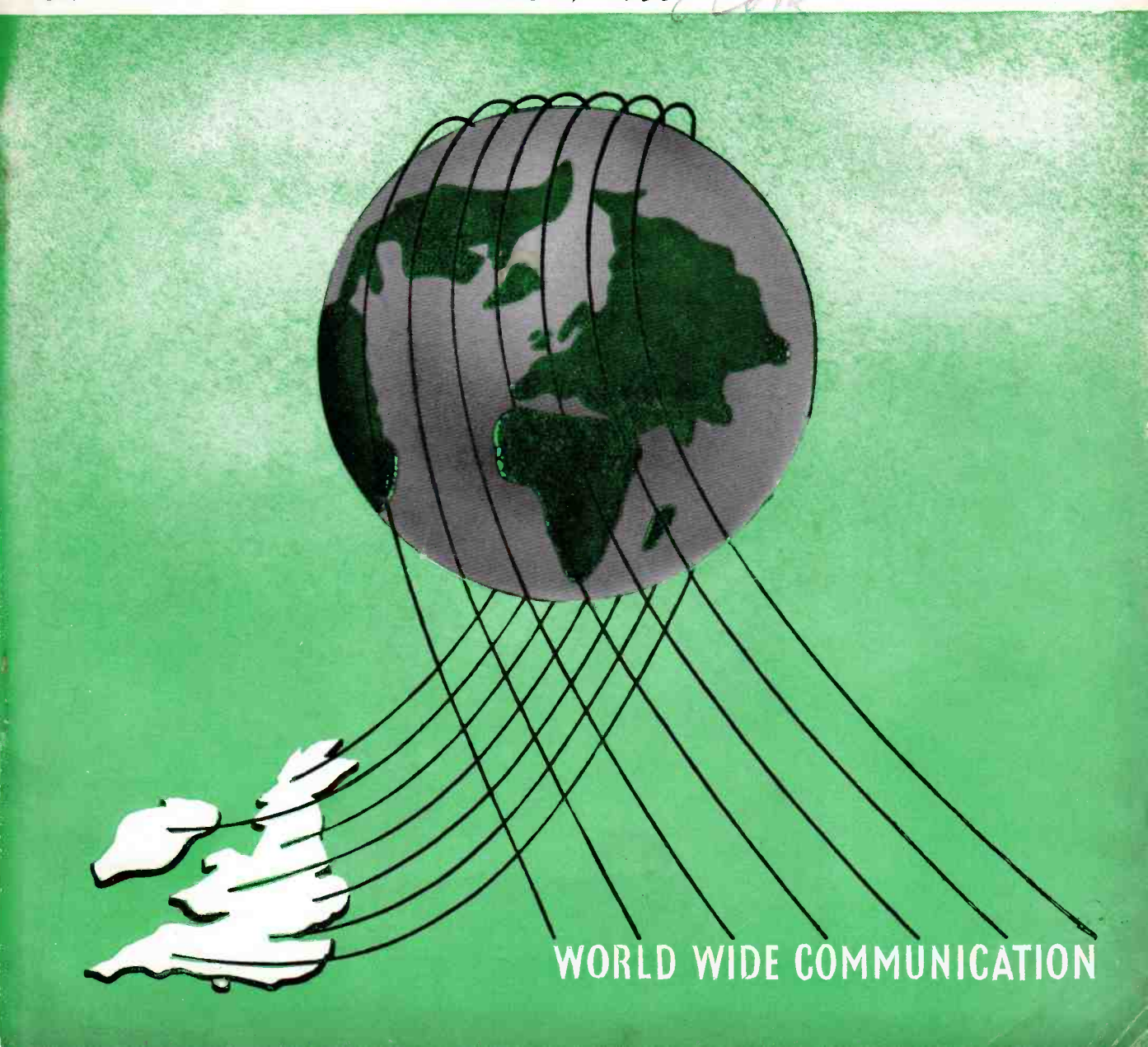
The SHORT WAVE Magazine

2/-

VOL. XIII MARCH, 1955 NUMBER 1



EDDYSTONE

MODEL '840A'

AC/DC COMMUNICATIONS RECEIVER

The new model '840A' illustrated above, possesses full Communication facilities and operates from either A.C. or D.C. mains 100/110 and 220/250 volts.

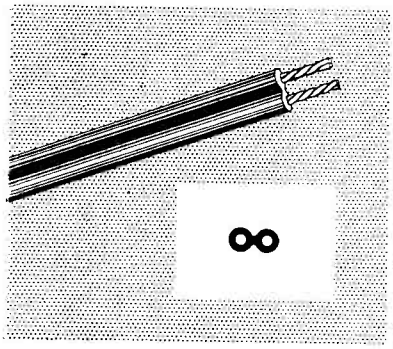
- **Seven valve superheterodyne with R.F. stage.**
- **Frequency coverage 30 Mc/s. to 480 kc/s.**
- **Clear, accurately calibrated horizontal tuning scales.**
- **Gear driven tuning with 140/1 reduction.**
- **Mechanical bandspread. Accurate re-setting.**
- **B.F.O. and noise limiter.**
- **Internal loud-speaker. Headphones jack.**
- **Robust diecast construction. Rustproofed steel case.**
- **Suitable for tropical service.**
- **Weight 30 lbs. Size 16¾" × 10½" × 8¾" high.**

List Price (in U.K.) £49

PLEASE WRITE FOR FULL SPECIFICATION TO THE MANUFACTURERS:

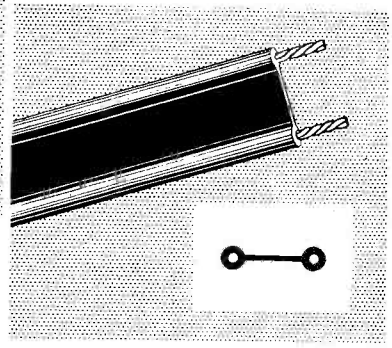
STRATTON & CO. LTD., ALVECHURCH ROAD, BIRMINGHAM, 31

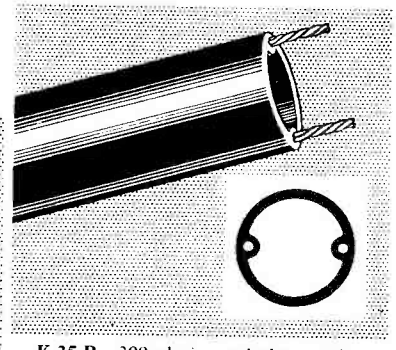
TELCON *LOW-LOSS* TRANSMISSION LINES



K.24.B 150-ohms nominal impedance, figure-8 section twin; capacitance 10.6 mmf/ft; Attenuation at 50 Mc/s, 2.1 db/100 ft; power rating at 100 Mc/s. 300 watts.

K.25.B 300-ohms nominal impedance, flat ribbon-type twin; capacitance 4.6 mmf/ft; Attenuation at 50 Mc/s 1.0 db/100 ft; power rating at 100 Mc s. 500 watts.





K.35.B 300-ohms tubular twin feeder with stable characteristics in varying weather conditions. Capacitance 4.0 mmf/ft; attenuation at 50 Mc/s, 0.92, db/100 ft; power rating at 100 Mc/s. 550 watts.

British Pat. No. 668,206

TELCON YOUR GUARANTEE

THE TELEGRAPH CONSTRUCTION & MAINTENANCE CO. LTD

Head Office: 22 OLD BROAD STREET, LONDON, E.C.2 — *Telephone:* LONdon Wall 7104

Enquiries to: TELCON WORKS, GREENWICH, S.E.10 — *Telephone:* GREenwich 3291

INDEX TO ADVERTISERS

SHORT WAVE MAGAZINE

VOL. XIII MARCH 1955 No. 139

CONTENTS

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

Advertisement Manager: P. H. FALKNER

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

Published the Friday following the first Wednesday each month at 55 *Victoria Street, London, S.W.*1. *Telephone: Abbey* 5341/2

Annual Subscription: Home and Overseas 24*s. post paid.*

AUTHORS' MSS

Articles submitted for Editorial consideration must be typed double-spaced with wide margins on one side only of quarto or foolscap sheets, with diagrams shown separately. Photographs should be clearly identified on the back. Payment is made for all material used, and it is a condition of acceptance that full copyright passes to the Short Wave Magazine, Ltd. on publication.

The SHORT-WAVE Magazine

E D I T O R I A L

Eventualities

The recent White Paper on Defence—grave enough in so many of its implications—is a clear call to all those in a position to give part-time service to the various national defence organisations.

So far as radio amateurs are concerned, these are the signals reserves of the three Services—the R.N.V.(W)R., the A.W.R.S. and the R.A.F.V.R.S.—or the communication sections of local Civil Defence bodies, including, in some areas, the Fire Service and the Special Constabulary.

Radio amateurs, by their specialised knowledge and ability, their adaptability and their enthusiasm, can make (and in some cases are already making) a most important contribution on the Home Defence front. To be fully effective, however, individual effort must be directly identified with some official organisation, either in Civil Defence or a Service reserve. Locally organised bodies of amateurs, intended to operate as a sort of "private emergency network" will—unless they are so closely integrated with the official communication system as entirely to lose their identity as an amateur organisation—assuredly fail to meet the requirement if a real emergency should arise.

Putting this another way, training must be with the equipment, on the frequencies and using the procedures which are common to the whole Home Defence communications system. No other course is possible if full efficiency is to be attained, and no encouragement or support should be given to private networks unless they are officially part of the local C.D. organisation.

Just two years ago we had occasion to draw attention to this subject and what was said then, in the present context, is just as true now.

And it is an odd comment on the friability of human affairs that the first occasion on which this space was used to discuss such matters was in the October of 1938, nearly 17 years ago—at the Time of Munich.

Austin Forbes G6FO.

Minimising Drift in the Crystal-Mixer VFO

USING N.T.C. CONDENSERS

C. C. STEVENS (G6XH)

It will be remembered that our contributor offered — in the September 1954 *issue of* SHORT WAVE MAGAZINE *— a VHF-VFO with a warm-up drift of less than 7 kc and a calibration accuracy within 3 kc, on Two Metres. Such a result would satisfy most people but G6XH has gone further than this — the drift has been reduced to 2 kc and the calibration accuracy is within one kilocycle, on the* 144-146 *mc band. This remarkable result is achieved, as explained in his article, by the use of negative temperature coefficient condensers. While this will be of particular interest to VHF operators, the significance of G6XH's work lies in the fact that the method he describes is equally applicable to VFO's for the HF communication bands, where the errors would be in terms of a few cycles only.—Editor.*

MOST amateurs will probably be aware that it is possible to reduce frequency drift in oscillators by the use of a special type of condenser which minimises the effect of normal capacity changes occurring with change of temperature. The author feels that his experience in applying this method to the VHF-VFO described in the September 1954 issue of *Short Wave Magazine* may be of interest — not only in this connection but also for its application to VFO's in general.

Performance of the VHF-VFO

It was suggested in the original article that the ultimate stability depended chiefly on the LFO and that the 18 mc output drifted somewhat less than one kilocycle during the first 20 minutes.

While this result when transferred to 144 mc is quite good the author (probably like many others) often wishes to operate his transmitter very soon after switching on, and it was therefore considered desirable to try to reduce this initial 20 minute drift. Furthermore, anyone using a VHF-VFO might well consider using it to treble to 70 cm, where this amount of drift might not be considered acceptable.

Apart from the circuitry no special care was taken in the original VFO to reduce the effects of warming-up, but it was felt that it ought to be possible to reduce it somewhat as, although during the summer the drift was actually around 700 cycles (at 18 mc), as the weather became colder it was found that it could not be relied on to be less than 1 kc ; this belief was strengthened by experience with a Top Band transmitter built from TU5B components incorporating the temperature compensated coil and condensers. The circuit and valve used for the oscillator were different from those for which these components were designed, but an attempt had been made to minimise the effects of valve capacity variations by tapping the grid and cathode of an ECO at impedance points as low as possible, as suggested by G2DXK (p. 339, July 1950, *Short Wave Magazine*). The drift then was equivalent to about 350 cycles on the 1.3 mc of the VHF-VFO (which may be compared with G2DXK's result on 3.7 mc, which was equivalent to just over 500 cycles, this being obtained by the use of a certain amount of negative temperature coefficient correction).

It thus appeared that an improvement was possible if suitable precautions were taken.

Causes of Drift in VHF-VFO

The stability of the 18 mc output of the VFO mixers depends not only on the LFO (which is itself liable to be affected by any change in the load presented by the mixers), but also on that of the crystal oscillator. The heat-up drift of the crystal oscillator itself and the LFO take place in the same direction, *i.e.* the frequency decreases, but if the difference frequency from the mixing is used, the two drifts will tend to cancel, and it has been verified that the 18 mc output drift is in fact less than that of the LFO. But it is the VFO output in which we are interested, and any attempts at stabilisation must be controlled by observation of the frequency of that output rather than of the LFO itself.

Method of Checking Frequency

The most accurate means of frequency checking available to the writer is comparison with the harmonics of the BC221 one megacycle crystal, and any measurements referred to or quoted here were obtained by comparing the 18 mc VFO output with the 18th crystal harmonic, and refer to 18 mc unless otherwise stated. The relevant figures for Two Metres are of course obtained by multiplying by eight.

As a variation of one cycle in the crystal (which might be caused by 1°F temperature

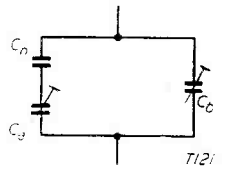


Fig. 1. The compensating circuit to minimise drift, as discussed by G6XH.

change) would lead to an error of 144 cycles/sec. on 2 metres, it is necessary to keep it set as accurately as possible — most conveniently by comparing its 15th harmonic with WWV on 15 mc. It will be possible to get within one or two beats per second by adjustment of the crystal trimmer on the front panel, and it has been found in the writer's case that a slight tilting of the BC221 case allows a delicate adjustment of the beats. In this way the accuracy is increased considerably, but this adjustment

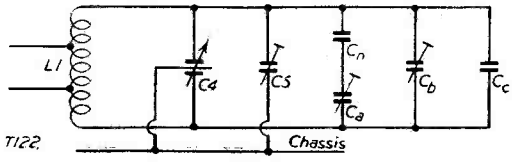


Fig. 2. The circuit of Fig. 1 introduced in the original LFO as shown on p. 395 of the September 1954 issue. C6 in that circuit is replaced by Cc above. C4, C5 are as in the original, Ca is 120 $\mu\mu$F, Cb 25 $\mu\mu$F, Cc is a 90 $\mu\mu$F condenser from a TU5B and Cn is a 270 $\mu\mu$F negative temperature coefficient condenser, as discussed in the text.

of the crystal should be checked frequently and, unless a frequency sub-standard is available, it is wise to view any actual figures with caution, and to consider that they indicate "trends" rather than very accurate measurements. The trends are sufficiently noticeable that it is clear that a considerable improvement in the performance of the VFO has been obtained.

Negative Temperature Coefficient Condensers

It was known that drift is caused chiefly by increase in capacity (due to heating) of any condensers associated with the oscillatory circuit and of the oscillator valve inter-electrode capacities, together with an increase in inductance of the oscillatory coil due to the same cause — and that this effect could be reduced by the use of one or more negative temperature coefficient (N.T.C.) condensers, which as their name indicates, vary in capacity with change of temperature in the opposite way to normal or positive temperature coefficient condensers, *i.e.* their capacity diminishes with rise of temperature. It follows, therefore, that a suitable choice of N.T.C. capacity should greatly reduce the effect of drift.

There are still on the "surplus" market small white cylindrical ceramic condensers of various capacities (the writer has found them up to 100 $\mu\mu$F) which apart from their value and tolerance are marked with an *N* (indicating negative coefficient) followed by a number giving the coefficient in parts per million. In those acquired at G6XH the coefficient has been 750.

Method of Compensating for Drift

Finding the optimum degree of compensation can be laborious, as each time soldering is done the equipment must be allowed ample time to cool. Frequency measurements should also not be taken for some time after replacing the VFO cover as it is essential to allow time for the contents to resume their accustomed relative temperatures.

As it was soon apparant that the correct N.T.C. capacity might be some intermediate value and as the writer likes to get such factors as nearly correct as possible, the following method was used which makes the operation reasonably simple :

Condenser C6 (135 $\mu\mu$F) of the original circuit was replaced by a 90 $\mu\mu$F TU5B condenser (*not* temperature compensated and shown as Cc in Fig. 2), which was available and considered to be potentially stable, plus the arrangement shown in Fig. 1, C_n being a suitably chosen N.T.C. condenser, and C_a and C_b miniature air trimmers. It will be clear that adjustment of C_a causes a change in the proportion of the negative characteristic of C_n effective in the oscillatory circuit. C_b can conveniently be used to restore the correct total capacity after C_a has been adjusted. C_n, C_a and C_b if built into an existing VFO can be made up on a separate small sub-panel and the complete oscillatory circuit is now as shown in Fig. 2, the values used by the writer being given. Other values for C_n and C_a may of course be used provided that the requisite amount of negative characteristic, as represented by the series value of C_n and C_a, can be obtained.

It will be seen that the zero setting trimmer C5 is connected across one half only of C4 in

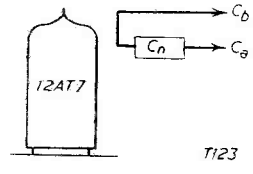


Fig. 3. Using the radiated heat from the 12AT7 LF oscillator to assist the stabilising process.

order to reduce hand capacity effects, which are now negligible. The various unbalances introduced by C5, C_n, C_a and C_b do not appear adversely to affect the balance of the push-pull oscillator, and it will be found that it is a fairly quick job to arrive at an approximate value of negative correction. Probably due to the different shapes of the positive and negative drift curves. it has not been found possible to make the resultant curve flat ; it will be found that if more than a certain amount of correction is applied in an attempt to reduce the initial drift beyond a given amount, then the frequency will first drift in the positive direction, then reverse, and start moving back again ! A compromise between initial and longer term drift must therefore be made, but in any case the amount will be seen to be relatively small. The optimum value of C_n in series with C_a with the author's VHF-VFO (as described in the September, 1954 issue) is between 20 $\mu\mu$F and 25 $\mu\mu$F.

Results

It has been found in practice that with ambient temperatures from 37°F to 56°F from day to day, the circuit can be adjusted so that from switching on the total drift is less than 350 cycles. During the first quarter-minute the deviation decreases fairly rapidly and except at the coldest temperatures becomes practically inaudible within five minutes and remains so for up to two hours' running. During this " steady " state there are variations which it is believed do not exceed 50 cycles/sec. overall, but it becomes difficult to measure these small variations, due for one thing to lack of a suitable standard of comparison, and also to difficulty in maintaining the mains voltage sufficiently constant. It has been found that a variation of 5 volts causes a frequency change of 30-40 c.p.s., and while this in itself is not great it shows the uselessness of attempting to assess frequency stability *too* accurately. It is possible that this effect of mains voltage could be reduced by using stabilised HT for the crystal oscillator and by arranging part of the N.T.C. capacity relatively near to the 12AT7 oscillator valve so that it would be " stabilised " by the direct heat radiated from it. If the mains can be held within five volts of nominal the writer feels that the result is satisfactory.

Placing the N.T.C. condenser near to the oscillator valve also accelerates its operation and thus decreases the time taken by the VFO to reach its normal steady working frequency, this being particularly desirable in cold weather when the equipment takes longer to reach a steady temperature. In the final set-up with

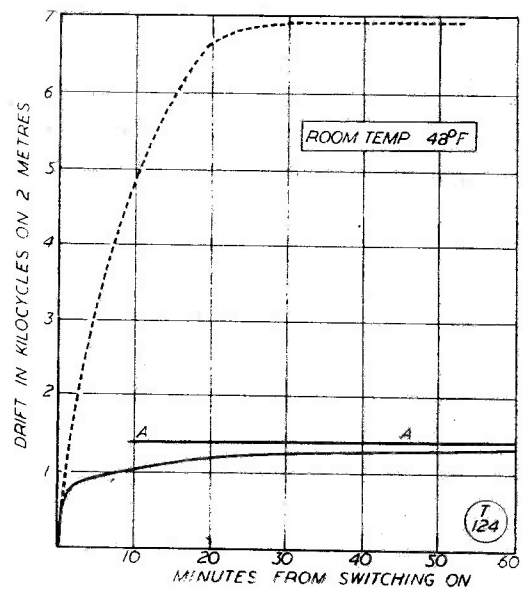


Fig. 4. The graph obtained by G6XH after the modifications discussed in his article had been applied. It shows the considerable improvement which resulted, as the dotted curve corresponds to the original drift curve on p. 397 of the September 1954 issue.

which the curve of Fig. 4 was obtained the N.T.C. condenser was arranged horizontally near the top of the 12AT7, with its axis at right angles to it and the nearer wire lead just not touching the glass of the valve. This is illustrated in Fig. 3.

Referred to Two Metres, the results mean that after one quarter-minute the deviation from normal running frequency should not exceed 2 kc, and within five minutes it should be within 1 kc of its steady state, and this steady state appears not to vary more than 500 c.p.s. It will probably be agreed that this is an acceptable standard of stability.

A simple application of negative temperature coefficient condensers has thus improved greatly the performance of the VFO, and it would appear to be well worth applying to ordinary HF VFO's for the communication bands. Fig. 4 shows the performance using measurements taken after leaving the VFO untouched for 24 hours, and also the original uncompensated curve for comparison. It will be seen that at a normal ambient temperature the results are well within the limits given above.

The method described is not new, but it is believed that the facts are not as well known as they should be, and that this description may be of use to others. The author wishes to thank those who assisted him with many discussions on stability, and also those who helped to confirm his results by tests on the air.

Electronic Aerial Relay

BLOCKING CIRCUIT ACTUATED BY RF

P. J. BUCHAN (G3GNY)

This is another of those ingenious circuits which give an instantaneous change-over for CW operation, in effect allowing for "listening-through." To make this fully effective, the transmitter must of course be keyed in such a way that it is completely cut off, from VFO to PA. The author discusses here only the aerial change over and receiver blocking arrangements, as applied to a low power transmitter.—Editor.

FULL break-in working, with an instant change-over from the transmit to the receive condition, has long been the aim of many a dyed-in-the-wool CW enthusiasts. The writer, whilst not in that category, has nevertheless always sought a simple means of changing the aerial from the transmitter to the receiver at keying speed without having a relay clattering in and out in time with the key. It is highly desirable that the same aerial and, if possible, the same aerial tuning unit, be used for both transmission and reception, and the "box" to be described allows both of these conditions to be met, the action being instantaneous.

Fig. 1 shows a typical arrangement of a transmitter connected to its tuning unit by means of a co-axial link. The receiver is connected in parallel with the transmitter, a switch S1 being opened during transmission, thus preventing the RF from damaging the receiver. The fact that the PA is in parallel with the receiver when listening is of no consequence because, although a certain amount of random noise may emanate from the PA stage, in practice this has not been found to be troublesome. An increase in the amount of PA bias will eliminate the trouble entirely. The switch S1 usually consists of a single pole relay which, like most things mechanical, is liable to give more trouble than its electronic counterpart.

Operation of the Circuit

Fig. 2 shows the complete circuit of the electronic relay and the associated diode rectifier unit. The relay consists of a triode grounded-grid stage, the grid of which is at earth potential to RF through C1. A 2-megohm resistor R1 provides a load for a high value of negative bias which will appear as soon as transmission commences. During reception the stage acts as a low-noise amplifier of inherent stability, the output appearing across RFC. This anode load will provide a useful amount of gain on the LF amateur bands, but if the performance of the receiver on 14 mc and above leaves something to be desired, then a tuned circuit covering the HF bands may be inserted between the choke and the valve anode. This arrangement will realise a *considerable increase* in the signal-to-noise

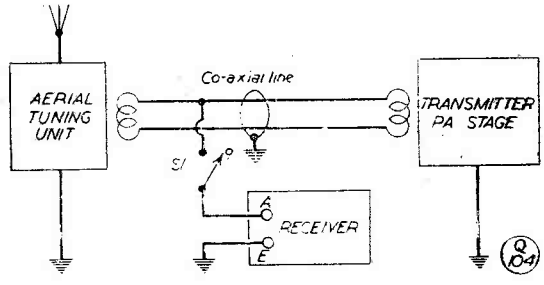


Fig. 1. Block schematic of the change-over problem at many amateur stations; S1 is the receiver aerial switch.

ratio and will improve the image ratio. R2 and C2 serve to provide the grid bias for the valve, and it will be noticed that the anode current flows through the link coils of the co-ax line. As soon as the transmitter output appears, about 200 volts of bias is applied to the triode grid and the gain of the stage falls to zero. The grounded grid forms an effective shield between the co-ax line to the aerial and the receiver input circuit, thus isolating it from the transmitter output. Stray couplings will allow a certain amount of signal voltage to appear at the receiver input but this will certainly be a lot less than would result from a separate receiving aerial not being switched out on "send"; the usual blocking bias will prevent heavy overloading of the receiver.

The DC bias for the triode grid is obtained from the diode D1, which is built in to the transmitter PA compartment. It will be seen that the diode is across the PA tank circuit and as soon as the stage operates the diode anode will rapidly take on a negative voltage equal to the peak value of the RF waveform. As this will be in the order of 80% of the transmitter HT it will be quite sufficient to cut off the triode stage; R3 and C3 form a simple filter to ensure that only DC is allowed to leave the transmitter, whilst R4 serves as the diode load. C4 should have a working voltage of four times

Table of Values

Fig. 2. Circuit of the Aerial Relay.

C1, C2, C3, C5,	R1 = 2 megohms R2 = 150 ohms
C6 = .001 μF	R3, R4 = 100,000 ohms
C4 = 50 μμF	R5 = 10,000 ohms

the HT if anode modulation is used. If the plate of the PA runs at more than say, 500 volts, it would be advisable to "tap down" the diode connection so that only a part of the RF voltage is rectified, otherwise an excessive DC voltage will be developed at the diode anode. All the diode components can be mounted on the diode valveholder so that installation is a simple matter. One unit for each transmitter in use will be necessary.

Application

The electronic relay derives its HT and LT supplies from the receiver and is permanently connected to it, being mounted on the rear of the receiver cabinet. It comes into operation as an amplifier whether the transmitter is being used or not. The co-ax line from the aerial tuning unit passes straight through the relay chassis, a small length of the cable being opened up to permit the connection of C2 and R2 to the centre conductor. There are no adjustments necessary and no snags have been encountered during about twelve months' operation with a ten-watt transmitter. Heater chokes are not needed on the LF bands but may improve performance above 14 mc. If operation is contemplated on the HF bands it would be

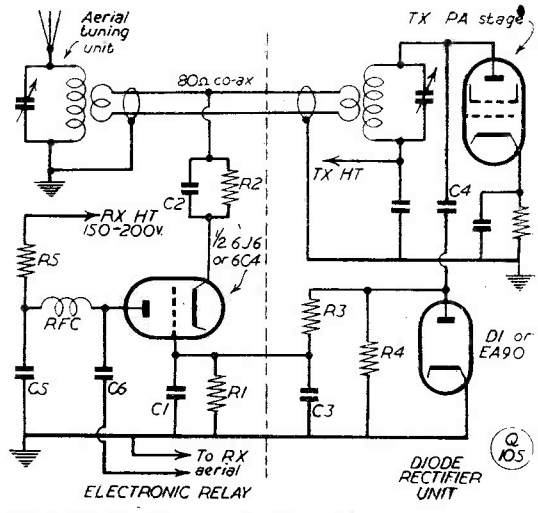


Fig. 2. Electrical layout of the electronic aerial relay suggested by G3GNY. The relay unit, coax line, receiver and transmitter must be bonded together. It should be noted that, in his case, the system has only been tried — albeit successfully and over a period — with low power.

advisable to make sure that the length of co-ax from the relay chassis to the transmitter is short compared with a quarter-wavelength, otherwise trouble may occur due to the mismatch which exists when the transmitter is not in operation. It should be added that the principles discussed here have not been applied (by the writer) to a high-powered transmitter, so that with PA's running at more than about 50 watts input, the method should be tried with due caution.

INDEX—VOLUME XII

This issue of SHORT WAVE MAGAZINE commences a new Volume. Every copy has gone out with a complete Index to the last Volume, No. XII, as a 6-page loose supplement, free of charge. Any reader who does not find the Index in his copy can obtain it by writing in to the office, enclosing a large stamped addressed envelope.

"THE OTHER MAN'S STATION"

This popular feature has appeared regularly in SHORT WAVE MAGAZINE for many years. The main requirements for a showing as "The Other Man's Station" is a good photograph with plenty of descriptive detail. Notes should cover the equipment, station activities, aspirations and achievements, and the interests of the owner as an amateur-station operator. Descriptions can be in "own words," and payment for the article as published is made immediately on appearance. We are just as interested in the newer stations as in those with an established reputation. If any part of the equipment is built to a SHORT WAVE MAGAZINE design, or has been inspired by some article in the *Magazine*, it is always of interest to know this, too.

XTAL XCHANGE

Readers wishing to *exchange* crystals are invited to make use of this space, which is free. Negotiations should be conducted direct and the notice set out in the form shown here.

G3DFF, 69 Shrewsbury Road, Carshalton, Surrey.
Has 100 kc and 465 kc bars, also 8100 and 14028 kc crystals, all certificated. Wants any frequency 12050-12100 kc.

G3IOZ, The Gables, Kilsby, Nr. Rugby, Warks.
Has crystals 7015, 7017, 7029, 7075, 7100, 7150 and 7175 kc, FT-243 mounting, ½-in. pins. Wants 455 kc bar and any frequencies for 3.5 mc CW band, any mounting.

G3JVK, 6 Colebrook Close, Worthing, Sussex.
Has 5490, 5910, 6030, 6287.78, 6490, 6827.78, 7950 and 8306.25 kc crystals. Wants frequencies in 1.8, 3.5 and 7 mc bands.

G5ND, 161 Penrose Avenue, Blackpool, Lancs.
Has frequencies 330, 3220, 3333, 5100, 8155.71, 8250, 8336.47 kc, and twin 7 mc crystal 7275/7290 kc in octal-based can with heater and thermostat. Wants 100/1000 kc bar for Class-D wavemeter, or single 100 kc bar; 465 kc IF bar, and 8 mc frequency to multiply into Zone C on two-metre band.

SWL, 22 Ryfold Road, London, S.W.19.
Has 3500 kc type DC-31, 7038.88 kc type CR and 1000 kc bar for BC-221. Wants 100 kc bar, preferably QCC 5/100, and frequencies for 160-metre band.

Starting on 25 Centimetres

Part II

TRANSMITTER PERFORMANCE—MEASUREMENT OF FREQUENCY AND OUTPUT — PRACTICAL POSSIBILITIES

A. G. WOOD (G5RZ)

The first part of this important practical article appeared in our February issue, to which sections of the text following necessarily refer. While the transmitter unit as described is built round a particular valve, the principles of design and construction can be applied to any suitable valve which is itself designed to give RF output in the 1000-megacycle region. It is intended, in future issues, to survey in some detail all the possibilities of our 25-centimetre band, with special reference to the setting up of point-to-point links.—Editor.

From the foregoing, therefore, it becomes evident that two or more alternative feed-back positions are called for and also provision for either capacity or inductive pick-up on the output side. Position A in Fig. 6A should be chosen to correspond with the junction of the cathode line to the cathode terminal and the feed-back probe can take the form of a 6BA screw working in a nut sweated to the outside casing of the unit. The screw is permitted to pass through a $\frac{1}{4}$ in. hole cut in the common gride line and should be long enough to reach the cathode tube. A 3/16 in. circular tab soldered on to the end of the screw will generally provide sufficient capacity to sustain oscillation. When not in use this screw is withdrawn to its fullest extent so that the tab rests almost flush against the inside of the plate tube.

For three-quarter mode operation a similar arrangement should be provided about 1 in. further away from the valve, but in this case a tab is not permissible since in certain plunger positions it may be desirable to withdraw the screw adjustment until flush with the outer tube so as not to impede plunger movement beyond this point.

With respect to output coupling arrangements it has already been stated that alternative capacitative and inductive pick-up is necessary, and, in fact, a combination of the two may be provided by introducing a narrow metal strip running parallel to the tubes, the end nearest the valve being sweated on to the extremity of the outer tube; the other end has a hole of perhaps $\frac{1}{4}$ in. diameter and is so positioned that the probe, which should be capable of in-and-out adjustment and which bears on its end a 3/16 in. capacity tab, is capable of passing right through the $\frac{1}{4}$ in. hole to make capacity coupling with the grid line beneath. Thus, in the position in which the tab registers with the hole an inductive loop is formed, whereas if depressed still further towards the grid line, capacitative pick-up is obtained. The probe can form the inner conductor of a 50 or 72 ohm co-axial cable which is coupled to the load, the outer cable being earthed to the exterior of the plate tube.

The sketch of Fig. 7 endeavours to explain this arrangement, which whilst a little tricky to set up initially, works quite well. Before leaving the subject of pick-up, it is suggested that one method which is perhaps worth trying would be to provide an inductive loop on the "live" side of the grid/plate plunger, feeding it through the plunger wall into co-axial feeder cable which is, itself, contained in a hollow push-rod of appropriate diameter. Since the "live" surface of the plunger is, at all times, operating in a field of high current density, it would seem that this coupling arrangement might hold good at all frequencies and in both modes. It has not, as yet, been tried by the writer, however, and is simply put forward as a suggestion.

Sufficient has now been said to show that circuits of this kind present a strange combination of electrical and mechanical requirements and that, in consequence, best results will be achieved where a happy compromise has been attained.

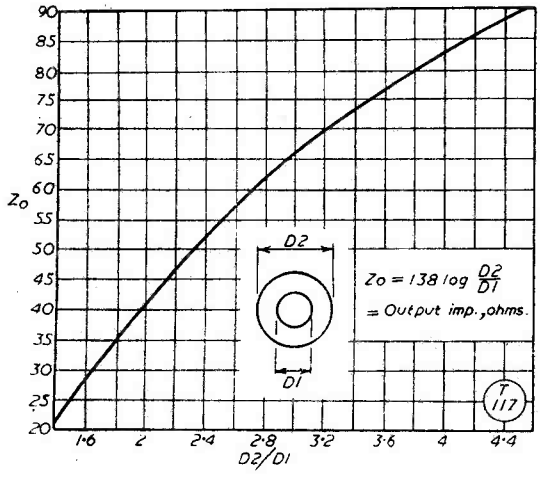
Plunger Construction

One very important factor affecting successful operation is the design of the shorting plungers or pistons. It is essential that *very good* electrical contact is at all times secured between the plungers and the walls of the tubes they are intended to short circuit. They are operating in any position under conditions of relatively high current and low voltage, so that poor contact will inevitably introduce serious resistance losses which, at best, will result in appreciable loss in efficiency and might quite easily prevent the circuit from oscillating.

Two types of plunger design are therefore

described. The first consists of $\frac{1}{4}$ in. thick brass or copper "pistons" machined down to make a very sloppy fit with the tubes into which they are intended to work. Two pieces of thin, springy, copper are then cut about $\frac{3}{4}$ in. in width and of sufficient length just to wrap round the piston, the one internally and the other externally. They are temporarily held into position with the piston so placed that a $\frac{1}{4}$ in. fringe projects on either side and the whole assembly is then sweated together. After removing the temporary retainers, the unit is carefully cleaned, and with a pair of tin snips a large number of transverse cuts are made in the $\frac{1}{4}$ in. fringes. These are then bent individually slightly away from the piston and the tips turned slightly inwards. Finally, these "fingers" are adjusted until they all make a good sliding fit with the walls of the tubes and the multi-contact points so produced are carefully burnished before the plunger is put into operation. The finished plunger then looks somewhat like Fig. 8.

The alternative method is to machine the piston to much closer limits and to turn out a shallow groove on both peripheries in much the same manner in which a piston-ring groove would appear on the piston of an i/c engine. Piston "rings" are then constructed of thin copper strip with a crimped construction exactly like a narrow strip of corrugated cardboard. These rings, after being cut to size, are then "sprung" into their grooves as the piston is inserted into the tubes, each separate corrugation then making contact with the tube wall. Possibly other alternatives will suggest themselves to the mechanically minded, but the over-all consideration is good, smooth contact at all plunger settings. If there is any appreciable RF leaking back through the shorting plungers, at some settings back-cavity resonance may be encountered resulting in sudden complete absence of oscillation or loss of output at certain frequencies.



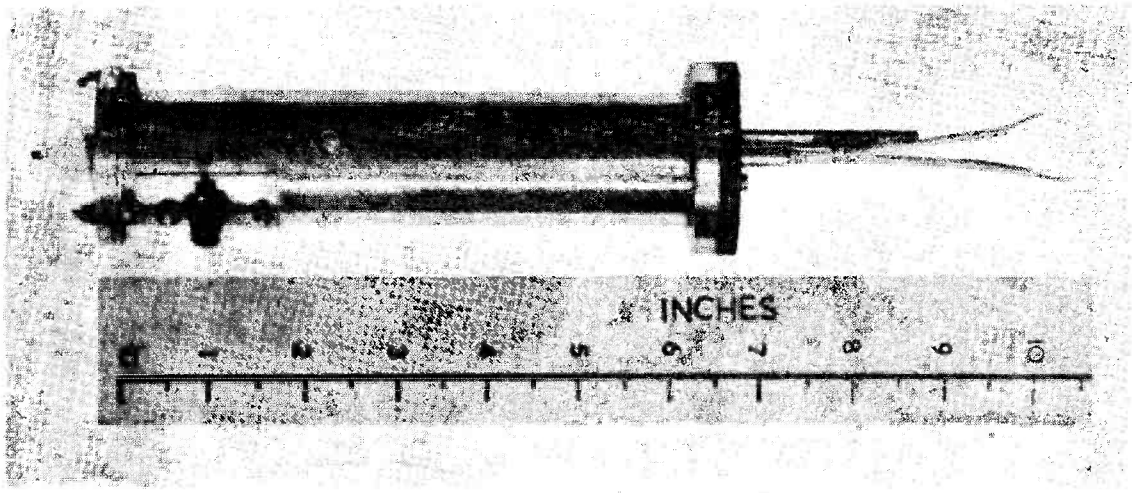
Curve relating the ratio of tube diameters (concentric line) with the output impedance, Zo. This graph enables circuits to be designed for a required impedance, or gives the impedance that will be obtained with valves of varying dimensions.

And, of course, it goes without saying that the cavity walls must be clean and highly polished. Doubtless, silver plating would add to the all-round efficiency at these frequencies, but oscillation and some degree of RF output *can* be obtained without it, as the writer has proved to his own satisfaction.

Practical 25-Centimetre Transmitter

Now as to practical results. The prototype oscillator built by the writer is shown in completed and "exploded" form in the photographs and, in fact, the circuit shown in Fig. 5A is based on this design with all dimensions given as constructed. It utilises a Mullard TD03-10 with a rated input of 10 watts maximum. Normal tuning arrangements no longer hold good at these frequencies and the chief value of the anode current meter is to prevent over-loading. Anode current jumps up as the circuit commences to oscillate and the degree of oscillation is shown on the grid current meter (which is very necessary for proper adjustment). In an unloaded condition with maximum feed-back, grid current may rise to a figure in excess of 20 mA. It is not considered desirable or wise to operate, other than momentarily, at this high figure and provision should immediately be made to couple on a suitable load which, for provisional tests, can consist of a 6-volt, 2 or 3-watts flashlamp bulb. As the load is applied grid current will drop appreciably and a rough and ready guide seems to indicate that grid current on load should be adjusted by alteration of pick-up adjustment, or feed-back coupling, or both, until approximately half the unloaded reading is obtained.

With the feed-back probe in the forward position, the frequency range of this particular instrument, in quarter-wave mode, is approximately 500-1310 mc as measured by Lecher lines. It must be admitted that with this particular instrument three-quarter wave mode operation was not so successful. This may be due, in part, to inadequate mode separation (a ratio of 3·2); slightly incorrect positioning of feed-back arrangements or insufficient length. The actual prototype measurements are, in fact, one inch shorter than the dimensions suggested in the key to Fig. 5A. Be that



Another view of the 25-centimetre oscillator described by G5RZ in this article. The mechanical details are shown in the sectional drawing, Fig. 5A, and an exploded view in one of the other photographs. *(See pp. 653, 655 of the February issue.)*

as it may, feeble oscillations have been detected in the region of 2350 mc, although too weak to be of any value, and moreover, it was found possible to operate the grid-cathode line in three-quarter wave mode, under which conditions output could be obtained up to a maximum frequency of approximately 1475 mc.

Measurement of Frequency

At centimetric wavelengths, measurement of frequency—close enough for practical purposes, within the limits of this discussion—is very easy ! It is simply a matter of setting up a Lecher line, as described in any of the handbooks, or see *Short Wave Magazine*, August, 1952.

Frequency can be checked to a surprising degree of accuracy and if the Lecher line set-up is itself mechanically stable, a UHF oscillator can be checked for stability within useful limits. In this case, the test is to see how much the frequency—as measured on the Lecher line — varies when checked over a period. In the model shown here, the frequency settles down reasonably close to the same setting after the time allowed for cooling down and warming up again.

Measurement of Output

Measurement of output at these ultra-high frequencies present difficulties. For tuning purposes the output end of the co-axial feeder was connected across a 6-volt 0·45 amp. flash-lamp bulb, and under these conditions maximum brilliancy was obtainable in the region of 8-900 mc. There can be no doubt, however, that this set-up provides a most unsatisfactory match and the losses due to standing waves must be very considerable indeed as the frequency is increased. Furthermore, base losses in the bulb are obviously very high — the amount of heat generated at this point in relation to the degree of light emitted is evidence of this ! It is of interest to note that towards the higher frequency end of the tuning range greater brilliance can be obtained by connecting one of the lamp leads to the centre conductor of the co-axial cable, leaving the other lead entirely *dis*connected ! However, the main factor is that in the oscillator illustrated here adequate feed-back can be obtained over the 1215-1300 mc band, and it is felt that with a correctly designed aerial arrangement a useful amount of RF energy can be radiated.

Some Experimental Results

Experiments are now proceeding with aerial design and field-strength measurements. Making use of a simple half-wave dipole with a 6 volt 0.04 amp. lamp connected to its centre comparative tests were carried out with various types of radiators. To date the most successful has been a folded quarter-wave ground plane, vertically polarised, with 90° corner reflector. The ground plane comprises a sheet of aluminium roughly 7 ins. x 10 ins. with the radiator projecting vertically through the centre. The ground-plane assembly can be made to stand about 6 ins. to 12 ins. above the oscillator, on four legs of suitable length, with a short run of co-axial cable connecting the output from the oscillator to the radiator. The reflector consists

of a second aluminium sheet not less than 7 ins. x 14 ins. bent to form two 7 ins. x 7 ins. squares. This rests on top of the ground plane and its distance from the radiator as well as the angle can be varied experimentally to find the best conditions.

With a 90° angle and a spacing distance of $2\frac{3}{8}$ ins. (quarter-wave) it is possible to obtain a glow on the reference dipole lamp at a distance of three feet from the radiator, whilst at closer distances the lamp will light up quite brightly.

The next step was to construct a more sensitive measuring device. This took the form of a folded dipole connected across a 1N21 crystal. Output is taken *via* a quarter-wave stub, $2\frac{3}{8}$ ins. in length, into a 500 microamp. meter. A 20 $\mu\mu$F condenser in series with the dipole element serves as DC blocking for the meter, and the far end of the stub is terminated across 300 $\mu\mu$F. The whole assembly is made up of 18g. wire.

With this device full-scale readings are readily obtainable in the radio room at a distance of about 14 feet when on the beam, or by reflection from sundry pieces of equipment around the walls ! A deflection is just observable through 18 ins. of solid brick-work.

With the transmitter firing through the window panes a deflection of between 10 and 20 μA can be obtained at a distance of 100 feet.

The wave appears to be strongly polarised in the vertical plane since vertical readings on the field strength meter in the region of 100-200 μA are reduced to zero if the FSM is turned into the horizontal.

A very marked phase-difference effect can also be detected. If the FSM is aligned on to the beam and the distance from the transmitter is varied, by stepping out, very pronounced nodes and anti-nodes will become apparent, the distance between each peak or each null being one half-wavelength. The same effect is to be observed on a side-to-side motion of the FSM. This makes it very difficult to plot any kind of radiation pattern as only a few *inches* of movement will make such a wide difference in meter reading. There has not been sufficient time to investigate this fully and the effect may be a function of corner reflector spacing or angle.

A reflecting plate behind the measuring dipole also has a noticeable effect on the meter reading, as has also reflection from nearby objects — a wall, or a garage door, for example — even at quite a distance from the transmitter.

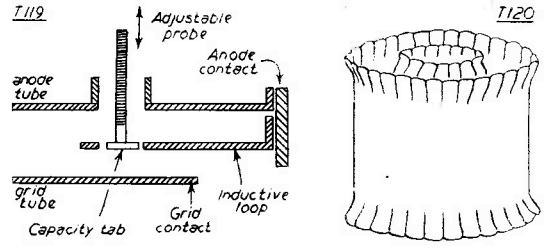


Fig. 7. Showing (left) one method of obtaining a combination of capacity and/or inductive pick-up on the output side. At right is Fig. 8, representing a tuning plunger, or "finger," constructed as described in the text. The lips are sprung to give firm, smooth contact on the walls of the tubes.

Receiver Possibilities

As to the receiving side, three approaches appear to be possible — (1) A crystal-mixer superhet with a broad-tuning IF amplifier ; (2) Another oscillator such as that described in this article, with a quenching frequency applied in the super-regenerative mode ; or (3) The more conventional type of super-regen. receiver, using a valve such as the 6F4, good for 1000 mc.

The outcome of these investigations will be reported in future articles, the objective being to develop a complete transmitter-aerial-receiver system on the 25-centimetre band, capable of operating as one end of a local talking channel. With the aid of others able to repeat the equipment, it will then be possible to investigate propagation factors on this band

APPENDIX

$$Zo = 138 \log \frac{d2}{d1}$$

Zo = characteristic impedance in ohms
d2 = i/d of larger tube
d1 = o/d of smaller tube, both in similar units

$$Xc = \frac{1}{2\pi f C}$$

Xc = capacitive reactance of relative electrodes at minimum chosen frequency
f = frequency in megacycles
C = interelectrode capacity in μF as stated by the manufacturers

$$\theta = \tan^{-1} \frac{Xc}{Zo}$$

θ = angular length of the line in electrical degrees

$$L = \frac{0.83 \times \theta}{f}$$

L = metres
f = megacycles

N.B. This result should be increased by about 10%.

$$f = 2760 \frac{1}{\sqrt{Zo \; L \; C}}$$

L = physical length of line metres with plunger in its closest position to the valve
C = terminating capacity in $\mu\mu$F
f = megacycles

N.B. This result should be reduced by about 20%.

under practical amateur conditions.

Naturally, a great deal still remains to be done. But if these notes succeed in creating interest in, and some measure of activity on, these higher frequencies, then they will have served their purpose.

Acknowledgment

Finally, the writer would wish to acknowledge his indebtedness to the staff of Havard University's Radio Research Laboratory, joint authors of *Very High Frequency Techniques*[1], and in particular to W. R. Rambo for the section dealing with Coaxial-Line Circuits. Their findings, so clearly explained, have been a constant source of inspiration and guidance during the series of experiments discussed here.

REFERENCE

1 "Very High Frequency Techniques", Vol. 1. Staff, Radio Research Laboratary, Harvard University. Published by McGraw-Hill.

Semi-Conductor Characteristic Curves

PLOTTING BY THE LOAD-LINE METHOD

E. JOHNSON (G2HR)

APART from their use as rectifiers, semi-conductors, *e.g.* germanium and silicon, are frequently required as non-linear resistors. A number of types are obtainable on the surplus market, but are not always readily identifiable. Reference to makers' data will not therefore help.

Plotting Curves

It is, of course, quite simple to draw the static curves by using a variable voltage supply, as shown in Fig. 1, and then plotting current against applied voltage as indicated in Fig. 2. As silicon and germanium diodes will only stand a comparatively low voltage, and one is often more interested in the "knee" of the curve where resistance changes rapidly, a dry battery is suggested. The usual potentiometer method of adjusting applied voltage has certain disadvantages; the constant current drain necessitates a continual check on voltage, and in order to obtain an approximately linear voltage drop along the potentiometer its resistance must be low compared with the lowest likely resistance of the diode at any given point.

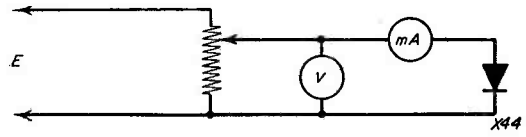


Fig. 1. Method of plotting curves using a potentiometer. G2HR explains in the text why the load-line method is preferable.

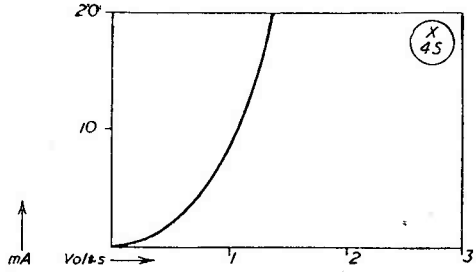


Fig. 2. Typical diode static curve, as discussed in the article.

Load-Line Method

A method used by the writer largely overcomes these snags, and the characteristic curve is plotted by an indirect method, almost as speedily and with the same degree of accuracy.

Reference to Fig. 3 will show that where a non-linear device — a thermionic valve, for example — is connected in series with a resistor, and a voltage applied, certain deductions may be drawn. Assuming a plate supply of 100 volts, it is evident that when the voltage drop in the resistor is zero, the current must also be zero, or in other words, the full supply voltage appears

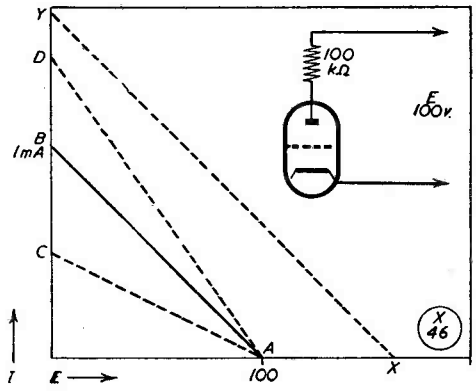


Fig. 3. Typical load-lines. A-B shows a load-line with a 100,000-ohm resistor and 100 volts HT; the lines A-C and A-D are as obtained with different values of resistance but keeping the HT constant. X-Y is a line taken with the 100,000-ohm resistor but increased HT voltage. A-B and X-Y are always parallel, this applying to any load-lines taken with the same resistor but different HT voltages.

on the anode of the valve. Point "A" in Fig. 1 can therefore be inserted at zero current and 100 volts. If we take a load resistor of 100,000 ohms and take the point where there is zero drop across the valve, the full supply voltage is across the resistor, and the current must be 1 mA, as shown at " B." The load being a pure resistor will conform to Ohm's Law in the usual linear manner, and it is permissible to draw the straight line "AB." Obviously other load resistors will show lines of varying slopes all with their points of origin on "A." Varying the supply voltage, with the same load resistor, will give a fresh load-line parallel with the first.

It will be clear from this that with a given voltage which fixes point "A," and knowing the current through the resistor load only (which determines point " B ") we can draw our load-lines independently of the characteristic curve. It will equally be apparent that we do not even have to know the precise value of the resistor provided the current falls within the required range.

A selection of resistors should therefore be taken, preferably in the " hundreds " range, up to a maximum of 1,000 ohms. Draw the load-lines, and then measure the current through diode *and* resistor, together. The current shown with any given resistor will then fall on the load-line for that particular resistor. These points should be carefully marked, and a smooth curve drawn through them, as in Fig. 4. A final reading may be taken with the diode only in circuit.

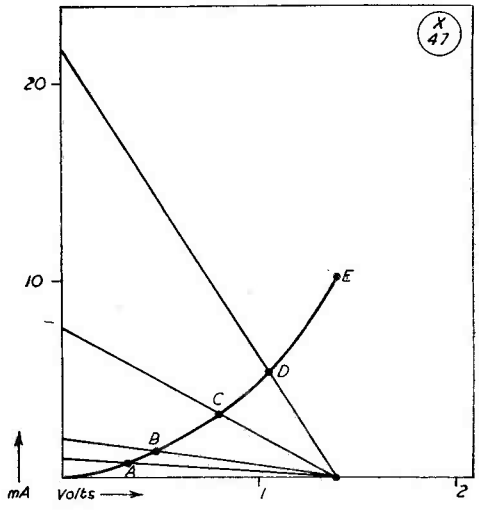


Fig. 4. The curve obtained using the load-line method described by G2HR. Points A, B, C and D show current through the resistor and diode together, and point E the current through the diode only. In this case, the battery voltage was 1.4.

RADIO AMATEURS' EXAMINATION — MAY

Intending candidates are reminded that their application to sit the next R.A.E., on May 6, should be sent in without delay. Details regarding the Examination itself should be available from the County Education Authority *or* the Principal of the local Technical College *or* from the Superintendent, Department of Technology, City & Guilds of London Institute, 31 Brechin Place, London, S.W.7, the examining authority for the R.A.E. Candidates normally sit the Examination at some convenient centre as near as possible to their homes—it is to enable the necessary arrangements to be made that applications must be in early. Readers taking the next R.A.E. are referred to a very useful practical article, "Tackling the Radio Amateurs' Examination," which appeared in the March 1954 issue of SHORT WAVE MAGAZINE.

DIRECT SUBSCRIBERS

A subscription to SHORT WAVE MAGAZINE for a year of 12 issues costs but 24s., post free to any part of the world. This ensures a copy being sent by direct mail on the day of publication. We are also pleased to make gift-subscription arrangements for overseas contacts. Orders, with remittance 24s., to: Circulation Manager, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

PHOTOGRAPHS FOR PUBLICATION

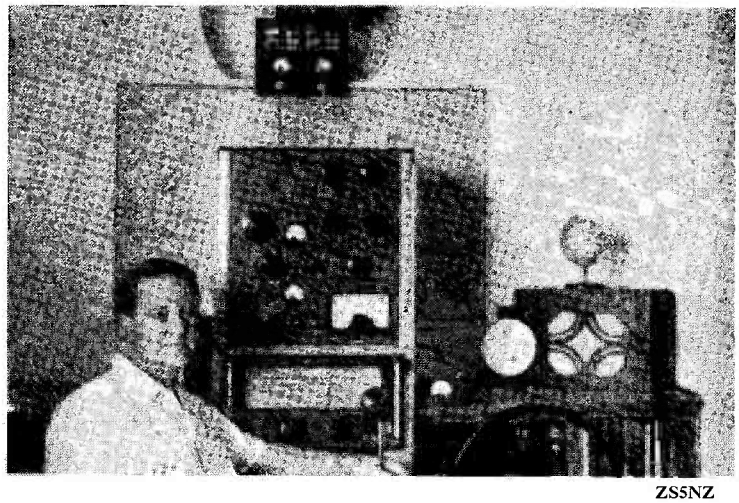
We welcome, for publication in SHORT WAVE MAGAZINE, photographs of Amateur Radio interest—covering stations, personalities or equipment, at home or overseas. Prints should be clear and sharp, with descriptive notes on a separate sheet (do *not* mark the back of the photograph). All those published are paid for, immediately upon appearance in print.

OBITUARY

We very much regret to announce the death, early in February, at the age of 56, of Air Vice-Marshal W. E. Theak, C.B., C.B.E., R.A.F. (retd.), of Woodbridge, Suffolk. He will be well remembered by many as one of the most distinguished signals officers in the Royal Air Force. On attaining air rank, he was successively Chief Signals Officer, Bomber Command; Air Officer Commanding No. 60 (Signals) Group; and Director-General of Signals in the Air Ministry, the highest signals appointment then open to an officer of the technical branch of the Royal Air Force. Air Vice-Marshal Theak joined the old R.F.C. in 1917 at the age of 18 and served with the R.A.F. at home and overseas until his retirement from the Service in 1951.

DX COMMENTARY

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



ZS5NZ

CALLS HEARD, WORKED and QSL'd

A FAIRLY lively month this time, and a brighter outlook altogether. The mere psychological effect of having embarked on a new cycle has proved a stimulus, and several types have come out of hibernation and developed quite an aggressive attitude—they are actually on the bands, *looking* for DX!

All bands from 1.8 mc to 21 mc have carried their share of the traffic, and it should only be another twelve months or so before 28 mc is back in full cry.

Of course, we still have patches of bad conditions, and quite long ones at that, but at least we know that there's always another good spell coming.

Taking *Twenty* as a barometer, one notes that not only is there more varied DX around at any given time of day, but that the DX signals are, on the whole, stronger than they were this time last year. Furthermore (it may be imagination. but we hope not) it seems that European interference is getting less troublesome and that the short-skip bugbear is lessening already.

So we will now let this Commentary unfold itself, band by band.

Top-Band Trans-Atlantics

Once again, the full story must wait for the complete summing-up. Meanwhile, it is in order to say that January 16 was a bit of a flop (the Inter-G Contest on that date didn't help), but that January 30, the "Novice Night," was better, although very few got across. W8's and 9's were numerous, and YV5DE was also heard over here. (Remarkable thing. but most of the G's reported on the other side had two-letter calls, and pretty familiar ones at that!) W1BB was still easily audible at 0830, but receiving conditions over there were obviously not too good. One unidentified "VP" logged here was believed to be VP7NG. TI2WR was being worked by W's, but not heard on this side, so far as we know.

G3IGW received KP4KD, KV4AA, VP7NG and YV5DE on this occasion, and, like many others, has some pretty strong things to say about some of the "novices" heard on what should have been a quieter band.

By the time you read this, the series will be over, the last organised date having been February 13, but we have no doubt that Sunday-morning activity will continue well into March. It has only been during the last two seasons that conditions have peaked around Christmas; prior to that we had some extremely good results during the March tests.

We will be keeping an eye on things, and although the summary of this season's Tests is planned to appear in the next (April) issue, we shall include as much as we can of all the activity up to mid-March. All who took part in the official Test Schedule are asked to let us have summaries of their results as soon as possible, so that they can be written into the detailed Report.

Countries and Counties

Apart from the Trans-Atlantics and other infrequent DX contacts, the usual high level of activity continues on the 160-metre band. Whether this will fall off when the DX bands become really good remains to be seen—but there certainly seems to be a lot of enthusiasm for medium-DX and local contacts on Top Band.

One of the latest to collect WABC is G2HAW (Hounslow), with 70 counties worked. This was achieved with a power of two watts, to make it a little more thrilling. With a maximum of 5 watts, eleven countries have been

worked, including W, OH, OK and HB.

GC3HFE (Guernsey) stays on the band by choice nowadays, having been more or less dragged on to it a year ago by remarks in this column about the desire for Guernsey contacts. He QSL's every QSO, but his own returns are only 30 per cent.—a Bad Show! He hopes that he may be able to put Alderney on the map before long, and mentions that if anyone hears either GC3HFE/A or GC3EBK/A, it might be worth investigation.

G3JHH (Hounslow) worked GC3HFE for a new one, but is *still* chasing Oxford without success. G3JJZ (London, S.E.6) found conditions extra good on February 2, when the OK's were all S9 *plus*, and buried under them were UB5CF and ZC4GF. Several OK's and HB9T were worked—also G3KAJ (Hereford), who is an interesting new one.

G3KEP (Bingley) reports for the first time. He is a 15-year-old who was licensed on January 28, and in his first twelve days of operation he raised 33 counties, to say nothing of OK1MQ, 1KTW and 3AL. He is active on Top Band only, every evening, hours depending on the homework situation!

G3JYV (Mitcham) was surprised at the frequent appearances of ZC4GF, and says that the response to these appearances must have given 'GF the impression that G's were licensed for Top Band only, and spot on his frequency at that! G3JYV also noticed high activity from HB9CM and HB9T, but hasn't raised them yet, although OK seems easy.

G2HKU (Sheerness) worked DL2VO several times; he claimed to be using 2 watts, QTH Herford, BAOR. Others raised by 'HKU were HB9CM and a flock of OK's. A Sunday cross-band sked with PAØPN is very successful—he receives G2HKU's phone very well on Walcheren Island, and replies on Eighty. OK1HI told 'HKU that he had worked ZC4GF, OD5LX and lots of W's.

G3JVK (Worthing) booked in GM3DOD (Renfrew) and G2FLU (Hunts) as well as OK3AL; he also had a report from Bear Island, 1500 miles North! GM3JNW (Alloa, Clacks.) needs only Dorset, Oxford and Suffolk for all English counties, but finds it difficult to get out to real DX. He has worked OK, but has only heard ZC4GF and can't raise him; GM3JNW mentions a possible Easter expedition by G3IGW into Selkirk, East Lothian and Kinross, and hopes to co-operate. Finally, he says that a new supply of QSL's is awaited, and that those "Clacks" cards *will* be forthcoming.

G3FAS (High Wycombe) managed a few new ones, and received OD5LX, but didn't make a contact there! G3JBK (Bexleyheath) heard YU1GM on the band, also a station he thinks was YV5DE. The former was at 0630 GMT, the latter at 2000, when he only rose above the "muck and rubble"

TOP BAND COUNTIES LADDER

(Starting Jan. 1, 1952)

Station	Confirmed	Worked
G5JM	94	94
GM3OM	93	95
G8KP	92	92
GI6YW	91	91
G2NJ	91	91
GM3EFS	89	91
G6VC	87	87
G5LH	87	87
G3JEQ	86	87
G3HDQ	85	85
G3HIW	84	89
G3CO	83	84
G3JML	80	81
G3EUK	77	83
G3BRL	76	76
G2AYG	73	74
G3JHH	71	73
G3DO	67	67
G3IGW	66	81
G3HQX	66	73
G3GYR	66	67
G3JKO	65	73
G2HAW	61	70
G5AO	61	64
G3HZM	61	62
GM3JNW	58	68
G2HKU	55	56
OH7OH	53	55
G3JJZ	52	61
G3JBK	47	57
G2CZU	46	47
G3JBU	41	45
G3FAS	40	49
G3IAD	38	59
G3DGN	34	53
G3JYV	33	48
EI8J	30	45
GC3HFE	30	44
G3JVK	24	39
G3JZG	22	39
G3JJG	20	48

General view of the Base station at Britannia Lake, North Greenland, from which G3AAT/OX was operated on the amateur bands.

for the space of about two call-signs and one CQ, so remains slightly doubtful.

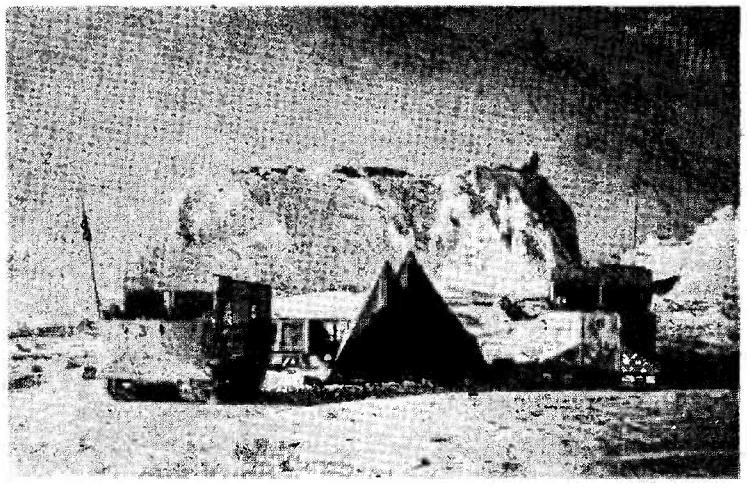
G3ETP (Lowestoft) mentions a notable QSO with G3ABM/A, who said he was operating in a *pig-sty*! No explanation forthcoming, so don't ask us . . .

ZC4FB and 4CA are both back in G-land by now, and if anyone is short of a ZC4FB card, they can get in touch with E. H. Ross, War Office Wireless Station, Beaumanor Park, Loughborough, with full details, and one will be sent *via* the Bureau. Before returning, ZC4FB had heard G8PU, also OK1LM working W1WY, W2GGL and W3RGQ; the latter was RST-229 in Cyprus.

G2NJ (Peterborough) has now discovered that the King's Dyke, on which his boat is moored, is the actual dividing line between Hunts. and Cambs. So he suggests that QSO's with him, when he is on the present mooring, should count for *both* counties! We can't quite swallow the idea of working two counties on one contact, though, however attractive it may sound . . . and as he has been "Hunts." for so long, that seems to be the one to stick to. Other news from 'NJ: he called PAØPN, who replied, but said "Not permit work foreign stations, hr Dutch flood-warning station near Flushing." But he gave the RST, and that was obviously a Top-Band QSO with PA! On the same day (February 12) G2NJ heard HB9CM calling HE9EHD—so there may be an interesting new one out there.

G2CZU (Bath), once mentioned as the only amateur we knew of who was trainer of a Rugger team, has now been "promoted" to look after the Bath 1st XV, and has less time on the air as a result. He has a lot of travelling to do, so when your local Rugger XV is playing Bath you will find G2CZU "toting the sponge." He is still chasing WABC, but can't induce the GM's to reply to him.

GM3HLQ (Lanarks.) plans a fortnight's expedition in July, during which he will visit the island of Islay; CW only on Top Band, *plus* CW and phone on Eighty. There is a fine site there, right on the edge of the ocean, with the U.S.A. as the nearest land. We will doubtless be having more detailed news later.



The two tracked vehicles in this picture are "Weasels," radio equipped for local and inter-communication working, and used by the British North Greenland Expedition for survey and exploration during the Arctic summer. It was from one of these that G3AAT/OX succeeded in working G2DZ of Daventry on the 40-metre band — see story in February issue.

Late Flash: G3IGW (*see* note in earlier paragraph) says he *will* operate from Selkirk on the Saturday, East Lothian on the Sunday, and Kinross on the Monday of the Easter Week-End, April 8-11. Snappy QSO's only—and the more the merrier.

14 mc Band

G5BZ (Croydon) enjoyed the recent spells of good conditions and remarks in particular on January 16, when Twenty was open to U.S.A. until 2330 GMT. This, as he rightly says, would be pretty remarkable for January, even at the *peak* of a sunspot cycle. He worked VE8, W6 and 7, YV, VP5, 7 and 9, JA, VS2, lots of VK and ZL and plenty of Africans. 'BZ heard a nice one on an occasion when the whole band was going mad over "ZA1BB." In the middle of a terrific pile-up of W's calling this chap, some wit came on and called "ZM7AA de ZC5BF"—and, sure enough, the W's were all calling ZC5BF for the next twenty minutes . . .

A good bit of QRP work is reported by G2HAW (Hounslow). With 4 watts to a CO, he came on Twenty and raised several stations, the best being W2GTL and W2NIN (bot! 559x), with a "W3EDP" aerial about 25 feet high.

DL2RO (Hamburg) found it profitable to listen round as early as 0600. Between this hour and 0700 he had good QSO's with ZS2A, MP4BBL, VU2JP and ZD6BX. Others, at various times, were VS9XZ (SU1XZ with a QRP rig in VS9), VP9's, HP1BR (1630), FB8BR (almost nightly at 1800), FY7YE (1530), FI8BA (1330), VP4LZ (1730). VQ and ZL have been good most days, and West Coast W's very consistent, especially W6WZD with a rhombic (six wavelengths per leg!) and a terrific S9 signal.

G3IAD (Wakefield) raised CR5SP (1230), VP7MI (1740), VE8PF (1230) and MP4BBL (0630). He has collected his DXCC and WGSA since he last reported for this feature.

Fourteen Metres

G5BZ, now scoring 109 on this band, made the best of some spells of good DX, especially on January 16. Contacts during the month included VE1, 2, 3; W—all except 6 and 7; VQ4, ZS, ZD6, ZD2, ZE, ZC4, ZB1, VS and VU. He is all in favour of a 21 mc Contest a little later in the year. G2YS (Filey) collected

ZD2DCP for a new one.

DL2RO insists once more that this band is shockingly neglected, and that it only needs some occupation to produce good DX results. He has brought his score up to the century, and has worked lots of DX between 1000 and 1200 GMT at week-ends (including VK and ZL, with VU2JP for a new one). An interesting contact was with VQ4AA, working portable from a train (*see* last month's note on the subject). South Americans have been good, with OA4ED and LU2DAW outstanding, and UG6KAA has been heard calling "CQ 21."

3.5 mc Band

There are a few more reports of activity on Eighty this month—not that the band has been terribly good, but interest seems to have reached a higher level. G2YS raised VP9BL, ZS6R and PY6FI, the latter giving him his WAC on the band. The PY was at 0700, the others in the small hours.

G3JAF (Lymington) sends us his first report, chief item of which is that he was heard *and called* by VP8AZ on Eighty. Alas—he didn't hear him! This would have given him his WAC. VP8AZ is now on his way home from Graham Land, where he worked 69 countries and 49 states; when he reaches home he will be G3IZJ (Newport Pagnell) and will have some 1500 QSL's to write out. G3JAF has worked fifteen states on the band, with 40 watts to a half-wave aerial.

Lt.-Cdr. R. Brett-Knowles, R.N., G3AAT, operating as G3AAT/OX at the British North Greenland Expedition's main base at Britannia Lake. Some notes on Amateur Radio activities and the experiences of G3AAT/OX appeared in our February issue. Another of the radio men with the Expedition is now G3KDK of Plymouth.

G3JJZ (London. S.E.6) had another session on Eighty, and with only 20 watts to an 807 doubler, and an aerial 16 feet high, he raised W1GL at 0815 one morning. Other contacts were OZ, PA, YU (for a new one), SM, SP and the like.

DL2RO comments on the signal from ZS2A, coming through at S7 during the night. Others worked were ZD2DCP (0100), ZE3JP (0200), VO6U, VO6N and lots of W's. He says that VP7NX is regularly heard between 0700 and 0800 GMT, but you have to queue for him. KM6AX has been heard at 0630, and ZL3GQ as late as 0830.

DL7AA (Berlin), who has increased his lead in the Five-Band Table by several more points, has raised VP7NX on *Eighty*, and tells us that OQ5RU will be on the band daily at 2100 GMT, 3505 kc.

G3IAD made a nice bag, comprising ZE3JP, ZS3K, ZS5U and ZS9I. G3IGW worked CT3AB and ZB1BF; he also heard VP7NX, ZD2DCP and ZE3JP.

40-Metre Band

One or two interesting patches on Forty have brought joy to those who can dig. G2YS, for example, collected ZE3JP, ZS's, VO's, ST2AR, a YO and OE13USA, who probably holds the prize for the longest (if not the most irritating) amateur call yet issued!

G5BZ worked a nice bunch, including ZD6, YI, VQ4, VS9, ZD2, VK, ZL, MP4 and 3V8. DL2RO acquired a similar lot, and comments on the usefulness of this band during the period 1900-2100. On one occasion the following were worked within twenty minutes (1940 - 2000): VO6U, VS9XZ, VK2GW, ZS6R and ZC4AJ.

G3IGW raised ST2AR and ZD2DCP. G3IAD collected ST2AR, CR6AI and ZE3JP.

News from Overseas

MB9CC (Graz/Wetzelsdorf) says they are now down to two MB9

FIVE BAND DX TABLE
(POST WAR)

Station	Points	3.5 mc	7 mc	14 mc	21 mc	28 mc	Countries
DL7AA	670	89	158	219	100	104	221
G6QB	598	52	108	221	82	135	235
G5BZ	576	62	113	227	109	65	230
G2VD	511	48	94	180	90	109	189
G4ZU	499	12	45	210	112	120	214
G2WW	488	23	70	190	98	107	198
G3DO	449	24	46	198	74	107	222
G2YS	405	59	77	144	79	46	160
G2BW	368	24	57	144	100	43	165
GM2DBX*	359	33	31	156	58	81	167
G8KU	335	22	50	160	28	75	168
ZB1KQ	284	6	34	118	64	62	139
G8VG	280	36	76	124	18	26	141
G3IAD	238	38	88	103	8	1	133
G2DHV	177	20	23	108	11	15	112

* (Phone)

stations—himself and 9BJ. He tells us, too, that he is not restricted in the same way as 9BJ, and will definitely be working on 160 metres by March. He will be active for quite some time, so he hopes to give Austrian QSO's to all the keen DX types on that band. MB9BJ did try it out on Christmas Day and Boxing Day, but is not normally allowed up there owing to a local regulation. G3JAP and MB9CC himself hope to make a few portable excursions up into the mountains during the summer.

G3HUA (Southampton) has just returned from one of his visits to the Far East. At the end of his trip, in Tokyo, he spent an enjoyable evening with KA2NS, who has not yet worked a G station. In Hong Kong he was entertained by the VS6 boys, of whom VS6CL is now the most active, though suffering from BCI troubles. (Call *off* his frequency, he says).

VS6AE, a real Old-Timer, is still busy on 14 and 21 mc, but has changed his QTH, and the new one is badly screened from G-land by a range of mountains. VS6BE and 6CG are only active in the evenings. In Ceylon, G3HUA met 4S7YL and 4S7FG, the former being on the air "almost continuously" but the latter infrequently.

The former MD5SX has returned from the Canal Zone, and is now G3KAP in Deal, Kent. He was a founder-member of G3HSX (RAF Bletchley) and would like to contact any ex-members, as well as any ex-SU or MD5 types.

Miscellany

A slight stirring of the 10-metre band is reported by G3IDG (London, S.W.12), who heard an unidentified DL4/Mobile on February 5 and 6. He also says that G5LB reports (*via* G2YZ) hearing an OH on this band on January 29.

G2HKU happened to be listening on 2182 kc, one of the "small ship" frequencies, on January 24, and heard a "Mayday" call from the s.s. *Bodara,* aground on rocks and requiring immediate assistance. As no one answered, he got an emergency land-line call through to GNF, North Foreland. It turned out that the ship was aground on Anglesey, and Seaforth Radio then handled the matter. G2HKU was officially thanked for his part in the proceedings.

G2AVF (Leicester) harks back to the real Old Days when we made our own fixed condensers and resistances! And he reminds your commentator of some five-metre tests from the tower of the old Crystal Palace, which we carried out in 1933; with G3CCA and G6VD, G2AVF was on the receiving end on that occasion. He is now becoming bitten with the DX bug on the Top Band, and wants to build a nice little VFO-PA job which will take care of it.

G3JTV (Stockport) reports for the first time, partly to report that he is getting cards for Top Band contacts that he has never made. At the moment he is rock-bound on 7 mc CW—so please note and treat any other G3JTV's as pirates.

DX Gossip

SV1AZ was a phoney and probably never anywhere near Crete. . . . DL4OR did not get the hoped-for permit for HV operation. . . . Another KC4 may be operating from Navassa this year. . . . TI9MHB (W6MHB) should have been on from Cocos Is. during February. . . . W1JRA

General view of the radio room at the British North Greenland Expedition's base at Britannia Lake. The gear was used for both Service and Amateur Radio communication, on the appropriate frequencies. As the caption to this photograph alleges that the operator was having a nap when this was taken, we will not identify him!

21 mc MARATHON

(Starting July 1, 1952)

STATION	COUNTRIES
GW3AHN	112
G4ZU	112
G5BZ	109
G4ZU (Phone)	108
VQ4RF	108
DL2RO	100
G2BW	100
G2WW	98
G3HCU (Phone)	95
G3TR (Phone)	90
GW3AHN (Phone)	85
G6QB	82
G2BJY	81
G2VD	80
G2YS	79
G3DO	74
G3CMH	71
ZS2AT	70
G3CMH (Phone)	68
GM2DBX	67
G3FXB	65
ZB1KQ	64
ZB1KQ (Phone)	63
5A2CA (Phone)	60
GM2DBX (Phone)	58

should be on from Afghanistan from now until May. . . . AC4NC, AC3PT and AC3SZ are all known to be active. VU2JP handles the cards, and has a sked with AC4NC, Sundays at 0500.

FD8AA and FE8AE are two calls that *should* be heard from time to time—both on 14 mc CW. . . . FL8AI has been heard and called, but is surrounded by a doubtful aura. . . . KP6AK is now the sole representative of Palmyra, but has a poor receiver at present. . . . VP5AE is on Grand Turk Island (Turks and Caicos), 14146 kc. . . . 1955 representation on Macquarie Island will be VK1DC and VK1ZM. VK1EG is leaving Antarctica and should be replaced by VK1RA and VK1AWI. VK1DY and VK1PG are expected to return to Heard Island.

VQ8AR is said to be on Reunion Island—not Mauritius. . . . The mysterious KD6AT, heard on Twenty some weeks ago, is still said to be a new country, and, they also say, in Asia. But nobody can discover where he is (or was) until his QSL's turn up.

(Thanks to KV4AA, West Gulf DX Club, and Southern California *Bulletin*, for some of the foregoing notes.)

That concludes this month's offerings, and please note that the deadline for the April issue is **first post on Friday, March 18.** (Overseas readers are reminded that for May issue it will be *Friday, April 15*). Address everything to "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London. S.W.1. Until next month, 73, Good Hunting, and BCNU.

Letters published are those which seem to us to be of general interest, but should not be read as necessarily being in accordance with our own views on the subject. We welcome readers' comments.

WHAT DO YOU THINK?

SIR,—*One often reads of the importance of the amateur and how great has been his work in the past. I think few would dispute his early achievements, in the days when the technique of radio was largely guess-work or cut-and-try. But is this true today? Do the leading radio concerns regard us in much the same way that any large engineering organisation would look upon junior mechanics? Or as an aircraft manufacturing firm would regard model aircraft clubs? Today, all we really appear to supply is the operator. The fact that most of us quietly close down when TV starts (whereas commercial radio does not) seems fair proof that either we do not know much about it or else are too scared to face facts with our TV neighbours, although given certain rights by the Post Office.*

Either way, is it not time we stopped patting ourselves on the back, and issued a few kicks instead?

A. H. Wickham, GM3IAZ, 46 Greenhill Road, Rutherglen, Glasgow.

CLEANING UP THE BANDS

SIR,—*It is now coming to light in official pronouncements (regarding which there is a strange lack of comment or any show of indignation in amateur circles) what the Atlantic City conference of 1947 really means for radio amateurs. Judging by what has happened on the 40-metre band over the last few years, it looks very much like a process of extermination.*

Are you prepared to undertake a crusade for the reclaiming of our bands? I am writing as one who loves Amateur Radio, not only for the personal pleasure it gives me, but for what Amateur Radio means, or can mean, for the world at large.

If we are to survive these onslaughts by commercial and other powerful groups, surely we, as radio amateurs, must now dedicate ourselves to this purpose.

H. C. Hall, G2RU, 294 West Street, Dunstable, Beds.

Readers will know that for years we have warned of the trend of events on the HF communication bands—and, in fact, it was in SHORT WAVE MAGAZINE that the danger of losing our bands by "sheer weight of commercial numbers" was first pointed out; that while having bands allotted to us officially by international agreement, the real effect would be that they would also be occupied by unauthorised commercials over whom nobody had any control. This is what is now happening. As to a crusade, we have done our share of this—and will do much more—as the Editorial in the July 1954 issue shows. But the real solution lies in a saner and more rational attitude on the political frontiers of the world.—*Editor.*

SIR,—*In these days of almost unbelievable crowding on the bands, it is the fashion to climb upon one's own particular soap-box and tell the rest how to set about a cleaning up. Up I go, then, with the following recommendations:*

(1) Bring back the AA licence. A 6-month course in handling the gear under non-radiating conditions would cure the faults of many a beginner.

(2) A power limit of 10 watts for the first 12 months on the air. A lid cannot do much harm with that.

(3) A power limit of 25 watts for a full licence. Many of the most successful operators on the bands today use no more, and some considerably less, proving that a few watts under the control of a competent operator can be

far more effective from a communications stand-point than a kilowatt at the fingertips, or on the lips, of a lid. Also, it should be borne in mind that many of the 150-watt fraternity often use this power for 'cross-town talking only.

A. B. Greaves, G3JOX, 25 Toorack Road, Harrow Weald, Middlesex.

Reforms in the general sense of G3JOX's proposals have frequently been advocated. While general reduction in power would be a partial solution if honestly adopted on a world-wide basis, it can be forgotten as a practical possibility—for one thing, the American kilowatt has been too long established, and, for another, most stations on the DX bands use far more than 25 watts; they would not reduce to this figure unless assured that everyone else was doing the same, which would be impossible to guarantee. Those are the realities. What could result in improved operating conditions would be a return to better manners on the air and more considerate behaviour—which, as every Old Timer will remember, was the standard expected 20 years ago of all privileged to hold a licence, irrespective of prefix.—*Editor.*

CANADIAN LICENSING

SIR,—*Your correspondent W. Richards seems to have been misinformed as to the licensing situation in this country* ("Novice Difficulties," p.497, November 1954). *The novice licence as such is not available in Canada, although it is now well established in the States. However, "provisional licences" are occasionally issued to applicants living in areas remote from the examining centres; many VE8 phones are thus licensed. The general requirements over here are very similar to those for obtaining a ticket in the U.K., with the exception that a further theory examination and a Morse speed of 15 w.p.m. are called for to obtain full telephony privileges after the first year of operation.*

E. Welling, VE6ZR, 201 1032-107 Avenue, Edmonton, Alberta, Canada.

SIR,—*An item appeared recently in your correspondence columns, on which I feel I should comment. It was stated that novice licences are available in both U.S.A. and Canada. Whereas the F.C.C. do issue several grades of licence to amateurs in the States, only one is granted in Canada. The candidate is required to pass a 10 w.p.m. Morse test and an oral examination in theory. On passing this, he is allowed to operate CW on all bands with full power —which is 500 watts into the aerial or, with a PA operating at about 70% efficiency, a DC input of 715 watts. At this stage, phone working is permitted only on some of the VHF bands. An "Amateur Certificate of Proficiency in Radio" is issued to those passing the test, the authority for which is the Department of Transport.*

After a period of one year, during which the station must have been in active operation on CW, the applicant can take a 15 w.p.m. Morse test and a further (oral) theory examination, when full phone privileges are granted. The passing of this test is not officially recognised as being a higher grade of licence, though the Certificate is endorsed for phone privileges.

A Canadian amateur licence permits, in addition to the home installation, the operation of one mobile station in any vehicle owned by the licensee; also /MM working in a private pleasure vessel. For your information, I might add that while my main interest is CW on Twenty running 80 watts, I also operate mobile from my 1930 Chevrolet!

B. R. J. Pooley, VE7AFP, 3658 West 36th Avenue, Vancouver, B.C., Canada.

We are obliged to VE6ZR and VE7AFP for these details about Canadian licensing regulations.—*Editor.*

THOSE "NEW" COUNTIES!

SIR,—*I wish to object most strongly to the suggestion* (p.604, January issue) *that the number of counties attainable in the Ladders be increased. Surely, when one says "county," one means a geographical county. As one of the rungs of the present VHF "All-Time Counties" ladder, I would like to explain that I have spent a great deal of time (nearly four years, in fact) in getting to my present position, and it would be most disheartening to have to start all over again, particularly from this location. So I trust that no hasty or unwise decisions will be made in this matter!*

J. Stace, G3CCH, 38 Skippingdale Road, Scunthorpe, Lincs.

As the originators of the whole idea and concept of County working—not only on VHF but on Top Band as well—we agree with G3CCH!—*Editor.*

GROWING PAINS

SIR,—*I have just (14 Jan. 55) completed my first month as a licenced amateur, and what a struggle it has been, as a novice. But the majority of my QSO's have been very friendly, and most helpful to me, though some of the old hands should learn that QRS does not mean "Increase speed to 20 w.p.m."! I have a QRP CC outfit on four bands, but everybody seems to want DX or an S8-9 signal for a QSO. For my part, I would even welcome SWL reports!*

D. W. Payne, G3KCR, 6 Croham Road, Crowborough, Sussex.

PLAYED-BACK RECORDINGS

SIR,—*With reference to that "Small Thought" on p.631 of the January issue, loss of friends by playing back their transmissions to them can always be avoided by observing two simple rules:*

(1) Obtain the originating operator's agreement to a play-back; and

(2) Before putting it on the air explain to him that the retransmission is a faithful reproduction of his voice, but it will not be recognised as such by him unless he is accustomed to hearing his own voice as recorded. This is because he has, since birth, been listening to himself by the dual channels of sound-wave and bone-conduction; this lowers pitch considerably, and leads every speaker to imagine that his voice is really deeper than it is; he may therefore be led to assume that the recording and play-back must

be electronically faulty and acoustically unnatural.

If this awakens the interest of the originating operator, he might also like to learn that the average male speaking voice has a wavelength of about 103 inches, while that of his XYL is probably about 52 inches.

Finally, do not record fading, static and interference; always choose strong local signals for a good recording and play-back.

N. P. Spooner, G2NS, 7 Foxholes Road, Southbourne, Bournemouth, Hants.

BAND III RECEPTION IN THE U.K.

SIR,—*In spite of everything that has been written, there still seems to be some misunderstanding regarding reception on Band III. It does not appear to be fully appreciated that as yet nowhere in the world has a vertically-polarised positively-modulated Band III system of transmission been used for television.*

Opinions on this matter are coloured by experience in Canada and the States, where, however, conditions are quite different. Signals are horizontally polarised with negative modulation on vision and are radiated by a large number of low-power transmitters—New York itself has numerous stations. On the Continent, Band III horizontally-polarised transmission is used with negative modulation, but signals are radiated from a few high-power stations. There is thus no parallel to the reception problem posed by the British system on Band III.

Many communication engineers agree with us that there is a case for a cautious approach in this matter. It is for this reason that we have obtained permission to radiate a 1 kW vision signal from a site in Croydon in order to assess the practical problems that may arise by the use of this new technique. From an examination of the coverage of this transmitter, it should be possible to calculate the coverage of the I.T.A. transmitter, knowing its effective radiated power and mast height, so that the all-important question of ghosts can be solved.

Belling & Lee, Ltd., Great Cambridge Road, Enfield, Middlesex.

SPACE FOR BEGINNERS

SIR,—*I would like to see in the Magazine a page or two for "Beginners Only." This would then make it suitable for all categories of your readers.*

E. V. Gunn, 13 Meeching Road, Newhaven, Sussex.

SIR,—*Since the withdrawal of your* SHORT WAVE LISTENER, *which I considered to be by far the most interesting radio periodical available to the SWL, there has not been anything on the bookstalls to cater for the listener or beginner. Therefore, I am sure that a great many readers would welcome a few pages in the Magazine devoted to simpler constructional articles and intended to be of more general interest to the SWL. Looking through the last few years' issues of the Magazine, it seems that the articles have been getting more advanced, and before long will be of interest only to the qualified radio engineer!*

W. Neal, 217 Sladefield Road, Ward End, Birmingham, 8.

NEW QTH's

Readers are reminded that, as agents in the U.K. and Europe for the *Radio Amateur Call Book*, all new call-sign/addresses or changes of address should be sent to us for publication. They will appear in our "New QTH" feature at the first opportunity and will also be published in the *Radio Amateur Call Book*, which is the sole directory to the licensed amateur stations of the world.

ARTICLES FOR PUBLICATION

We are always glad to see articles on subjects of Amateur Radio interest; all material used is paid for at good rates. A note on how articles should be prepared appears every month on the Contents page. Contributors can best help themselves (and us) by setting out their material in the form in which they would expect to see it in print. This involves a close study of SHORT WAVE MAGAZINE, and careful attention to such points as permitted abbreviations, the use of sub-headings, the drawing convention, the making up of tables of values, and sequence in the treatment of the subject. Particular care should be given to drawings and diagrams, which must be accurate in every detail and conform as nearly as possible to the *Magazine* convention; but they need not be copper-plate, as all diagrams are re-drawn for block making.

The Editor is pleased to consider any ideas for articles, but, as a general rule, is not prepared to suggest subjects to aspiring contributors unless they have already appeared in print in SHORT WAVE MAGAZINE, or are otherwise known as writers in the field of Amateur Radio.

RADIO COMPONENT EXHIBITION

Probably the most important from the point of view of the technician, the annual exhibition of the Radio & Electronics Component Manufacturers' Federation is being held at Grosvenor House over the three days April 19-21. This exhibition is intended primarily for engineers and technical personnel in all the user-industries and in the Services. This year, no person will be admitted without a badge; the issue of badges is being done by a process of application and selection through the electronics industry itself.

CARDS IN THE BOX

Operators holding the call-signs listed below, for whom we have no forwarding address, are asked to send a large s.a.e., with name and call-sign, to BCM/QSL, London, W.C.1, for the delivery of their cards. If publication of the call-sign/address in our "New QTH" feature and in the *Radio Amateur Call Book* (for which we are the agents) is also required, that should be mentioned when sending in the envelope.

G3BGJ, 3HPE, 3JIT, 3JQX, 3JVC, 3JXC, 3JXZ/A, 3JYZ, 3JZC, 3RL.

Miniature Oscilloscope

Part II

MECHANICAL DETAILS

A. K. BROOKMAN, B.Sc., A.R.C.S. (G3FLP)

Readers are referred to our February issue for the first part of this article.—Editor.

The layout and method of construction is shown in the photographs and drawings; the chassis (Fig. 2) was bent up from 22 SWG tinned steel sheet, and the panel (Fig. 3) is of 16 SWG duralumin. The plate which carries the mains transformer and choke is also of 16 SWG dural, and is attached to the sides of the chassis by 4 6BA countersunk screws. The plate should *not* be made of steel, as this increases the stray field of the mains transformer.

Magnetic screening of the CRT is essential, and is provided by a Mumetal sheet wrapped round the tube and tied with copper wire. No screen could be obtained to fit the VCR139A, and it was necessary to cut down a screen taken from a VCR97; the cutting must be done very carefully with a fine-tooth hacksaw, since mechanical strains or distortion can easily destroy the magnetic properties of Mumetal.

The tube mask (Fig. 4) is constructed of 22 SWG tin, and lined with thin black rubber sheet; four small brackets are soldered to it and secured to the panel by 6 BA screws. These screws also hold the perspex window in place. In order to clear the mask, the four controls above chassis level are set back $1\frac{1}{8}$ ins. from the panel on two pieces of 22 SWG tin bent into channel section — the method of assembly is shown in Fig. 5. The base of the CRT is held by a clamp, also of 22 SWG tin; the drawing of Fig. 6 is self-explanatory.

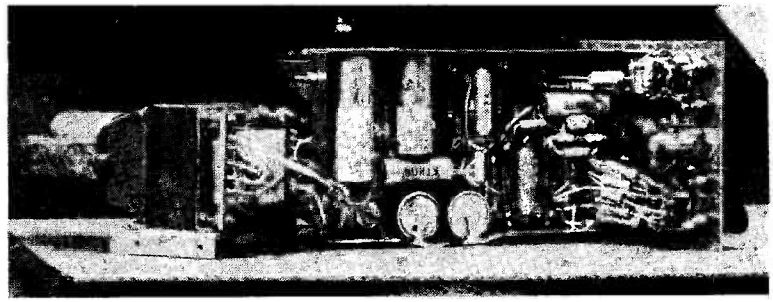
The Cabinet

The cabinet (Fig. 7) is of 20 SWG steel, and was made to the author's drawings by Philpotts Metalworks, Ltd.; the chassis is secured to it by 4 6BA roundheaded screws at the corners of the front panel, and two 4BA studs with quarter-inch spacers at the back of the chassis; these studs also make useful earthing points when signals are fed into the group board (Fig. 8).

Panel Layout

Identification of the controls is often a weak point in amateur-constructed equipment, and, although engraved knobs can be obtained, none could be found which were small enough to fit comfortably on the panel. Access to an engraving machine, of course, solves the problem; but an attractive finish can be obtained in the following way, for the expenditure of little more than elbow-grease. After drilling and removing all burrs, the panel is rubbed down with very fine emery paper until all scratches are cleaned off, and further smoothed with "crocus" paper. It is then vigorously scoured in water with an ordinary household cleaner such as "Vim" or "Ajax," until a perfectly fine matt finish is obtained. After drying, the panel is lettered with Indian ink and a "Uno" stencil (size UC2, Pen 1, is suitable). The panel should not be handled unnecessarily before lettering, as grease from the hands prevents the ink adhering properly to the metal. When the ink has dried, the panel is given two coats of clear lacquer; this causes the lettering to appear an intense gloss black, against a matt silver-grey background. Although quite durable, this finish is not as strong mechanically as crackle or stoved enamel; it should therefore be treated with care during assembly, and plain washers should be used on the bushes of all controls.

The curious cut-out which holds the two EHT smoothing condensers requires some comment. It was originally intended to use a single 0·25 μF rectangular metal cased condenser, but this was found to give inadequate smoothing, and the two condensers shown were



Underside of the Oscilloscope chassis, with the power pack sub-assembly removed, showing general layout.

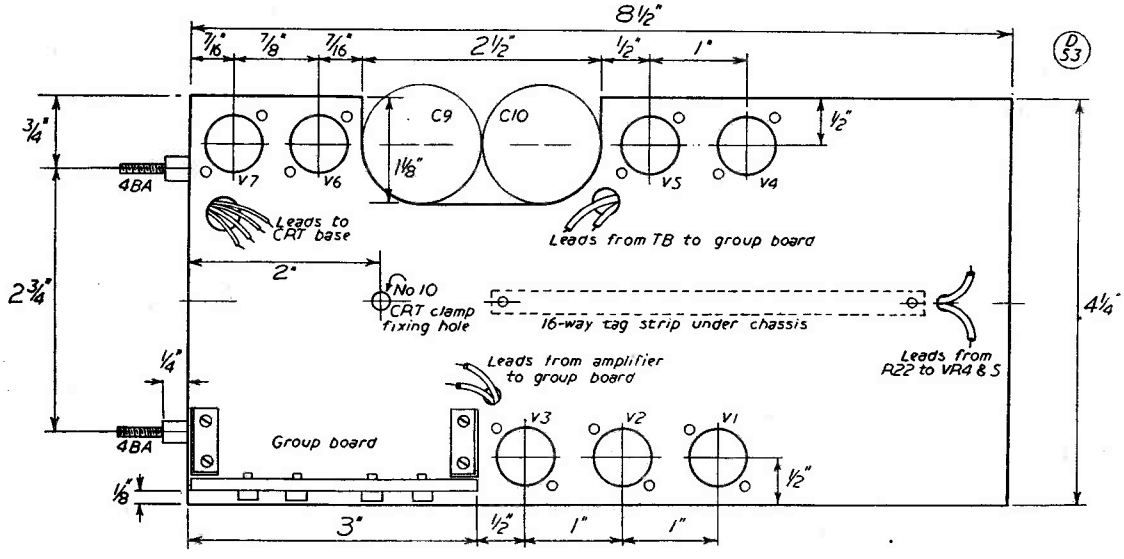
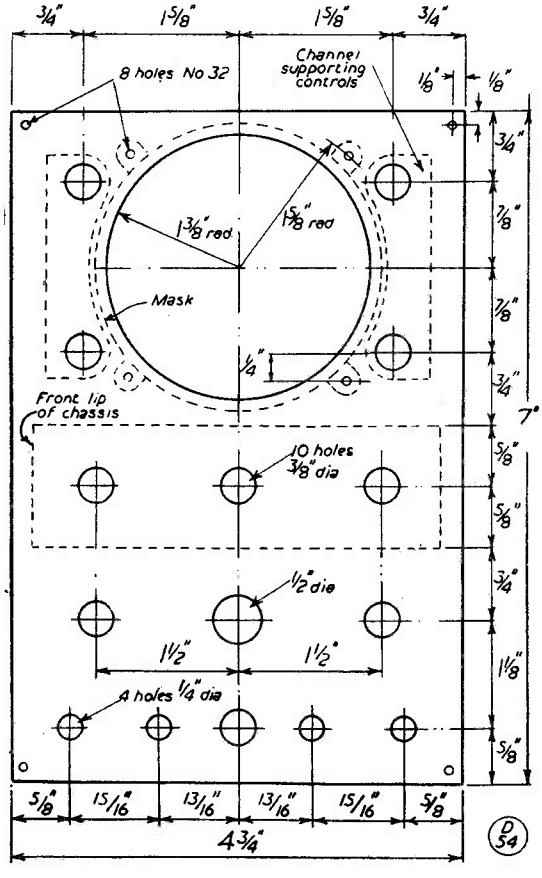


Fig. 2. Plan view of the chassis cut-out for the Miniature Oscilloscope described by G3FLP. A few non-critical dimensions are not given as they may depend upon parts actually used and small changes in the general layout. The side and rear aprons are 1-in. deep, and the front drop is 1¼-in. A photograph of the completed instrument appeared on p. 673 of the February issue.



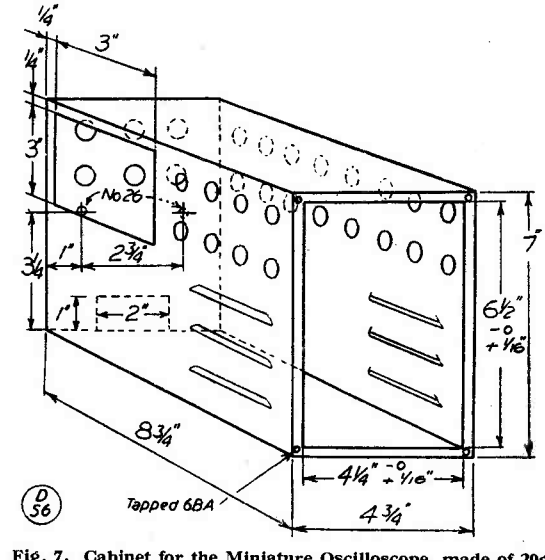


Fig. 7. Cabinet for the Miniature Oscilloscope, made of 20g. steel. All ventilating holes are ⅛-in. diameter and the louvres are 4-in. long by ½-in. wide.

substituted. These unfortunately were about ⅛ in. wider than the chassis could accommodate; anchoring them effectively provided an interesting mechanical problem ! A small cut-out was also required in the inside of the front flange of the cabinet to admit the extra width.

Most of the small components are anchored

Fig. 3. Detail of the front panel layout, and see photograph.

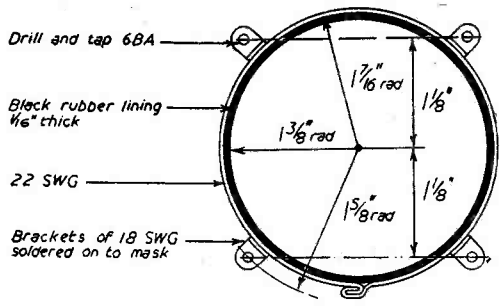


FIG 4 MASK (Axial length = 1")

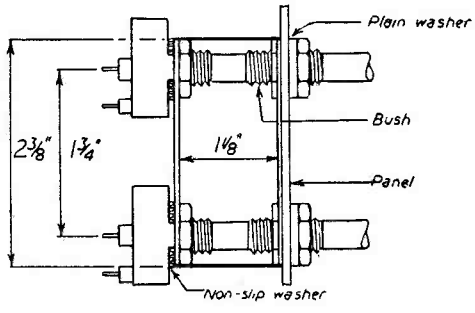


FIG 5 CHANNEL ASSEMBLY (Inside elevation)

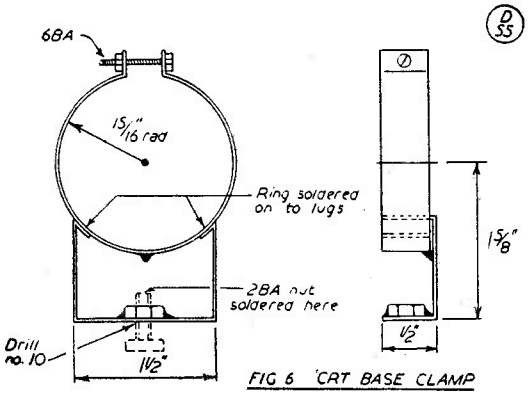


FIG 6 CRT BASE CLAMP

These drawings cover Figs. 4, 5 and 6, referred to in the text.

to a 16-way tag strip which runs down the centre line of the chassis. Earth connections are obtained by soldering directly to the chassis; when wiring up, the heaters and mains pair should be run first, followed by the cathode bias resistors, grid leaks, and anode loads. HT and EHT wiring is installed last; the group board, which carries the four coupling condensers and leaks, can be wired as a separate unit and installed after completion.

The U-links for the group board are an item liable to be forgotten; they are conveniently made by threading short lengths of phosphor-

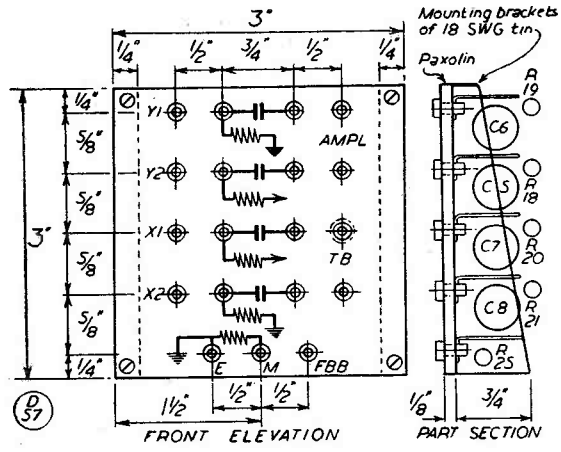


Fig. 8. Detail of the group board. In the author's case, the sockets were made by drilling out 2 BA brass screws.

bronze strip through holes drilled axially in $\frac{1}{2}$ in. lengths of $\frac{1}{4}$ in. dia. perspex rod. A drop of Durofix secures the strips permanently; 9 links are required.

In Conclusion

The oscilloscope has now been in use for several months, and has been perfectly reliable in a variety of applications ranging from the examination of commutation transients in a large DC machine to continuous modulation monitoring of a small transmitter and the display of valve dynamic characteristics. The operating facilities provided have proved adequate, the input attenuator being particularly useful. No modifications of the original design have proved necessary, and the only one envisaged is the provision of a "constant time scale" time base, already mentioned.

RADIO CONTROLLED MODELS—FREQUENCY CHECKING

In future, those who are licensed to operate radio-controlled models will only be required to check the frequency of the transmitter as often as may be necessary to ensure that the equipment is operating within the authorised frequency bands. A further concession announced by the GPO is that the model control apparatus can be operated by anyone provided this is done under the personal supervision of the licensee.

NORTHERN RADIO EXHIBITION

The Radio Industry Council, organising the Show to be held at the City Hall, Manchester, during May 4-14, has announced that H.R.H. The Princess Royal, Colonel-in-Chief of the Royal Corps of Signals, has consented to open this Exhibition on May 4 next.

Modified Pi-Section Coupler

PROVIDING WIDE CAPACITY VARIATION

S. POLLARD (ZS6AHI)

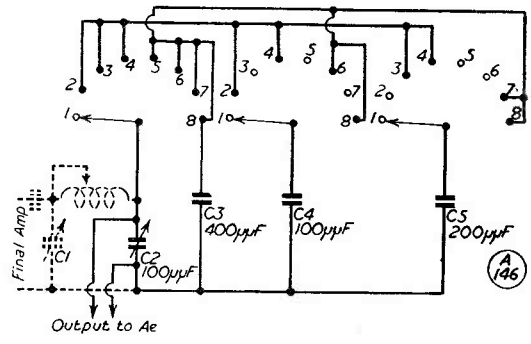
THERE is a simple way of overcoming what is probably the only practical disadvantage of the pi-section coupler. This popular output tuning system, widely used by owners of portable as well as fixed stations, will enable any type of transmitting aerial, down to the proverbial "clothes line," to load up the final amplifier satisfactorily. But if low-impedance feeders are being used, the coupler must have an output condenser of high capacity — of the order of 800 or 900 $\mu\mu$F in some circumstances.

Provided that the coupler is to be used only with low-impedance feeders, an output condenser of relatively low voltage rating can be employed — even a three-gang receiving condenser with the three 350 $\mu\mu$F sections connected in parallel. But this arrangement is not to be recommended when voltage feed is used, for there is then a distinct danger that the condenser will flash over. A wide-spaced 900 $\mu\mu$F condenser would be one solution ; but one must then be prepared to accommodate a physically large (and expensive) component in what may well be a limited space.

A simple alternative has been in use at the writer's station for some time. It consists of a wide-spaced 100 $\mu\mu$F transmitting condenser, three fixed condensers (100, 200 and 400 $\mu\mu$F) with a test voltage of 2,500, and a three-bank eight-position switch. With this combination, any capacity up to 800 $\mu\mu$F can be obtained.

Circuitry

The diagram shows the switching arrangement. The three banks of the switch are, of course, ganged. It will be seen that, in position 1, only the 100 $\mu\mu$F variable condenser C2 is in circuit, giving a range from minimum capacity to 100 $\mu\mu$F. In position 2, C4 is in parallel with C2, giving a range of approximately 100 to 200 $\mu\mu$F. Position 3 puts C2 and C5 in parallel, giving 200 to 300 $\mu\mu$F, and so on, the condensers being paralleled in various combinations to give 100 $\mu\mu$F steps, until, with the switch in position 8, all the condensers are in circuit, giving the top range of 700 to 800 $\mu\mu$F.



Circuit of the RF coupler switching scheme described by ZS6AHI. It enables a wide range of capacity variation to be obtained so that different aerials can be used on various bands.

It should be remembered that, in a pi-section coupler, loading increases as the capacity of the output condenser decreases. Thus, after connecting the feeders across C2 (or a single-wire feed to the top of C2), it is best to start with the switch in position 8 and C2 at maximum capacity. The tank condenser C1 should be quickly tuned to resonance. Then C2 should be decreased, C1 being readjusted to maintain resonance. If the desired degree of loading is not reached by the time C2 is at minimum capacity, C2 should be returned to maximum capacity, and the procedure should be repeated on each successive position of the switch until the aerial loads up.

When low-impedance feeders are used, loading will be achieved at the higher positions of the switch ; high-impedance feed systems will load up at the lower positions of the switch.

At ZS6AHI, where the pi-section coupler is used as the final tank circuit, equally effective loading was obtained using first an aerial fed with 52-ohm coax and then a length of wire 255 feet long.

Mounting Composite Arrays

TWO BEAMS ON ONE MAST

M. BARLOW (G3CVO)

MANY readers will no doubt have been faced with the problem of mounting two directional aerial arrays on one mast. Particularly on the VHF bands, it is desirable to get the arrays as high as possible, so that if one beam is mounted above the other, some sacrifice in height has to be made. In addition, with this arrangement, the aerial system tends to become top-heavy and unwieldy, with the uppermost bearing or support dangerously low. One way out of the dilemma is to mount the arrays back to back, possibly with a common reflector of, say, wire-netting. Many VHF operators have in fact done just this, but then there is the disadvantage that when changing bands the arrays must be turned through exactly 180° — which can be most inconvenient. An alternative method is to mount the two arrays facing the same way, at the same mean height, but constructed in such a way that neither has a serious effect on the other.

Approaching The Problem

At G3CVO arrays for 2 m and 70 cm were required, and only one mast was available, this being a 36ft. length of 1-inch steel conduit. The whole mast rotates on a large glass marble bearing at the base, and a " surplus " car back-axle bearing under the eaves of the house gives support at about the 20 foot level. The slope of the roof leaves only the top 9ft. or so for aerial arrays, whilst the mast cannot be extended further due to aesthetic and safety reasons. The original aerial at G3CVO on two metres was a 4-over-4, spaced 38ins. vertically. The desired 70 cm aerial was a 16 element stack, consisting of 4 stacked centre-fed full waves with reflectors. This occupies 3ft. of vertical mast, and if placed in between the sections of the two-metre array, the top and bottom 70 cm elements would have been only one inch away from the 2 m elements in the vertical plane. This seemed to be tempting Providence too much, and it was felt that from 70 cm considerations alone, no elements should be nearer than $\lambda/4$ at the shorter wavelength, *i.e.*, six inches. Accordingly the combination shown in Fig. 1 was tried. ABCD and EFGH are the 2 m Yagis (C and G being folded dipoles), *abcd* are the 70 cm radiators (no feed arrangements shown) and *efgh* the 70 cm reflectors. It will be noted that the booms of the 2 m array have been placed half-way between sections of the 70 cm array. This particular beam is made entirely of Birmabright; the vertical mast extension is $\frac{5}{8}$in. diameter thick-walled tube, the booms are quarter-inch tube, and all the elements are made of $\frac{1}{8}$in. rod. The joints were formed by drilling and tapping $\frac{5}{8}$in. diameter paxolin rod as necessary; many of the elements are tight push fits into the paxolin, but all horizontal elements must be screwed home firmly to prevent trouble from birds settling on them. The entire array weighs just over 6 lbs. (excluding feeders) and has very little wind resistance.

Results with the array indicate that the use of larger diameter components would not alter matters to any extent. The feed arrangements are drawn separately for clarity in Fig. 2, the 2 m array being fed from 300-ohm tubular through open wire sections YX and YZ, and the 70 cm array from 75-ohm co-ax through a balun and Q-bars to the usual crossed open wires, *wxyz*. In addition, strengthening wires run from the ends of the booms over the top of the mast for added rigidity.

Observations and Results

The operation of the 2 m array was checked first; field-strength tests indicated almost zero forward gain, and a very high VSWR measured with a twin-loop indicator. (This type of indicator is somewhat suspect at these frequencies.) To get any gain, the reflectors D and H had to be brought right in to about 6ins. from the radiators, and even with a double-stub tuner

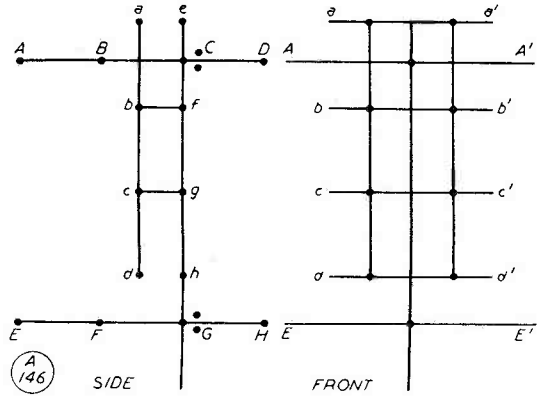


Fig. 1. Layout of the elements in G3CVO's 144/430 mc beam array. The spots indicate mechanical mounting points.

at the feed point, it was very difficult to keep the standing waves down. At this position, sections XY, YZ were made of 300-ohm feeder for convenience, this not causing any further deterioration in either gain or VSWR (although it should !). Under optimum conditions, the aerial was raised to its full height, and tried for 10 days in all conditions. As expected, all reports were very poor, nothing over 20 miles being heard or worked.

As the 4-over-4 was built to a tried design (originally by G3GBO), it was clear that the 70 cm array was having a serious effect upon it. Now, the front (radiating) 70 cm elements are each 12ins. long, 1/6th of a wavelength at 2 m, and reasonably spaced from the 2 m radiators. The reflectors, though, were each 24ins. long for structural convenience, and these were immediately suspected. Accordingly, the reflectors were sawn in half through the paxolin clamping blocks ; this would not, of course, effect the operation on 70 cm. To the writer's joy, the matching and gain improved at once, and with the 2 m elements back to their normal spacing (16ins.), the 2 m array was working much nearer to the expected results.

After a fortnight's further trial, the 70 cm array was removed entirely, and two additional factors became evident.

First, the main lobes were at 45° to the horizontal on 2 m, due to the use of 300-ohm flat feeder at XY, YZ. This has a finite velocity factor, and hence the phasing of the two Yagis was incorrect. Replacing by open wires here brought the lobe horizontal at once, and the array worked perfectly. Also, it was discovered that in fact the middle two 70 cm reflectors had not been sawn quite all the way through. After further trials the 70 cm array was replaced, and the reallly interesting result was that, at 20 miles range, the 2 m signal only dropped by about the thickness of G3ANB's S-meter needle — considerably less than one S-point, in fact. Local field strength tests showed that the lobes were slightly modified, as might be expected, but the matching remained unaffected.

The 70 cm stack has also been tested and appears to operate perfectly satisfactorily. No alteration in pattern or matching due to the presence of the 2 m array has been detected.

Conclusion

Several conclusions can be drawn from these experiments, which have been performed with some care in view of the lack of other information on the subject. First, if a very slight loss

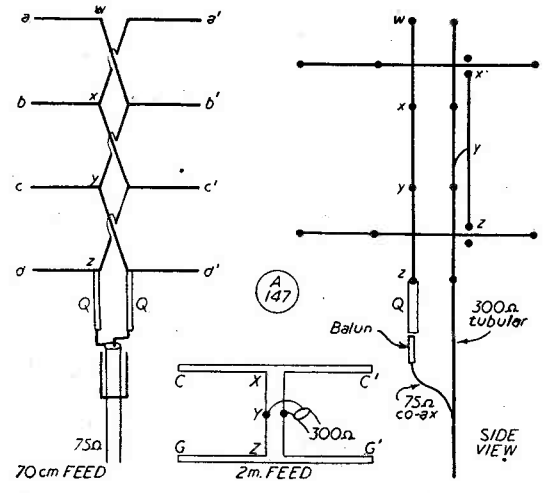


Fig. 2. In this sketch, the feed arrangements are shown for the two beams, the 4-over-4 being fed by 300-ohm tubular ribbon and the 70-centimetre stack by 75-ohm coax and a matching transformer.

in signal strength, due probably to modification of the lobes, can be tolerated, there is nothing to prevent two arrays being entwined or interlaced on the same mast at the same height facing in the same direction. When this is done, lobe modification will be least when the arrays are symmetrically arranged ; in the case discussed, it would probably have been better to stack the 2 m Yagis at $\frac{5}{8}$ of a wavelength, when the 70 cm stack would have fitted neatly inside. Finally, the higher frequency elements should not exceed $\lambda/6$ if possible of the lower frequency, and should be spaced at least $\lambda/4$ at the higher frequency from any of the lower frequency elements.

The writer wishes to thank G3ANB and G2CZS in particular for ready help and great patience in assisting with these experiments.

INSTRUMENT EXHIBITION

The third British Instrument Industries Exhibition will take place at Earl's Court, London, from June 28 to July 9. It will show the latest products of the manufacturers of scientific and electrical instruments, covering a wide field in technology and applied science. This exhibition will coincide with that of the International Printing Machinery and Allied Trades Show at Olympia.

GERMAN RADIO AND TV EXHIBITION

Those who are planning a Continental holiday this year might like to know that the German Radio Exhibition is to be held in Dusseldorf during August 26-September 4. It is to be on a lavish scale and will cover a wide range of technical interests.

VHF BANDS

A. J. DEVON

The Recent Openings—
Activity and Coverage—
Some 70-Centimetre Results—
Station Reports and The Tables—

HAVING now recovered from the temporary *malaise* with which he was afflicted, at a most inconvenient moment — when the writing of "VHF Bands" for the February issue was the next item in the pending tray—your A.J.D. returns to duty with profuse apologies for having failed to turn up last month, with muttered curses at the circumstances which necessitated it, and with abuse from the Editor for malingering. But he is also deeply appreciative of the kind thoughts of those readers and correspondents who missed this feature last time—and it was rather a humbling experience to be torn off a monumental strip by one correspondent for having "failed to contribute your usual excellent article," these being his words.

Well, so much for that. Reverting to business, the most important happenings since this piece was last composed were the openings of December 18-19, December 29 and January 23-25, that of January 24 being particularly productive in the EDX sense. On the other occasions, good GDX ranges were possible and some of the Continentals were appearing in the Midlands.

Your A.J.D. was making some observations on his own account during the early part of February. These suggested that the afternoons and evenings of February 7-8 should have produced particularly good GDX conditions—yet no correspondent mentions anything out of the ordinary for either of those dates; so one is forced to conclude that, in fact, nothing much did happen!

There can be no question—and we make no apology for harping on this theme—that the only way to prove GDX paths and conditions generally is by regular long-term, long-haul schedule keeping, such as G5BD/GM3EGW, G5CP/G5MA and G6LI/PE1PL. Of these, the most difficult is undoubtedly G5BD/GM3EGW, but the others are equally interesting, particularly G6LI/PE1PL, because it is worked in the early morning, around shaving-time. It is hoped to be able to do analyses of all these results in due course, as they should yield some very useful data.

Other distant-directions over which one would like to see regular schedules established are North Devon - Northern Ireland, London - Dublin, East Anglia - Northern Ireland, and Midlands - Glasgow/Edinburgh, all fixed for just after sunset. We would be very glad to publish profiles along such paths, worked out from the contours, and to do a regular analysis of results. It is of vital importance for the future that as much factual, proven information as possible be available regarding operating results and possibilities on our VHF bands — and what goes for Two Metres applies equally to 70 Centimetres.

Coverage and Activity

From what is already known about coverage on Two Metres—and it is quite a lot—it can be said that the normal radius of action of the average amateur station on 144 mc is 50 miles, that GDX working (to distances up to 250 miles or so) is possible for about 20% of the time, and EDX for 10%. By *average*, we mean average—not the chap in a built-up area with a 3-element flat-top surrounded by brick walls, nor the man on a hill-top out in the country, but the sort of location from which the majority of any random sample of 20 VHF stations will be found to be operating.

One great advantage of the two-metre band under dead-DX conditions is its great suitability for comfortable local working, free of QRM—the definition of "local" depending upon a particular station's reliable coverage with loud signals. This should seldom be less than about 50 miles in most directions, unless the location is unusually bad.

As to VHF activity during the last couple of months, look at the results turned in by G6TA (London, S.W.16), which are *most* illuminating. During the month to January 15, he worked 80 different stations; for the month to February 12 his total is 81. Now, this completely contradicts those who, almost automatically at this time of year, report "dead band, no activity." Even if all G6TA's contacts were in the London and Home Counties area (which they are not), it would be reasonable to suppose that there was the same level of activity, proportionately, in other areas of the Kingdom where there are centres of VHF interest—in other words, if 60 of the (let us say) 300 or so stations in the London and Home Counties area are active during any one month, then it is fairly certain that 10 of the 50 stations that may be available in the Cheshire/Lancashire district would also be on during the same period. Everybody is not on regularly, or even for part of the time. But a certain number of stations are always on for some of the time. It is this "certain number" which increases so sharply when conditions are good, or the buzz gets round that an opening is developing.

There are many DX operators on the HF communication bands who would be glad to find, on 21 mc, half as many stations to work as G6TA can show on two metres—well, *is* there anyone

regularly working Fourteen who has had contacts with 40 different stations in one month? From the available data, your A.J.D. very much doubts it! Yet 21 mc is an open DX band, easy to get on, with very little QRM, local or otherwise.

Of course, as one knows when discussing G6TA's results in this context, he is now on a knob in the Streatham district, putting out a very good signal in all directions and is regularly active, though with relatively low power, as he is now back on 20 watts with the 832 PA. But the fact remains that Streatham is an inner suburb of London, well in the bricks-and-mortar area, yet G6TA is a reliable two-metre contact for the Midlands.

Others who show good totals of stations worked during the period are, from East Anglia, G3WW; and from the Midlands, G8VN (who is still using an indoor beam only).

An interesting feature of the calls h/w lists is the number of new call-signs they include—not only stations new to two metres, but in some cases stations new on the air, *e.g.* G3KBB and G3KEQ, who must have come straight on VHF as soon as their tickets came through.

From all the foregoing, it can be said that the 144-146 mc band is in a pretty healthy state, though we can always do with more activity, and there is plenty of room for new stations.

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).

G3CKQ, Rugby, Warks.

WORKED: G2HOP, 2YB, 3BJQ, 3CRH, 3DKF, 3DO, 3FAN, 3FUW, 3GPT, 5ML, 5YV, 6PO, 6XA, 6YU, 8VN.

HEARD: G2ATK, 2BVW, 3BA, 3EJO, 3FW, 3HHY, 3IOO, 3JGY, 3WW, 4SA, 6CW, 6RH, 6XM, 6XX.

G3IEX, Bexhill-on-Sea, Sussex

WORKED: F3JN, G2CZS, 2FTS, 2HCG, 3BA, 3BNC, 3BSU, 3DIV, 3FYY, 3HBW, 3WW, 5RO, 5UM, 6NB, 6XH, 8KW.

HEARD: G2AIW, 2DP, 2FNW, 2HDZ, 2KF, 2YB, 3DJX, 3FAN, 3FQS, 3FYY, 3GHI, 3GSA, 3GVF, 3HCU, 3HWJ, 3IAM, 3IIT, 3IJB, 3IRW, 3JXN, 4SA, 5KW, 5MR, 5YV, 6AG, 6LL, 6NB, 6OX, 6RH, 6XH, 8KW, 8KZ, PE1PL. (*December* 19 *to February* 12).

G2CZS, Chelmsford, Essex.

WORKED: F8AA, G2HCG, 2WS, 2YB, 3ANB, 3BA, 3CVO, 3DKF, 3DOV, 3FYY, 3HWJ, 3IEX, 3IIT, 3IJB, 3ITF, 3JXN, 3KEQ, 3WW, 4AJ, 4GT, 5BM, 5JO, 5KW, 6LL, 6TA, 6XM, 8KW, 8LN, 8RW.

HEARD: G2DJM, 2FNW, 2WJ, 3CRH, 3DJX, 3EGV, 3FAN, 3FIH, 3HHY, 3HVO, 3JEP, 3KBB, 3VI, 4AC, 4OT, 5KW/M, 5TZ, 5UM, 5YV, 6JJ, 6NB, 6OX, 6RH, 6XH, GW5BI, 8UH, ON4BZ, 4HN, PAØFC, PE1PL. (*December* 13 *to February* 11).

SWL, Coventry, Warks.

HEARD: G2AIW, 2ATK, 2COP, 2MV, 3BA, 3CUZ, 3EJO, 3FAN, 3FIH, 3FUW, 3GKZ, 3GPT, 3HHY, 3IVF, 4SA, 5BM, 5MA, 5YV, 6NB, 6TA, 6XA, 6XM, 6XX, 6YU. (24S *in* 14C *in* 3 *hrs. December* 29-30).

G3JGY, Malvern, Worcs.

WORKED: G2FNW, 2FXK, 3GBJ, 3GKZ, 3IVF, 4PR.

HEARD: G2AOK, 2ATK, 2ATK/M, 2CUZ, 2HOP, 2NB, 2XV, 3CRH, 3DKF, 3GOP, 3IER, 3IOB, 5ML, 5YV, 6TA, 6XM, 6XX, 6YU, 8BP.

G6TA, London, S.W.16.

WORKED: F3JN, G2ABD, 2AHL, 2AHP, 2AHY, 2AIH, 2BMS, 2BRR, 2COP, 2CVD, 2CZS, 2DTO, 2DUV, 2HCG, 2UN, 2YB, 3AGR, 3ANB, 3ARL, 3ASG, 3BII, 3BJQ, 3CKQ, 3CRH, 3DF, 3DJX, 3DKF, 3EGG, 3EGV, 3ENY, 3EOH, 3EPW, 3FAN, 3FGT, 3FIH, 3FUH, 3FUL, 3FYY, 3GHO, 3GSM, 3HHD, 3HWJ, 3HXS, 3HZJ, 3IAI, 3IAM, 3IES, 3IJW, 3IOO, 3ISA, 3JFR, 3JJH, 3WW, 3XC, 4GT, 4SA, 5CP, 5DF, 5KW, 5LK, 5LO, 5MA, 5ML, 5MR, 5TP, 5TZ, 5YH, 5YV, 6AG, 6FK, 6JP, 6KD, 6LL, 6OX, 6PO, 6XA, 6XH, 6XM, 6YU, 8KW, 8VN. (*Month January* 12 *to February* 12).

G8VN, Rugby, Warks.

WORKED: G2ABD, 2COP, 3BJQ, 3CKQ, 3DKF, 3ENS, 3FUW, 3GHO, 3HZF, 3HHD, 3IVF, 3JZF, 5BM, 5JU, 5YV, 6CW, 6NB, 6PO, 6SN, 6TA, 6XA, 6XM, 6YU, GW3GWA.

HEARD: F8GH, G2CZS, 2DCI, 2FTS, 2HCG, 2PU, 3BA, 3GBJ, 3GNJ, 3ISA, 3IUD, 5AU, 5CP, 5MA, 5MR, 5TZ, 6AG, 6XX, ON4TW. (*January* 14 *to February* 13).

SWL, Bridgend, Glam.

HEARD: G2ADZ, 2BMZ, 2DDD, 3FAN, 3FIH, 3GHO, 3GOP, 3GVJ (?), 3IER, 3QV, 4SA, 5MA, 5ML, 6JK, 6NB, 6TA, GW2ACW, 2FRB, 3EJM, 5BI, 8SU, 8UH. (*Month to January* 14).

G3JZF, Birmingham, 23.

WORKED: G2CVD, 2DCI, 3EPW, 3EVC, 3FIH, 3GBJ, 3GKZ, 3HAZ, 3HHD, 3IVF, 3JZG, 3WW, 5BM, 5JU, 5ML, 6NB, 6SN, 6XA, 8VN.

HEARD: G3FAN, 4SA, 5TZ. (*January* 23 *to February* 11).

G3WW, Wimblington, Cambs.

WORKED: G2ABD, 2AIW, 2BVW, 2CIW, 2COP, 2CZS, 2DUS, 2FQP, 2HCG, 2PU, 2XV, 3APY, 3BII, 3BSU, 3DOV, 3FAN, 3FUL, 3FW, 3GDR, 3GGJ, 3GNJ, 3HZF, 3IEX, 3IIT, 3IUK, 3JZF, 3KEQ, 5JU. 5KW/P (Hunts.), 5KW/P (Rutland), 5MR, 5YV, 6AG, 6RH, 6TA, 6XH, 6XM, 6XX, 8BP, 8KW, ON4BZ, PAØDSW, PE1PL.

HEARD: G2FJR, 2MV, G3CHR, 3CVO, 3EPW, 3FIH, 3HXS, 3IOO, 3IWJ, 4OT, 4SA, 5CP, 5JO, 5MA, 5ML, 5TZ, 6LL. (*January* 20 *to February* 13).

G3JHM, Worthing, Sussex.

WORKED: F3JN, 3LP, 8GH, 8OB, 9TV, G2DDD, 2DSP, 2UN, 2WS, 2YB, 3CGE, 3FEX, 3FEX/M, 3FIH, 3FRG, 3IAM, 3JEP, 3JVY, 5DS, 5KW/P, 6NB.

HEARD: F8ME, G2AHP, 2AIW, 2DVD, 2HCG, 2HDZ, 2NM, 2TP, 3AGA, 3EGV, 3FAN, 3HBW, 3WW, 4SA, 5KW, 5MA, 6AG, 8WI. (*December* 18 *to January* 16).

G3FYY, London, N.W.2.

WORKED: D L 3 N Q, G2ABD, 2AHP, 2AIW, 2AOK, 2BBN, 2HCG, 2FNW, 2TP, 2YB, 3AGA, 3BA, 3BII, 3BTC, 3DF, 3DJX, 3DKF, 3FAN, 3FIH, 3GNJ, 3GSM, 3GXG, 3HHY, 3IAI, 3IAM, 3IES, 3IEX, 3IJB, 3IRA, 3ISA, 3JMA, 3JXN, 3XC, 4GT, 5BM, 5DS, 5DT, 5KW, 5MR, 5RZ, 5UM, 5YH, 5YV, 6JK, 6TA, 6XH, 6GD. 8KW, 8KZ, 8RW, ON4BZ.

Some 70-Centimetre Items

The proposals put forward by G3FZL—aired at some length in this space in the December issue—for a modified 430 mc band plan, have met with a silence that is absolutely deafening. No single correspondent in the last two months has referred to it, even remotely—from which it can be deduced that most people prefer to stay as they are. Fair enough—the *active* 70-centimetre stations are still only numbered in tens, and your A.J.D.'s own feeling was that there is no need to make any changes to the existing Plan.

G6NF (Shirley, Sy.) reports that the January opening also made things good on the 430 mc band; he had a phone QSO with G2XV (Cambridge) on the 23rd, for a new contact and a new county in a new direction; G6NF only runs 5 watts on 70 cm, but it gets out all right; he is now looking for the South Coast stations, having heard "3-D" at Littlehampton. Inspired by G5RZ's recent article, G6NF says he will soon be on 25 cm, using a CV90 in a modified Type 10 receiver cavity.

From Malvern G3JGY reports that G6ZP and himself keep at it on 430 mc but don't hear much else. G2ADZ (Woolacombe) writes that he is all set up and ready on 70 centimetres, but we gather has neither worked nor heard anything from there so far. G3WW (Wimblington, Cambs.) is now firing on 435.6 mc and is in 70-cm touch with G2XV locally; he is using G3HAZ/G3BKQ equipment and is available for schedules on Sundays. G3JHM (Worthing, Sx.) is back again on the band, and on January 8 he had a good QSO with G2DD (Stanmore, Middx.) at 56 miles; others worked have been G2DDD, G2DSP and G3HBW (50 miles). And for those who might like to know, we should add that G2DDD, G2DSP and G3JHM call CQ towards London each evening at 1900, and at 1200 on Sundays, for five-minute periods.

Regarding 70 centimetres, an exceedingly interesting report from G3IRW (Hoddesdon, Herts.), not far from Hertford itself, and well on the north side of London. On January 8, he followed a half-hour QSO between G2DDD (Littlehampton) and G2DD (Stanmore) and finally managed to get a contact with "3-D," whose signals were RST-579 and RS-57 on phone, while G3IRW was 549 in Littlehampton; the distance is over 70 miles. During the same evening G2DSP-G3JHM, both right on the South Coast, were heard in QSO, and though G3JHM (who was a steady 559) was called six times between 2030 and 2230—alas! no contact. This was the first occasion on which G3IRW had heard South Coast stations. He is still trying hard for G2XV. over the much shorter distance of about 33 miles; they have heard one another. G3IRW is using a G3HAZ-tripler, as described in the May 1954 issue of *Short Wave Magazine*, driven by an 829B from two metres; he reckons his RF output on 430 mc to be about 5 watts; the aerial at G3IRW is a 32-element job accommodated *inside* the roof space.

Two-Metre Activities

There on January 23-24 was G2CZS (Chelmsford), who got 589 from F8AA, with ON and PA heard, PE1PL being S9 on phone. At G2CZS, work is going ahead on a 3/3/3 and on a matching device to make it perk properly; receiver improvements are also in hand, and a new modulator—all in all, G2CZS hopes to be well in line for the DX when the opportunities come along.

G3JZF (Birmingham) came on the band just in time for the opening on January 23, using a modified T.1143 at 25w., a modified RF-27 into a modified BC-342, and a 3-element flat-top at 25 feet. He says "work is in hand on all sections of the equipment, with a new converter at the top of the improvement list"—in the meantime, G3JZF wishes to apologise to those who have called him without response. He and G3JZG wonder if they are the only two first-year and CW-only two-metre chaps in the Midlands; they would like a lot more CW activity, anyway!

G8VN (Rugby) worked G5YV, G6XM and GW3GWA on January 23, and on the 24th he was receiving F8GH and ON4TW (RS-57); a Sunday morning, 0935, schedule is being run with G6TA, and G2ABD (Kenton, Middx.) has been worked. Going back a bit, G8VN reports hearing a total of 25S, all round the country, on the evening of December 29.

As already mentioned, G6TA has reverted to his 832 PA and 20 watts, after finding that the 829B with 50-60 watts only gave him ½-an-S point more on most contacts, with the disadvantage of local spread—and, anyway, what's ½-an-S pt. to a chap who is collecting S8's and 9's most of the time! G6TA remarks that the low level of activity in the London area seems to make him quite popular with stations to whom he has had the pleasure of giving first contacts for London County. G3JHM (Worthing) reports G3JVY as a new station in Brighton, and continues to keep in touch with the F's across the water.

G5DS, having moved to a new QTH in Surbiton, sends final scores from the old one, and wonders whether he will have to start all over again on the ladders—so far as he is concerned, *No*, because from the point of view of the Tables, one QTH in Surbiton is as good as another. If he had moved right out of the district, it would have been a different matter. G5DS says he will show up again on Two as soon as he has overcome the problems inseparable from the move.

The case of G2BRR, lately of South Woodford and now house-hunting in the Swindon area, is different—his move does necessitate a re-start in the Tables. And he has our sympathy in the accommodation problem; in the meantime, G2BRR hopes to do a bit of listening from his temporary abode. G3FIH (Combe Down, nr. Bath) would like to find some more early-evening activity, and has been getting his share of the DX. G5MR (Hythe, Kent) points out that the rules for the last European VHF Contest *were* published in this country—yes, A.J.D. stands corrected, but he couldn't find them in his copy! Nevertheless, an apology is due. Vernon has recently worked another Vernon in the person of G3FYY, and a good QSO for him was G3VI, of Braintree, Essex.

G3BJQ (Rugby) moves in both Tables and keeps fairly active, with G3CKQ as his second local station; the latter has had good contacts with G3GPT for Lancashire and G3FAN for Hampshire, with several new stations also worked. During the period, G5MA has been very busy from the fixed station at Ashtead, and for good GDX has raised G3AGA (Penryn), G3AUS (Torquay), G3IOO (Oswestry), G3IUD (Wilmslow, Ches.), G3FIH (Bath), G3GNJ (Bristol), GW3GWA (Wrexham) and GW8UH (Cardiff). Nice all-round coverage with a 4-over-4 at 56 feet, which is also keeping the schedule going with G5CP up in Chesterfield.

G3IER (Cheltenham) climbs on both Ladders and confirms that conditions have been quite good in spite of the "supposed falling-off during the winter." He has been getting good signals from distant G's like G3FAN, G5CP, G5MA and G6TA—the latter being as strong as a local on some occasions, and raised for a new county. G5KW/P was also

SEVENTY CENTIMETRES

ALL-TIME COUNTIES WORKED

Starting Figure, 4

Worked	Station
26	GW2ADZ
23	G3BKQ
16	G2XV, G6NF
15	G4RO
14	G3HBW
13	G3IOO
11	G2HDZ, G5YV
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

TWO METRES

ALL-TIME COUNTIES WORKED LIST

Starting Figure, 14

From Fixed QTH Only

Worked	Station
71	G5YV
68	G3BW
64	G6NB
62	EI2W (209), G3BLP (630)
60	G5BD
59	G3EHY, G4SA
58	G8OU
57	G2OI (349), G3CCH, G8SB
56	G2FJR, G3GHO
55	G2HIF, G3WW, G5BM, GW5MQ
54	G3IUD (201)
53	G2AJ (519), G2HDZ (416), G3FAN, G4CI
52	G2NH, G3IOO, G5DS (571), G6XX, GW2ADZ
50	G3ABA
49	G5MA
47	G5WP
46	G4HT (476), G5BY, G5ML (280), G6YU (205)
45	G2XC, G6XM (356)
44	G3BK, G3HAZ (262), G8DA
43	G2AHP (500), G3BA, G3COJ, G4RO, G5DF
42	G3FIH, G3GSE (424)
41	G2DVD, G2FQP, G3DMU, G6CI (184)
40	G3BNC, G3CGQ, G3DO (274), G3HWJ, G5JU, G8KL
39	G2IO, G3GBO (434), G3HBW, G3VM, G6TA (383), G8IL (325)
38	G2FCL (234), G3APY, G3WS (183)
37	G2DDD, G2FNW, G2FZU (180), G3DLU
36	G2DCI (155), G2HOP, G3BJQ (161), G3CXD, G6CB (312), G8IP
35	G3FZL, G3HCU (224)
34	G3BKQ, G3FYY (207), G3IER (128), G5MR (242), G8IC
33	G3HHY (125)
32	G2CZS (198), G2FVD, G8QY, G8VN (151), 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
26	G3AEP, G3CFR (125), G3SM (211), G4LX, G4MR (189)
25	G3JMA, G5SK, G6PJ
24	G3CVO (190), G3FD, G3FXG, G3FXR
23	G3CWW (260), G5PY, GW3GWA
22	G3AGR (135), G3ASG (150), G3BPM, G3HIL
21	G2AOL (110), G3DVO, G3IWJ, G3JHM (104), G6XY
20	G3EYV, G3HSD, G3IOE, G3YH
19	G3FEX (118), G3GCX, G5LQ (176)
18	G3CKQ, G3DBP, G8NM, GC2CNC
16	G3FRE, G5AM
15	G2BRR, G2DRA, G3IWA
14	G2DHV, G3CYY

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

worked, for Kent. The QSL situation is G3IER's bleak spot, being only 71/128, with many VHFCC members failing to do their stuff.

Diversion

The comment by G3IER prompts your A.J.D. to remark that, from his own experience, much of the trouble seems to be due to the failure of many operators, not much interested in QSL cards, to keep envelopes at the bureaux. This can hold up cards for months, and it is not unusual for some "offenders" to receive great bundles for contacts they have long since forgotten and have to search a long way back through the log to check up on. One delay leads to another, and, human nature being what it is, all this bundle is put aside to be "dealt with when I have time." Very few people consciously intend *not* to QSL. The *intention* is nearly always the reverse, in fact.

What the problem calls for is more goodwill all round and the honouring of undertakings to "sure QSL," especially when it is qualified by the statement to QSL "on receipt of your card, OM." With this goes the obligation to keep envelopes at the bureaux, so that there is no undue delay in the delivery of cards. More than this it does not seem possible to say!

G6LI/PE1PL

This important schedule continues to yield interesting results —one point being that good conditions during an evening can be followed by peak results soon after dawn on the day following. This happened on the morning of December 31, when G6LI/PE1PL were S8 to one another (the highest signal strength recorded up to that time), and PE1PL also had a good QSO with G6XM (York) at 0830. Observations by G6LI indicate that a DX signal can fade down for as long as 20 minutes, to reappear quite steadily for 5 minutes or so, and that given the pressure and temperature conditions at each end of the path, it is possible to forecast what signal levels should be—in most cases, anyway.

More Station Reports

G3DLU (Compton Bassett) has been busy on constructional work and has discovered that a v/holder made of P.T.F.E. as advertised is a good deal better than one made of nylon-loaded bakelite — so much so, that the inductance of the RF coil in his converter had to be increased to get him back into the band in that stage. Another constructional job in hand at G3DLU is a 500-ohm open-wire feeder for a 120-foot run, made up with polystyrene spreaders.

G3IEX (Bexhill, Sx.) finds it very difficult to work into the London area, in spite of being able to hear much more distant Midlands stations at good strength, with G2HCG (Northampton) often up to S9. In the other direction (Midlands - South Coast) an outstanding signal, when he is on, is G2FTS (Hailsham, Sx.), who is believed to have a particularly favourable location. G3IEX is practically at sea-level, on the west side of Bexhill.

G5CP (Chesterfield, Derbys.) reports the continuing success of the G5MA schedule, and still wants offers for some more schedules — what about G5CP/GI3GQB, or one of the other GI's?

G3HHY (Solihull) comes into the All-Time and, explaining a point made in this space in December, says that his receiver front-end is a 6AK5 triode connected and Hazeltine-neutralised, into a Z77 as a straight pentode, into the mixer; the Z77 is adjusted for maximum gain, as the noise-factor is determined solely by the 6AK5—provided, of course, that all that follows it is up to the mark. G3HHY had a fine bunch of QSO's over the fortnight at the end of the year, 57 stations being worked, with another dozen heard, including three F's. G3HHY comments on the high level of G6TA's signals up there,

The next burst of activity from Solihull will be over April 1-14, after which he will be QRT, probably for 12 months or more.

G3CCH (Scunthorpe) worked G3EGV in Hants. for his 57th county in the All-Time. G3FYY (London, N.W.2) was very glad to get DL3NQ during the December opening, after taking his place in the queue to do it—this was the first time G3FYY had even heard a DL. Later in the period, his 14 watts were good enough to get him out to G3AGA for Cornwall and into Gloucester and Somerset, and he has also been able to work G5YV on phone. G3FYY, to whom G6TA is, of course, a local, mentions the latter's colossal signal, which is making him the leading London station. G3FYY himself has now worked over 200 different stations, which is good going in view of his QRP, rather poor location and the fact that he also works other bands besides two metres—it took him 8 months to make the first century, and another 9 months to reach the second. He says: "Looking back, it is extraordinary how many stations I have heard and worked once, and then never heard again."

Our SWL's

From SWL's Cox of London, S.W.18, Drybrough of Coventry, and Lee of Bridgend, Glam., we have useful comments and interesting calls-heard lists. Down in Bridgend, G3FAN is the most consistent GDX signal, readable on phone most evenings while working his regular schedule with G2HCG (Northampton) at about 1900—with his beam headed north, of course! SWL Cox has been hearing Liverpool stations in S.W.18, and SWL Drybrough, using a triode-connected 6AK5 RF stage in the converter feeding into a 6J6 oscillator-mixer with a Z77 IF following, has found that a single folded dipole at a poor location will nevertheless bring in quite a number of GDX stations; incidentally, the dipole being fixed to receive in the N-S line, his calls-heard list confirms the directivity of the aerial. A new converter is in hand, and SWL Drybrough hopes that his results will encourage others who may think that a poor location is an insuperable handicap to interesting listening on the two-metre band; he is on a main road in suburban Coventry, and the dipole is only 20 ft. up. And again on the theme of activity, a calls list from SWL Cox in S.W.18 shows a total of more than 70 different stations heard on two metres in the month to February 12, including four Europeans.

Since January 17, G3WW has been running a pair of slots at full-wave spacing with four reflectors. Over January 23-24, he had 22 contacts, including ON4BZ, PAØDSW and PE1PL—and it will probably interest GW3GWA to know that his signal was QRM to ON4BZ when Guy was working G3WW! A contact GW3GWA-ON4BZ would certainly have been something *very* nice for the mid-winter period. New stations worked by G3WW include G2ABD (Harrow), G3BII (Beaconsfield) and G3KEQ (Croydon). An interesting cross-band duplex QSO was that with G3FAN, on two metres, with G3WW on Eighty.

G2ADZ (Woolacombe, N. Devon) sounds a bit discouraged by his inability to get regular contacts. Though he is 610 ft. a.s.l., clear away to the north, and can work EI4E, of Killarney (250 miles) on schedule, his only other QSO's are with "GW locals" across the water; all this is "except on December 29," when G2ADZ found himself doing well to the north and in the Midlands. It seems that the winter spells of good GDX conditions *may* not always extend as far west (though this seems unlikely)—it is more probably a function of activity and the way beams are headed when DX conditions do occur. Anyway, think of G2ADZ, out on a limb down there, and remember that he is well placed, has good gear, and is looking for contacts, particularly in the London and Midlands directions, at 1900-2000 most evenings. By the way, the EI4E/G2ADZ schedule is at 1850 on Saturdays and Sundays.

EI4E himself is well equipped and, according to EI2W, should be a good DX contact for G's. Henry of EI2W now has a 24-element two-metre beam hanging in the sky, consisting of a pair of 4-by-3 Yagi arrays side-by-side. This ought to get him somewhere, and all interested are asked to note that he is very anxious for reports from distances over 200 miles.

Clarke at GM3DIQ in Edinburgh hopes to be operational again very shortly, and says he is "putting together a self-contained job running 70w., phone or CW, with a new receiver, all in a cabinet 26 ins. by 17 ins. by 11 ins." This item will be transportable, enabling him to operate as GM3DIQ/A from Lowther Hill, and thus giving either Lanark or Dumfries, depending on the bids! Clarke says there is a lot of reconstruction going on round the Scottish stations, which we all

TWO METRES

COUNTIES WORKED SINCE SEPTEMBER 1, 1954

Starting Figure, 14

From Home QTH only

Worked	Station
40	G5YV
35	G2FJR
33	G3GHO, G6TA
31	G5MA
29	G3WW
28	G3FIH
26	G5DS
25	G3FYY, G8VN
24	G2CZS, G3BJQ
23	G2DVD
21	G3DO
20	G2AHP, G3DVQ, G3HWJ
19	G5BM
18	G2ADZ, G3DBP, G3IER
16	G3IRA
14	GM3DIQ

Note: This Annual Counties Worked Table opened on September 1st, 1954 and will run for the twelve months to August 31, 1955. All operators who work 14 or more Counties on Two Metres are eligible for entry in the Table. The first list sent should give stations worked for the counties claimed; thereafter, additional claims need show only counties worked as they accrue. QSL cards are not required for entry in this table.

hope will bear fruit before very long.

Scottish VHF Dinner-Meeting

This will be at the Royal Hotel, Sauchiehall Street, Glasgow, on March 30, opening at 6.30 p.m., with tickets at 10s. 6d. each from J. Hunter, GM6ZV, 20 Manesfield Crescent, Clarkston, Glasgow. It is hoped that EI2W will be able to get across and that there will be a representative gathering of the GM VHF clan.

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
GD/EI	GD3DA/P-EI2W	30/7/51
GD/GM	GD3DA/P-GM3DAP	29/7/51
GD/GW	GD3DA/P-GW5MQ	28/7/51
GI/EI	GI3GQB-EI2W	13/6/51
GI/GD	GI2FHN-GD3DA/P	29/7/51
GI/GM	GI2FHN-GM3OL	1/7/49
GI/GW	GI2FHN-GW3ELM	8/7/49
GM/EI	GM3BDA-EI2W	12/6/51
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/EI	ON4BZ-EI2W	21/9/51
ON/GM	ON4BZ-GM3EGW	21/11/53
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

This and That

Regarding those stamped addressed envelopes that are said to be fluttering about the VHF's, it has been suggested that a half-crown postal order should be included as an extra inducement—this will make it quite like the pools.

Looking through the latest issue of Australia's *Amateur Radio*, it is rather surprising to find that the standing two-metre record in VK is only 317 miles, made as long ago as 1952 by VK3GM/VK7LZ. With the distances and the distribution of amateur population out there, one would have expected something greater than this. There seems to be quite a high level of VHF activity, and the VK's have the great advantage of possessing two intermediate VHF bands not open to us—50 mc (6 metres) and 288 mc (one metre).

Six metres is, of course, a particularly useful band, and it will be remembered, by those G's who were granted privilege-licences for a short period in the winter of 1947-'48, that some real DX was possible on 50 mc. Our issue of April 1948 (p.116) records contacts between G's and stations in F, MD5, PA, SU, VE, ZS and seven W districts!

VHF Century Club

We are glad to record two new elections to the VHF Century Club: F. T. Smith, G6FK, of Wolverhampton, No. 176; and H. J. Buckett, G3ARL, of Sandown, I.o.W., No. 177.

In his 100 cards, G6FK was able to include no less than 46 from 5-metre days, 13 of them being Europeans in F, I, OK and SM—a reminder of those sporadic-E openings we used to get on the old 58 mc band; his balance of 54 is for phone-only contacts on two metres. The G3ARL selection, for two metres only, includes cards from five countries.

The Tables

Your A.J.D. hopes and believes that all claims are properly entered, and asks for a correction on any unintentional error. All active operators are asked to bring themselves right up-to-date in the Tables as soon as possible—it helps to keep the record straight, and we all know where we are.

The lists in the "Activity Report" have been carefully selected to give the most recent results with as wide a coverage as possible. Readers are particularly asked to put in calls h/w lists—with the usual reminder about "call-signs in alphabetical and numerical order, just as you see them in print."

BRITISH ISLES TWO-METRE ZONE PLAN

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

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

Motor Mobile

Unquestionably, our most active mobile operator, G2ATK/M, travels the country from Monday to Friday each week, in the course of business. Though he seldom finds anyone on the two-metre air during the day, he is on for the early part of most evenings, working the locals wherever he happens to be. We hope shortly to describe his /M equipment in full detail.

And, once again, that seems to be about it for this month; the last piece of paper has gone from the pending tray, and it only remains to say—

Dead-Line!

For the April issue, this will be **Monday, March 21,** or about a fortnight after you see this. Please send all your VHF news, views, claims and suggestions to: A. J. Devon. "VHF Bands," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

Constructing Open Feeder Line

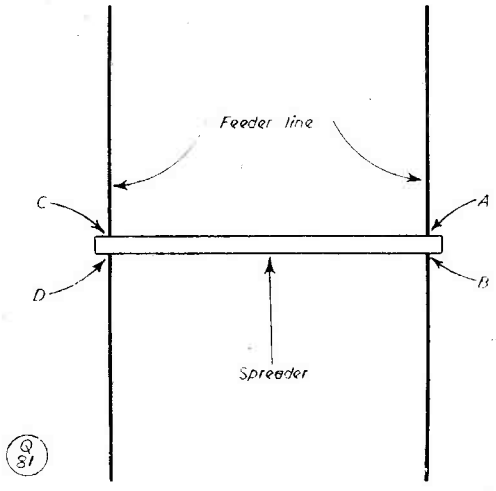
FITTING THE SPREADERS

H. TEE (G8UA)

MOST amateurs have, at one time or other, constructed 600-ohm open feeder line, commonly called "Zepp Feeders" or "Zepp Line," and have discovered how slow and laborious a task it is to wire in the porcelain spreaders in the usual manner. Also, when the line has at last been constructed there always seem to be one or two spreaders which *will* slip, no matter how carefully they have been attached to the feeder wire.

A much simpler and very much quicker system, when using porcelain spreaders, is as follows :—

Anchor the two feeder wires to a firm support the width of the spreaders apart. Then, instead of fixing them to the feeder wires in their grooves, thread the spreaders on to the two parallel wires through the holes at the ends. One spreader every three or four feet should be sufficient. When a sufficient number of spreaders have been threaded on for the length of line required, anchor the other end of the line and space out the spreaders as necessary.



This sketch shows where to apply cement fixative when making up an open-wire transmission line.

Then at the hole in each spreader squirt a blob of "Rawlplug Durolastic Cement" (supplied in tubes) to hold the wire securely. After doing a couple or so you will have acquired the knack and will be able to walk up the line fixing the spreaders in a fraction of the time taken by the usual method.

As well as being speedier, this system results in a much more secure line—when dry the cement will hold quite firmly, and no trouble will be experienced with slipping spreaders.

MINIATURE & SUB-MINIATURE PRECISION POTENTIOMETERS NOW AVAILABLE

Two new precision potentiometers have been added to the range recently introduced by Salford Electrical Instruments. Ltd., Peel Works, Silk Street. Salford 3, Lancs. They comprise linear miniature and sub-miniature types, and have been developed for use in applications where space is particularly limited, as in some computing devices, time base generators and electronic control systems.

The miniature potentiometer, the D.2, though it weighs only 15 gm and is but $1\frac{1}{8}$ in. in diameter, covers a resistance range from 1,000 to 90,000 ohms and has a power rating of 1 watt. The maximum resolution obtained is 6 turns/degree and the standard electrical angle is 340°. There are two taps on the standard model, each being made to a single turn of wire. The housing is fitted with a keyed locating spigot, and thus allows up to three units to be ganged on a single shaft. The torque with plain bearings is approx. 5 gm. cm., but ball bearings can be fitted if necessary, and the torque is then of the order of 2-3 gm. cm.

The sub-miniature potentiometer, known as the S.D., features a special resistance card and clamp ring assembly. The complete potentiometer weighs 4 grammes and measures only $\frac{5}{8}$ in. in diameter by $\frac{1}{2}$ in. in length. The resistance range covered by this instrument is from 200 to 8,000 ohms. The maximum resolution is 2 turns/degree and the power rating $\frac{1}{2}$ watt. There are two taps and the electrical angle is 280°. The sub-miniature potentiometer cannot be ganged, and is essentially a "trimmer" and unsuitable for servo application. It can, however, be supplied with a $\frac{1}{2}$ in. long shaft or with a screw adjustment as required.

CRYSTAL PALACE TV TRANSMITTER

The BBC announces that it has placed a contract with Marconi's Wireless Telegraph Co., Ltd., for the design, supply and setting to work of the main transmission line system at the new Crystal Palace Television Transmitting Station. This comprises two transmission lines, each of which will feed sound and vision power to half the aerial system.

The contract also covers the development and installation of the vision and sound transmitter output combining units and test loads, together with their associated switchgear, for the new station.

RF Stages for VHF Receivers

DISCUSSING THE BASIC THEORY

K. E. V. WILLIS, B.Sc., A.R.C.S. (G8VR)

IT is well known that at frequencies above 30 mc receiver performance is determined by the choice of the first valve in the sequence. Usually this is the RF amplifier, although in some cases it will be the mixer valve, coupled directly to the aerial. The sensitivity of a VHF receiver is related to the " noise figure " of the initial stage which imposes a restriction on the useful amplification which may be employed. Once the signal level falls below that of the noise generated by the first valve, further amplification is pointless since noise and signal are then increased simultaneously with no improvement in the signal-to-noise ratio. Thus, it is important to choose a valve which is a low generator of noise for the first stage of the receiver. At frequencies below 30 mc the noise contributed by extraneous sources swamps the valve noise and the noise figure is no longer of great significance.

Triode *v.* Pentode

Valve noise is due to a number of causes. In pentodes the cathode emission separates into two components, one flowing to the anode and the other to the screen. This division of current produces what is termed " partition noise." In a triode there is no division of current and partition noise is absent — which is one reason for the modern practice of using triode amplifiers in high-performance VHF receivers. The pentode, however, has the great merit of a low grid-anode capacity which permits the grid and anode circuits to be resonated at the same frequency without self-oscillation occurring. Commercial manufacturers tend to use pentode RF stages for this reason ; it simplifies their problem in producing large numbers of receivers without the need for the special adjustments which would be essential if a factor of possible instability were present. But even the use of pentodes requires attention to layout if complete stability is to be achieved, since at the high frequencies involved very little feedback need be present for instability to occur. Special pentodes have been produced with the grid and screen-grid wires aligned. This has the effect of " shading " the screen-grid from the cathode and reducing the screen current for a given applied voltage. This also reduces partition noise and in certain circumstances may give a lower noise output.

Other Sources of Valve Noise

The flow of grid current is also a source of noise. In receiver RF amplifiers the stage is never driven into grid current but stray grid-emission due to impurities on the grid structure may cause noise. To prevent this, valves have been constructed with gold-plated grid wires, but generally speaking the problem is of little importance to the amateur.

Another source of noise is due to thermal agitation, which is a function of valve temperature. A random motion of electrons occurs in all the conducting parts of the valve which gives rise to a random flow of current. This manifests itself as noise although it is very small compared with partition noise. The most serious effect is " shot noise " which again is a random process, *i.e.* the irregular emission of electrons from the cathode surface. This is the factor which determines the noise performance of the triode.

Although much literature exists on the subject it is relevant to state than an assessment of noise figure is made by comparison with the thermal agitation noise produced by a hypothetical resistor at room temperature. A valve which generates " shot noise " equivalent to the thermal agitation noise of a 1,000-ohm resistor is said to have a noise figure of 1,000 ohms. One of the better pentodes for VHF work, the 6AK5, may exhibit a noise figure of 2,000 ohms, much of this being due to partition. The 6J6 triode is about one quarter as noisy as this, and in fact triodes are available with figures as low as 200 ohms. However, other factors must be taken into account, such as operating potentials and valve capacities, the latter influencing the size of tuned circuits which may be employed. In other words, it is essential to consider the design of the stage *as a whole* ; a low-noise valve in a poor circuit cannot be expected to give good performance.

Triode Amplifiers

The triode RF amplifier is obviously a good choice at VHF and therefore it is of interest to examine the possible ways in which it can be used. A convenient classification is as follows :

(*a*) Earthed cathode
(*b*) Earthed grid
(*c*) Earthed anode.

The earthed-cathode form which has tuned

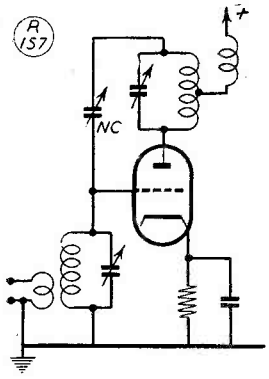


Fig. 1. The earthed-cathode triode, the standard arrangement, in which the valve must be neutralised.

circuits in the anode and grid is well known. In this circuit the cathode is common to both input and output circuits since the anode is earthed to RF, and positive feedback is possible *via* the anode-grid capacity, which tends to be high. This calls for some form of neutralisation which can be decidedly tricky at 145 mc, particularly in view of the fact that the earthed-cathode amplifier has a high gain. However, the noise figure of this arrangement is the best of the three possible forms *provided the valve has been correctly neutralised.* This statement cannot be emphasised too strongly for a trace of regeneration has the effect of increasing the noise figure very sharply even if at the same time it increases the stage gain. A receiver employing a badly-neutralised earthed-cathode triode will seem to be very lively indeed on local signals and yet will have poor weak-signal performance. A typical circuit of the type just described is shown in Fig. 1. A far better arrangement is to make use of two triodes in push-pull connection. Such a circuit has all the advantages just described and in addition is more stable. The circuit is symmetrical and no radio-frequency component flows in the lead between cathode and earth. This is important, for a common impedance at this point can materially affect the neutralisation of the stage. Furthermore, the two triodes appear in series across the tuned circuits ; this halves the shunt capacity and improves the L to C ratio. The circuit which is shown in Fig. 2, will be recognised as the RF amplifier used in the now-famous G2IQ converter. The outstanding results which this circuit has produced have been widely publicised, but it has also been criticised, mainly by those who have failed to achieve total neutralisation and have therefore lost performance on threshold signals.

There have been reports of experimental work by amateurs using earthed-cathode triodes without neutralisation. The technique adopted has been to reduce the anode voltage drastically until self-oscillation ceases. By paying particular attention to layout and screening it is possible that stability can be achieved but it would seem unlikely that the valve would then show sufficient gain to make the circuit worth while.

The earthed-grid triode has had a considerable following and combines an inherent stability with a reasonably low noise figure. It does not compare with the earthed-cathode triode in this respect, however, but has the advantage of excellent screening between input and output circuits due to the earthed-grid which is interposed between them. In valves specially designed for earthed-grid operation the grid takes the form of a planar-mesh brought out to a number of valve pins to give a low-inductance return to earth. A better arrangement is the disc-seal type of construction which brings the grid connection out on a large area metal disc or ring. If the screening between input and output is efficient the stage will need no form of neutralisation because the feedback which occurs between input and output circuits is out of phase.

Another feature of the earthed-grid amplifier is its extremely low input impedance which

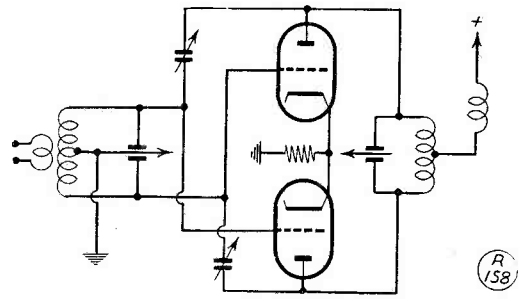


Fig. 2. A push-pull RF stage, neutralised. When correctly set up this gives very good results and ensures as much front-end gain as can conveniently be used, having regard to noise factor.

lends itself to direct-coupling to co-axial transmission lines, *e.g.* aerial feeders. It is a disadvantage, however, when a tuned input circuit is employed since the circuit is shunted by this low impedance resulting in loss of selectivity. This can be overcome by tapping the cathode connection down the tuned circuit (Fig. 3), but this results in a loss of signal voltage presented to the input of the amplifier. It is then necessary to effect a compromise between the shunt effect and input voltage, and this is normally a matter for experiment.

The earthed-anode amplifier or cathode-follower is of academic interest only at VHF, for even on the assumption that it can be

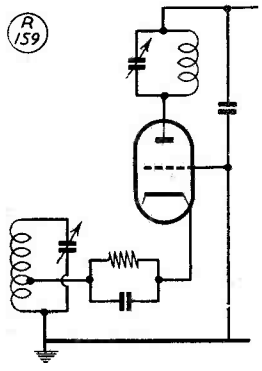


Fig. 3. The GGT RF amplifier has a very low input impedance, facilitating direct coupling to the feeder line. For the significance of the cathode tap, see text.

designed to behave as a cathode-follower at such frequencies its usefulness would be limited by the fact that the stage gain would not exceed unity. It would appear, therefore, that the best, *i.e.* lowest noise figure is achieved by using an earthed-cathode triode, provided that the stage is correctly neutralised. The use of two such triodes in push-pull simplifies the problem of neutralisation and gives a marked increase in L-to-C ratio, which always improves receiver performance. The earthed-grid circuit has a poorer noise figure, but may give better results in inexperienced hands due to its inherent stability.

The Cascode Circuit

A circuit which has come into prominence in recent years is the Wallman Cascode circuit, designed originally for wide-bandwidth applications. Its performance under narrow-band conditions is exceptionally good, however, and it has proved popular among amateurs on Two Metres. It is really a combination of the earthed-cathode and earthed-grid forms, but to some extent overcomes the more serious objections of these circuits. It uses two triodes, the first being connected to the aerial as an earthed-cathode amplifier. This has a low noise-figure and high input impedance but is not easy to neutralise. By making the anode load of this valve a second triode connected in earthed-grid form, the problem is simplified. The earthed-grid form has a low input impedance ($1/gm$) and is quite stable in operation. If it is assumed that the mutual conductance of the first triode is also gm, then since the valve works into a load resistance $1/gm$ its stage gain will be unity. Under such conditions it will be easy to neutralise the stage, and in fact it may not be necessary at all. The noise contributed by the second triode is quite low, but in any case the situation has been improved by the increase in input impedance of the stage as a whole.

This adds up to an amplifier having the input impedance of an earthed-cathode triode, the noise-figure of an earthed-grid form and the gain of a pentode. The gain is determined by the fact that the mutual conductance of the whole stage is gm, which working into a final load R gives a gain gmR, the gain of a pentode

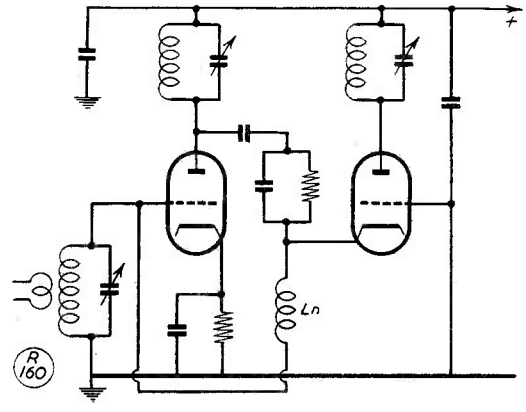


Fig. 4. Layout of the well-known Cascode RF stage for VHF, the advantages of which are discussed in the text. Ln is the neutralising inductance.

of similar mutual conductance. In practice, the cascode circuit is easy to adjust and should work right away provided the tuned circuits resonate in the band. A typical cascode RF circuit is shown in Fig. 4, and a full constructional design appeared in the March, 1952 issue of *Short Wave Magazine*.

SOME BBC STATISTICS

During 1954, the BBC spent £4¼ million on TV production, *plus* nearly £2 million on capital expenditure account (stations and equipment). The television staff itself now numbers 1,700 people, an increase of 380 on the previous year. A permanent two-way television link between London and the Continent has been contracted for, with landward connections by coaxial cable and a micro-wave radio circuit across the English Channel. The BBC engineering department has designed and produced a "Standards Converter" to change the French 819-line transmission to the British 405-line system.

BACK NUMBERS—VOLUME XII

Some back numbers of most issues of Vol. XII are available, at 2s. 2d. post free. If on looking through the Index in this issue of SHORT WAVE MAGAZINE you notice some article you particularly want, early application is advisable as not a great many back-number copies are held. Order, with remittance, to: Circulation Manager, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SKYLARKS ON TOUR

REALITY OF SPIRIT OF AMATEUR RADIO

C. H. SULLENS (G3FQU)

THE following is a brief account of a most enjoyable eleven days' touring holiday in England and Wales, undertaken by G3FQU and G2HLF (and their XYL's) in an Austin 10 utility, commencing on July 11 last. One of the objects was to visit as many as possible of the members of the "Skylarks" morning net on 80-metre phone, both transmitters and SWL's.

The weather, on starting out from Whitton, was very dull and heavy rain was encountered, particularly at St. Albans. However, by the time we reached our first stop, at Higham Ferrers, Northants., the rain had mercifully ceased; here we called in on G3HZF. After lunch and a contact or two over the air we set off again for Dore, Sheffield, where we put up for the night at G3GWR, also meeting there by arrangement G3ATI of Upper Poppleton, Yorks., and G3HSZ of York City. After breakfast the next day, Sunday, we continued on to Rochdale (G6QA) for lunch, then on to Ramsbottom (G3IOL) where we stayed two nights. On Monday afternoon we all went over to see an SWL friend in Stacksteads, Nr. Bacup, later going on to G3BWH at Rawtenstall, to spend another enjoyable evening. On Tuesday morning we set off from Ramsbottom (the weather still remaining fine) our first call being on an SWL at Fazakerley, then to Liverpool to lunch. On again through the Mersey Tunnel, Birkenhead and Queens Ferry to Llandudno where we had tea; then over to Llanberis, Snowdonia, where we stayed four nights. From our headquarters there we made excursions into the surrounding country, visiting various beauty spots, and also went over to the Isle of Anglesey. During our stay at Llanberis we were very hospitably entertained by both GW3GYY and GW3HMA. The weather, except for the Wednesday, was not at all kind, and we were unable to make the ascent of Snowdon.

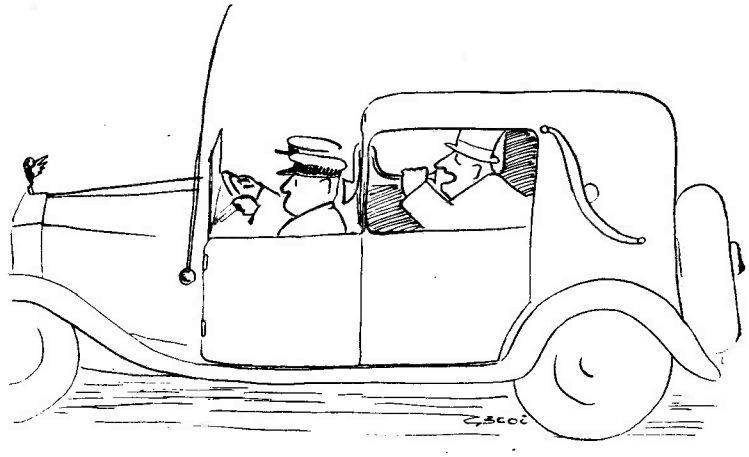
We left Llanberis on the Saturday morning *via* Nant Peris, Corwen and Llangollen, stopping at Shrewsbury for lunch with another of our SWL friends. The weather was still not all that could be desired, and we left Shrewsbury in pouring rain, arriving late afternoon at Redditch, where we met G3GBJ, G3GFB and G4PR. Here we stayed the night, setting out again after breakfast next morning (Sunday), at last leaving the rain behind us, and after passing through most lovely scenery in the Vale of Evesham, we got to Monmouth in time for lunch with GW2FOF. Then on again in bright sunshine to Pontypool where we stayed the night with a listener friend. Off again the following morning (Monday) after breakfast, our first stop was at Stroud for lunch and tea with our fifth SWL contact, then on to Kemble, where we stayed the night. Next morning after breakfast (Tuesday) we visited G3HHZ and having had lunch there set off on our journey home, arriving at Whitton early in the evening. After a meal and a brief talk on the air, G2HLF and his XYL set off for their home at Heathfield, Sussex, arriving there around 9 p.m.

Thus ended a tour of 1,100 miles in 11 days, during which many amateurs and SWL's were met personally, most of them for the first time. The kindness and hospitality we received was overwhelming, and it is difficult to express in words our appreciation of the efforts of all those (particularly the XYL's) who contributed so largely to the success of our tour.

May this spirit of true Amateur Radio friendship flourish and long continue!

BBC SOUTH DEVON TV/VHF STATION

The Minister of Agriculture having given his consent to the construction of a television and sound transmitting station at North Hessary Tor, on Dartmoor, the BBC is proceeding immediately with the work. The permanent TV/VHF station will include a 750-foot mast. It is hoped that the television side can be completed by the end of this year and the VHF installation during 1956. In order to bring television to the area at an earlier date, the BBC has installed, at North Hessary Tor, a temporary transmitter with a 150-foot mast. This should provide a satisfactory service in Plymouth and within a radius of 15-20 miles of that city.



". . . . Polkinhorn! Fire up the rig and put out a long CQ on Two . . . ."

NEW QTH's

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

DL2XQ, G. J. Neville, Box A, R.A.F. Wahn, 2nd A.T.A.F., B.A.O.R. 19.

EI4V, D. L. Fennelly, St. Judes, Snipe Avenue, Newcastle, Galway.

G3GPX, P. J. Bartram, Barendale, Heath Road, Woolpit, Bury St. Edmunds, Suffolk.

GM3HLK, D. Ferguson, 149 Onslow Drive, Glasgow, E.1.

G3JVY, D. D. Devan, 3 Denmark Terrace, Brighton, Sussex.

G3JXE, R. S. Wilkinson, 46 White Street, Hull, Yorkshire.

G3JYE, M. A. Race, 34a Butts Road, Alton, Hants.

G3JYF, B. Bellringer *(ex-ZL1AIO)*, 14 Green Lane, Redruth, Cornwall.

G3JYV, D. A. R. Tilcock, 16 Taffey's-How, Mitcham, Surrey.

G3KAD, T. N. Ayscough, 39 St. Peter's Road, Balby, Doncaster, Yorkshire.

G3KAK, J. P. Hunter, 24 Currock Road, Carlisle, Cumberland.

G3KAP, R. H. Taylor *(ex-MD5SX)*, 45 Albert Road, Deal, Kent.

G3KAX, G. Mac'Krell, Bramshaw Cottage, Reigate Heath, Reigate, Surrey.

G3KAY, Sgt. R. J. Lane, Sgts.' Mess, R.A.F. Station, Bassingbourn, nr. Royston, Herts.

G3KAZ, J. E. Saunders, 7 Queen's Road, Bradford Abbas, nr. Sherborne, Dorset.

G3KBE, W. Hazelden, Hazeldene, Bretby Lane, Bretby, nr. Burton-on-Trent, Staffs. *(Tel.: Burton 4469).*

G3KBF, C. Butler, 7 Victor Road, Teddington, Middlesex.

G3KBO, T. J. Devine, Crombie Villas, Halstead, Sevenoaks, Kent.

G3KBQ, P. H. Huntsman, 2 Lincoln Terrace, Hexham-on-Tyne, Northumberland.

G3KBR, R. A. Huntsman, 2 Lincoln Terrace, Hexham-on-Tyne, Northumberland.

G3KCD, P. Bedwell, 29 Kingsville Road. Higher Bebington, Wirral, Cheshire.

GW3KCQ, J. N. E. Williams, 10 Treherbert, Cwmanne. Lampeter, Cardiganshire.

G3KCR, D. W. Payne, 6 Croham Road, Crowborough, Sussex.

G3KCV, J. W. F. Saunders, 26 Helena Road, Yeovil, Somerset.

G3KCX, R. Bryden, 1 Minster Lane, Barrow - in - Furness, Lancs.

G3KDA, M. G. Rimmer, British Railways (W.R.) Hostel, Old Oak Common Lane, London, N.W.10.

G3KDK, H. Dean *(ex-B.N.G.E.)*, 54 Bernice Terrace, Lipson Vale, Plymouth, Devon.

GI3KDS, W. J. Woodside. 27 Burnside Road, Portstewart, Co. Londonderry.

CHANGE OF ADDRESS

EI6X, B. Fogerty, 18 Plassy Avenue, Lanahrone, Limerick.

G2AAN, J. H. Clarke, Orchardleigh, Grange Park, Bishops Stortford, Herts.

G2APF, J. Frampton, 61 Nelson Road, St. Johns, Worcester, Worcs.

G2AZC, E. L. Wills, Pathways, Exeter Road, Topsham, nr. Exeter, Devon. *(Tel.: Topsham 3534).*

G2FSJ, Sgt. E. Thorne, No. 1 Police Station Quarters, New Milton, Hants.

GW2FUW, M. M. Williams, 185 Kenry Street, Tonypandy, Glam.

G2KL, F. N. Evans, 41 High Street, Brompton, Gillingham, Kent.

G3AEP, R. P. Mackrell, Ferncliffe, Drewton Avenue, Cross Cop, Morecambe, Lancs.

G3AGX, L. D. Colley, 24 Skirbeck Road, Hull, Yorkshire.

G3DJD, R. J. Donald, Wild Geese, Westmeston Avenue, Rottingdean, Sussex.

G3EJC, D. Flowers, 89 Staines Road, Feltham, Middlesex.

G3GRT, E. W. Taylor, 99 Portland Crescent, Stanmore, Middlesex.

G3HCL, F/Lt. D. E. C. Lockyer. St. David's Lodge, Sycamore Road, Farnborough, Hants. *(Tel.: Farnborough 757).*

G3HFP, T. Worton, 38 Wyresdale Avenue, St. Helens, Lancs.

G3HVQ, J. Kenton, 104 Holly Leys, Stevenage, Herts.

G3IAB, N. R. Curtis, 28 Arnold Street, Boldon Colliery, Co. Durham.

G3IBJ, C. C. Asher, 81 Green Lane, Maybush, Southampton. Hants.

GI3IFD, T. Carlisle, 65e Bridewell Drive, Carrickfergus, Co. Antrim.

G3ION, G. A. Allcock, 29 Granby Grove, Highfield, Southampton. Hants.

G3JCL, C. Lawson, 23 Alington Grove, Wallington, Surrey.

G3JDN, P. D. Lucas, Flat "B," Glenview, Reigate Road. Reigate, Surrey.

G3JEG, G. B. Marston, Eilansgate House, Hexham, Northumberland. *(Tel.: Hexham 1045).*

G3MY, Dr. G. Michael King. Hillcrest Cottage, Thornhill, Bamford, nr. Sheffield, Yorkshire.

G5DS, J. L. Danks, 7 The Ridge. Surbiton, Surrey.

G6UT, T. A. St. Johnston *(ex-ZS1RG)*, Normandale, Great Hallingbury, Bishops Stortford. Herts.

G8JR, N. P. Haskins, Netherwood, Wellington Avenue. Fleet, Hants.

A CORRESPONDENT has reminded us that, although we have been writing this feature for some years, during which a diversity of subjects has been covered, there is one that we have never even mentioned. And what should this be but The YL! *Not* the YL who is responsible for young amateurs disappearing from the DX bands until she becomes the XYL; *not* the young daughter who has grown up sufficiently to attract other potential hams to the OM's house every night; no, *The YL*, who is an amateur in her own right. There are more of her than you might think . . . but she is rather modest about her position in what must seem to be almost a man's world. We should say, at a guess, that there might be twenty licensed YL's in this country, but as they seldom write to tell us anything about themselves or of their achievements and activities, we cannot yet enlarge on them. In the States, as one would imagine, the licensed YL's have organised themselves in a big way, and this organisation shows signs of spreading throughout the world.

INTERNATIONAL YLRL

The *YLRL*, now a very flourishing body in the U.S.A., is holding its first International Convention next June. This will take place at the Hotel Miramar ("on the shores of the Pacific Ocean") in Santa Monica, Calif. The *YLRL's* activities are chronicled each month in *CQ*, and one of the very pleasant features is the large number of families that hold a complete set of licences. In a recent issue we read of W7OSV, whose family owns *six* call-signs, five of them held by YL's (his wife and four daughters!) The number of OM/YL combinations—stations with two call-signs—must run into many hundreds, and the novice licences have made it possible for large numbers of American daughters to become initiates, too. At least four nuns are licensed operators; and a delightful variant on the usual set-up is provided by several families in which Mother is licensed, Father is not interested, but *Junior* is the "OM" with a call of his own. YL's of Great Britain, what are you doing? May we hear of *your* activities, too?

MUSEUM PIECES

One cannot tune round the bands on any single day without hearing a signal (if that is the appropriate word) that takes one straight back for twenty-five years or more. On phone, it takes the form of a noise like a self-excited oscillator modulated by a carbon microphone coupled to the tank coil by a single-turn loop. On CW, it must come from a Hartley oscillator mounted on a large wooden board which also accommodates the key (so that the valve and the coils can be "ponged" lustily when the brass-pounding begins). The latter must also have all the other attributes of the Bad Old Twenties—chirp *and* clicks *and* drift, with at least 30 per cent. modulation by 50 or 100 cycle AC. What intrigues us is this: If these manifestations are not due to some forgotten transmitter, unearthed from a dusty garret after twenty-five years' sleep, how *are* they produced? If they do come from a more modern piece of equipment, what ingenuity must have gone into the necessary modifications!

ANIMAL, MINERAL OR . . .

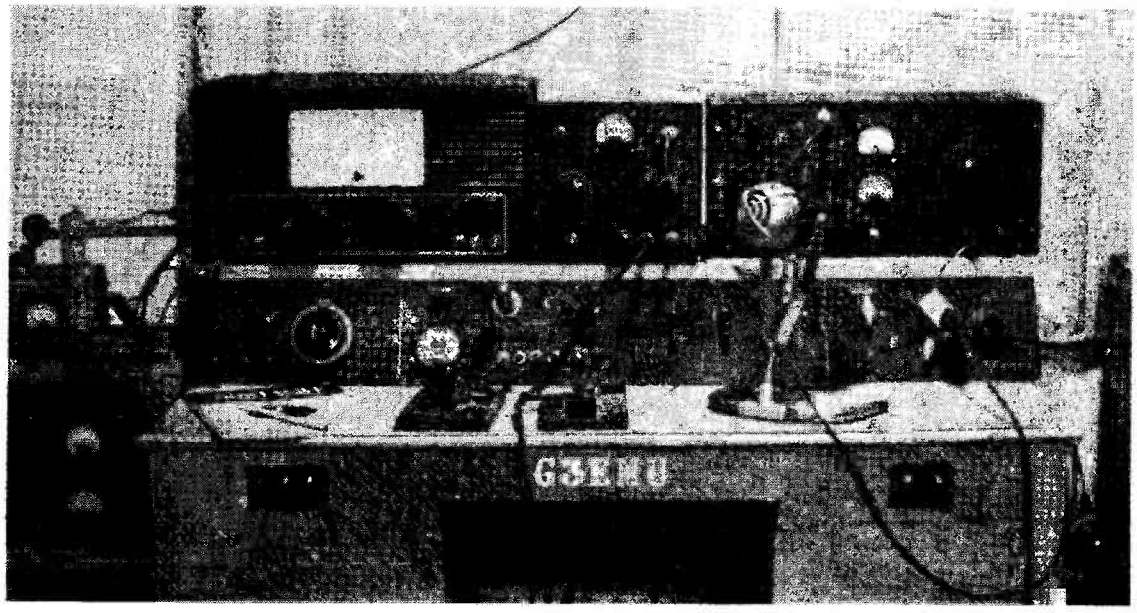
One that we heard the other day had everything. It started as CW and finished as phone, thereby satisfying everybody. The first discovery was made on about 14060 kc, where an erratic buzz-saw noise could just be resolved, by an experienced operator, into a series of rudimentary CQ's. After some ten minutes of these, a call-sign did emerge, but only if one swung the receiver dial to keep pace with the chirp, which occupied about 8 kc. No replies were forthcoming, so, after listening for roughly twenty seconds, the operator (for we might laughingly term him such) repeated the procedure. Deciding, apparently, that there was no one on the band except a crowd of lids who couldn't read Morse, he hitched up the microphone and began to whistle. The jagged edges thus produced inflicted slight scratches on the commercial on 14000 kc, lethal wounds on everything between 14030 and 14100, and appeared to cause a kind of breathless hush on the band. Alas, when the human voice was finally let loose, it was quite unintelligible. No names—but it must have sounded fine in Barcelona!

REVERSAL

As a neat and tidy rounding-off of the last two paragraphs, we have often thought how amusing it would be to build a transmitter that *looks* like a museum-piece, but puts out a signal in keeping with modern technique. This could easily be done on the Top Band, where screening is not essential if care is taken in other ways. A breadboard layout, starting with a DE5b crystal oscillator, a series of LS5b doublers or buffers, and an LS5 (or DFA9, or PX25) in the final, would produce a truly perfect signal. Modulation, by triodes throughout, would give speech quality of the kind that would make everyone stop and listen. And yet the whole thing might look the kind of wreck that ought to be putting out the mush referred to previously. Just as an "Emett" engine could give one a perfectly comfortable ride on the 8.15, so an "Emett" transmitter could be made to look a thing of real beauty while putting out an irreproachable signal. Perhaps someone would like to Have a Go? But it *must* be photogenic!

The Other Man's Station

G3EMU



IN the south-eastern corner of England, in the ancient city of Canterbury, is amateur station G3EMU, owned and operated by I. N. Cline at 15 Knight Avenue, first on the air in November 1948.

Last year, under pressure from "she-who-must-be-obeyed," an attempt was made to tidy-up the station to everybody's satisfaction — the result is shown in our photograph.

Top left on the operating desk is the main receiver, and beside it the much-used Top Band transmitter, consisting of VFO-7193, BA-6J5, PA-TT11. The modulator for this transmitter is also built into the black crackle cabinet enclosing this part of the rig as a single unit; the modulator valve sequence is 6SH7-6J5-6V6, transformer coupled to the TT11 PA.

The next cabinet, top right, contains the band-switched HF transmitter, built round a Labgear multiplier with pi-section PA tank circuit. For this transmitter an EF80 is used in the oscillator, followed by four EF91's as multipliers, a 6K6 clamper and a single-807 PA, which runs at 60 watts input. The general construction follows the usual pattern for TVI-proofing, and a separate 50-watt modulator is available for this transmitter.

Again from the (lower) left, the sloping panels accommodate: The converter for 144 mc, S-meter, control switches and fuse-lamps (in all HT secondaries) and HT and LT outlet sockets for taking off any power required for auxiliary gear, or for test purposes. Next comes a 10/100 kc frequency marker, the last panel carrying a phone monitor, audio filter and switches for headset to receiver or monitor.

Visible on the desk is a straight key, the back-contacts of which can be made to control the receiver for "listening-through" working when desired. Beside it is the paddle for the El-Bug, the 6SN7 valve and relays for this being built as a unit under the desk-top, with one control knob protruding for speed adjustment; the microphone is a crystal type.

The various power packs and LT supply units are contained in the cupboards on each side of the knee-hole, the switches above the doors being for AC input control. On the extreme left of the photograph part of the two-metre transmitter is visible, with the 50-watt modulator below it.

At the moment, aerials at G3EMU consist of an end-fed "length of wire" and a four-element Yagi for 144 mc; it is hoped to improve matters in this department, local bye-laws permitting. With the exception of the Eddystone S.640 receiver, all gear is home-constructed, and even the crackle on the metal work was obtained by baking in the (XYL's) oven. G3EMU remarks that, of all his gear, his favourite item is always his soldering iron.

THE MONTH WITH THE CLUBS

By *"Club Secretary"*

(Dead-line for April Issue: MARCH 18)

WE are pleased to note a welcome increase in the number of Clubs reporting to us this month, as well as a strong indication of enthusiasm and growing membership among several of the newer additions to our lists. A varied programme of events, an enterprising local publicity officer, and a permanent or semi-permanent headquarters—these seem to be the essential ingredients for success. We are always particularly glad to give publicity to new Clubs, and also to individual efforts to form a Club where none existed before. Simply write in with all relevant details, and your "Club Secretary" will do the rest. And so to a review of this month's activities . . . .

Coventry will be hearing two lectures on Radio Aids to Navigation, given by G3RF on March 14 and 28, at 9, Queen's Road, Coventry. **Derby** recently heard a series of three lectures on the Gee system of navigation, given by Mr. G. M. C. Stone, of A. C. Cossor Ltd.; they were illustrated by films.

Ilkestone has been in existence since April 1954, and meets every Thursday in Room 5 at the College of Further Education, Field Road. This is a new building and is well equipped with test gear, lab. facilities, film projector, lecture room and canteen. It is planned to hold lectures on sound reproduction. Morse classes, constructional evenings and outside visits. The Club has its own transmitter, call G3JSZ, and new members will be welcomed.

Isle of Man recently took part in the Trades Exhibition and Fair, held in the Palace Ballroom, Douglas. GD3FLH was in action, and nearly 300 contacts were made. The ten-guinea hotel voucher (*see* p. 617, January issue) was won by G3JDL of Barrow-in-Furness.

Romford recently held their AGM, when G2FWJ was elected Chairman. Future events include lectures on Transistors (G.E.C.) on March 22, and on TVI Suppression (G5RV) on April 12. New members and visitors will be welcomed at the meetings, every Tuesday at RAFA House, 18, Carlton Road, Romford.

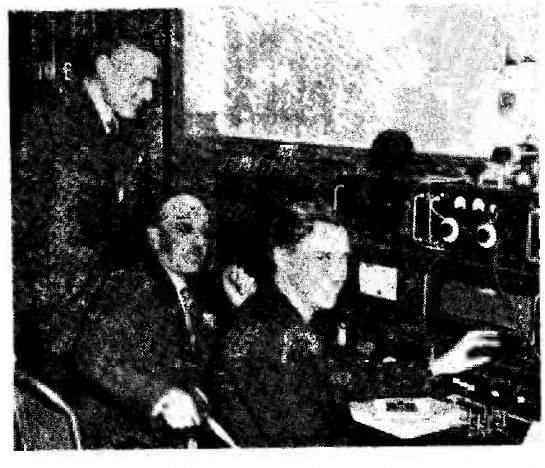
Acton, Brentford and Chiswick held their AGM at the end of January, and elected G3GEH President. The Secretary and Treasurer (G3IGM and G3IRB respectively) were re-elected, and the Committee consists of G5LQ, G3FJT and G3JVL. The Treasurer's report showed a satisfactory improvement in the Club's finances. This Club is now on Top-Band phone every Tuesday evening.

Barnsley held their Annual Dinner in January, and during February they had lectures on Stabilised Power Supplies and Tape Recording. On March 11 there will be "Lecturettes," and on March 25 a talk on Transistor Transmitting, by G4JJ.

Bournemouth were also in the fashion, with the AGM in January and the Annual Hamfest in February. Normal meetings are held on the first Friday of the month, and visits have been arranged to local aircraft and radio factories and also to the BBC TV station at Rowridge, I.o.W.

The March programme for **Bradford** includes a Film Show on the 8th, and the AGM on the 22nd. Recent activities at **Clifton** have been various constructional activities, a Junk Sale, and a spring-clean of the workshop. On March 4 there is another Junk Sale; on March 11 and 25 there will be two constructional evenings, and on the 18th, a talk on The Voyage of the M.V. *Aries*, by E. Skelton, G3JOQ. Meetings every Friday, at 225, New Cross Road, London, S.E.14.

Leeds meet four times during March, with the following programme: March 9, Simple Transmitter Construction—"Doublers," by G4AD; March 16,



When the Leyland (Lancs.) Rotary Club organised a hobbies exhibition, a group of Leyland amateurs laid on G3GGS/A for the occasion. At the receiver is G3GGS, with G2CHF beside him, and G5AX standing, left. Assisting operators were G3DBY, G3HKU and SWL Fish. Public interest in this venture was most enthusiastic.

Deadline for next month's reports is **Friday, March 18.** They should be addressed to "Club Secretary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

Questions and Answers; March 23, "Power Amplifiers," by G4AD; March 30, Junk Sale.

Slade are holding a special meeting on March 4 to consider the adoption of amendments to the rules. This will be followed by a display of members' apparatus. On March 18 there will be a lecture by W. E. Merrill.

Southend held their AGM in the Ekco canteen, and celebrated their 35th anniversary, this being one of the oldest active Clubs in the country. Two founder members, Messrs. Bridges and Knipe, represented those who have belonged to the Society since 1920, and were duly thanked for their loyal support. In February there was a visit to Barking Power Station, organised by coach which picked members up from several different points. Over two hours were spent learning of the processes, almost entirely automatic, involved in the generation of half-a-million kilowatts.

Spen Valley hold their AGM on March 9, and on the 23rd they are visiting the C.I.D. Operation Room at Wakefield, by permission of the Chief Constable, West Riding Constabulary.

West Lancs have recently heard two interesting talks, one on Direction-Finding (G3IQO, assisted by G3JPJ and G3JMQ), and one on Home-Made Transistors, by G3CSZ. Normal meetings are held every Tuesday evening, and the Annual Dinner is provisionally arranged for March 25, in Liverpool. Enquiries concerning this should be addressed to the Secretary (*see* panel for QTH).

Chester have now appointed GW3HEU as press representative, and the new committee (G3HAC chairman) have decided to introduce discussions and debates into the Club's programme. The Annual Dinner is arranged for March 19—tickets are still available from the Hon. Sec.

Grafton have had lectures on Speech Clippers, Transmitter Design and The Simple Approach to Amateur Radio, and on March 4 they have a visit from G5RV, who will talk on New Ideas in TVI Suppression. RAE Classes continue on Mondays, with Friday meetings devoted to the usual Club activities.

Hawick paid a visit to the **Berwick** Club on February 6, and saw some mobile stations in action. Berwick make a return visit on March 27. The secretary of Hawick would like any interested visitors or residents in the district to contact him regarding further meetings.

Reading have a visit, on March 26, from the Engineering Dept. of the G.P.O. The subject of the lecture will be Radio Interference. The AGM will be held on March 12, and the Annual Dinner, at the White Hart Hotel, on the previous evening.

The newly-formed **Mitcham** Club held its inaugural meeting on February 8, and formulated rules, elected officers and decided on the title of "Mitcham and District Radio Society." Membership numbers about 20, and the next meeting after publication is on March 25, when new members and visitors will be cordially welcomed at the Buck's Head, Fair Green, Mitcham.

South Manchester meet on March 11 to hear about Tank Circuits (G2HW), and on March 25 for a Junk Sale. Plans are being made for the Annual D-F Contest and will be made public shortly. New members have been arriving, and mostly joining the RAE Course which is held every Monday evening at the Club Headquarters.

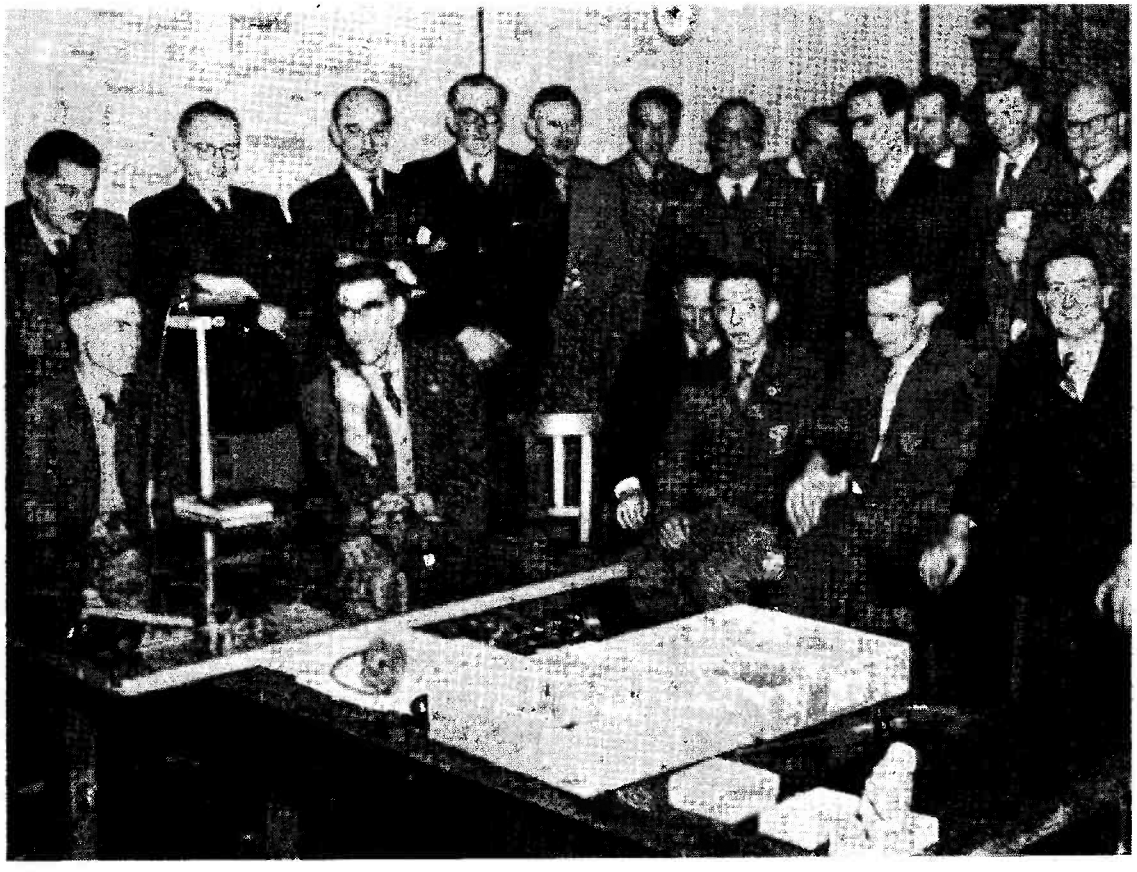
Scarborough hold their meetings every Thursday. On the first Thursday in the month there is an auction; third Thursday, "Basic Radio" course. An annual dinner is suggested for the near future.

Sutton and Cheam have arranged their entire programme up to Christmas 1955. On March 12 they hold their Seventh Annual Dinner, at Wilson's Cafe; an attendance of over 100 is expected. The Constructional Contest prizes will be presented at this event. Next regular meeting, on March 15, will be held at the Harrow Inn, Cheam Village, when Mr. W. H. Andrews will lecture on the Metropolitan Police Wireless System.

Wirral meets on the first and third Wednesdays.

NAMES AND ADDRESSES OF SECRETARIES REPORTING IN THIS ISSUE:

ACTON, BRENTFORD and CHISWICK: R. G. Hindes, G3IGM, 51 Rusthall Avenue, Bedford Park, London, W.4.
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.
BRENTWOOD: J. S. Thornton, G3FQQ, 18 Western Road, Billericay, Essex.
CHESTER: N. Richardson, 23 St. Mary's Road, Dodleston, Chester.
CLIFTON: C. H. Bullivant, G3DIC, 25 St. Fillians Road, London, S.E.6.
COVENTRY: J. H. Whitby, 11 St. Patrick's Road, Coventry.
DERBY: F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby.
GRAFTON: A. W. H. Wennell, G2CJN, 145 Uxendon Hill, Wembley Park, Middlesex.
HAWICK: G. Shankie, 17 Ettrick Terrace, Hawick, Roxburghshire.
ILKESTON: J. Eaton, G3EZZ, 74a Station Road, Langley Mill, Nottingham.
ISLE OF MAN: R. S. Trickey, GD3DRB, 35 Sunningdale Drive, Onchan, I.O.M.
LEEDS: B. A. Payne, 454 Kirkstall Road, Leeds 4.
MITCHAM: D. Tilcock, G3JYV, 16 Taffzy's How, Mitcham, Surrey.
READING: L. Hensford, G2BHS, 30 Boston Avenue, Reading.
ROMFORD: N. Miller, 55 Kingston Road, Brentwood.
SCARBOROUGH: P. Briscombe, G8KU, 31 St. John's Avenue, Scarborough.
SLADE: C. N. Smart, 110 Woolmore Road, Birmingham 23.
SOUTHEND: J. H. Barrance, M.B.E., G3BUJ, 49 Swanage Road, Southend.
SOUTH MANCHESTER: M. Barnsley, G3HZM, 17 Score Street, Bradford, Manchester 11.
SPEN VALLEY: N. Pride, 100 Raikes Lane, Birstall, Leeds.
STOCKPORT: G. R. Phillips, 7 Germans Buildings, Buxton Road, Stockport.
SUTTON & CHEAM: F. J. Harris, 143 Collingwood Road, Sutton, Surrey.
WEST LANCS: S. Turner, G3JUB, 5 Balfe Street, Seaforth, Liverpool 21.
WIRRAL: A. C. Wattleworth, 17 Iris Avenue, Claughton, Birkenhead.



G6CJ doing his conjuring tricks — the well-known aerial demonstration — at the Reading Radio Society's hamfest. With the aid of the items shown here, he is able to prove, in the most convincing way, the performance and radiation characteristics of many different aerial types and beam arrays.

at the Y.M.C.A., Whetstone Lane, Birkenhead. Short wave listeners and novices are particularly welcome. Another Club with the AGM looming is **Stockport**; this will be on March 16, 8.00 p.m., at the Blossoms Hotel, Buxton Road, and it is hoped that there will be a good attendance of members.

THE E.M.I. WIRED TELEVISION SYSTEM

The E.M.I. Wired Television System was the subject of a paper read to the Television Society, at its October meeting, by E. J. Gargini, M.S.R.E., of E.M.I., Ltd.

Besides dealing in full with the E.M.I. system, the paper discussed the relative merits and de-merits of wired broadcasting as against radiated broadcasting.

First, the paper outlined the main objections to wired broadcasting: The high initial cost of the network itself; the considerable time taken to develop a service in a large town, and the attendant aesthetic problems; the necessary limitation of the service to areas of relatively high population density; the difficulty of making significant changes to the combination of channel circuits and bandwidths once the system is installed, and the need for correction of the frequency characteristics of the cable circuits.

None of these obstacles is insuperable, and the author pointed out that against them must be weighed the disadvantages of radiated broadcasting. These are: The susceptibility of radiated broadcasting to all kinds of interference; the average by low signal input to the receiver, requiring high amplification circuits; the limitation in the number of possible services, due to the fact that in general any one channel can provide only one service; the restriction of high quality reception to areas local to the transmitter; the high cost of transmitting equipment; and, lastly, the complexity and diversity of receiver design.

Even the simplest form of wired broadcasting—the single co-axial system—appears to surmount all these disadvantages. It permits the use of low sensitivity terminal units operating with a signal input

at least equal to that of local station radio reception, and so with a suitable cable the possibility of extraneous interference is virtually ruled out. For sound reception a large number of channels is readily accommodated using the simplest form of superhet as a terminal unit, and similarly, *monochrome vision* terminal units can be simple superhet arrangements for which the heterodyning oscillation is supplied *via* the relay network. All amplification can therefore be at intermediate frequencies.

This simple single co-axial system does involve rather high maintenance costs in respect of terminal equipment. By increasing the complexity of the relay station apparatus, vision terminal equipment can be reduced simply to a cathode ray tube. Although this is attractive in certain circumstances, the best solution is found to be a compromise involving the use of a number of wired circuits, which whilst considerably simplifying terminal equipment, does not unduly increase the intricacy of the relay station equipment. For example, sound terminal equipment can be reduced merely to a loud-speaker with channel selector switch, and similarly, vision circuits employing only low gain intermediate amplifiers can be used. The scanning circuits of subscribers' terminal units can also be greatly simplified by taking advantage of the immunity to noise of closed circuits.

The paper pointed out the adaptability of the E.M.I. Wired Television System to "slot meter" programmes as operated in the U.S.A.

The first part of the paper concluded with a general discussion of the advantages of the wired system to the subscriber in terms of cost and convenience, and of the general problems of coverage and overloading in broadcasting channels, all of which the author feels would be solved by the general adoption of the wired broadcasting technique.

The second part of the paper was devoted to a detailed technical survey of the E.M.I. Wired Television System and the problems involved.

POSTAGE — PLEASE NOTE

Due to heavy postage charges, we must ask that all correspondence to which a reply is expected should be accompanied by a stamped addressed envelope. This need not, of course, apply to correspondents' reports for our various activity features, to which in the ordinary way no individual reply is given.

TELEVISION TRADE TEST TRANSMISSIONS

The BBC announces that the week-day TV trade test transmissions will be continued until the end of April, though liable to interruption without notice, the period being 10.00 a.m. to 1.00 p.m. The programme consists of demonstration films, Test Card "C" and recorded music, and is intended to enable the industry and the retail trade to test and adjust TV receivers.

SMALL ADVERTISEMENTS

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

TRADE

QSL 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. SW.47, London, W.4.

BRAND-NEW, original cartons: RF Units, Types 26, 27/6 ; 25, 15/- ; 24, 11/- ; postage 2/6.—E.W.S. Co., 69 Church Road, Moseley, Birmingham.

G3CGD for first-class QSL's at QRP prices ; 5% Discount for Club Stations.—30 St. Luke's Road, Cheltenham, Glos.

WANTED: BC-610 Hallicrafters, ET-4336 Transmitters, AR88D's and LF's ; receivers and spare parts for above. Also BC-221 Frequency Meters. Best prices.—P.C.A. Radio, Beavor Lane, Hammersmith, W.6.

WANTED: Aerial Tuning Units, BC-939a.—P.C.A. Radio, Beavor Lane, Hammersmith, W.6.

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

WANTED: Command Receiver, types BC-454, medium wave, and BC-455 ; reasonable.—North, 52 Oldfield Road, Coventry.

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

APPOINTMENT

RADIO & TELEVISION SERVICE ENGINEER required for expanding Company in Slough area ; excellent prospects for rapid advancement for man of proven ability.—Write with full details of experience and stating salary required to Telefonic Radio, Ltd., G3XC, 1 Station Approach, Slough, Bucks.

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.

VOIGTLANDER BESSA CAMERA ; f3.5, synchronised ; as new ; exchange for good transmitter (any bands).—D. Townsend, Paxford, Holly Road, Wilmslow, Cheshire.

SMALL ADVERTISEMENTS, READERS—*continued*

ENCLOSED RACK CABINET, 42″ high ; castors, black crackle ; £5. Woden DTM18, £5 ; DCS11, 12/6 ; UM1, 30/- ; 813's, £2 ; 35T's, 15/- ; RCA 8019's, 15/- ; Labgear PA coils, centre link, five bands, £2 ; Turret 50 watts, £2 ; wideband couplers, set 5, £2. WANTED: UM2. All as new. Carriage extra.—Surman, Lyncote, Coltsfoot Drive, Guildford.

FOR SALE: Brand-new (unused) Minimitter Tx, complete with low-pass filter.—Box 1545, Short Wave Magazine, Ltd., 55 Victoria Street, London. S.W.1.

WANTED: BC-453 with power pack ; must be perfect ; with or without valves.—Riddle, Murrayfield Golf Club, Murrayfield Road, Edinburgh, 12.

AMATEUR, SELLING UP, offers for sale BC-348 modified for mains ; R1481 modified for 10-metre reception ; also 5-metre Converter and 10″ Amplion Loudspeaker in case. Prefer to sell *en bloc.* —J. B. Rogers, 25 Brading Road. S.W.2. (*Tel.*: *Tulse Hill 7002, Evenings*).

FOR SALE: Eddystone 740, perfect condition ; SWL owner QRT ; £26. Carriage extra. Bristol area.—Box 1543, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Latest model USA HRO-60, SX71, etc.; Rx brand-new or brand-new condition, in complete guaranteed factory condition ; unmodified, etc.; good cash price paid.—Write, giving fullest details, Box 1544, Short Wave Magazine, Ltd., 55 Victoria Street, S.W.1.

STATION FOR SALE, comprising S.640, two transmitters, four power units, mod. amplifier, table microphone, VFO, xtal calibrator, electronic key, S-meter, aerial tuner ; specially built tabe fitted to take above, with aerial relay and mains filter ; 20ft. mast. S.A.E. details and photo. Buyer pays carriage. £55.—Box 1549, Short Wave Magazine, Ltd., 55 Victoria Street, S.W.1.

TAPE DECK for sale ; high impedance heads, B.S.R. motors ; £4.—Williams, 4 Shutlock Lane, Birmingham, 13. (*Phone*: *HIG. 4160*).

EXCHANGE AR88LF in new condition for BC-221 and HRO, or similar. Also require: Grid Dip Meter, U.S.A. Test Equipment, clean valves (all types).—Box 1547, Short Wave Magazine, Ltd., 55 Victoria Street, S.W.1.

WANTED: Panda, BC-221 and good Communications Receiver, AR88 or similar ; also VHF Receiver, S27 or similar.—Box 1548, Short Wave Magazine, Ltd., 55 Victoria Street, S.W.1.

NATIONAL NC81X ; 160, 80, 40, 20, 10-metre bands only ; full bandspread ; 230-250v. AC. Auto, BFO, Xtal, internal power supply ; 8″ speaker. re-aligned ; good condition ; handbook ; £15 (or offer).—G3HMC, 33 Summerleaze Park, Yeovil. Somerset. (*Tel.*: *1572*).

FOR SALE: Eddystone 840 ; Brown's phones ; Folded Dipole aerial ; receiver still under guarantee ; £37.—Box 1546, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS, READERS—*continued*

TRANSFORMERS: Primary 240v., Secondary 250 mA, 1750-0-1750 volts, tapped 1250 and 750, £5; Woden DTF12, 2.5v., 10 amp., CT, 25/-; PCS12 Swing choke, 5-25 Henry, 250 mA, 27/6; Zenith 10 Henry, 250 mA choke, 10/-. Pair new Raytheon 866 and one used STC 2v./400v., lot 25/-. Condensers, 2000v., working one 1 mF, two 2 mF, one 4 mF, lot 17/6; or all above, £9 15s. VALVES: New (two) 813, 42/6 each; used T20, 7/6; two Eimac 35T, 12/- each; two HF100, 10/- each. New RF-26 Converter, 28/6. Two Eddystone 2kV 60 + 60 mmF tank Condensers, 7/6 each. Ferranti 3" flush round M/C milliamp. meters, 50, 100, 150 mA, 8/6 each. Carriage extra. Lot to clear, £19.—G5KM, 9 Woodstock Road, Barnsley, Yorks.

OFFERS (or exchange for smaller-sized Rx), DST-100 and P/Pack; also ZC1 Tx/Rx; both with manuals.—Box 1550, Short Wave Magazine, Ltd., 55 Victoria Street, S.W.1.

COMPLETE Amateur Station for sale, including 150-watt Marconi transmitter, switched 160/80/40/20 metres; American receiver 1147A, 1.5 to 30 mc, Xtal, calibrator, D104 Mic., etc.; £60.—G3BEF, 11 Geoffreyson Road, Caversham, Reading, Berks.

BARGAIN (must sell, no offer refused): 6ft. totally enclosed Rack; black crackle finish, hinged door open at rear, castors fitted on base, fitted with 800v. P/Pack (Woden transformers), modulator, 807's Tx; beam indicator with pair of selsyns; requires a little attention; 28 mc folded dipole beam, unpacked, new; £1. BC-610 Tuning Units, Labgear Coils, new, 5/-; Radiocraft 807 CW Tx, 30/-. Numerous radio and Tx parts; must clear, any price. —Coppell, 119 Lahenheath, Southgate, N.14. (*PAL 4686*).

SALE: MCR1, complete, excellent condition, £7; pair 3" Magslips and M-motor, 50/-. WANTED: UM3.—G3DVQ, 44 Hartley Hill, Purley, Surrey. (*UPL. 9471*).

G3IDG needs *CQ*, January, March, April, June, November, December 1945, May 1946; *Radio* before 1936; *R/9* before April 1935; *QST* before 1924; *Calling CQ* (de Soto). What *Amatenr Radio, Break-In, Radio Zs* have you?—95 Ramsden Road, London, S.W.12.

HRO SENIOR, 4 coils, 3 bandspread, AC power pack; perfect condition; £25. Eddystone S-640, unmarked, £16 10s. WANTED: Power Pack for B.2. All carriage extra.—L. Grout, 68 The Drive, Worthing, Sussex.

RSGB TWO-METRE CONVERTER, Philpott's cabinet, Raytheon 6BQ7, £6; Simmonds 1.5 kc band-pass crystal filter, 460 kc, with manual, 35/-; 829B, 30/-; 832, 15/-.—G3BK, 28 Regent Avenue, March, Cambs.

BRAND-NEW UM1, 45/-; four LS50, 7/6; two holders, 1/-; three LV1, 5/-; two holders, 9d.; 500 μA, 2½" scale, 10/-; four Sylvania EF50, 4/-; four British EF50, 3/-; Army M/C mike, 2/6. Prices each. Post paid.—Farrar (G3ESP), Ackworth, Yorks.

£10 **OFFERED FOR EX-GOV. POWER UNIT, TYPE 231, IN GOOD CONDITION.**—G. V. Allen, 107 Union Road, Sheffield, 11.

SMALL ADVERTISEMENTS. READERS—*continued*

SALE (owner going overseas): Tx 150w. phone, TVI-proof on 80, 40, 20, 15 and 10 metres; band-switched WBC's; Franklin BA, BA or Doubler; parallel 807's; CRT and phone monitor built in; fully relay controlled; enclosed in standard rack 30 ins. high; £65. Rx double super, S-meter, £15. BC-221, modified for modulation, £20. On air all bands until sold. Consider any reasonable offers near above prices.—Box 1557, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

NATIONAL SW54; received from America three weeks ago; new and unused, in maker's case; now surplus to requirements; £27.—20 Plemont, Bexhill, Sussex.

2/- OFFERED for *Short Wave Magazine*, Vol. 1, No. 3, March 1946. Odd or a complete set of plug-in coils for R1082 receiver. Manual re charts required for RCA wavemeter TE149.—G. V. Allen, 107 Union Road, Sheffield, 11.

BC 348Q FOR SALE; AC P/Pack, original handbook, £18; also (two) BC-348L's, AC P/Pack, £14 10s. each. For above, spare coil pack, IF's and main tuning drive and condenser. Interested in SX24 or S40B.—Box 1553, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

GOING QRT: R1155N (160, 80, 40, 20m.) with power unit, handbook, spare valves, phones, £7 10s.; new Acos Mic. 36-4, 57/6; over 100 new Valves (including TT15's, QVO4/7's, 6AM6's, 6C4's, etc.), £6 the lot; Chassis containing 3 power units (500v., 250v., 250v., 6.3v.), £3; Weston Output Meter, £1; Xformer 425-0-425, 5v., 6.3v. (twice), 10/-; 2-valve 1/C Amplifier (provision for internal batts), 15/-; 4 assorted MA'meters, 10/-; B & W 50-watt Coil Turret, 10/-; 20m. Ground Plane, sectional whip, with base, £1. Or sell the lot, including many coils, chokes, condensers, etc., for £20. Buyer collects.—G3GUP, 12 Saffron Way, Walderslade, Chatham.

THE FOLLOWING FOR SALE (all in excellent condition): Commercially-made 150-watt Phone/CW Transmitter, 7-30 mc, in 6ft. cabinet; National 81X Receiver with matching speaker and handbook; Eddystone All-wave Four-battery Receiver with medium- and short-wave coils; Top Band 10-watt Phone/CW Transmitter with self-contained p/pack; unused RCA 813 with ceramic holder; AC/DC Prop-pitch Motor; Garrard Universal Turntable and Pick-up; TU5B unit; Eddystone Speed Key (boxed and unused); clockwork precision Morse Tape Inker; *Wireless World*, October 1949 to July 1953; *Bulletin*, July 1933 to August 1939, and June 1946 to May 1954; *Short Wave Magazine*, August 1946 to March 1954. Also miscellaneous gear.—Enquiries and offers to: Box 1552 Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: B2 Transmitter (Rx and p/pack unnecessary but considered). condition immaterial; S640 or S740, must be good condition. All letters answered. Can arrange for RX to be picked up U.K.—Cain, VQ2AH, Box 95, Ndola, N. Rhodesia.

B2 MINOR, complete for AC. Offers?—G5ND, 161 Penrose Avenue, Blackpool, Lancs.

AR 88LF, excellent condition; buyer collects; £47. Radiocraft DX-9 VHF Super-regen., 955-6C5, 30-210 mc, £7.—Box 1551, Short Wave Magazine, Ltd., 55 Victoria Street, S.W.1.

SMALL ADVERTISEMENTS, READERS—*continued*

FOR SALE: Lane Mk. III Tape Deck, little used. £8; Premier Amplifier for above deck, good working order, with p/pack, £6 (o.n.o.).—Box 1554. Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

VALVES: EF39 (four), 3/6 each; EK32 (one), 3/6; EF50 (three), 2/6 each; SP61 (twelve), 10/- lot; EF54 (one), 3/-; ECC31 (one), 2/6; ECC91 (two), 3/6 each; 9006 (one), 2/-; N339 (one, new), 5/-. All carriage paid.—10 Honeypot Lane, Brentwood, Essex.

CLEARANCE (re-equipping): HRO Senior, B/S coils and p/pack, 5RV 75-watt TVI-proof Tx, double-beam 'scope, VHF Rx, 5ft. 6ins. rack, 2ft. 6ins. rack, three p/packs, modulator-p/pack 807's, Variac, low-pass filter, 32ft. sectional mast and large collection meters, valves, relays, condensers, resistors, coil turrets, coils, switches, etc.; £110 all, or offer? Buyer collects. — Fenton, Gay Bowers, Danbury, Chelmsford. (*Phone: Danbury 518*).

BRAND-NEW Canadian Staff Car Communication Receiver, 1-16 mc, RF, BFO, 6v., etc., £18 10s.; Hallicrafters S38B, £12 10s.; National 1-10, £8 10s.; R1155, £8 10s.; Tuning Meter, suit AR88, 15/-; six 5ft. Cables with two Jackplugs, 3/- each.—4 Spring Gardens, Atherton, Manchester.

HRO SENIOR MODEL for sale, £22; 3 band-spread coils covering 10, 20, 40 and 80 metres.—Carpenter, 86 Locket Road, Wealdstone, Harrow, Middx.

BC221 FOR SALE; excellent order, with original charts in perspex case; £22 (o.n.o.). — Box 1556, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

AVO 7, requires overhaul, £7; Marconi **TV CHANNEL 3,** complete with preamp, working, £19 10s.; new 6in. **SPIRIT COMPASS,** £1; 5ft. 6in. **POST OFFICE RACK,** standard type and angle section, drilled and tapped sides with base, 35/-; **35mm. MINIATURE CAMERA** with spare cassettes, £4 10s.; 6- and 12-volt vibrator transformers, £1 each; **35mm. ENLARGER** with new 2¼in. condenser, £4 10s.; "Scotch Boy" recording tape, 1200ft. reels, 11/- each.—The Crab & Lobster Inn, Mill Hamlet, Sidlesham, Chichester. **(PHONE: SIDLESHAM 233).**

R103A, 80/40 metres, modified, built-in p/pack, 230v., £5 or exchange for Transmitter.—G3HLW, 150a Barrack Road, Christchurch, Hants.

B36 RECEIVER, 1 mc - 20 mc, complete with speaker and p/pack; provision for S-meter; very robust job; £16; excellent working condition. Canadian 58 set Trans./Recr., 6-9 mc, working order, including vibrator pack, mikes, phones and instruction book; first-class for mobile rig; £10. Two 6-volt car radios, 6-valve (RF stage) Philco; 5-valve Ekco, pre-set stn., small and compact, £10 each.—N. J. Birkett, 24 Holborn Drive, Derby.

QST, July to December 1954, 13/-; Makers' Manuals, 15/- each: SX17, HRO60, 75A3, AR77E.—Box 1555, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

EDDYSTONE 358X, complete with all coils, S-meter, crystal filter; 40 kc - 31 mc; manual; £13. R1155, £6. R1132, £2.—G3JBU, 7 Western Terrace, Northampton.

SMALL ADVERTISEMENTS, READERS—*continued*

BUY OR BORROW, Circuit or Manual, etc., Bendix RA1B Receiver. Please help. All letters answered.—Lewis, 46 Clydesdale Road, Romford, Essex.

EDDYSTONE 640 Rx; alignment just checked by makers; appearance as new; £17.—Day, 48 Woodstock Road, Begbroke, Oxford.

Short Wave Magazine Advertising gives World-Wide Coverage.

Printed by The Courier Printing Co., Ltd., Tunbridge Wells, for the Proprietors and Publishers, The Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1. The *Short Wave Magazine* is obtainable abroad through the following: Continental Publishers & Distributors, Ltd., William Dawson & Son, Ltd.; AUSTRALIA AND NEW ZEALAND—Gordon & Gotch, Ltd.; AMERICA—International News Company, 131 Varick Street, NEW YORK. Registered for transmission to Canada by Magazine Post. *March* 1955.