The SHORT WAVE Magazine

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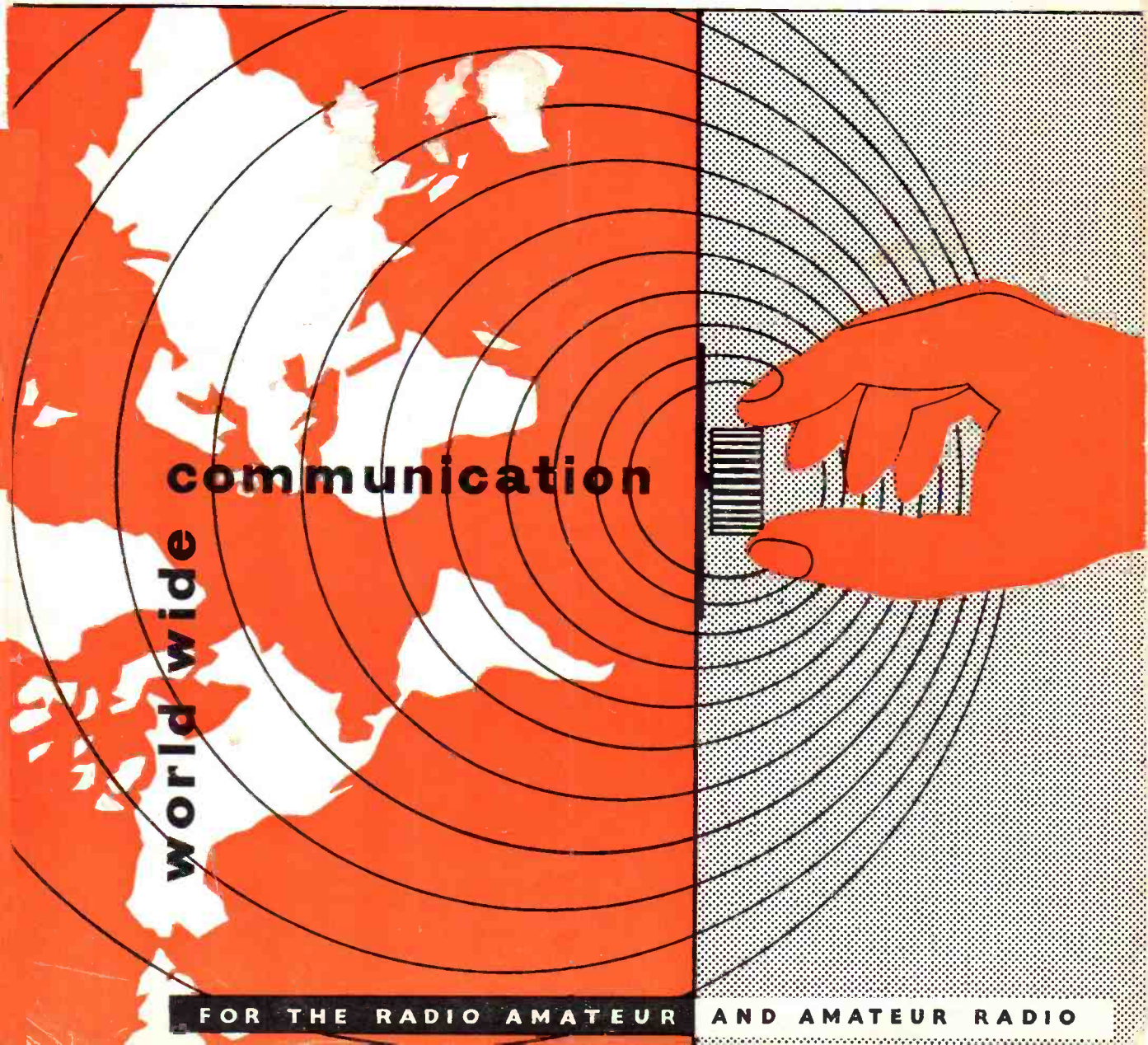
VOL. XV SEPTEMBER, 1957 NUMBER 7



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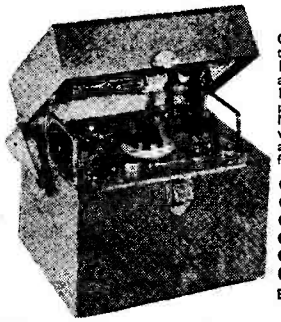

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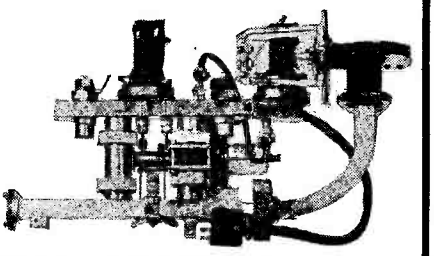

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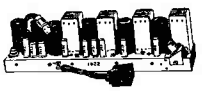

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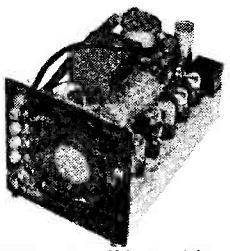

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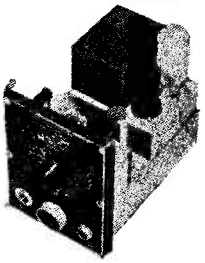

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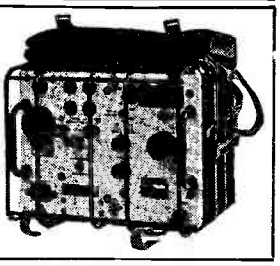

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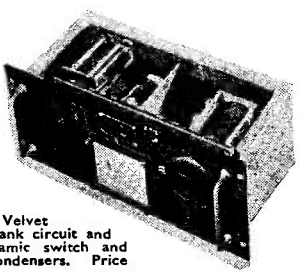

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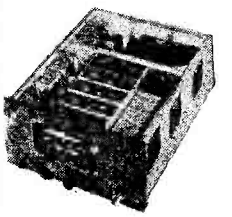

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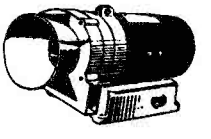

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FOR THE RADIO AMATEUR AND AMATEUR RADIO

The SHORT WAVE Magazine

EDITORIAL

Difference *It has seemed evident for some time that, looking across the world of Amateur Radio, there is a confusion and a plethora of "awards" and "certificates" — parchments that are offered for operating achievements of one sort or another. No list of them is ever up to date, and many have never had more than a handful of takers.*

This statement may well induce somebody to come back with "Well, if there are too many, why offer yet another one in this very issue?" — which on the face of it would be fair comment. The answer is that there is a great difference and a clear distinction between the award which is cooked up to favour a particular group by attracting contacts to it, and those available on a world-wide basis without favouring any particular neighbourhood. That is to say, the "Worked All Boys in Brummapool" is obviously inspired by the hope that a lot more people will be interested enough to look for Brummapool contacts in preference to those with other amateurs under the same prefix who do not happen to live within the confines of Brummapool, or wherever.

A certificate offered on a national or international basis — such as our new "Polar Regions Award" — with carefully considered standards and requirements, is in a very different category from the purely local-interest award devised primarily for the benefit of the issuers rather than the issuees. It is this that should be the test of the validity of any award.

While there is nothing to prevent any body or group — Amateur Radio fortunately still being an activity free of such restrictions — from issuing whatever certificates they like, it would seem that the point has long since been passed where local-interest awards have either value or meaning. On the other hand, there is everything to be said for those which, while setting a reasonable standard and issued under proper safeguards, confer operating or DX status on the recipient. In any event, the value of and interest in an award will always be determined by the number of claimants there are for it.

Austin Forbes G6FO.

High Selectivity IF/ AF Amplifier Unit

FOR AM PHONE, CW AND SSB RECEPTION, USING PRODUCT DETECTOR

A. C. EDWARDS (G3KGN)

Our contributor offers a design which—though necessarily somewhat elaborate — will be of immediate interest to all who are seeking improved performance on the amateur bands. Incorporating some of the latest receiving techniques and within the scope of the competent home constructor, a unit on the lines of that described here will produce results much superior to those obtainable with almost any conventional type of receiver. The amplifier as described also lends itself to the idea of using separate converters for the various HF bands, which is probably the most refined approach to the amateur requirement of high selectivity combined with full band-spread and the utmost in sensitivity. Receiving equipment on these lines could never be mass-produced, and indeed it is conceivable that the one-off home-constructed installation could be better than anything commercially obtainable. The circuitry involved in the unit discussed here is not in itself new or revolutionary, but this is probably the first constructional design to be published in which all the accepted aids to better reception are used together. — Editor.

DURING a recent rebuild, the opportunity was taken of bringing the receiving side of the station up-to-date and constructing the IF/AF amplifier about to be described.

The prevailing high level of QRM on the amateur bands and the growth of single-sideband working makes desirable a greater degree of selectivity than has been necessary in the past. Much thought was given to the methods by which this could be obtained and a study made of articles which have appeared over the past few years in *QST* and *Short Wave Magazine*. No originality is claimed for any particular part of the circuit finally evolved, but it is thought that it may be of some interest to those who are unfamiliar with the latest trends towards better reception which have appeared since the war, particularly in the States.

If necessary, reference can be made to the articles quoted where fuller information is required on certain features.

Design Considerations

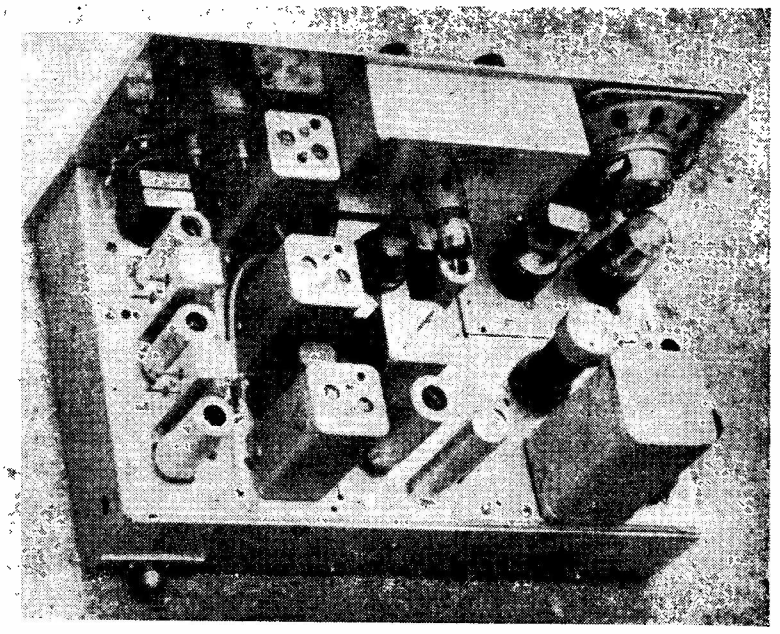
As is well-known, to obtain the combination of high selectivity and effective second channel rejection, the double superheterodyne principle is usually employed, with a low second IF for adjacent channel selectivity and a high first IF for freedom from images on the HF bands. However, in the present case it was decided to take the comparatively low frequency of 465 kc for the first IF because most of the components were to hand and also because in the first instance it was decided to use the station CR100 as the front end. Provided at least two stages of RF of good design are put in before the first mixer (as in the CR100, HRO and similar types) image problems will not be too troublesome. However, the constructional design is such that it would be a simple matter to replace the first IF strip and second mixer with components suitable for a higher IF, say, around 2 mc, if desired.

The lower the frequency the easier it is to produce selective circuits, so that most of the selectivity will therefore be obtained from the tuned circuits of the (low frequency) second IF strip. The difficulty in home-constructed receivers is in devising some method of varying the overall selectivity to allow for the reception of both phone and *CW* signals. This is achieved in commercial communications receivers by sometimes quite elaborate mechanical and electrical switching, rather outside the scope of the home constructor. One solution, suggested by G6HL (April, 1952, *Short Wave Magazine*) is to use separate IF strips for phone and CW—but something less complicated was required in the present case, and it was eventually decided to aim at an overall selectivity curve centred on 61 kc and having a band-pass response 2·5 kc wide, flat at the top and with minimum skirt.

If we were to tune in a double sideband AM phone signal in the centre of the pass-band in the usual way, it would sound pretty horrible after passing through a filter only 2·5 kc wide, as only 1,250 cycles of intelligence on either side would come through—in other words, no high notes. However, both sidebands contain the same intelligence, so we can place the carrier to one side, at 60 kc, so that only the carrier and one sideband are in the pass-band. We now have all frequencies up to 2,500 cycles and the signal sounds much better. Now suppose we had a strong interfering carrier at

465 kc, right in the middle of the upper sideband of the wanted signal. If our second mixer oscillator is working 60 kc below the input signal, *i.e.*, at 405 kc, then this interfering signal will fall within our IF pass-band at 61 kc and, ordinarily, knock out our AM signal with a 1,000-cycle beat note. However, if we shift our second oscillator to 525 kc we now receive only the lower sideband and the unwanted carrier falls outside our pass-band at 59 kc.

Thus, by *switching the oscillator* to the high or low-frequency side of the signal we can receive at will either the upper or lower sideband, depending on which has interference on it (*see* McLaughlin —"Exit Heterodyne QRM" —*QST*, October, 1947).



Main chassis layout of the Amplifier. The first strip, at left, includes the 465 kc IF section, second mixer, and crystals X1, X2 in the grid of V4 (see Fig. 1). Next comes the 60 kc IF strip; the centre strip carries the two detectors, and L3 in a screened can, with V9, V10 above; the "Q-Multiplier" unit is in the screened box fitted to the front panel. At right rear are V13, V15, with V14 just visible behind the output transformer. The valves immediately below the speaker are V11 and V12. As explained in the text, each section of the circuit is built up as a separate unit, which can be tested through before fitting it into its place on the chassis.

Now it is characteristic of an AM signal that the carrier can fade with regard to its sidebands and if we arrange our BFO to operate at 60 kc we can use it to augment our AM carrier when the latter is fading, thus giving what is known as "exalted carrier reception."

Furthermore, our BFO is now at the right frequency to furnish an artificial carrier when receiving the upper or lower sideband of a single sideband suppressed carrier (SSB) signal.

As the band-pass is 2.5 kc wide, additional selectivity must be added for CW reception and it was decided to incorporate an electronic crystal filter, or "Q-Multiplier," in the 465 kc IF strip to pass or reject a narrow band of frequencies, as will be explained later.

Further selectivity was to be available in the AF stages in the form of the "Selectoject" circuit.

So much for basic design considerations. The circuit finally drawn up is shown in Fig 1.

Circuit Details

As can be seen, input is taken *via* coax from the grid lead of the first IF transformer in the station receiver and feeds into a two-stage 465 kc amplifier of conventional design (V1, V2). Manual gain is controlled by R43 in the cathode circuit.

Connected in parallel with the anode circuit of the first IF stage is a shunt type "Q-Multiplier" with four operating functions, controlled by S1. In the "off" position, no HT is applied to the 12AX7, V3. In the P, "peak," position only one triode section (V3b) is active. This has a tuned circuit in its anode using a high-Q inductance L2, and through the use of positive feedback, the *apparent* Q of the circuit can be increased up to approximately 500, depending upon the setting of R53. As this is in parallel with the first IF stage, it has the same effect as making the stage regenerative; thus, the receiver has increased gain over a narrow band of frequencies. The actual resonant frequency determines the position of the peak, which can be moved across the band-pass by C44. The "broad" position B (S1a, S1b, S1c) is obtained by switching R48 in series with the lead to the first IF stage and reduces the effect of the "Q-Multiplier," thus broadening the peak. In the "null" position, N, negative feedback is applied to the circuit by switching in V3a.

This has the effect of lowering the anode resistance of V3a when the multiplier V3b is at resonance, effectively attenuating the IF signals while adjacent signals off-resonance pass through without attenuation. As before, C44 fixes the position of the *null* in the band-

pass and R52 determines the degree of attenuation (R52 and R53 can be initially pre-set and then not touched). The overall effectiveness of the circuit is dependent upon the "Q" of L2.

Originally the writer used an Osmor coil type QA5, which has a Q of approximately 150, and this gave very good results. The coil now in use, however, was wound specially by the firm and has a Q of approximately 300 for the same inductance. Anyone intending to use this circuit is recommended to obtain a similar coil from Osmor Radio Products Ltd., as the few extra shillings spent is worth it for the superior performance obtained.

The second mixer, a 6BE6 (V4) is crystal controlled at 405·55 kc or 525 kc, selected by S2. The crystals actually used are FT-241 72nd harmonic types 29·2 mc and 37·8 mc respectively (54th harmonic types 21·9 mc and 28·4 mc are also suitable). These crystals are readily available from Henry's Radio, and will oscillate on their fundamentals in low power circuits; no difficulty should be experienced provided the circuit values shown are not changed.

The 60 kc IF strip uses two 6SK7's (V5, V6) coupled by three BC-453 85 kc transformers T3, T4, T5, padded down to 60 kc. The IF transformers were removed from their original cans and mounted upside down in longer and broader cans (found in the junk box). The windings were shunted by 150 μμF 1% silver mica condensers (not shown in circuit) and additional twin ceramic trimmers of 12-42 μμF were mounted in the top of the cans, the original trimmers being retained. Larger trimmers are needed in view of the swamping effect of the added fixed capacity; small 100 μμF trimmers would have been ideal but were not to hand. At first it was intended to vary the coupling of the first IF transformer in an attempt to sharpen the selectivity curve for CW reception; a mechanical link consisting of a gear-wheel and a 4BA screw was rigged up between the fibre rod of the transformer and a knob on the front panel; but this has proved unnecessary in practice when the "Q-Multiplier" is switched in.

The unit has two detectors selected by S3. For AM a conventional diode circuit is used (V7), but for CW, SSB or exalted carrier AM a 6BE6 (V8) functions as a product detector, with consequent advantages of less loading on the last tuned circuit and less output required from the BFO. L3 and C55 in the anode of V8 comprise the filter in the output to take out the resultant beat note. A useful article on the

Table of Values

(All resistors ½ watt unless shown otherwise)

C1, C2, C3, C5, C6, C8, C12	= .05μF
C4, C10, C24, C26, C29, C53	= .01μF
C15, C16, C17, C18, C19, C20, C25, C28, C46, C47, C48	= 0.1μF
C9, C11, C14	= 47 μμF
C13	= .006 μF
C21	= 300 μμF
C22	= 100 μμF
C23	= 1 μF
C27, C49	= .001 μF
C30, C33, C34	= .02 μF
C31, C32	= .002 μF (*see text*)
C35, C36, C37, C38, C39	= .005 μF
C40	= 12 μμF trimmer
C41	= 470 μμ Fsilvermica
C42	= .0027 μμF silver mcia
C43	= .001 μμF silver mica
C44, C56	= 100 μμF variable
C45	= .25 μF
C50	= 200 μμF
C51	= 10 μF, 25v.
C52	= 8 μF, 350v.
C54	= 25 μF, 25v.
C55	= 500 μμF padder
C57	= 16 μF, 350v.
C58	= 240 μμF (T6)
R1, R22	= 220 ohms
R2, R3, R67	= 3,300 ohms
R4, R19, R25, R65	= 100,000 ohms
R5, R47	= 1,500 ohms
R6, R7	= 3,900 ohms
R9, R13, R18	= 2,700 ohms
R10, R11, R21, R38, R41	= 22,000 ohms
R12, R17, R27, R49, R62, R63	= 47,000 ohms
R14, R15	= 270 ohms
R16, R52, R53	= 10,000 ohms pot'-meter
R20, R57	= 680,000 ohms
R23, R48	= 27,000 ohms
R24, R61	= 68,000 ohms
R26, R28, R45	= 220,000 ohms
R30, R40, R55, R68	= 470,000 ohms
R31, R54, R56	= 1,000,000 ohms
R32, R35	= 2,000 ohms 1% (*see text*)
R36, R37	= 4,000 ohms, 1% (*see text*)
R33, R34	= 500,000 ohms ganged pot'meter (*see text*)
R39	= 6,000 ohms
R42	= 2,000 ohms
R43	= 20,000 ohms pot'-meter
R44	= 33,000 ohms, 1-w
R46, R51	= 2.2 megohms
R50	= 15,000 ohms
R29	= 1 megohm pot'meter
R58	= 390 ohms
R60	= 100 ohm pot'meter
R66	= 500,000 ohm pot'-meter
R69	= 470 ohms, 1-w.
R59, R64	= 4,700 ohms
T1, T2	= 465 kc IF Trans-formers
T3, T4, T5	= BC 453 IF Trans-formers (*see text*)
T6	= BC 453, BFO coil (*see text*)
L1	= 1.5-3 mH (any long-wave coil)
L2	= *See text*
L3	= 19mH RFC Denco RFC7
RFC	= 1mH RFC
S1	= 3 pole, 4 way wafer switch
S2, S7	= Toggle switches
S3	= 4 pole, 2 way wafer switch
S4	= 3 pole, 3 way wafer switch
S5	= 2 pole, 3 way wafer switch
S6	= 1 pole, 2 way wafer switch
X1, X2	= Crystals, *See text*
M	= 0-1 mA Meter
V1, V2, V13	= 6BA6
V3	= 12AX7
V4, V8	= 6BE6
V5, V6	= 6SK7
V7	= ½ 6AL5
V9	= 6AM6
V10	= 6H6M
V11, V12	= 6SN7
V14	= 12A6
V15	= 12C8

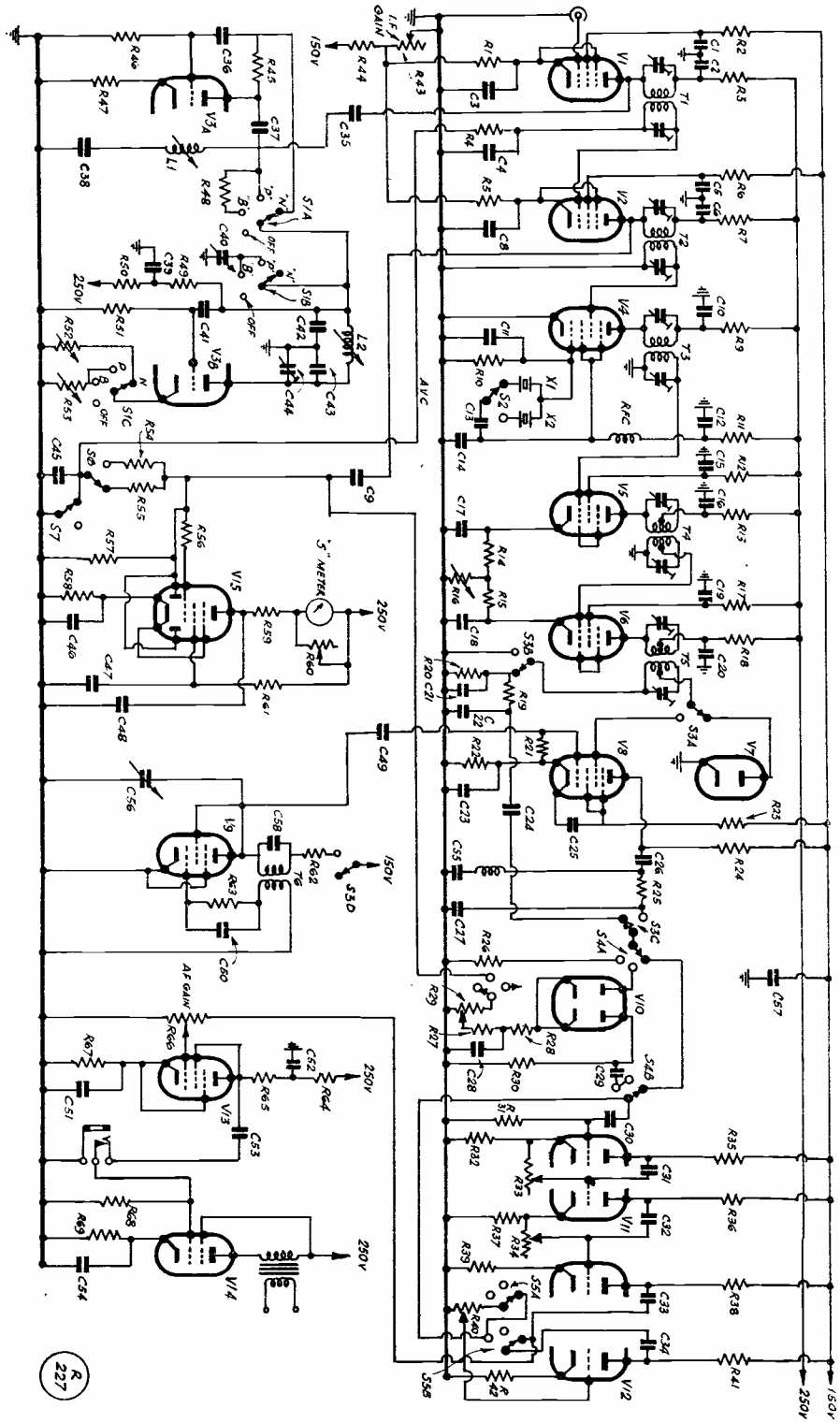


Fig. 1. Circuit of the Selective IF/AF Amplifier discussed in the text. It will take CW and either AM or SSB phone, with that knife-edge selectivity so essential on the amateur bands today. Incorporating the latest techniques, the circuit is well in the advanced category for amateur band receivers.

advantages of product detectors appeared in the May, 1956, issue of *QST* : " Reception with Product Detectors," by M. G. Crosby, W2CSY, and they have also been discussed in " SSB Topics," in *Short Wave Magazine*, by G6LX.

The BFO (V9) is only switched into circuit along with the product detector. The BFO coil T6 is from the BC-453, padded to 60 kc. With care the additional 240 $\mu\mu$F silver mica condenser C58 can be fitted into the original shield can.

The original trimmer condenser is set at full mesh and a 100 $\mu\mu$F air-spaced variable to ground, C56, used as the new panel control.

V10 (6H6M) operates as a series type noise-limiter clipping both positive and negative peaks and is a copy of that used in the Collins 75A4 receiver. The threshold is fully adjustable by R29 and for CW/SSB the bias, selected by S4c, is from a negative source in the power-pack ; for AM reception it is the rectified carrier voltage.

Output is fed to two 6SN7's (V11, V12) in the " Selectoject " circuit. Those unfamiliar with its operation are referred to *Short Wave Magazine* for January, 1952, or the 31st (1954) Edition of the *ARRL Handbook*. Briefly, this filter-amplifier has three operating functions controlled by S5a - S5b. It can be used as a normal amplifier with only one triode amplifying ; in the " reject " position, only one frequency — variable between 300 and 8,000 cycles—is rejected, which is selected by R33/R34 with R40 set for maximum attenuation (this is the position for telephony) ; in the " select " position, one frequency (selected by R33/R34) is amplified while the rest are much attenuated.

R40 is set just off oscillation when the unit will be in its most selective state. Care should be taken to see that the values of R32 and R35, R36 and R37 and R33/R34 and also C31 and C32 are as equal as possible.

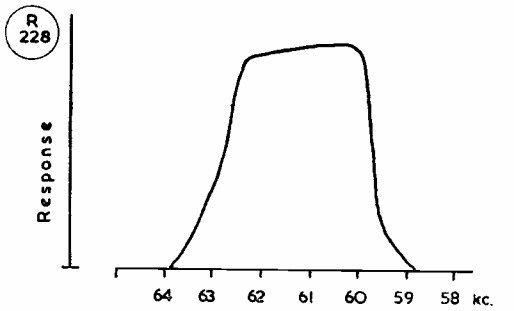


Fig. 2. Response curve obtained on the 60 kc section in the IF/AF Amplifier described by G3KGN.

The AF amplifier (V13) and output stage (V14) are quite conventional and require no comment except that a 12A6 was used for V14 only because it was to hand and a 12 volt supply was available in the power pack. The same applies to the AVC rectifier and S-meter valve, V15 ; control is applied to V2 and to the second RF valve in the front end. " Fast " or " slow " AVC action can be obtained by altering the value of the time-constant components by S6 in V15 grid. It will be noted that the gain of the 60 kc IF section is fixed after initial adjustment of R16.

Construction

Not having a new chassis available and wishing to save expense, the writer decided to put to good use one of the several " surplus " chassis which were taking up valuable space in the shack. A four-sided 16-gauge aluminium chassis size 13 ins. x 8 ins. x 2½ ins. with overdrilled top was selected and the top removed with a coping saw, leaving a lip about a ½ inch in all the way round, together with the four sides. The circuit was then built up in six sections, *viz.* : AF stages, Selectoject, detector and BFO, second IF, second mixer, and first IF. Each section was built and wired as a separate unit on flat aluminium strips with edges turned down for rigidity and with a tag strip on each for interconnecting leads. When completed, these strips were then bolted into place to the lip on the chassis framework. By commencing at the output stages and working back, each section could be tested as it was installed and it was a simple matter to remove any section for modification if necessary. The " Q-Multiplier " valve and associated circuitry are contained in a metal box size 5 ins. x 3 ins. x 2 ins. which was to hand (but an Eddystone diecast box would be ideal) and which is mounted at the back of the front panel so that R52, R53, C44 and S1 project through the panel.

Power supplies are fed in through an octal socket from the station power-pack—approximate requirements are 250 volts at 70 mA ; 150 volts stabilised, 30 mA ; 6·3 volts at 4 amps ; 12 volts 0·3 amps (*see above*) and −20 volts for the noise limiter. A 22·5 volt battery will do for the latter as the current drain is negligible.

Alignment

A signal generator of some sort and an output meter are essential for lining up to ensure that the response curve is of the correct shape

and extends from 59·8 kc to 62·3 kc. If a commercial instrument is not available rig one up (on a temporary basis if you like), using a long-wave coil and a twin-gang 500 $\mu\mu$F condenser connected in parallel, to any of the designs published in back numbers of *Short Wave Magazine.*

Calibration should be simple using the station receiver; remember that the 15th harmonic of 60.533 kc will fall on the Home Service on 908 kc.

Coupling in the BC-453 transformers is set to minimum by pulling out all the fibre coil plungers. A modulated signal of 61 kc is then fed into the second IF strip and the variable trimmers adjusted until maximum output is obtained. Coupling is now increased by pushing in the plungers until the response curve flattens at the top. Careful adjustment of coupling and trimmers and the plotting of results on graph paper should eventually result in a curve as shown in Fig 2.

This was found to be with the plunger in the second transformer right out and with the first and third plungers half out, but differences in layout and stray capacities would no doubt alter this. Unfortunately, the BC-453 transformers are not of very high "Q," so the sides of the curve are not as steep as would be ideal, but they are readily obtainable and in practice have proved satisfactory.

Alignment of the 465 kc section can be carried out with a signal generator or a steady signal tuned to the centre of the receiver band-pass. Check by switching sidebands and noting that output is equal.

Having aligned the IF sections, the "Q-Multiplier" circuit can now be set up. A coax plug and socket and a short length of coax connect the multiplier into the anode circuit of V1 and with this plug now inserted and switch S1a-b-c at "off," tune in a steady phone signal in the centre of the IF band-pass and adjust L1 for maximum signal. This ensures the receiver will function normally whether the "Q-Multiplier" is connected or not. Next, set C44 in the anode of V3B at half-mesh, S1 to "null" (N) and adjust L2 for minimum signal. Now set R52 for lowest signal level and reduce it still further, if possible, by fine adjustment of L2. This adjustment removes the carrier and low frequency sidebands, giving phone signals a tinny and overmodulated characteristic. Leaving the setting of C44 unchanged, switch to "peak" and advance R53 until a squeal is heard. Back off until the squeal stops and adjust trimmer C40 for maximum signal. The peak and null settings should now coincide in frequency.

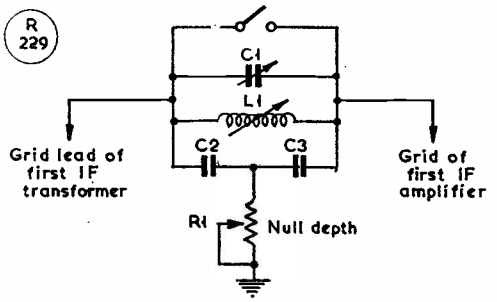


Fig. 3. As suggested in the article, a T-notch rejection filter can be used instead of the "Q-Multiplier." In this circuit, values are: C1, 100 $\mu\mu$F; C2, C3, .003 μF; R1, 15,000 ohms; L1, 4-5 mH.

In operation, the performance of this unit has been fully up to expectations.

If a signal is tuned in on the centre of the receiver band-pass as shown by the S-meter and there is interference on it, switch over to the other sideband. If the interference is still there and giving trouble, tune it out with the "Q-Multiplier" in the "null" position. For CW, set the multiplier to "peak," and we have an adjustable peak tunable across the pass-band, of width about 0·1 per cent. of the intermediate frequency, *i.e.* approximately 460 cycles, and with height adjustable through a range of about 30 dB. In fact the circuit will "ring" if we adjust R53 too far. Advantages over a conventional crystal filter are that we have either a peak or a slot and not a combination of both and no *retuning of the receiver is required.* Single-signal CW reception is a certainty with no trace on the other side of zero beat. And, of course, there's always the Selectoject to fall back on if we're still in trouble!

As the intermediate frequency is lowered, noise limiters become less effective but the one used appeared to be the best of several tried, although key-clicks can become more noticeable.

If anyone should contemplate constructing a similar unit but using a higher IF, say around 1600 kc, as mentioned earlier, remember that the "Q-Multiplier," being a percentage bandwidth device, will be about four times less effective at this frequency. Putting it in the 60 kc IF system will not help much either as the resultant high Q obtained makes the 60 cycle slot difficult to control and the circuit rings badly. The answer is to try a simple T-notch rejection filter, as shown in Fig 3.

Modulation Check Meter for the Receiver

INGENIOUS REFERENCE CIRCUIT FOR DIRECT MODULATION DEPTH READINGS

M. W. KIRBY

Here is another interesting add-on unit to enhance the value and improve the usefulness of the station receiver. Even if it proves difficult to apply an accurate calibration to the instrument, it will always compare the depth of modulation as between one station and another.—Editor.

THE device discussed in this article is, so far as the writer is aware, the only one of its type to be described in current literature; although it does not approach the oscilloscope method of checking modulation depth it does, if used intelligently, give a much more useful indication than "depending on one's ear." The method used to evaluate the modulation depth on any phone signal is to set the RF gain of the receiver to give a predetermined voltage to the demodulator, as judged by the S-meter against a reference signal. The modulation meter is then switched to the "on" position, when the swing of the needle will indicate the peak modulation by noting the highest point which it reaches.

The disadvantage of such a system is that the calibration only holds for a given receiver, which must be very carefully tuned to the signal. It is advisable to connect the meter as early in the receiver audio system as possible, as any tone control—or other limiting device as is often introduced in receivers primarily designed for communications use—will give a false reading on signals where the modulation power is concentrated in the lower audio frequencies. But providing care is taken in setting the meter up and it is re-calibrated when any major adjustment is made to the receiver which would alter its gain, then the meter should work well and enable accurate reports of modulation depth to be given.

The circuit is shown in the diagram and, as can be seen, consists of a linear audio amplifier feeding into an output stage which, in the absence of signal, is biassed to cut-off. Any audio power delivered from the demodulator to the amplifier grid is therefore used to drive the output valve into anode current, so giving a measure of the level of audio power present on a carrier for a predetermined S-meter reading. The theorists will be quick to point out the system's many drawbacks but the fact is that in practice it does work! The meter was checked against an oscilloscope and it was found, on some 40 signals within the amateur bands, that the meter reading was within 10% of (and on most signals very much nearer) to the 'scope indication.

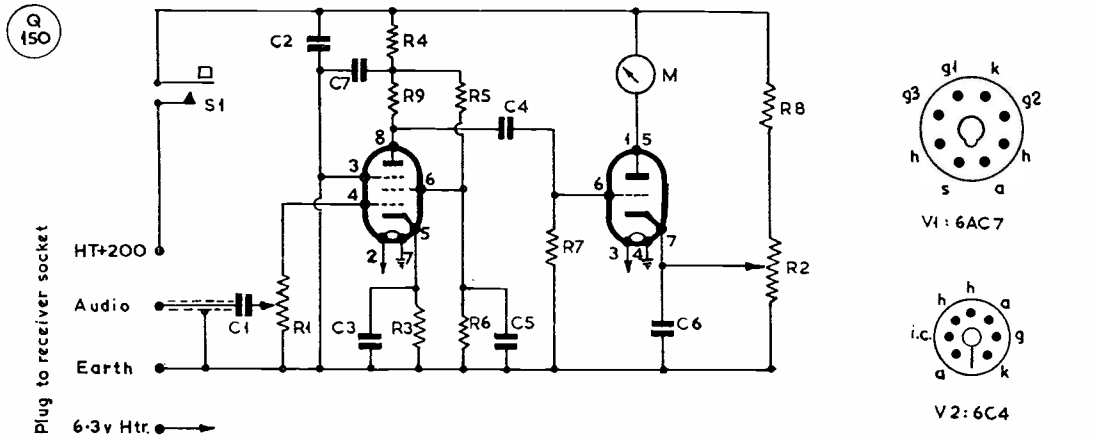
Construction

The unit can be constructed on a $4\frac{1}{2}$ in. x 6 in. x 2 in. chassis with the leads brought out to a four-pin plug to match a socket in the receiver. The two controls can be of the preset type and mounted on the front panel as the bias setting may need occasional adjustment in areas where the mains voltage fluctuates. All grid leads should be well screened and the smoothing efficient, as any hum introduced will lead to errors in calibration. No special precautions in lay-out are called for, although good quality components should be used as a non-linear response would give variations in the output depending upon the audio system at the transmitter end.

Setting Up and Calibration

To set the meter up plug in to the receiver socket and find a station of known modulation depth. Tune very carefully to the centre of the carrier and increase the RF gain until the S-meter indicates, say, S8. *All subsequent readings must be referred to this setting on the S-meter.* Next, adjust R2 until the modulation meter itself reads 0·1 mA and set the zero-balance on the instrument to zero. Next, adjust the audio gain control R1 of the unit till the meter just kicks up to full-scale reading on audio peaks with a 100% modulated signal.

The meter is now set ready for use and unless it is recalibrated the controls must not be reset. Assuming the 0—1 mA meter is scaled in tenths, 0·6 mA would represent 60% modulation, 0·25 mA 25%, and so on; this can be checked by reference to a BBC signal, on which average speech modulation is 60%. And even if the figures are not accurate, they will always be comparative. Remember, the meter only gives an accurate result when the signal produces an S8 reading on the S-meter, so it is important that the RF gain control is set to give this value on each signal to be measured. The press-to-read switch can be



Circuit of the Modulation Meter, designed as an auxiliary unit for any usual type of communications receiver, from which it could take its power. The effectiveness of the arrangement depends upon the accuracy of the initial setting-up procedure, since it is a reference system, as explained in the text. Even if not accurately calibrated, however, it will always compare, reliably, the depth of modulation between different stations on the same band.

mounted either on the unit or, as is usually more convenient, on the receiver front panel; it is required to make the meter inoperative when a signal of over S9 is tuned in, otherwise the needle would swing across the scale on modulation peaks and could be damaged. It should be mentioned that the meter for its operation requires very little audio to drive it and should cause no noticeable change in the receiver audio output.

The audio input for the meter can be taken from the diode demodulator circuit at the point of audio feed to the voltage amplifier or, if no tone control is provided in this circuit, it may be taken from the grid pin of the first audio valve. In some circuits it may be a good thing to connect a 100,000 ohm resistor in series with the meter feed and, as care must be taken not to introduce hum at this point, the lead should be well screened. Should it be found that the linear amplifier of the unit will not give sufficient output to drive the control valve, the audio may be taken from the anode of the receiver triode amplifier; the grid connection is to be preferred, however, as few receiver voltage amplifiers have the required linear characteristic.

This modulation check meter is a useful addition to any amateur-band receiver and, for the SWL, can make reporting much more interesting—its value to the transmitting amateur is obvious.

Table of Values

Circuit of the Modulation Check Meter

C1, C2, C4, C5	= 0.1 μF	R3	= 3,300 ohms
C3	= .005 μF	R4	= 33,000 ohms
C6	= .01 μF	R5	= 100,000 ohms
C7	= 8 μF, 350v. elect.	R6	= 150,000 ohms
R1	= 1 megohm pot' meter	R7, R9	= 68,000 ohms
R2	= 5,000-ohm pot' meter	R8	= 15,000 ohms, 2-w.
		M	= 0·1 mA m/c meter

(All resistors 1-watt except as stated)

PROPOSED SSB NET ON TOP BAND

It is felt, by a small group of Sideband operators in the south of England, that with the approach of winter more use should be made of the 160-metre band for U.K. SSB working. A simple transmitter is all that is necessary, with any aerial that will load up "Marconi-fashion"—and even an HF beam can be made to do that. It is proposed to make the Top Band SSB Net schedule 2200 clock time on Monday evenings, starting on October 14. Some further notes, with data on a suitable linear amplifier, will appear in October "SSB Topics" in SHORT WAVE MAGAZINE. It is hoped that one result of regular SSB activity on 160 metres will be to get many more U.K. operators interested in Sideband working, and the technique of SSB reception.

"CONTROLLED CARRIER CONSTANT MODULATION"

In this article in our August issue, the rectifier W in the circuit diagram on p.299 was inadvertently drawn with the positive side earthed—it should, of course, be connected to produce positive voltage on the screen of the PA. Some further notes on this system of modulation will appear in an early issue of SHORT WAVE MAGAZINE.

AUDIO GAIN BOX

TWO-STAGE HEAD AMPLIFIER

B. Wardman (G5GQ)

DO you have to speak within an inch or so of your microphone to get full modulation for your transmitter or tape recorder? If so, would you like to be able to talk to it comfortably from an armchair some feet away? That is just what this head amplifier makes possible for a cost of 20s. or so. In fact, the writer has actually made a recording, in the heart of London, of a pair of blackbirds singing more than 250 yards away! This was by way of an exercise to test the effectiveness of the thing.

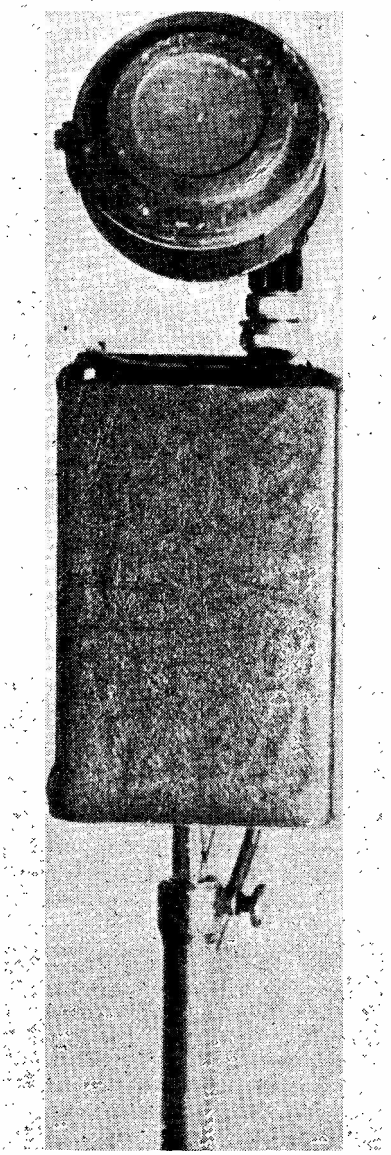
The completed unit is shown on its microphone stand in the photograph. It consists of a box containing a two-valve RC amplifier, taking HT and LT from the normal transmitter or recorder supply (300v. HT at about one milliamp, plus 6.3v. for the heaters). One shielded cable and plug carries the power, another the microphone output. The actual microphone in the picture is a high fidelity condenser type, but any other high-impedance type, such as a crystal, can be plugged in.

Somebody will now be saying, "But if extra amplification is required, why not add an extra stage or two to the existing amplifier?" The answer is twofold. The type of transmitter (or recorder) where one has to speak within an inch or so of the microphone has a first stage (usually a pentode) requiring about 1/10th of a volt input. Move a few feet away from the microphone, and the effective voltage at the first stage will drop to less than one thousandth of that, perhaps to something like 1/10,000th volt. Now in the first case, speaking close up, we have a relatively short lead (3 or 4 feet long) to connect in the microphone, and this lead is running around the 1/10th volt level. It must pick up a certain amount of mains hum and other noises, but provided these are reasonably below 1/10th volt, they will not be troublesome. For example, a hum pick-up of only 1/1000th volt would only be 1% of the speech input.

But supposing we add extra stages to the existing amplifier, so that it works at 1/10,000th volt input. That same hum pick-up will be ten times as loud as our speech—in other words it would drown out everything! Therefore, what we do is incorporate the microphone actually with its own pre-amplifier, *i.e.* make the first stage or so into a "head amplifier." The output from this is far higher, well up to the 1/10th volt level or more, so we can run a fairly long lead from it to the existing amplifier without much fear of hum pick-up; any AC interference there might be would be well below the level of the relatively loud signal we were producing. In effect, you get your gain at the microphone end, not in the speech amplifier itself.

Circuit

The circuit (for a crystal microphone) is shown in Fig. 1. It comprises an HF pentode and a triode, both RC coupled. These are not at all critical valves. For example, as there happen to be plenty of EF50's at G5GQ, one was used in the pentode stage—for transmitting and recording they are quite satisfactory. For PA (public address) work, however, an EF50 might be a trifle too microphonic at this level and hence a low noise audio pentode might be more suitable, such as an EF41. This is a matter of individual preference. For the second stage, the 6J5 (metal) takes a lot of beating, because it is very quiet and stable.



Microphone and head amplifier on its stand, complete, as described in the article. The increased audio gain enables the microphone to be "talked at" in comfort from several feet away, while allowing a connecting lead of any convenient length into the speech amplifier proper.

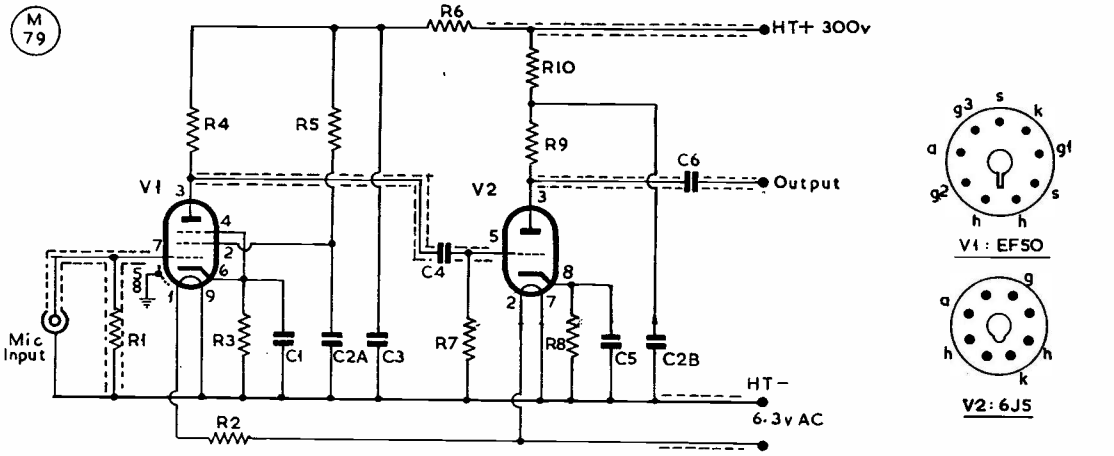


Fig. 1. Circuit of the head amplifier as discussed by G5GQ in the article. An EF50 gives ample voltage gain for the 6J5 in the second stage. To reduce the possibility of hum and because the current drain is very small, the EF50 is run at reduced heater voltage ; in this particular application, it does the valve no harm. A condenser microphone is mentioned but a crystal type could be used equally well. The input and output leads should be run in shielded cable.

Working at so low an input level, the greatest care must be taken at the first stage. Note the 10-ohm resistor R2 in the heater lead of the EF50, to drop the voltage from 6.3v. to 3.8 or 4.0 volts. This is a tremendous help in reducing hum, which is one of the main troubles with low-level high-gain stages. The valve holder itself should be mounted with rubber grommets as a precaution against microphony. The holder itself must be fitted with a valve clip (retainer).

The low heater voltage advocated and used in this little unit may surprise many readers. It is possible only because the valve is RC coupled, and so is taking only 25-50 *micro*-amps, which is well within the ability of the cathode even at that low temperature. Remember also that it is only handling minute fractions of a volt at its grid, far less than the conventional input stage in your existing amplifier. The heater voltage is not at all critical. At the second stage, it makes no detectable difference, so the 6J5 is allowed to run normally.

The resistors used in the circuit are neither critical nor of special types. Years ago, one had to scratch round for what were called " special noise-free resistors " and use wire-wound ones wherever possible, because the standard types used to give the most awful frying noises. But normal modern ones are absolutely satisfactory.

The coupling condensers *are* important. It is an absolute waste of time to put in cheap paper types, so start right with good mica ones.

Every inch of the grid lead of the pick-up stage must be shielded, and this means not just the microphone lead, but also the grid leak itself ; wrap it round with tape and then shield it with copper foil. It was at this stage that most of the teething troubles were encountered. There was an appalling sizzling noise which just couldn't be traced ; every fixed condenser, every resistance was changed without effect. Finally, the actual shielded cable was changed over, and there was the fault. From a number of tests done since

Table of Values

Fig. 1. Circuit of the Head Amplifier

C1, C5	= 50 μF, 6v.	R5	= 1.5 megohm, ¼-w.
C2A,C2B	= 24 x 24 μF, 450v. *or* 32 x 32 μF	R6	= 330,000 ohms, ½-w.
C3	= 0.1 μF, 450v.	R7	= 500,000 ohms, ½-w
C4, C6	= .01 μF, 450v.	R8	= 1,500 ohms, ½-w.
R1	= 5 megohm, ¼-w.	R9	= 150,000 ohms, ½-w
R2	= 10-ohm, 5-w.	R10	= 33,000 ohms, ½-w.
R3	= 3,300 ohms, ½-w.		
R4	= 500,000 ohms, ½-w.	V1	= EF50
		V2	= 6J5

then, it seems that certain types of braided audio cable suffer from some sort of bi-metallic effect in the braiding itself, possibly due to plated and unplated sections touching. Practically all polythene RF feeder cables are free from this effect, but many of these, whilst suitable for RF, are not shielded sufficiently against AF, and may be prone to pick-up hum. Therefore, if there is hum or sizzle, check up on those shielded cables and try substitution. In any event, to prevent " sharsh " effects, the braiding itself must be protected by an insulated outer covering—as most such cables almost invariably are.

Mechanical Construction

The construction suggested permits the very easiest assembly, and still allows the unit to be removed from its case within seconds to change a valve. Other arrangements are, of course, possible, the object being always to make the head amplifier integral with the microphone.

At G5GQ, the amplifier section consists of two heavy aluminium (or steel, if you prefer) plates, each 5 ins. x 3½ ins. These are lined up together, and three holes drilled through. Three 6-inch lengths of 4 BA brass rod are put through these holes, with nuts, so that the two plates are spaced about 3½ inches apart. and the rods protrude 2½ inches below as a sort of tripod.

The container is, in effect, an upturned box of a total depth of 5¾ inches. The bottom is also drilled

in the centre so that it can be fixed and bolted on to the microphone stand. Two ¼-inch holes are also made at convenient points to take the two cables—power input and microphone lead. When the amplifier is complete, it is simply dropped in until the three rods locate in the bottom holes, slip into position, and are locked by nuts.

Having got the mechanical parts ready, the amplifier proper can be constructed. This is mounted entirely on the lower plate. The simplest way is to take the assembly of the two plates and three rods apart, treating the lower (amplifier base) plate as an individual unit. The top of this can be seen in the side view photograph. The EF50, 6J5 and the 24 x 24 μF decoupling condenser are mounted in the top; all the other parts are underneath.

The top plate carries the microphone swing mounting, and a socket into which a plug from the microphone goes. The shielded lead from the grid of the EF50 is brought up through a hole in the amplifier baseplate and connected to this socket and, of course, thus to the microphone itself. This lead can also be seen quite clearly in the photo.

The assembly is then bolted up, and the power and output leads connected. Power is fed in through a 3-core shielded polythene cable, the braid being earthed but not carrying any power. A single-core polythene shielded cable provides the microphone output. The entire assembly can be tested before being put into its case. The container is then covered with dark red leather (or some similar material) secured by Durofix, making the finished job shown in the photograph.

Power Supply

In the original models, extra special smoothing was used in the HT supply; this was not difficult because it was taken from the very well smoothed and stabilised supply for the transmitter VFO unit. This limited the microphone and head amplifier to use with the transmitter only. However, tests were made with simpler power supplies, that in the recorder being about the simplest brute-force type in existence. It made no difference at all; there was no trace of hum (no doubt due to the matter of micro-amps only which the head amplifier takes) *plus* the decoupling resistors

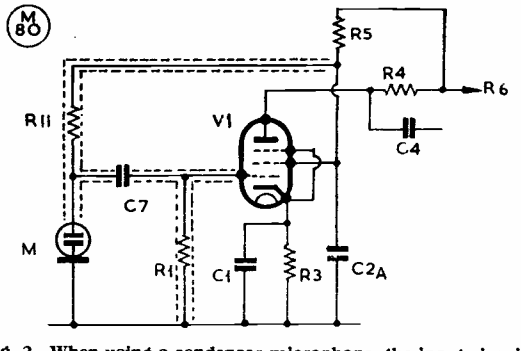
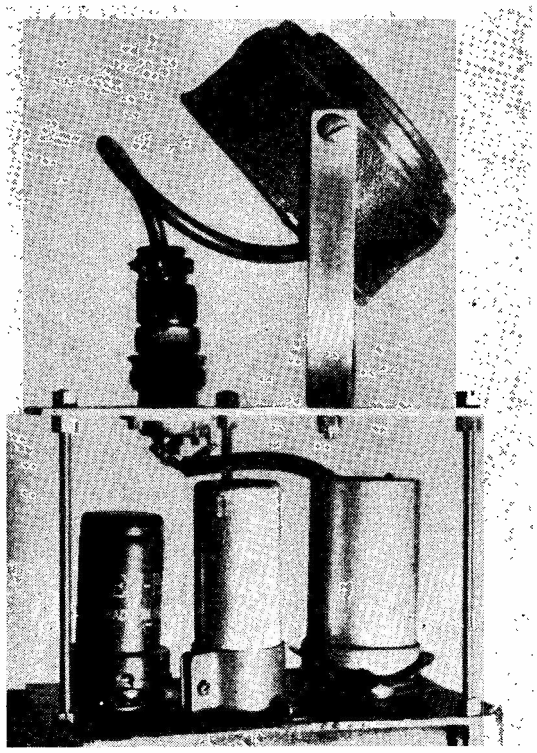


Fig. 2. When using a condenser microphone, the input circuit can be arranged as shown here. C7 is .01 μF, 350v. working, and R11 anything from 20 to 40 megohms. Shielded and earthed leads should be used as indicated.



Construction of the head amplifier, in its box immediately below the microphone. The circuit elements are carried beneath the lower base plate. This assembly gives ample immediate gain, and makes the microphone much more convenient to use.

and the large decoupling condensers. Therefore, the power lead from the head amplifier was terminated in an octal plug, both the transmitter cabinet and the recorder case being drilled to take octal sockets, which carry 300v. HT and 6.3v. LT from their normal supplies. Thus the microphone plugs into either, and can be used for both as required.

Condenser Microphone

If a condenser microphone is used, it has to be given a polarising voltage and also coupled by an isolating condenser to the grid. The circuit, which is believed to be original, is shown in Fig. 2, the unique feature being the way the polarising voltage is taken from the screen grid circuit. This not only gives a more stable voltage, but also introduces a balanced feed-back.

Results

The head amplifier, with a condenser microphone, has been in use at this station consistently since the beginning of January and its quality is well spoken off on the air. Visitors to G5GQ are always amused at being able to speak anywhere within 15 feet of the microphone and take part in a QSO. For tape recording, whether music or speech, it is just about as perfect as can be and is used in conjunction with the Mixer Unit described in the May 1957 issue of SHORT WAVE MAGAZINE.

Driver Unit for Ten

ANOTHER USE FOR THE RF-24

C. E. GODSMARK (G3IWL)

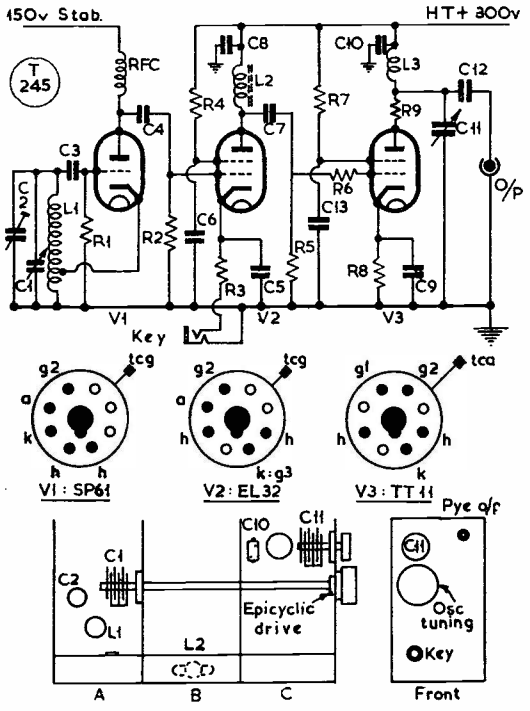
FOLLOWING are some notes on a 10-metre driver unit that the writer has constructed from an ex-RF24 unit.

This unit lends itself well to the modification and results in a very compact VFO for Ten. As most of the wiring—heater, HT and screens—is already in place, a few evenings' work will produce the thing "ready to go."

First, all the switch gear must be removed, as it is not required. The oscillator section of the RF24 is retained as the VFO oscillator. One of the grid coil formers is used for the oscillator coil and fixed in place of the existing ceramic former. The oscillator frequency is made 14 mc. The original SP61 can be used, but the writer found that a CV660 (6AC7) gives better results; this of course necessitates changing the valve base. The other two bases must be changed to international octal, since V2 is an EL32 doubler to 28 mc. The anode coil L2 of the EL32 is the original mixer anode coil rewound. V3 is a straight amplifier on 28 mc. Care must be taken with the wiring of this stage as the TT11 employed here will tend to take off; however, stability was easily achieved with grid and anode stoppers each of 30 ohms. The tank coil L3 in the anode of the TT11 must be adapted according to the requirements of the PA the unit is to drive. At the writer's QTH a high-impedance output is required direct to the grid of the final RF amplifier, and the ceramic former from the original oscillator is fully wound with 22g. wire for L3. If 80 ohm output is needed, a 2-turn link would be correct in place of C12. The tuning capacity C11 should be of good quality as it has to withstand HT.

Operating Notes

It was found that the oscillator would remain "spot on" after 15 minutes or so, but a stabilised HT supply is, of course, much to be preferred and is recommended for best results. Actually, the writer uses a VR105 strapped into compartment B—*see* sketch. A stabilised switchable supply of 150 volts or so for the oscillator V1 alone will increase the RF output of the unit and be convenient for netting. The tap on the oscillator coil controls the quality of the note. If the note is rough the tap should be eased towards the earthy end of the coil, until the note clears, consistent with good output. The anode coil L2 of V2 is tuned up to peak when at about 28·3 mc and will remain fairly broad over 500 kc or so. The unit will give 4 mA grid drive through 20,000 ohms into the grid of an 807.



Circuit and layout used by G3IWL for his conversion of the RF-24 as a driver for 10 metres. It is always worth having separate gear for Ten, as not many transmitters can be considered fully efficient over the whole range 3500-28000 kc.

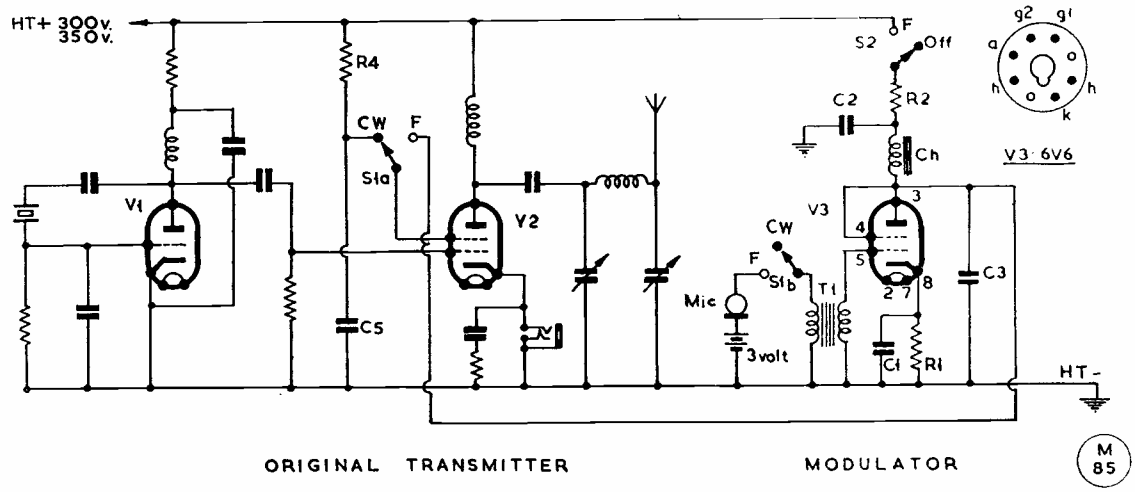
Table of Values

RF-24 Unit as 10-metre Driver

C1	= 25 μμF miniature variable	R1, R2	
C2	= 3-30 μμF Philips trimmer	R5	= 10,000 ohms
C3	= 25 μμF ceramic	R3	= 250 ohms
C4, C7		R4, R7	= 20,000 ohms
C12	= 50 μμF ceramic	R6, R9	= 30 ohms
C5, C6, C8, C9,		R8	= 400 ohms
C10, C13	= .001 μF, mica	RFC	= 2.5 mH RF choke
C11	= 35 μμF, o/p tuning	L1	= 12t. 22g, tapped 3½t.
		L2	= 10t. 30g. (*see text*)
		L3	= *See text*

NEW QTH's

Readers are reminded that, as agents for the *Radio Amateur Call Book*, all new U.K. callsigns and changes of address should be notified to us. Appearance in "New QTH's" ensures publication in the *Call Book*, which circulates throughout the world.



Circuit of the screen modulator, applied to the transmitter shown on p.189 of the June issue; the only changes from this are with respect to the switching S1 for changing from CW to phone. To get good quality with adequate modulation, it may be necessary to experiment with aerial coupling to the PA and the value of R2 in the modulator; the static screen voltage for V2 should be about half that normally applied for full CW output. This is not intended to be a DX-phone transmitter, but it will work the locals very comfortably — and on 40 metres remember that the locals are European stations.

Screen-Modulating a QRP Amplifier

SIMPLIFIED PHONE OPERATION

R. H. WRIGHT (G3IBX)

MODULATING the "Simple CO/PA Transmitter" described in the June, 1957, issue of *Short Wave Magazine* is neither difficult nor expensive; it can be done by applying the modulating voltages to the screen grid of the RF amplifier valve—V2 in the circuit on p. 189, June.

The diagram herewith shows the modulator circuitry referred to the original transmitter. The audio output from a carbon microphone drives a 6V6 valve, triode connected, through the microphone transformer, T1. The AF voltage variations at the anode of the 6V6 are then used to "swing" the screen of the PA, V2 in the original circuit. With a good carbon microphone in use, reports say speech quality is satisfactory and percentage modulation adequate.

The circuit of the original transmitter requires only slight modification, effected by the switch S1a, which joins the screen of V2 to the anode of the modulator valve. C5 in the original is correct for CW working, but must be replaced by a capacity of not more than 500 $\mu\mu$F (C3) when changing over to phone.

For operation of the transmitter on telephony, tune as described in the previous article for CW, change S1a—S1b to the phone position, and then if the jack in V2 cathode is of the closed circuit type, *i.e.* completes the circuit when the jack plug is withdrawn, remove the key and plug in a milliameter. When the microphone is not in use, it can be automatically switched off if S1a—S1b is a DPDT switch (to avoid discharging the energising battery) if the transmitter is left on "CW" position. The switch S2 cuts HT to the modulator and need only be at "off" during long CW sessions.

Table of Values

Circuit of the Screen Modulator

C1 = 50 μF, 50v. elect.	Ch = 10-15 Henry AF choke, 30 mA
C2 = 0.5 μF paper	
C3 = 500 $\mu\mu$F (*see text*)	S1a-S1b = Toggle DPDT
R1 = 300 ohms, 1-w.	S2 = Toggle on-off
R2 = 20,000 ohms, 1-w.	V3 = 6V6 or 6AQ5
T1 = Microphone xformer	

LORD BRABAZON, PRESIDENT R.I.C.

The new president of the Radio Industry Council, in succession to Sir Edward Appleton, is Lord Brabazon of Tara. He has many connections with the radio and aircraft industries, and is a pioneer in both. As mentioned in our August issue, the R.I.C. has important co-ordinating functions towards the radionics industry as a whole.

STATION GB3SP

AMATEUR RADIO PARTICIPATION AT SCOUT JAMBOREE, SUTTON PARK, AUGUST 1957

A. F. Dennis (G3CNV)

The author of this article has been connected with Scouting for more than 20 years, and it was due mainly to him that GB3SP was brought into being. For such a large undertaking, many willing helpers had to be found and welded into a team—thus, it was very much a co-operative effort, with G3BA and G3CNV responsible for organisation and supervision. Many readers will have heard or worked GB3SP. Here is the story, from the inside, of what became the largest Amateur Radio station ever to be put on the air—a great credit to all concerned, and another outstanding example of the initiative, adaptability and resource of radio amateurs—and Scouts.—Editor.

THE story of GB3SP starts nearly two years ago when the writer approached Imperial Headquarters for Scouting with a suggestion that an Amateur Radio station should form an integral part of this year's Jubilee Jamboree Celebrations in Sutton Park. The main directing committee agreed enthusiastically to the suggestion, adding "It must be the biggest and best station possible." The writer then set about getting support for the venture, and to this end the working committee of the Jamboree Radio Station was formed by two representatives each from the British Amateur Television Club (Birmingham Group), Midland Amateur Radio Society and Slade Radio Society. The Post Office was approached for certain additional facilities, and these were duly granted—a special callsign GB3SP was allocated and, more important, permission was given to radiate simultaneously on all bands a news service on Scouting matters. It is believed that this was the first occasion that the PMG had allowed an exhibition station to radiate its own news service.

Approaches were then made to more than 20 manufacturers for the loan of equipment of various kinds; it must be stressed that the success of the station was in no small measure due to the ready co-operation which the committee received from a total of 22 firms.

The news service was radiated simultaneously on all bands 160-2 metres, all transmitters being linked back to the news booth *via* an isolating amplifier unit. Transmissions, which took place on the hour every hour while the station was operative (1200—2100 G.M.T.), were greeted enthusiastically all over the world and personal comments by the general public who visited the station were very gratifying.

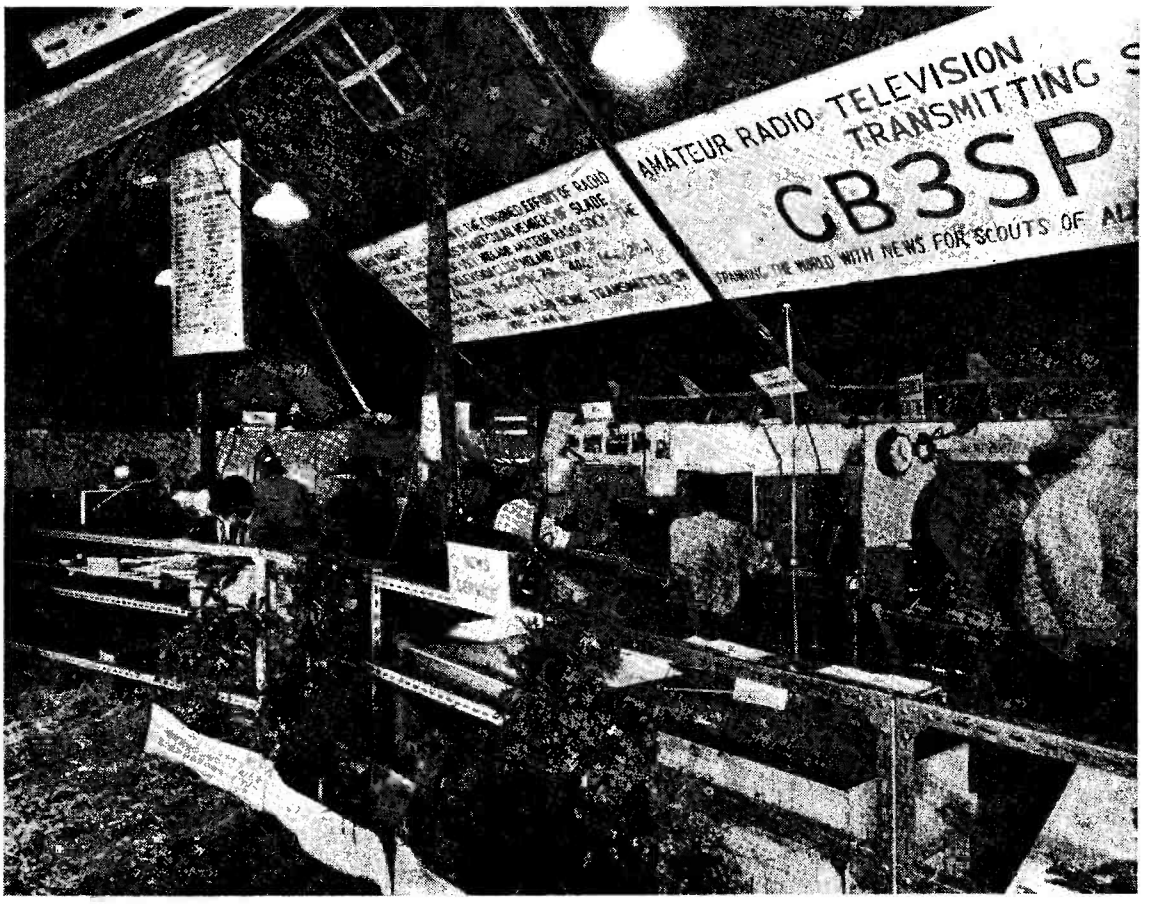
On the day the station opened Lord Peter Baden-Powell, son of the founder, visited GB3SP and made a special recording for broadcasting—he was greatly impressed by the scope and layout of the station. Later on that day a group of German Scouts visited us and quite spontaneously broke into one of their national songs—all of which was duly recorded on tape for future use. Liaison had been established at the Press Camp and a team of reporters—in the main members of the "Mountbatten" Sea Rover Crew—were out and about in the various camps covering some of the many events going on round us. In this work they were greatly assisted by the use of a portable battery operated tape recorder specially loaned for the occasion. It is not possible to detail all the people who were interviewed for the news service—suffice it to say that they numbered nearly 20 nationalities. Musical items varying from the bagpipes to an oil-drum band from Trinidad were also featured as part of the "news." In all, 121 news bulletins were broadcast from the station. In order that the activities of GB3SP, and in particular its own news service, should be more widely known, a circular letter had previously been sent through the organising commissioners to all countries involved in the Jamboree celebrations, mentioning the Camp's own radio station.

Equipment Installed

The station itself comprised in all seven transmitters, as follows: 1.8 mc from Slade Radio Society; 3.5 mc, Panda PR120V; 7.0 mc, Panda PR120V; 14 mc, Labgear LG300; 21 mc, Labgear LG300; 28 mc, Labgear LG300; 144 mc, G3HAZ. Receivers were many and varied—they included Eddystone 888, Marconi, Redifon R150, Airmec C864, and a BRT400 belonging to G3AG. Outside the station was our aerial "farm." Having plenty of space available on the highest point in the park it was possible to erect something most of us can only dream about. G3BA, who was in charge of aerials, produced Sterba Curtains on 14 and 21 mc and a "Lazy-H" for 28 mc, *plus* dipoles for 3.5 and 7.0 mc, topped off by a long wire for Top Band—this vanished into the woods at the rear of the station, and it is believed that it was 600-ft. long. The aerial system was suspended between four 80-ft. poles, loaned and specially erected by Messrs. Poles, Ltd., for the event; they rather dominated the scene at Camp Centre, being visible for quite some distance. Many visitors paused to admire the aerial array—and more than one asked—"Are these for the B.B.C.?" (who were adjacent to us, incidentally) and on being told what they were, were duly amazed.

During the first few days of the Jamboree over a quarter of a million people visited Sutton Park and not a few of these inspected GB3SP in operation, many coming quite long distances specially to see this truly international gathering of 35,000 Scouts from 62 different countries. While the station was in operation more than 1,100 contacts had been made in less than a week and, judging by the queues that formed up on the various frequencies, the popularity of GB3SP was quite considerable.

A very popular part of GB3SP was the TV stand—manned by members of the Birmingham Group, B.A.T.C. Demonstrations using a live camera were staged, also of Telestill and Telecine. "On the spot" interviews were arranged and on one occasion



A general view of the layout at GB3SP, the all-band station installed and operated for the duration, August 1-10, of the Scout Jubilee Jamboree at Sutton Coldfield. Separate operating cubicles were provided for each band, with reception desks for messages and visitor entertainment. British commercial amateur-band equipment was used almost exclusively and the total value of the installation was put at £4,000.

two very large and ferocious-looking Redskins, complete with head-dress, warpaint and tomahawks, were to be seen on the monitors in the tent. Two Maoris, complete with bead skirts and warpaint, also paid us a visit, as did a Scots group with bagpipes. The magnetic effect of seeing *oneself* on the "telly" drew large audiences, who on more than one occasion overflowed the tent. In addition to all this, the Group had on display quite a varied selection of apparatus made by members. George Flanner, G3KBA/T, provided a camera and its associated equipment and did most of the camera operating. He did find life rather difficult on several occasions when the darker Scouts were being interviewed against a natural dark background.—"Can't get any contrast!" muttered George, twiddling knobs furiously. Despite this, the picture quality was excellent and compared very favourably with the BBC and ITV—the results fully justifying the tremendous amount of behind-the-scenes work that went into this side of the venture.

Quite a number of visitors were licensed amateurs; many were the personal QSO's that took place. Our visitors' book shows callers from several countries—notably from the States—all of whom were amazed to see such a large and elaborate amateur set-up.

Local Societies had display stands which attracted no small amount of attention from the visiting public; MARS had produced a special edition of their monthly *News Letter* for the occasion and these were despatched from the site to members on the first day of issue of the special stamps. Slade Radio's *Contact* was also on sale, as was the BATC Birmingham Group's news letter—again specially produced for the occasion.

Operating Team

Some 60 licensed operators were at one time or other at the microphones of the seven transmitters and were responsible for the 1,712 contacts made. The highlight QSO was working VP8CI—the station attached to the Royal Society's Antarctic

Expedition at Halley Bay, on 14 mc, RST-569 both ways. Other contacts were with /M stations and several /MM stations. In all, 71 countries were worked during the 12 days of operation.

Overseas visitors to the station included LA8AF, W8VBX, W8WJK, W8DS, K8AJW, ZL2NR, K6CNM, W3IRW, W2RLE, LA6BB, VE1CB, W2MXM, VP2GZ, W3FHC, KN3AJG and a host of G's too numerous to mention.

Looking on the Jamboree in retrospect, this Amateur Radio station has been a triumph of co-operation between members of the Midlands Societies involved. Then there were all our friends in the Trade, who loaned or donated apparatus to equip GB3SP. Over 100 amateurs in one way or another contributed to the operational success of the stations, together with members of 1st Sutton Sea Scouts—the "Mountbatten" Sea Rover Crew.

It was rather a wrench to dismantle so fine a station containing over £4,000 worth of apparatus. Many have described it as the largest Amateur Radio station ever to be operated—we aimed to do this and now believe that it has been accomplished. We did set out to put Scouting on the air, and judging by the number of operators far and wide who admitted membership of the movement, we did fulfil a useful role, and many others have written to say how much they appreciated the activities of GB3SP.

Finally, special thanks are due to the following firms, who contributed equipment to the station: Airmec Ltd., Receiving apparatus; Aerospray, Spray painting equipment; Bullers Ltd., Insulators; Cosmocord Ltd., Microphones; Desco Ltd., Office furniture and typewriter; E.M.I. Ltd., Recording apparatus; Handy Angle Co. Ltd., Constructional steelwork; Hawnt & Co., Electrical fittings; J-Beam Aerials, VHF aerials; K. W. Electronics Ltd., HF aerials; Labgear Ltd., LG300 transmitters; J. Lucas Ltd., Electronic office equipment; Marconi Co., Ltd., Receiving apparatus; Marconi Instruments Ltd., Frequency standards; Panda Radio Ltd., PR120V transmitters; Poles Ltd., Aerial masts; Redifon Ltd., Receiving apparatus ; Stratton & Co., Ltd., Receiving apparatus; Telegraph Construction & Maintainance Co., Ltd., RF and power cables; C. H. Young Ltd., Aerial equipment; 3 M's Co., Recording tape; Reosound Electrical Co., Floodlighting equipment.

The writer would also like to place on record his own thanks to the committee and all Midlands amateurs concerned in this venture for their most willing help and co-operation. Particular mention must be made of the two ladies who assisted so nobly behind the scenes, coping with the secretarial work involved—Mrs. Joyce Symes (XYL G3LNN) and Miss Diana Williams, and also Mrs. Mary Follis (Mrs. G3AY) our only lady reporter, who in her spare time seemed to be able to produce cups of tea from out of thin air.

Among the manufacturers of radionics test and measuring instruments and apparatus, the name of Avo, Ltd. is known all over the world. To improve the reliability of their products even further, the firm have now introduced a dust-free, air-conditioned zone in the factory, within which instruments are built, calibrated and tested under ideal working conditions. All personnel accept, and work to, exacting standards so that Avo, Ltd. can keep ahead in the race for world business. The firm's manufacturing methods and facilities cannot be bettered by any similar plant abroad.

DX COMMENTARY

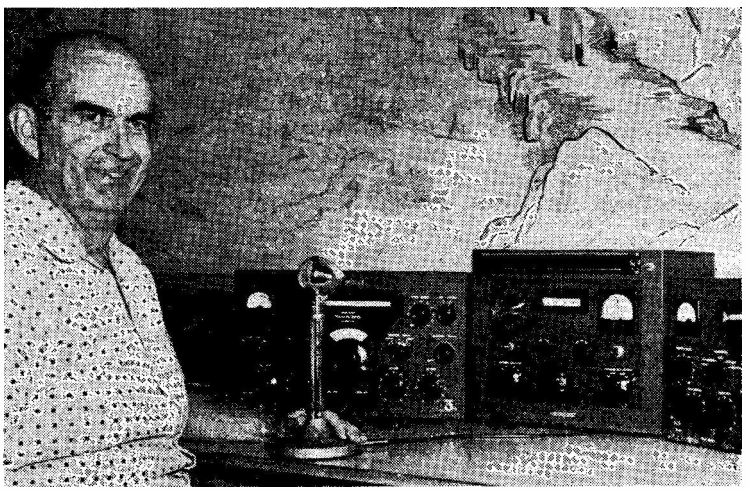
L. H. THOMAS, M.B.E. (G6QB)

IT has been a much busier month than last, with conditions as good as the weather has been foul. At any time of day there has been DX available on one of the bands, although its quality has varied from "bread-and-butter" to the exotic variety. However, the number of new countries worked by correspondents during the period is sure proof that things have not been dull.

Sun-spottery has been kinder to us, on the whole, since the colossal explosion with which the sun announced the beginning of its own IGY. Solar activity naturally remains very high, but we have not had the freakish conditions that flattened the bands at the beginning of July.

Ten remains pretty dull, but should certainly be waking up during September. *Fifteen* is perhaps the best band for consistent DX without too much interference from locals. *Twenty* remains just what it always has been, and a most exasperating mixture at that. All the Lids and Klots that used to spread their dreadful activities over the old Forty-metre band now seem to use Twenty for the same purposes, including gramophone-grinding in the CW area—can you beat it! Short-skip exposes them to everyone's notice, and we can only hope that something horrid will eventually happen to them.

The WAZ Marathon table is particularly lively, nearly everyone on it reporting a change each month. Note the very close bunching at the top of the ladder, where they must be approaching saturation! It is highly unlikely that the Fortieth Zone (23, of course) will be worked by anyone this year. Were it only a feasible spot for a DX-pedition, what a Thing that would be! The lucky travellers could be sure of working 39 Zones and 200 Countries within a day or so — but they would have to take two stations if they wanted to make a WAZ on the deal, or else they would find Zone 23 impossible.



FS7RT/PJ2MC

CALLS HEARD, WORKED and QSL'd

Round the DX Bands

G3BHW (Margate) is joint top-scorer on the Marathon ladder at present. Despite gardening and the like, he raised HI7LMQ and PJ2MC on Ten phone; Fifteen, also phone, brought him VR2AS and 2AZ, ZD1EO, VQ6ST, PJ2MC, MP4's, OA and VP4, 5 and 6. On Twenty he stuck to CW and raised VP8AO and 8BJ, VP2VB, VQ6AB, XW8AB, LA2JE/P (Hope Is.), LA1VC/G (Bouvet Is.) and quite a few more. Bouvet Is. is at present a query in regard to country status, we believe.

G3FXB (Southwick) was delighted to raise W6UOU/KS6 (SSB/CW) on Twenty. The same band gave him VP2VB, VP8CC and VQ3SS on CW, plus TG9MQ on phone. Fifteen CW raised FE8AH, KP6AL, PZ1AQ, VR2AS and XW8AG; Phone was responsible for KP6AL, PJ2AX, VQ6ST and ZD4CP, with some OA's and VE3AHU/SU. XW8AG was there at 1500 GMT—QSL *via* XW8AB (but how does one even get a card from XW8AB? We can't!)

The only activity at G3FPK (London, E.10) was short spells of CW on Twenty. These succeeded to the tune of TI2VA, FM7WR (2230), VS9AD, LA2JE/P, VS6DX, FF8AC (0600), many OHØ's, UL7GN and UAØAB, who was running 10 watts and gave G3FPK a 599 report at 2330 on two successive nights! Comment from 'FPK, who has been stalking the rare Russians—How is it that during contests one hears very fine operating from some of the U stations, and yet in the normal course of events they seem to have G9BF notes and the most terrible operating technique? Final point—he is departing for Monaco in early October and will be using his other call 3A2BT . . . details later.

G3DO (Sutton Coldfield) was not on the air much, having been tied up operating GB3SP from the Jamboree site. However, he did put his score up with KG6AGY, PJ2MC, FS7RT and ZK1BS, all on Fifteen phone.

G2NS (Southbourne) observed a terrific pile-up on Fifteen when VP2VB showed himself on August 11. He doubted whether the station was genuine, this being Danny Weil's call, but from what others say about him it does appear to be OK. He was operating from the British Virgin Is., and also occasionally signing /P.

G3JKF (London, W.5) reports a big jump in his Marathon score, mostly due to Twenty CW. Among the better ones were FP8AA (2100), UM8KAA (1800), XW8AB (1935), UAØOM (2225), FB8BD (1750), and UI8KAE (1630). The latter said he was in Zone 18. ZD3BFC was worked on Ten phone, and among the got-aways were ZS7C, XZ2TH, HR1EZ, VS4BA and DU's — all Twenty CW.

GM2DBX (Methilhill) has at last raised his hundredth country on Fifteen phone, where three new ones were ET3XY, EL2D and VR2AZ. But his most difficult job of the month, he says, was raising GB3SP on Eighty phone!

G3KDE (Freshwater Bay, I.O.W.) is ex-VR3G, and he tells us that the operators of all the four Christmas Island stations are now back in G-land; they were very disappointed to make so few U.K. contacts while out there. VR3B has now left Fanning Is. for New Zealand, but there is a rumour that VR3A may return. Working from home, G3KDE has raised PJ2ME, OHØ's and a whole gaggle of U prefixes, as well as the usual W's, VK's and the like. Phone brought him EA9EE for an all-time new one.

G6VC (Northfleet) likes Fifteen and comments on the variety of JA and Far East signals during the mornings, most consistent being JA7AD. (Some of these fellows use 500 watts, by the way.) On Twenty he bagged HI8BE for a new one, and on Forty, ZC4BN. Fifteen landed PZ1AQ, OHØ's, YV5DE, PX1FC and SV1AB.

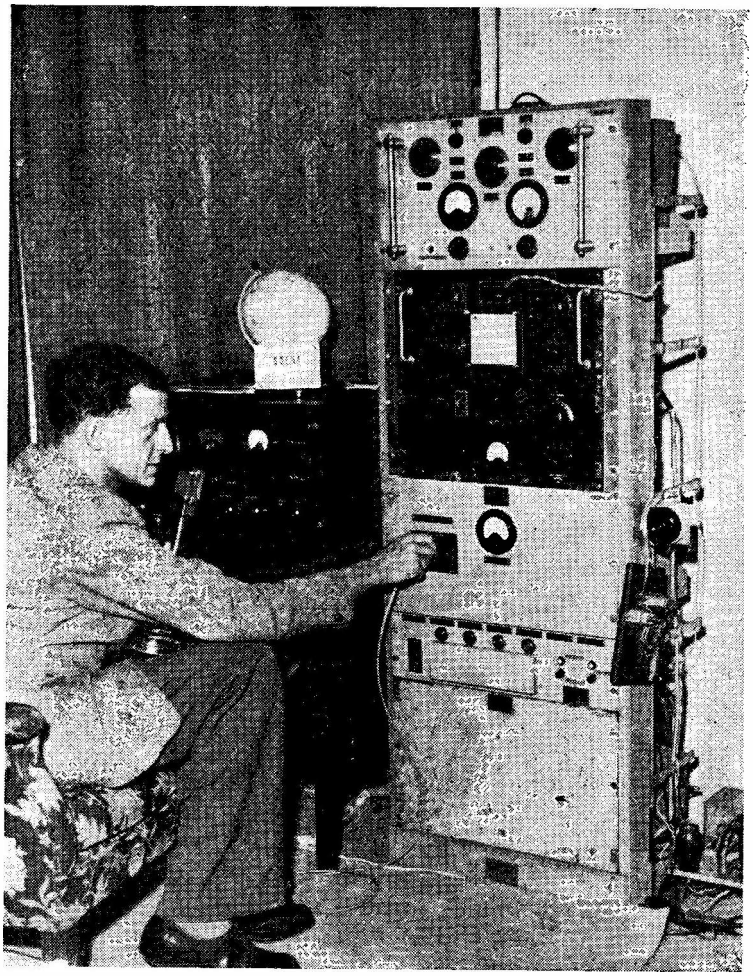
G3BHJ (Norwich) also worked Fifteen, where CW raised FF8BZ, JA7AD, U's, 4X and "sundries"; phone collected CE, CN, EL, KP4, LU, MP4, OA, VP4 and 6, VE8, ZP, 5A, Europeans and "the fabulous VK3AZY," whose 12 watts of phone seem to get across at all times, irrespective of conditions. G3BHJ runs a home-brewed table-topper and a 21-year-old SX-11, suitably modernised, together with a 135ft. Zepp.

GM3BCL (Aberdeen) had to give best to his favourite band (Ten) and launched out on Fifteen. The first week brought him five new ones—VP5BL, CR4AS, FS7RT, PJ2MC and VQ6ST, all on phone. He also raised VK9HO and VS1GZ.

QSL Interlude

A recent plaint by G6PJ concerning poor response-ratio on QSL's prompts G3JKF to say that he has worked 109 countries this year, and QSL'd them all, but only 40 have been confirmed. He finds the Russians pretty prompt. (Incidentally, he worked the much-discussed ZC6UNJ in May and received his card *via* the Bureau one month later.)

GM3BCL considers that the



G3FUT, Newton Abbot, S. Devon, goes for phone-only on 20 metres and since being licensed in 1949, has worked 189 countries, with 177 confirmed. The aerial installation consists of a pair of "ZL Specials" erected at right angles; they can be flopped-over for changing directivity, thus in effect comprising a fixed beam system which gives practically world-wide coverage. The transmitter runs full input to an 813 PA, modulated oy 807's in Class-B zero bias. The receiver is an AR88, permanently connected into a tape recorder; all contacts can be played back.

sending of cards should be part of the station procedure; otherwise, if you don't QSL, say so at the time, and not in the *Magazine* several months after. He suggests that the best way to QSL is to write the card out during the QSO instead of "leaning back with hands behind head and feet on the table." (CW men might find either procedure a little difficult!)

Transatlantic Visitor

G3IDG (London, S.W.12) asks us to mention that W3HQO of Philadelphia is over here for some months, revisiting his home town of Kidderminster, which he left 29 years ago. We also have a very nice letter from W3HQO in person, telling us that since he was licensed in September 1956 he has worked 75 countries and made at least 200 G contacts. He has now visited more than a dozen of the G stations with whom he has had regular QSO's, and wants to use this column to say how "immensely courteous" he has found all G stations — with just *one* exception. He will be back on October 15, working CW on Ten, Fifteen and Twenty and still looking for G's.

DX Bands Again

G3KMA (London, N.W.11) has spent all his time on Twenty and Forty. Twenty CW raised RAEM, OHØ's, CR6 and 7, numerous Asiatic U's, VS1 and 2, MP4, PJ2ME, HI8BE, VP2LU and a bunch of South Americans. He was chasing UJ8AG when he wrote, and missed him but picked up VP2VB instead!

G3WL (Plymouth) tells us that the operator aboard *Mayflower II* was W2HWA, originally an Exeter man.

G5FA (London, N.11) raised FP8AA, VS1 and OHØ's on Twenty; SVØ, VS6, JA, CN2 and OA on Fifteen; and TI1WS/MM and OHØ on Forty. G5BZ (Croydon) was not very active but collected HP1LO and CP1CJ for new ones on Fifteen, as well as VP7MN and VP2VB; gotaways on the same band were ZC5AL, ZC5RF and XW8AB.

G3LET (Westcliff) put up a ground-plane and worked six new ones on Twenty CW, where his contacts included a long-awaited CT1, UL7, UI8, FP8AA, VP2VB and CX1DZ. HE9LAA was called many times, but he put out CQ's for long periods—and then went back to an OK, having been called by W's, VK's and The Lot!

G6TC (Wolverhampton) raised UL7, CX5CO, VS1GJ and VK4FE (the latter on Thursday Island)—all Twenty CW. New on Fifteen were MP4 and KH6AK.

G3GGS (Preston) winkled out LA2JE/P (Hope Is.) and UA3MIR ("Moscow Festival Station"). PY9EJ, UM8 and UH8 were interesting but missed. FS7RT was often heard, but always rag-chewing.

G3ABG (Cannock) worked UD6, CR6, VS1, UI8, ZD3BFC, VP2VB, XZ2TH, UL7KBK (Twenty CW); 3V8, VQ6LQ, MP4 and CR7 (Fifteen CW); OA4CA, VE8, FS7RT, VP4 and 6, VQ6ST (Fifteen Phone)—and, finally, worked GB3SP on *six bands* in one afternoon! Anent the CR5 expedition (*see* last month) he learns that CR5SP arrived at Principe all set, only to find that there was no AC available! Finally, G3ABG mentions that eight out of nine students in his own class were successful in the May R.A.E., so he has lined up plenty of extra QRM for himself!

G2BLA (Morden) worked CR6AI on Ten CW, and VP6EB on Ten Phone. Fifteen CW gave him JA7AD for a new one; Twenty CW yielded VU2JG. 4X4CJ, worked on Forty, suggested a QSY to Eighty and was worked again (2035 and 2055 GMT). Strange Character on Forty was JA5DD (call repeated many times) giving QTH as The Hague!

G3FPQ (Bordon) made Fifteen phone contacts with ET3XY, FB8BX, HS1A, PJ2MC, VR2AG, VS4JT, VS9AI, ZK1BS and ZL5AA. CW fetched in F9QV/FC, FE8AH, FK8AS, PX1FC, XW8AG and ZC5AL. Twenty CW added LA2JE/P, OHØ, UM8, VK9JF, VP2VB and W6UOU/KS6. A few short looks at Forty raised CT3AS, KZ5RF, OHØ and 5A5TZ

FIVE BAND DX TABLE
(POST-WAR)

Station	Points	3.5 mc	7 mc	14 mc	21 mc	28 mc	Countries
DL7AA	808	109	166	224	165	144	236
G3FXB	712	72	129	206	181	124	230
W8KIA	704	68	148	265	113	110	265
G5BZ	704	64	118	240	168	114	246
G3FPQ	631	65	89	191	171	115	211
G3DO	594	24	46	225	147	152	243
W2EQS	539	79	114	161	104	81	177
W6AM	503	30	58	272	86	57	272
G3WL	446	39	76	144	114	73	176
G2YS	446	65	85	145	97	54	163
G3ABG	428	45	83	162	75	63	180
GM2DBX (Phone)	417	34	31	158	100	94	173
G3BHW	406	15	32	150	117	92	184
JA1CR	348	19	49	174	70	36	176
W6AM (Phone)	345	13	32	240	39	21	240
G6VC	341	33	45	137	71	55	150
G3INR	330	46	57	124	60	33	135
G3JWZ	281	50	61	72	65	33	114
G3GZJ	281	18	54	86	81	42	124
G3IGW	260	42	63	80	55	20	108
G3JLB	257	41	41	65	60	50	108
G6TC	249	17	62	117	26	27	127
G3IUW	245	31	38	67	60	49	114
G3JZK	221	15	46	47	77	36	115
G3HQX	207	12	37	67	45	46	99
G2DHV	201	20	26	120	21	14	124
G2BLA	185	24	41	51	50	19	84
G3NDR	176	10	21	75	35	35	89
G3JJG	163	35	41	64	21	2	80
GW3DNF	142	21	30	49	33	7	58
G3IDG	80	11	14	15	14	27	39
G3HEV	79	10	21	20	24	2	51
G3JSN	75	16	17	22	13	7	33

(Failure to report for three months entails removal from this Table. New claims can be made at any time).

GW3AHN (Cardiff) christened his new QTH with a rotary dipole for Fifteen. On CW he worked CP1CJ, DU7SV, FE8AH, FK8AS and 8AT, KP6AL, UAØ, VP2VB and 7NM, VQ6LQ, VR2AS, XW8AG, ZC5AL and 3W8AA. Phone added FS7RT, KP6AL, PJ2MC, VP5CM and VR2AG, to mention only some of them. He is now at work on a Minibeam and hopes to raise some real DX . . . Present score on *Fifteen* is 187 countries.

G3JJG (Mitcham) worked FP8AA and UJ8KAA on Twenty, and added a few new ones on the other bands as well, including OHØ on Forty and CN2 on Fifteen.

G3BDQ (St. Leonards) finds things really looking up at last, and his lists confirm this. Twenty was scoured to the tune of FL8AB (1800), KG6AAY (1800), UM8KAA (1645), KH6's, ZS3B, YV1AD (0750), VP2VB (0045), VU2JA (1518) and the two LA's in the Spitzbergen group. All this was on CW, and the same mode on Fifteen fetched in ZC5AL (1730), ZC5RF (1630 and 1730), FK8AT, W7HAH (Montana), VS1, VQ6 and quite a bunch of JA's, West Coast W's and the like. Fifteen phone was responsible for ET3XY (1920), VQ6ST (0850), VQ2's, OQ5 and ZS. G3BDQ also heard FU8AA trying to work XW8AB, but European QRM killed that one. The new aerial in use for Fifteen is a top-fed "pitchfork," 20ft. long and spaced one-eighth, hanging down vertically outside the window. It works, too. (*See* p.185, June 1956 issue.)

G3LNR (Nottingham) got out of Europe for the first time with his 14 watts on Forty, when he raised PY4OD; he also worked TI1WS/MM and heard W6MOJ (0430) at 569.

W A Z MARATHON, 1957

All Bands

Station	Zones	Countries
G3BHW	39	165
G3HLY	39	165
G3FKM	39	164
G3FXB	39	160
G3DO	39	156
G3BDQ	39	139
G3JKF	38	109
GM3EOJ	37	104
G3HCU	36	98
G3DC	35	102
G3FPK	34	91
G5FA	34	89
G3GGS	33	94
G3GZJ	33	93
GM2DBX	33	87
G3LET	33	81
G3JWZ	32	86
G2BLA	32	76
G3HQX	31	92
G6PJ	31	75
G3DNR	26	70
ZL3CP	22	34

***"POLAR REGIONS AWARD"* (PRA)**

We are pleased to be able to announce the institution of a new operating award, designed to stimulate interest in the Polar regions. The PRA is open to all radio amateurs, and is subject to the same general rules and conditions as apply to all other SHORT WAVE MAGAZINE Awards and Certificates.

To obtain the Polar Regions Award, claimants must be able to show cards as follows: (A) ***Arctic***—QSL's from six of the areas Alaska, Canada, Finland, Greenland, Norway, USSR *all lying north of the Arctic Circle,* Jan Mayen and Spitzbergen (incl. Bear Is. and Hopen Is.)—making eight possibilities from which the six cards can be derived. Also (B) QSL's from any six of the following eight ***Antarctic*** areas: Antarctica, Falkland Is., Heard Is., South Georgia, South Orkneys, South Sandwich Is., South Shetlands and Macquarie Is. Cards must not be dated earlier than January 1st, 1955, and contact can be on any band, CW or phone. Claims should be made as laid down on p.253 of the July 1957 issue.

News from Overseas

W2EQS (Westwood, N.J.) is a mine of useful information, much of which has been filtered off into "Top Band Topics." He also joins our Five Band Table, and tells us that he, with W2HTI and 2NLQ, will be operating from FP8 during the middle two weeks of September. No call is yet assigned, but they will be putting FP8 on the map on all bands from Ten to One-Sixty, using CW, AM and SSB. Recent DX for W2EQS (who is probably best known over here as a keen Top-Bander) has included VP3VN and 5A5TZ on Forty; FP8's, FO8AK, PJ2ME, FE8AH, KP6AL, VK9AD (Norfolk), ZK1AU and SVØWR on Twenty.

W6ITH writes from Sint-Maarten, *via* W6YY, to confirm that he has been operating FS7RT and PJ2MC once more, both stations having been left set-up since his last visit. He has had over 1000 contacts from each side of the Island, nearly all on SSB, and the DX from down there is "fabulous." Reg recently worked 312 stations in 7 hours, all outside North America (he didn't even look at the W band)—this on Fifteen. In fact, he says he still gets as many replies for both FS7RT and PJ2MC as he did when he first put them on the air. (Incidentally, we note that W6ITH now holds the call 4D7RT . . .)

W6AM (Long Beach) now heads the DXCC table once more with his world-highest score of 272. His extra one comes from Ghana, and we are beginning to doubt whether there are any more left. OH2AA/Ø and UO5AA have brought his phone figure up to 240, but he is short of several phone QSL's and has an actual score much higher than that. Don tells us that he has a new RME receiver with sideband selector and pre-selector, which is "quite sensational" on all bands.

VQ4CW (Nairobi) says that there are many pirates using VQ4 call-signs, among them VQ4LF, 4MC and 4MP. The official calls, now two letters only, are up to

VQ4G . . . ; holders of older calls, including the three-letter ones, are allowed to continue with them. The new series are co-ordinated between VQ3, 4 and 5, so that VQ4AA can become VQ5AA in Uganda or VQ3AA in Tanganyika, knowing that no such call will have been issued.

DL2DE (RAF Butzweilerhof) is G3JVQ, and has been very active on Eighty and Forty. With an input never higher than 9 watts, and generally 6 watts, he worked UA1 on Eighty, and UA9 and W2 on Forty, most of his other contacts being Europeans.

D. R. D. Wadia is a keen SWL in Bombay, who has been at it since 1921 and was the first to verify the old 2LO station of the BBC from out there ! He sends us a vast list of calls heard on the DX bands, which shows that there are far more Asiatic stations on the air than we suspect. However, he hears all the DX that we do, and a lot more besides. He, too, has found Ten dead since June, but prior to that it was excellent.

S. J. Jury is an SWL in Cyprus (an Army operator) and he sends a list of stations heard on Fifteen and Twenty, including many G phones. Unfortunately we haven't space to reproduce any lists of calls heard in this feature these days, but we hope he will continue to report anything of unusual interest.

TOP BAND COUNTIES LADDER

(Starting Jan. 1, 1952)

Station	Confirmed	Worked
G2NJ	98	98
GM3EFS	97	97
G3JEQ	95	96
G6VC	95	95
G3GGS	92	94
G3HEK	92	94
G3FNV	90	92
G3AKX	89	89
G3JHH	89	89
G2AYG	88	88
G2FTK	86	91
G3KEP	85	85
G3ABG	79	81
G2CZU	77	77
G3KOG	75	79
G3DO	75	75
GM3KHH	66	72
GM3KLA	66	68
G2HDR	65	67
G3KYU	62	62
G3EJF	60	65
G5JM (Phone)	57	58
G2CZU (Phone)	55	55
GM3COV	49	62
G3KEP (Phone)	47	60
G3HKF	47	61
GW3HFG	46	63
G3KXT	39	43
G3JSN	35	52
G3JZP	35	45
G2AO	30	53
G3LBQ	27	44
G3LEV (Phone)	26	35
G3LNO	23	41
G3LNR	17	26
G3IUW (Phone)	12	25

Operating Notes

There is no doubt in our mind that the greatest single annoyance these days is the promiscuous CQ-caller. Just how many DX contacts he wrecks (without doing himself the slightest bit of good) it is impossible to estimate. This very morning we were listening to VKØAS knocking off the W's and other DX, and positioned ourselves (silently) in the queue, ready to call at the next break. On comes a G with a long, slow "CQ DX," right on the frequency. He is replied to (as usual) by an SP —and proceeds to work him. Both stations are S8-9 with us, and they have a ten-minute QSO at about ten w.p.m.

Of course, VKØAS disappeared completely under this treatment. But probably either of these stations could have worked him, had they bothered to listen on the frequency. Later on, when this particular party finished, VKØAS emerged again calling "CQ Europe," and was forthwith blotted out by a raucous CQ from a YU station—T7, wobbling and spreading over ten kc or more. A little later on we began to queue hopefully for W6UOU/KS6 — a weak signal but workable, if the frequently kept clean. It happened all over again, with a G (a different one) calling "CQ DX," getting a reply from an OH, and working him.

Two questions we should like to pose herewith : What do some of these people mean by "DX"? And what, if any, is the point of calling "CQ DX" when there is plenty of DX on the band just waiting to be worked by anyone who takes the trouble to *listen* for it ?

If these were isolated instances one wouldn't mind, but you can seldom come on any DX band without running into one of these mad tea-parties, and Twenty is especially bad now that the short skip is so prevalent. The same thing goes on on Fifteen and Ten, no doubt, but then the CQ types only upset the other end of the thing, and we don't hear them. CQ-maniacs are Public Enemy Number One, as far as the DX man is concerned. (Of course, a "CQ DX" on an apparently dead band is sensible procedure. The band may be permanently dead for some of these types.)

DX Gossip

DX is good in Japan, judging by the recent issues of the *JDXRC Bulletin* (parts of which we can understand !). We are always intrigued by JA1EF's results on *Forty*, and the current list includes VK9AU, KL7, KR6, ZS, 4X, UB5 and UF6 on that band. ZM7AC, when working a pile-up of W6's, was not audible in Japan at all.

In the recent JDXRC world contest, JA1VX, ICJ and 6AK put in the three highest scores, with JA1CO "world champion" on Ten Metres. Other news from JA-land is that VU4AA (Laccadives) is active; that VR6AC is heard almost daily; and that XW8AC is frequently on.

ZK2AB (the real one) has been active again on phone (14190) . . . AC5PN has not been on since February 1956; supposed contacts after that date are phoney . . . VR4JB is a welcome new one from that area. VR4DW will be active soon (*ex*-VK4DW). The former uses only 15 watts, work-

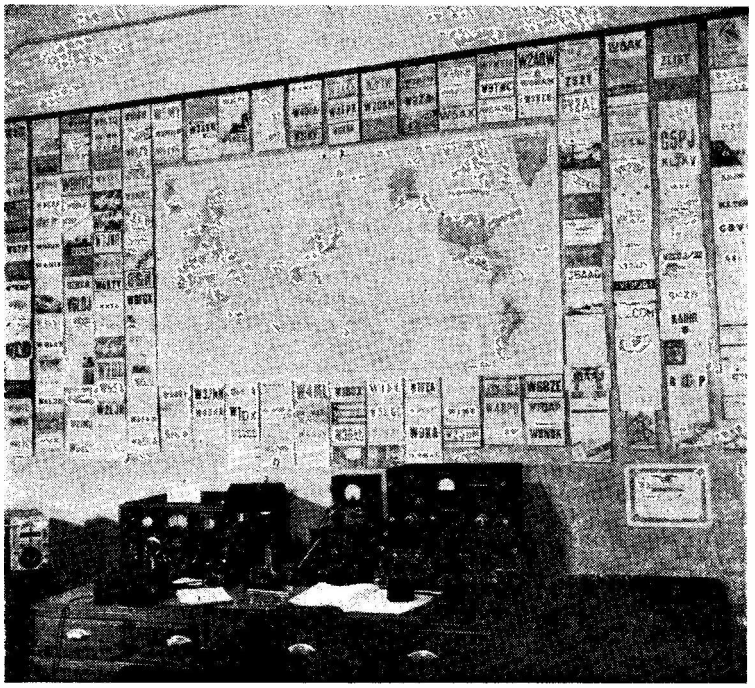
ing CW on 14080 and phone on 14200 kc.

Other interesting phones on Twenty include FB8CD, KM6AX, FK8AS, CP1TF and VR6TC—all worked by WGDXC members. CW reported by the same successful DX'ers includes HH2LD, CP1CJ, HI8BE, VR3B, KW6CM, ZK1AU and 1BS, VR6TC, KH6CV/KW6, FB8XX and 8ZZ, ZC5AL, XW8AG and ZM7AC (all on Twenty).

Recent activity from Aaland Island has been provided by OH3AB, 3QC and 3UI, all signing the customary /Ø after their calls. They have shown up on 21, 14 and 7 mc at various times.

W6UOU/KS6 caused quite a stir around the bands—mostly Twenty, where he used CW, AM and SSB . . . OK1MB's projected tour to ZA-land is about due as you read this . . . The promised Ifni expedition by EA9DF is off—he has been transferred back to Spain.

FB8CD gave quite a string of stations their first Comoro contacts (Twenty). He is still there, as far as we know . . .OH2KO/Ø and OH2IK/Ø figure in recent lists of calls worked; it seems that the Aaland Islands might be suffering from congestion. Any volunteers for Pitcairn on similar lines ?



One of the Zone 24 stations, giving Manchuria, has been W2WMV/C9, who ran an AR88 and a BC-610. To save you straining your eyes, the only G cards visible in this photograph are those of G3TK, G5PJ, G5VU, G6LX, G6ZO, G8DV and G8IP. No doubt many other U.K. stations were worked by W2WMV/C9.

Phone Technique

In response to an allegation that this "Commentary" is too CW-minded, and that most of the DX on which we comment is of the brass-pounding type, we spent considerably more time around the 'phone bands this last month. It was interesting and rewarding, too, and we have arrived at the conclusion that the proportion of really good, slick operating on phone is just about the same as on CW. (Dare we add—that implies a pretty *small* percentage?)

A really good phone operator is just as much of a pleasure to listen to as a top-flight CW man. He knows what he wants, makes his calls with the minimum of words or repetition, wastes no time on useless and confusing phonetics, and generally gets results. In doing so, be it noted, he causes far less QRM on the band than the aimless waffler who just goes on spouting in the wrong place and at the wrong time, radiating useless watts on a cause that is already lost.

It is glaringly obvious that the man who works the real DX on phone is the type who calls "ZK6AA, ZK6AA, ZK6AA, this is G3XYZ, G3XYZ calling and listening." not the wind-bag with his "Hello, hello, hello; hello Zanzibar King Figure Six Able

Short Wave Magazine

DX CERTIFICATES

The following have been awarded since the publication of our last list, in the June 1957 issue :

WFE
No. 29 G8FW (Doncaster)

FBA
No. 87 F8YE (Villeneuve)
88 F8GB (Conflans)
89 SM5AHK (Hagersten)
90 G3HCI. (Lymington)
91 OH2YV (Lauttasaari)
92 OH3OD (Parola)
93 PAØVO (Eindhoven)
94 W6BYB (San Francisco)
95 IT1TAI (Palermo)

WNACA
No. 148 ZL2AFZ (Napier)
149 F8PM (Villeurbanne)
150 PY2AHS (Rio de Janeiro)
151 G3HCL (Lymington)
152 SP3PL (Warsaw)

WABC
No. 152 G3EFZ (Wirral)
153 GM3KHH (Elgin)
154 G3JEG (Hexham)
155 GM3KSJ (Bellshill)
156 GM3HRZ (Kinloss)

WBC
No. 73 EA8BF (Tenerife)
74 EA4CR (Madrid)
75 DL1YA (Munich)
76 CR6AI (Caala)
77 W8DLZ (Grand Rapids)
78 DL2ZS (BOAR)
79 SM5ARR (Nykoping)
80 W3MDE (Philadelphia)

Details of MAGAZINE DX AWARDS and CERTIFICATES, and the claims required for them, appeared in full on p. 253 of the July 1957 issue.

Overseas claimants (only) may send either (*a*) A check list, without cards, duly certified by the Hq. of their national Amateur Radio society, or (*b*) An uncertified check list, from which all or any cards may be called in for scrutiny by us. Claimants from the U.K. should send the relevant cards for each award.

No Award will be issued without proofs which we consider to be satisfactory.

A complete list of the U.K. Counties (for WBC) was published on p. 20 of the March 1956 issue.

Able . . ." No; by the time he has got a couple of those out, someone else is *working* the station. Unfortunately, Wind-Bag doesn't know this; and so, after three minutes of the above, he finds there is no reply and starts all over again. We sometimes think that if it were not for this dim type there wouldn't be any QRM on the bands at all.

Just how long does one have to be on the air to learn a bit of horse-sense in operating? Surely it's obvious that if the DX station doesn't come back after two or three minutes, he won't still be there carefully listening for another long call. He's far more likely to be well into a QSO with someone who knew his stuff. (It's also obvious that he must have had quite a few replies to choose from . . . and he would hardly select the one that went on longest and branded its originator as a Bit of a Clot anyway).

Unkind words, no doubt, but perfectly true and, apparently, necessary now and then.

Top Band Topics

Trans-Atlantic tests on One-Sixty become tougher each year. Quite apart from the present conditions (the worst possible for this type of DX) the QRM situation on the other side has become incredibly bad. W2EQS, whom so many of us have heard and worked on the band, says that it is now broken up into segments and engulfed with Loran, until every kilocycle between 1830 and 2000 kc is rendered useless. On the East Coast they are allowed to operate on 1800-1825 and 1875-1900 kc, but where can they *listen*? W2EQS says "Prior to the war this band was *loaded* with stations morning, noon and night. Yes, I even remember the days when it extended all the way down to 1715 kc." (And so do we !)

Last season there was very little activity; but on July 21 FP8AA put St. Pierre on the band for the first time, and W2EQS notched him up for his 25th country. (Worthy of mention are CN2, FP8, HK, KG4, KP4, KV4, KZ5, LU, TI, TI9, VP4, YV, KH6 and all W districts. But, as yet, no GC or GM !)

G2AO (Malvern) is a new climber on the Counties ladder, where he starts with a score of 30 and 53. He set himself the targets of 40 by August and 60 by Christmas ! Activity on the other bands is restricted until after he claims his WABC.

G3AKX (Sale) finds things very noisy, but he collected G5PP/P in Wigtown, and also worked him on phone from Armagh. Hereford (G3ESY) gave him yet another new one, and he recently claimed WAGM—all on One-Sixty—and describes it as a very nice-looking sheepaskin.

G3KGM (London, S.W.3) will be operating as GM3KGM from Ross-shire between September 10 and October 9—phone and CW. He also tells us that GM3HKF/A will be active from Inverness, Ross and Sutherland during the period September 9 to mid-October.

G3GGS acquired his final GI county (Tyrone) thanks to G5PP's efforts. G3LNO (Coventry) also passes on a vote of thanks to G5PP and G3HGY for new counties faithfully handed out. G2FTK, also in Coventry, worked all the GI counties and sundry new GM ones with these expeditionaries, as well as raising Denbigh, Hereford, Nairn and Moray. He wants to see a "WABC II" or "WABC plus 30" awarded for 90 worked and confirmed. (We might think seriously about this.)

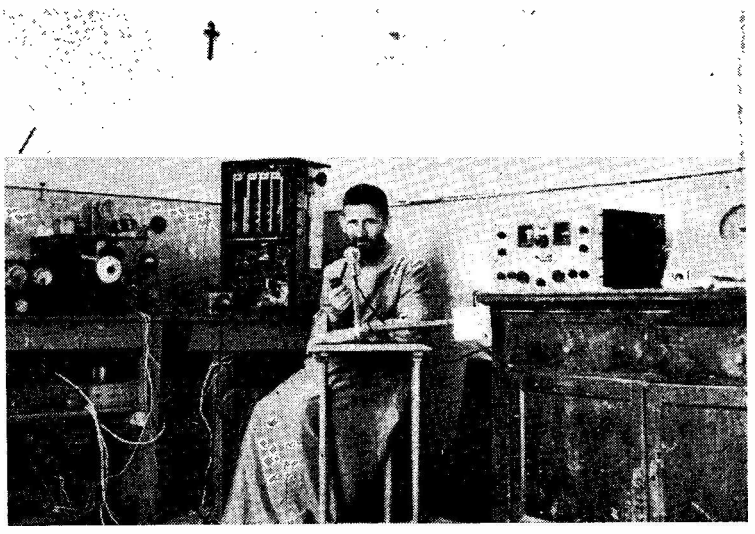
GW3DNF (Chirk), who only recently started on the band, is now moving to London and will be resuming as G3DNF after a period of inactivity. However, we hope to hear him start up again in due course. G3LNR (Nottingham) is looking forward to the winter months on Top Band, and managed one new one—GM3KHH/P in Nairn.

G2CZU (Bath) spent much time chasing G5PP, and had bad luck with the Scottish counties, owing to a "terrific barrier of noise"—mostly static, we imagine. However, the GI venture was much better and brought him four counties. Nairn and Hereford were raised on phone, and the all-phone WABC is getting quite close.

G2NJ (Peterborough) has been using a pocket-size gate modulator (single 6SN7) and with this he has raised 30 counties on phone, including GM3JUD (Hebrides) and G3HGY/P (Hereford). On CW he worked OK1BN and GM3KHH/P (Nairn).

SWL Corner

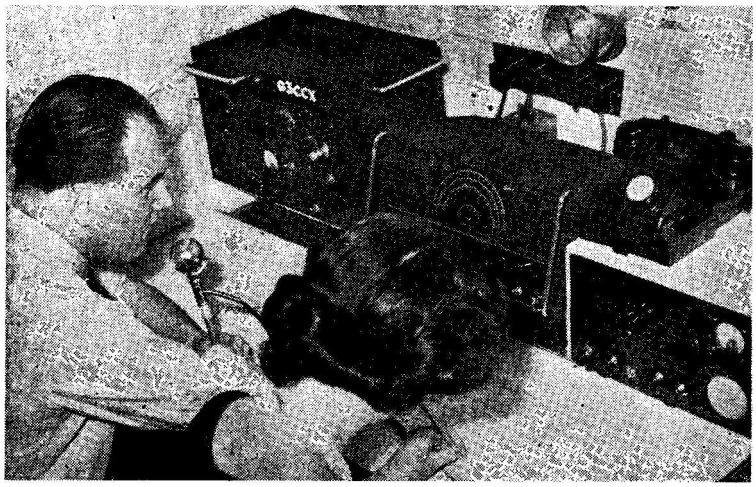
M. J. Prestidge (Birmingham) tells us that OK1MB is going to operate from Albania, October



Some years ago, AR8AB was active from Damascus, Syria. Nowadays, the prefix for that troubled land is YK, and the operator of this station is YK1AB.

1-14, *Eighty metres only. . .* P. Day (Sheffield) has heard that W3ZA expects to be on from Southern Viet-Nam with an XV8 call-sign; he also tells us that VQ2HJ says VKØDC is very active on Fifteen phone (1645), and that VS4JT will be on SSB very soon. On Fifteen phone P.D. has heard KC6KJ and VK9NT; and, though he has not yet logged them, he understands that FE8AH and 8AK are both on the band (phone) around 1500.

And so we end this month's offering, with the reminder that the deadline for the October issue is first post on **Friday, September 13.** (For the November issue it will be *October 18.)* Address everything, as usual, to "DX Commentary," *Short Wave Magazine, 55* Victoria Street, London, S.W.1. Don't be late, or assuredly you will miss the boat. *73!*



G3CCX is at Littlehampton, Sussex, the transmitter running a 6146 in the PA at 35w. input, modulated plate-and-screen by a pair of 6L6's; all bands 10 to 80 metres are used, with three aerials, and the gear is fully TVI-proof. Operation is mainly on phone. As we see from this photograph, the office work is handled by the XYL.

ANOTHER "YASME" VENTURE?

It is reported that Danny Weil will shortly be returning home from the States, with the idea of finding another yacht—a 10-ton Bermudian auxiliary sloop—to start out again on his round-world voyage. He is said to have made about $4,000 from his American lecture-tour and in donations, and another $1,000 from what is described as "the QSL policy." Total funds amount to roughly £1,800, which is rather less than half the capital required to set him up with a *Yasme II* and meet other promotion expenses. There is also that bill for £700 for his rescue. . . .

BBC's AMATEUR RADIO BROADCAST

Those who chanced to see, in their *Radio Times,* an item called "Radio Hams" (*sic*) billed in the Light Programme for August 3 may not have been much impressed by the content of this 13-minute recording—for that is all the time the BBC gave it in their "Hobbies" series. For the uninitiated there was too much jargon, while those who know what Amateur Radio is about would probably agree that it is just not possible to begin to put the subject over in that sort of time. On this account alone, one does not want to be unduly critical. Among the voices recorded for the programme, the outstanding performer was VP8BP—in his piece, he also had the tact and good sense to use *amateur* and *radio amateurs* instead of that over-worked and ridiculous word "ham." Would that it could be banished altogether from our vocabulary! If only those who use it so freely realised how much it lowers the prestige of Amateur Radio and the standing of radio amateurs when it is bandied about over the air and in the public print. . . .

TV ENGINEERING PIONEERS

It is interesting to note that this year Mr. D. C. Birkinshaw, chairman of the council of the Television Society, and Mr. T. H. Bridgewater, its honorary treasurer, have completed 25 years in the service of BBC Television. Having joined the Corporation in 1932 to operate the low-definition 30-line TV system invented and developed by Baird, they may fairly claim to be the first television engineers in this country—if not in the world, since BBC television was established long before any other public service was started. Both Mr. Birkinshaw and Mr. Bridgewater are still with the BBC, as senior engineers.

Ex-GC8NO DOES THE HONOURS

During the Royal tour of the Channel Islands, Her Majesty visited Victoria College, Jersey, on July 25. One of the photographs in the *Illustrated London News* of August 3 shows the Queen at the College, escorted by the Headmaster, Mr. Ronald Postill—until quite recently, he was active as GC8NO, and even now takes considerable interest in the College radio society and the Signals section of the CCF. It happens that the Managing Editor of SHORT WAVE MAGAZINE was *in statu pupillari* at Victoria College, Jersey when it was visited by King George V in 1921. Time marches on.

CALLSIGN ALLOCATION SYSTEM FOR RUSSIAN AMATEUR STATIONS.

Letter following Numeral (or K)	UA1	UA1K	UA2	UA2K	UA3	UA3K	UA4	UA4K	UA6	UA6K	UA9	UA9K	UAØ	UAØK
A	Leningrad	Leningrad	Kaliningrad	Kaliningrad	Moscow	Moscow	Stalingrad	Stalingrad	Krasnodar	Krasnodar	Chelyabinsk	Chelyabinsk	Krasnoyarsk	Krasnoyarsk
B	Leningrad	Leningrad			Moscow	Moscow							Krasnoyarsk	Krasnoyarsk
C	Leningrad				Moscow	Moscow	Saratov	Saratov			Sverdlovsk	Sverdlovsk	Krasnoyarsk	Krasnoyarsk
D	Leningrad				Moscow						Sverdlovsk	Sverdlovsk		
E		Archangel			Moscow	Kalinin		Penza		Stavropol		Molotov		
F	Leningrad	Archangel			Moscow	Smolensk	Penza		Stavropol		Molotov		Khabarovsk	Khabarovsk
G					Moscow	Orel							Khabarovsk	Khabarovsk
H					Moscow	Yaroslavl	Kuibyshev	Kuibyshev			Tomsk	Tomsk		
I		Vologda			Kalinin	Kostroma	Kuibyshev							
J					Kalinin				N. Osetin		Tyumen	Tyumen	Amur	Amur
K						Tula		Ulyanovsk						Primorsky
L					Smolensk	Voronezh	Ulyanovsk		Rostov				Primorsky	
M		Novgorod			Orel/ Yaroslavl	Tambov	Ulyanovsk				Omsk	Omsk		
N	Archangel				Kostroma	Ryazan	Kirov	Kirov		Rostov				
O	Archangel					Gorkiy				Rostov	Novosibirsk	Novosibirsk	Buryat-Mongolia	Buryat-Mongolia
P	Archangel				Tula		Tatar	Tatar	Grozny	Grozny			Buryat Mongolia	
Q	Vologda				Voronezh	Ivanovo	Tatar				Kurgan	Kurgan		Yakutsk
R	Vologda				Tambov		Tatar						Yakutsk	
S					Ryazan	Vladimir	Mari	Mari			Chkalov	Chkalov	Irkutsk	Irkutsk
T	Novgorod				Gorkiy	Gorkiy				Astrakhan				
U		Murmansk			Ivanovo	Kursk	Mordov	Mordov	Astrakhan			Kemerovo	Chita	Chita
V					Ivanovo/ Vladimir					N. Osetin	Kemerovo		Chita	
W					Kursk	Kaluga	Udmurt	Udmurt		Dagestan	Bashkir	Bashkir		
X					Kaluga									
Y	Murmansk				Bryansk	Bryansk	Chuvash	Chuvash			Altai	Altai		
Z	Murmansk													

NOTE: The initial letter K after the numeral indicates a Club ("Klub") station, of which there are a great many in the Soviet Union.

RUSSIAN AMATEUR CALLSIGN ALLOCATIONS

The Table reproduced opposite is based on that contained in a previous issue of SHORT WAVE MAGAZINE (March, 1953, p. 34) with various amendments and additions bringing it up to date. Among the more important changes is the omission of the Crimea, which the Russians have now incorporated in the Ukraine for administrative purposes. Thus, former UA6S- and UA6KS- calls have become UB5S- and UB5KS-. The Amur region (capital Blagoveschensk) which previously formed part of Primorsky (capital Vladivostok) has now been endowed with autonomy and calls emanating from this area are in the sequence UAØJ- and UAØKJ-.

As a general rule, the letter following the numeral (or the letter K) in any UA call-sign denotes the province in which the station is located. The only exceptions are as follows :—

Calls UA3MA - ML are in Orel province.
UA3MM - MZ are in Yaroslavl province.
UA3VA - VL are in Ivanovo province.
UA3VM - VZ are in Vladimir province.

It will be seen that this table is now practically complete with the exception of the provinces of Pskov (UA1), Velikye-Luki (UA3), Khabardin (UA6) and Tuva (UAØ) in which there is, as yet, no regular activity.

G8TD JOINS PANDA RADIO

W. H. Dyson, G8TD, has joined Panda Radio with responsibility for production control. The London office and showrooms of the Panda Radio Co., Ltd., are at Autavia House, Redcliffe Gardens, London, S.W.10.

MEASURING THE WAVELENGTH

We are very glad to notice a pocket flexible steel measure calibrated not only in inches and centimetres, but in frequency corresponding to quarter wavelengths, designed for measuring off UHF/VHF aerial elements rapidly and directly. What might be called the "maximum capacity" of the tape is 200 cm., which is a quarter-wave at 37.5 mc. The highest frequency reading is 1000 mc, for which the physical quarter-wave is 7.5 cm. The inch-scale on the tape is divided in 16ths. The price of this very practical aid to quick thinking is 5s. 9d., post paid in the U.K., and it is available from: Aveley Electric Ltd., Ayron Road, Aveley Industrial Estate, South Ockendon, Essex.

SAVBIT RECEIVES MINISTRY APPROVAL

Ersin Multicore 5-Core Solder "Savbit" Type 1 Alloy with 362 Ersin Flux has now received Ministry approval under Number DTD/900/4535. It may be used for soldering processes on equipment for Service use in lieu of solders to B.S.219. This is the British Standard Specification governing the alloys which may be used in solders for Ministry work. This specification has not permitted the use of solders containing copper because for seaming work copper has been regarded as an impurity. "Savbit" Type 1 Alloy, which contains a small percentage of copper and is made by Multicore Solders Ltd., has been exhaustively tested over the last two years by many firms in the radionics industry. These tests have shown conclusively that the incorporation of a small percentage of copper in the alloy prolongs the life of solder bits by ten times.

SUMMER SCHOOL AT BBC ENGINEERING TRAINING DEPARTMENT

A Summer School was held at the BBC Engineering Training Department, Wood Norton, near Evesham, from July 22-26. It was attended by 31 professors and lecturers from the Engineering and Physics Departments of 26 Universities and Technical Colleges in all parts of the country. The object was to give those responsible for the teaching of electrical engineers an opportunity to study the methods used by the BBC and to meet senior BBC engineers and the heads of some of the Programme Departments—particularly those concerned with the broadcasting of programmes about science in the Sound and Television Services.

The training methods used in the Engineering Division of the BBC were described by the Head of the Engineering Training Department, Dr. K. R. Sturley, and members of his staff. Methods used for teaching both fundamental principles and operational methods to BBC staff were illustrated in the laboratories, where training courses of many different types are given both to established staff and to new recruits. The courses vary in length from one week to twelve weeks, and up to 200 resident trainees can be accommodated at one time.

CARDS IN THE BOX

Operators listed in this space are asked to send a large s.a.e., with name and callsign, to: BCM/QSL, London, W.C.1. Cards held for them can then be cleared. If notification of the callsign/address in "New QTH's," and subsequently in the *Radio Amateur Call Book*, is required, that should be mentioned when sending in for the cards.

G2AUD, 2AVB, 2CWX, 2FW, 3BQU, 3HUX, 3JUN, 3KOB, 3KSW, 3KZB, 3KZT, 3LJH, 3LLD, 3LLG, 3LLJ, 3LOU, 3LPK, 3LSP/A, 3RS, 3VC, GI2CIZ, 3IVM, GW3AP.

THE RADIO AMATEURS' EXAMINATION–1957

INCREASED ENTRY BUT LOWER PASS RATE

We were able, through the courtesy of the Director of the Department of Technology, City and Guilds of London Institute, to report, on p.320 of the August issue of SHORT WAVE MAGAZINE, the immediate results of the last Radio Amateurs' Examination, held in May.

Compared with 1956, this showed an increase in the number of candidates (562) but a much higher proportion of failures (185). Last year's Examination produced 458 successful candidates from the 518 who sat, whereas this year we have only 377 out of 562. The failures have increased from only 11.6% last time to 32.9% this year. It is rather a disturbing result, because the Paper as set was quite reasonable and straightforward and—except perhaps for two questions—should have been plain sailing for any properly-prepared candidate. Indeed, it is obvious that the weakness this year must have lain in the preparation—unless it was that the marking was stiffer. In an examination of this kind, the proportion of failures should never exceed 20%; if it does, either the questions are not within the syllabus, or the instruction is weak, or the marking is too severe. As we can on this occasion eliminate the first possibility, it would seem that the high percentage of failure must be due to a combination of inadequate preparation and, perhaps, a higher standard of marking than in previous years. The quality of the candidates presenting themselves can be taken to be a constant factor in a test such as the R.A.E.

We give the Question Paper herewith, together with the Examiner's own comments. These, we suggest, should be carefully studied not only by those who intend to sit for the 1958 R.A.E. next May, but also by those who are instructing them.

Courses of Instruction—1957-'58

Authorities and organisations who have notified us of their willingness to give instruction for the Radio Amateurs' Examination are as follows:

Bradford Technical College; Brentford Evening Institute (*apply* J. R. Hamilton, 11 Hitherbroom Road, Hayes, Middlesex); Grafton Radio Society (*apply* A. W. H. Wennell, G2CJN, 145 Uxendon Hill, Wembley, Middlesex); Ilford Literary Institute (*apply* C. H. L. Edwards, G8TL, 28 Morgan Crescent, Theydon Bois, Epping, Essex); North-

QUESTION PAPER

55.—RADIO AMATEURS' EXAMINATION

Friday, 10th May, 6.30 to 9.30 p.m.

Eight *questions in all are to be attempted, as under*:

All four *in Part 1 (which carry higher marks) and* four *others from Part 2.*

Part 1.

All four questions to be attempted from this Part.

1. Licence Conditions.
   (a) State the requirements in respect of the following:—
      (i) Log-keeping. What entries should be made?
      (ii) Frequency control and measurement.
   (b) (i) What is meant by "shared" bands?
      (ii) Which bands are shared? *(15 marks.)*
2. With the aid of a diagram describe an "artificial" aerial. How can an "artificial" aerial be used to measure the power output of a transmitter? *(15 marks.)*
3. Describe, with the aid of a circuit diagram, a frequency-stabilised C.W. telegraph transmitter. Comment on the method of keying. *(15 marks.)*
4. List various types of interference that can be caused by an amateur transmitter. Describe methods of abating the interference in each case. *(15 marks.)*

Part 2.

Four questions only to be attempted from this Part.

5. Describe the construction of a half-wave dipole aerial and indicate a method of coupling it to the transmitter. Show the voltage and current distribution in the aerial and the radiation pattern. *(10 marks.)*
6. Describe any one method of checking that a telephony transmitter is not over-modulated. *(10 marks.)*
7. Define *thermionic emission* and explain in simple terms how this effect is used in radio valves. *(10 marks.)*
8. With reference to wave propagation describe briefly:—
   (a) skip distance,
   (b) ground wave,
   (c) the causes of fading. *(10 marks.)*
9. What is capacitive reactance? How does it affect the current flow in an A.C. circuit?
   Calculate the reactance of a 200 pico-farad capacitor at a frequency of 7 Mc/s. *(10 marks.)*
10. What losses are encountered in inductors carrying high frequency currents?
    State how the losses are kept to a minimum in:—
    (a) an air-cored inductor,
    and (b) an inductor with a core of magnetic material. *(10 marks.)*

EXAMINERS' REPORT

"The general standard of the candidates' work was rather lower than in the preceding year. A report on each question follows:

Question 1. Parts a(i) and b(ii) were satisfactorily answered by the majority of the candidates. In part a(ii) an appreciable number of the candidates quoted the old instead of the revised licensing conditions which came into force in June 1954. In Part b(ii) few candidates gave a complete list of the frequency bands shared, but it was encouraging to find that most were familiar with the fact that certain bands are shared.

Question 2. The majority of the candidates instead of describing the artificial aerial as a tuned circuit showed it as an untuned circuit consisting of an inductor and a resistor (in some cases only the latter). Under these conditions maximum transference of power would not be obtained. Also in a number of answers the artificial aerial was shown incorrectly connected to the output stage. The second part of the question dealing with the actual measurement of power was satisfactorily answered by most of the candidates.

Question 3. This question was fairly well answered by the majority of the candidates. An appreciable number gave a diagram of only the oscillator stage and omitted the rest of the transmitter circuit. Also a fair number of the candidates who gave the complete circuit diagram did not describe the function of each stage. Many candidates gave incorrect circuit diagrams. The second part of the question dealing with the keying of the transmitter was treated satisfactorily by most candidates.

Question 4. A large number of the candidates, while giving a list of the various types of interference, treated the abatement of the interference in general terms rather than in detail. It was noted that very few gave overloading of the stages as a prevalent source of harmonic generation.

Questions 5 *and* 8. Well done by practically all candidates.

Questions 6 *and* 7. Fairly well done by most of the candidates.

Question 9. The first part of the question was satisfactorily answered by the majority of the candidates. This also applies to the formula for reactance in the second part of the question. Quite an appreciable number of the candidates were unable to give a correct numerical solution, while in a number of cases the solution would have been correct if the decimal point had been inserted in the right place.

Question 10. Very few candidates attempted this question and of those who did only a small number gave a satisfactory answer."

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wood Evening Institute (*apply* G. P. Anderson, G2QY, Potter Street School, Northwood Hills, Middlesex); and Wembley Evening Institute (*apply* A. J. Bayliss, G8PD, Copland School, High Road, Wembley, Middlesex).

In addition to the foregoing, the bodies shown below gave R.A.E. instruction during the 1956-'57 session. In this list the reference in each case is to the local technical college, evening institute or college of further education, the address of which can be obtained from the telephone directory for the district.

England: Barrow, Birmingham (Education Dept.), Bolton, Bognor Regis, Cambridgeshire (Technical College), Cannock (*apply* G3ABG, 24 Walhouse Street), Coventry, Derby, Dudley, Exeter, Farnborough, Gravesend, Grimsby, Guildford, Hastings, Hull, Ilkeston, Leicester, Loughborough, London (E.M.I. Institutes), London (Northern Polytechnic), London (Technical College, S.E.4), Middlesbrough (Constantine Technical College), Newcastle-on-Tyne (Rutherford College), Oldham, Plymouth, Preston, Rotherham, Salisbury, Southampton (University), Swindon, Walsall, Wellingborough.

Scotland: Dumfries, Dunfermline (Lauder Technical College), Glasgow (Allan Glen's School), Glasgow (Burnbank School of Engineering).

Wales: Flintshire (Technical College); Swansea.

Northern Ireland: Coleraine; Londonderry.

Channel Islands: Jersey Evening Institute.

Readers who intend taking advantage of the facilities offered are advised to apply for enrolment details without delay. In all cases, the fees charged are purely nominal, amounting to no more than a few shillings for the whole course, and in some instances Morse instruction is provided as well—however, for the majority of candidates, it is a matter of passing the R.A.E. first before getting down to the Morse.

It should also be noted that even if an authority does not appear in the lists above, it is always worth approaching the principal of the local Technical College or Evening Institute, asking if a course can be arranged—quote Subject No. 55 in the City and Guilds Examination Syllabus.

HAVE YOU ANY?

We are always in the market for good, clear photographs and short items of Amateur Radio interest. Any that are used are paid for immediately on publication. This includes material for our "Other Man's Station" feature.

RADIO HOBBIES EXHIBITION

The scope and size of what used to be the Amateur Radio Exhibition (sponsored formerly by the Radio Society of Great Britain and not held since 1955) has now been enlarged, and it is to be known as the Radio Hobbies Exhibition. It will be held at the Royal Horticultural (Old) Hall, Vincent Square, London, S.W.1, under the management of P. A. Thorogood, G4KD. Dates are October 23-26, and the opening will be performed by Sir Harold Bishop, Director of Engineering Services, BBC. It is hoped to make the Exhibition international in character, and to show apparatus of American and Continental manufacture. Short Wave Magazine, Ltd. will, of course, be represented, and we hope to meet many readers at our stand. Some further information about the Exhibition will be given in the October issue.

"VERY SAD STORY"—HAPPY SEQUEL

In our September issue of a year ago (p. 357), we mentioned the case of a reader who had made no less than eleven attempts to pass the Radio Amateurs' Examination, failing each time. His difficulty was that he was unable to obtain any advice or tuition locally; we asked for someone within travelling distance, who might be able to assist, to come forward. G3FRW (Warsop) responded and—well, you've guessed it. A few weeks ago, we had an enthusiastic letter from the reader concerned telling us that, thanks to all the help he was given by G3FRW, he had indeed succeeded in passing the last R.A.E. Now, he is busy on the Morse, and we look forward in due time to publishing his callsign/address in "New QTH's." Great credit is due to the reader in the case, who is not-so-young, for his courage and persistence; for G3FRW, this success will be its own reward.

VHF BANDS

A. J. DEVON

Early-August EDX Opening—
Standings in "Countries Worked"—
Activity at PE1PL—
European VHF Contest Note—
Station Reports and The Tabular Matter—

THE tail-piece to last month's "VHF Bands" hinted at an improvement in conditions. This duly came to pass, and the appearance of LX1SI on August 2 and HB1RG on the 4th with signals workable from the U.K. naturally caused much interest and brought on quite a lot of activity.

Since the first week of August, however, conditions have been uninspiring, and though all those active VHF operators not away on holiday keep an eye on the two-metre band for any signs of an improvement, activity has been low — which is only to be expected.

During the early-August opening, all sorts of interesting things happened on both VHF bands. LX1SI worked quite a number of G's, being a new country for practically everybody, and from nearer at hand F8MX was a splendid signal for long periods. Both are outstanding among Continental operators — F8MX is always easy to copy, with clean modulation and very clear enunciation. LX1SI uses the QLM, QMH procedure in the correct way and to good effect, and it was a pleasure to hear him working — intentionally, and not by accident — stations at the HF end of two metres. Among the outstanding contacts recorded were G5VY/LX1SI on August 2, GI8DV/LX1SI and F8MX/GM3EGW on August 3, and HB1RG/GM3HLH (for a very fine "First") on August 4. GM3EGW was unfortunate in missing a QSO with LX1SI, whom he did hear on the 2nd. On the evenings of August 2/3, G5MA had as fine a series of VHF-DX contacts as one could hope to make on two metres — he raised GD3UB, GI3CWY, GI3GXP, GI8DV, GM3EGW and LX1SI. And on the 2nd, G6NB (who says he is "still active, even if QRL") worked 12 countries in succession.

On 70 centimetres, one of the outstanding performers was, again, F8MX; he now has a 64-element stack on that band, and among new U.K. 430 mc contacts for him were G2FNW and G3GDR. Many other good EDX QSO's were made on both bands — we have only mentioned here the best of those known to us in terms of distance covered during the period when HB1RG and LX1SI were coming through. It is interesting to note that HB1RG (who is HB9RG, portable on Mt. Chasseral on this occasion) worked most of his DX during *daylight* on the Sunday; in fact, his contact with GM3HLH was at the unusual hour of 1220 GMT, and signals were 569/579.

After August 5-6, conditions fell away again, and remained rather on the flat side for the remainder of the period.

Countries Worked

Naturally, these early-August results have brought about a very interesting situation in Countries Worked. Guy of ON4BZ has not yet been nudged out of the hot seat, but three of our leading G's are up with him, having drawn level at 16C by reason of their QSO's with LX1SI. There are now two different sets of 16C worked, the difference being 9S4 in favour of ON4BZ, and GD in favour of the U.K. stations. To get out in front, the best chance for Guy is still a GD contact — apparently, he was not on during the August opening, and so missed an opportunity with GD3UB, who was very busy working stations to the south-east. The ace for ON4BZ is 9S4, no longer a country because the Saarland has been incorporated in Germany.

The "loose" ones for all four leaders are, therefore, OE and SP (and, possibly, EA). Bill of G6NB has heard OE2JG (on 144.5 mc during the opening) and the available SP's are known to be SP5EL, 145.3 mc and SP5FM, 145.8 mc. These SP's are good stations; they run 100w. and work CW, and it is reported that they fully appreciate the significance of conditions on VHF, are on regularly, and are looking for U.K. contacts.

To keep this pot on the boil, your A.J.D. has been devilling out the frequencies of some of the more interesting EDX stations, as follows: DL7FU, Berlin, 144.00 mc; OZ3A, 144.11 mc; OK1VR, 144.15 mc; OZ1OJ, 144.32 mc; SM7BAE, 144.75 mc; OZ1JR, 144.79 mc; SM7PQ, 144.83 mc; and OZ7WA, 145.43 mc. In this list, OK1VR will be noticed, representing another country not yet worked from G (or ON!). We have no reliable information as to the status of OK1VR as an EDX operator, nor whether there are any other OK's active on two metres — he is given because his frequency is known.

Station of PE1PL

There can be few U.K. VHF operators who have not either heard, worked or heard of PE1PL, the commercial-amateur station established by the Physical Laboratory of the National Defence Research Council of the Netherlands at The Hague. At present, PE1PL is on two metres only (144.00 mc dead), investigating VHF propagation, and running 150w. RF into a beam, consisting of five full-wave elements backed by a screen, having a measured gain of 15.5 dB. The operators on PE1PL use CW and phone, speak (and write) fluent English, and run a station which it is always a pleasure to work.

The interesting thing is that PE1PL can be heard over large areas of England at almost any time. On the air on Mondays-Fridays, the following regular schedules are being kept daily (all times GMT): 0900, G2NY; 0915, G6FO; 1140, ON4LN; 1150, PAØKH; 1155, PAØWI; 1200, G5YV; 1215, G2HCG; 1220, DL6EZA; 1230, HB9RG; 1240, LX1SI; 1245, DJ1XX; and 1250,

DL3VJ. The busy period is thus 1200-1250 GMT (lunch time) and the operators on PE1PL are aware that they are often called by G's during this period but are unable to spare the time to work them because, naturally, the stations on regular schedule must have priority. Nevertheless, the band is always checked in the U.K. direction at 1300 GMT, so if you are at home then and can hear PE1PL, they will hear you. (At the moment, however, PE1PL is QRT for summer leave until September 16.)

Of the schedules mentioned, the longest-distance ones are HB9RG, 610 kilometres, and G2NY (Preston) at 550 km. Taken day-to-day, these are about 50% successful; G2HCG and G6FO, at about 370 km (say, 220 miles) are worked regularly, every day that they are on; indeed, it is astonishing how consistent and reliable the path is for these two stations.

The operators on PE1PL are now keen to open new schedules with U.K. stations, Mondays to Fridays every week, around 0930 and 1500 GMT. Those interested and able to get on the air during "normal working hours" at these times after the 16th should write: *Radio PE1PL, Physisch Laboratory, RVO-TNO, Waalsdorpervlakte, 's-Gravenhage (The Hague), Netherlands.* Contacts normally consist of an exchange of signal reports and weather information, and need not last more than 10 minutes or so on CW (or phone, depending on conditions). PE1PL is very well modulated, and their speech is R5 when the CW signal may be no better than S3-4.

On the morning of August 5 (Bank Holiday), when conditions were still very good, PE1PL had a field day with those G's who happened to be on. Having kept the regular schedule with G2NY, the following stations were worked between 0915 and about 1020 GMT: G3IWJ, G3AGS, G3GUX, G3BOC, G3IOO, G3JWQ and G2FNW, in that order. The last PE1PL QSO we actually heard during the period of this review was with G5YV at 0930 GMT on August 22. (G6FO worked PE1PL on August 23, 26 and 27.—*Ed.*)

Some Station News

G3KEQ (Sanderstead, Sy.) has been good enough to send us the full *dossier* on his trip, with G3JQN, round the Welsh counties — *see* Activity Report. They seem to have been everywhere and done everything; the best site encountered was near Aberdaron in Caernarvonshire. From their calls h/w log it is interesting to notice how consistently G3GHO, G3LSI, G5MA and G8VZ were worked during the tour. Conditions were never really good, and the weather was against them for most of the time — nevertheless, G3JQN/G3KEQ were very pleased with their results, and want to thank those who contributed to what from their own point of view was a most satisfactory expedition.

And talking of expeditions, just about now GM3BOC/A will be up there in Brora, Sutherland (a very rare county on any band) looking

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 strict alphabetical and numerical order).

GM3EGW, Dunfermline

WORKED: F8MX, G2NY, 3BW, 3CCH, 3CGQ, 3GHO, 3HBW, 3JWQ, 3KFD, 3NT, 5BD, 5MA, 6NB, GM3KYI. *HEARD:* G3BA, 3GUX, 3LIM, LX1SI. (*July* 24 *to August* 2).

SWL Stokes, Ruislip, Middx.

HEARD: F8MX, G2AHP, 2AIH, 2ANT, 2HDY, 2QY, 2TP, 2WS, 3BII, 3DF, 3EYV, 3FCQ, 3FMP/A, 3FQS, 3FUH, 3GDR, 3GHI, 3GNR/P, 3GTH, 3IAM, 3IUL, 3JQN, 3JQN/A, 3JTQ, 3KEQ, 3LOA, 3LTF, 3PV, 4DC, 5KW, 5MA, 5YV/P, 6AG, 6GR, 6JP, 6NB, 6NF, 6OX, 6RH, 6YP, 8HY, 8RW, 8SK. (*July* 28 *to August* 14).

PE1PL, The Hague.

WORKED: G2FNW, 2HCG, 2NY, 3AGS, 3ASC, 3BOC, 3CCH, 3EMU, 3FAN, 3GUX, 3IIT, 3IOO, 3IWJ, 3JR, 3JWQ, 3JZG, 5YV, 6YP. *HEARD:* G3KHA, 6OX. (*August* 1-15).

G3FUR, Stamford, Lincs.

WORKED: F8MX, G2BDP, 2BVW, 2DUS/P, 2HOP, 2FNW/P, 3BGW, 3CDB, 3CGQ, 3ERD/P, 3FD/P, 3GHO, 3GSR/P, 3HES, 3HES/P, 3HZK/M, 3IIT, 3ION/P 3IRA/P, 3JMA/M, 3JMA/P, 3KHA, 3LHA/P, 3LIM, 4MK, 5BM, 5DW, 5PP/P, 5YV/P (Hunts), 5YV/P (Surrey), 6CW, 6LI, 6RH, 6XM/P, 6YU/M, 8SB/P, 8UQ/P, GB3SP, GC3EBK, PAØBN, ØNO, PE1PL. (*July* 19 *to August* 20).

GW3KEQ/P on GW Tour

Nr. Beaufort, Brecknock, July 14.

WORKED: G3GHO, 3IER, 3KHA, 3LIM, 3LSI, 4DC, 5MA, 8VZ.

Nr. Pendine, Carmarthen, July 15.

WORKED: G3FKO, 3HXS, 3KHA, 3LIM, 3LSI, 4DC, 5DW, 5MA, 6NB, 8VZ, GW8UH/P. *HEARD:* G2HOP, 6AG.

Nr. Tenby, Pembs., July 16.

WORKED: G2BMZ, 3FIH, 3HXS, 3IER, 3KHA, 4DC, 5BD, 5MA, 6AG, 6NB, 8VZ, GW8UH. *HEARD:* G3GUZ.

Nr. Tenby, Pembs., July 18.

WORKED: G2FNW, 3GHO, 3HXS, 3LSI, 5BD, 5DW, 5MA, 8VZ, GW4CG. *HEARD:* G2CIW, 2DSW/M, 3IIT.

Nr. Cardigan, July 19.

WORKED: G2RD, 3GHO, 3KHA, 3LIM, 3LSI, 5DW, 5MA, 8VZ, GW3FKO/P.

Nr. Newquay, Cardigan, July 20.

WORKED: G2NY, 5MA, 8VZ.

Nr. Newquay, Cardigan, July, 21.

WORKED: G3GHO, 5MA, 8VZ.

Nr. Aberdovey, Merioneth, July 22.

WORKED: G3AYT, 3DKF, 3GHO, 3HBW, 3LSI, 5MA, 8VZ.

Nr. Aberdaron, Caernarvon July 23.

WORKED: G2NY, 3DKF, 3FIH, 3GHO, 3HBW, 3HXS, 3KHA, 3LSI, 4DC, 5MA, 5YV, 6NB, 8VZ. *HEARD:* GD3UB.

N . Aberdaron, Caernarvon July 24.

WORKED: EI6A, G2FNW, 3DKF, 3GHO, 3HBW, 3JZG, 3KFD, 3KHA, 3LHA, 3LSI, 4DC, 5BD, 5DW, 5MA, 8VZ. *HEARD:* F8MX, G3BA, 3GOZ, 3JZN, GD3UB.

Nr. Amlwch, Anglesey, July 26.

WORKED: G3FMI, 3GHO, 3GUX, 5BD. 5MA.

G2AHY, Crowthorne, Berks.

WORKED: F8MX, G2AHL/M (Bucks), 2AUD, 2CIW, 2GG, 3BFP/P (Surrey), 3DF, 3FCQ, 3FD/P (Beds.), 3FMO, 3GDR, 3GNR/P (Sussex), 3GNS/P (Som.), 3GQK/P (Surrey), 3IRA, 3JFR, 3JWQ, 3KEQ/P (Surrey), 3KFX, 3KSR/P (Hants), 3LHA, 3LOK, 3LTF, 4KD, 5DF, 5NF, 5PP/P (Warks), 5YV/P (Surrey), 6JK/P (Bucks), 8LM/P (Herts), 8UQ/P (Hants), 8VZ.

SWL Tomlin, Malvern, Worcs.

HEARD: F8MX, G2ATK, 2DDD, 2DTO/P, 2FJR, 2HCJ/P, 2HDR, 2OI, 2UJ, 2XV/P, 2YB, 2YM, 3AVE, 3BA, 3BJF, 3DKF, 3DLU, 3EJO, 3ENY, 3FAN, 3FCQ, 3FIH, 3FMI, 3FUR, 3FVK, 3GGJ, 3GGR/P, 3GHI, 3GHO, 3GMN, 3GZM, 3HBW, 3HHY, 3HII/P, 3HTY, 3HXN, 3HXS, 3HZF, 3HZK/M, 3IER, 3IIT, 3ION/P, 3IOO, 3IRA, 3ISA, 3JGY, 3JGY/M, 3JGY/P, 3JR, 3JWQ, 3JWQ/P, 3JYZ/A, 3JZN, 3KEF, 3KEQ, 3KHA, 3KUH, 3LHA, 3LIM, 3LOK, 3MA. 3WW, 3XC/P, 4DC, 5BD, 5BM, 5DW, 5MA, 5ML, 5YV, 6NB, 8SB/P, GD3UB, GI3GXP, GW2HCJ/P, 3GWA/P, 3KEQ/P, 8UH. (*July* 1 - 31).

SWL Winters, Melton Mowbray, Leics.

HEARD: G2CDB, 2CRL, 2FMO, 2FNW, 2FNW/P, 3AYT/M, 3BA/P, 3BU, 3DLU, 3EGE, 3EKX, 3ERD/P, 3FUR, 3GGR/P, 3GHO, 3GSO, 3GVK, 3HZK/M, 3IVF, 3JMA/P, 3JWQ, 3JWQ/P, 3JXN, 3KAG/P, 3LKA, 3PY/M, 4MK, 5ML, 5PP/P, 5YV/P, 6CW, 6XM, 6XM/P, 6YU/P, 8CZ, 8SB/P, GW2HCJ/P, 3BOC/P, 3GWA/P. (*July* 15 *to August* 18).

G3DLU, Sheffield.

WORKED: F8MX, G2DDD, 2JF, 3AYT/M (Buxton), 3EKX/M (Nr. Derby), 3FIH, 3FUJ/P (Nr. Derby), 3GGR/P (Worcs.), 3GHO, 3HA, 3IGA, 3JQN, 3JR, 3JXN/M (Nr. Leics.), 3KHA, 3KSR/P, 3KUH, 3LKA, 5YV/P (Hunts) 6RH, 6XM/P (Nr. Leics.), 8KW/M (Dorset), 8QY/P (Nr. Birmingham), 8VZ, GC2FZC, 3EBK, GI3CWY, 3GXP, GW2HCJ/P (Flint). *HEARD:* G2ATK, 2CDB, 2CIW, 2CVD, 2FJR, 2FNW, 2NY, 2RD, 2XV, 2WJ, 3BA, 3BA/P, 3CCH, 3DO/P (Sutton Coldfield), 3EGE, 3ERD/P (Derby), 3FAN, 3FUR, 3GFD, 3GHI, 3GNS/P (Mendip), 3GSO, 3GUX, 3GXS, 3HTY, 3HWC, 3IER, 3IRA, 3IWJ, 3JWQ, 3JXN, 3JZN, 3KAG/P, (Derby), 3KEQ, 3KFD, 3LCV, 3LDW, 3LHA, 3LKA, 4KG, 5BD, 5KG, 5KW, 5MA, 5ML, 5YV, 6XM, 8SB/P, (Nr. Buxton), 8UQ, GD3UB, GW3BOC/P. (*July* 23 *to August* 18).

TWO METRES

ALL-TIME COUNTIES WORKED LIST

Starting Figure, 14

From Fixed QTH Only

Worked	Station
76	G5YV (787)
71	G3CCH, G6NB
70	G6XM
68	G3BW
66	EI2W (286), G3GHO, G3IUD (302), G5BD
64	G3BLP
63	G2FJR (542)
62	G5MA
60	G2OI (402), G3DMU
59	G3EHY, G4SA
58	G3FAN (637), G3IOO, G8OU
57	G8SB
56	G3WW (770), G5DS (654)
55	G2HDZ (495), G2HIF, G5BM, GW5MQ
53	G2AJ (519), G4CI, GM3EGW (196)
52	G2NH, G3KEQ, G6RH, G6XX, GW2ADZ
51	G3HBW
50	G3ABA, G3GSE (518)
49	G3HAZ (358)
48	G3FIH, G5ML, G6TA (487), G8VZ (257)
47	G3DKF, G5WP
46	G4HT (476), G5BY, G6YU (205)
45	G2DVD (362), G2XC, G3BJQ, G3LHA (261), G5JU
44	G2CIW (228)*, G3BK, G8DA
43	G2AHP (500), G2DDD, G3BA, G3COJ, G3HWJ, G3JWQ (325), G4RO, G5DF
42	G2HOP, G3BNC, G3DLU*, G6CI (220)
41	G2CZS (282), G2FQP, G3DO, G3WS (255)
40	G3CGQ, G3IER, G8KL
39	G2IQ, G3DVK (208), G3GBO (434), G3VM, G8IL (325)
38	G2FCL (234), G3APY, G3CKQ, G3HTY, G5MR (343), G8VN (190)
37	G2FNW, G2FZU (180), G3DLU, GC3EBK (260)
36	G2DC (155), G3CXD, G3DLU* G3IIT, G3KHA (195), G6CB (312), G8IP
35	G3FZL, G3FYY (235), G3HCU (224)
34	G3AEP, G3CKQ (162), G8IC
33	G3FUR, G3HHY (125)

for an opening to the south while he works round the GM's. From Wigtownshire, GM6WL/P was heard by G3GHO on August 19.

This time we have an interesting clip of news from Scotland. GM3HLH writes that during the August opening he worked, besides HB1RG already mentioned, DL3IY and DL3YBA on CW; he was reading F8MX at RS-57 on phone but could not attract his attention before he went QRT. Fraser of GM3EGW, a steady and consistent operator who gets his share of what is going whenever conditions give the GM's a break, had some nice

Worked	Station
32	G3HIL, G8QY, G8VR, GC2FZC
31	G3HXO, G3KPT (108), G5RP
30	G3FRY, G3GOP (208), G3GSO (160), G3GVF (129), G3IRA, G3KEF (110), G5NF, GM3DIQ, GW8UH
29	G3AGS, G3AKU, G3FIJ (194)
28	G2AHY (159), G31TF, G3KUH, G8DL, GM3BDA
27	G3CVO (231), G3DAH, G3ISA (160) G6GR, GI3GQB, GW3GWA
26	G2BRR, G3CFR (125), G3SM (211), G3YH, G4LX, G4MR (189)
25	G3JMA, G3JXN (220), G5SK, G6PJ
24	G3FD, G3FXG, G3FXR, G3JHM
23	G3CWW (260), G3HSD, G4JJ/A G5PY
22	G2DRA, G3AGR (135), G3ASG (150), G3BPM, G3KQF, G5AM, G8NM
21	G2AOL (110), G3DVQ, G3IOE, G3IWJ, G6XY
20	G3EYV,
19	G3FEX (118), G3GCX, G5LQ (176)
18	G3DBP, G3JGY, GC2CNC
17	G3EGG
16	G3FRE, GM3DIQ*
15	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.

* New QTH

G contacts during the opening and now stands at 53C and 196S worked in the All-Time — no mean feat from where he is. GM3EGW has moved to a new QTH; as it is only about 400 yards from the old one, we can confirm that he is entitled to carry forward all his scores. GM3DIQ is now fully operational from his new QTH at Kilbarchan, Renfrewshire, with a 6/6 slot array on a tower; his Rx is a 21-valve triple superhet, of his own design and construction, in which the two-metre front end can be switched out to take feed from a 70-cm converter. GM3DIQ is on from 1900 clock time every evening (he has a schedule with G2HCG at 1905); the only G station worked in the month to August 19 was G3CCH.

G3JZN (Radcliffe, Lancs.) goes to 10C in the Countries table by reason of having worked F8MX during the last opening, and G3CCH (Scunthorpe) moves up another two in the All-Time, with GM3DIQ and GI8DV. G3GHI (Kenley, Sy.) not having reported for some time but now more active again, goes to 12C in Countries Worked, having got GM3EGW for a new one.

For G3IOE (Newcastle) the "door has been slightly ajar," with G3BA (Sutton Coldfield) heard with a good signal on several occasions, but not responding, and a few PA's logged during the August opening. Stations worked include local G2DKH, on again from Stanley and good for Co. Durham. G3IOE has a new converter, with a NF of 3.8 dB — but says that since getting back on the band he has yet to hear G6NB!

GB3SP on Two

As many VHF operators already know, the Scout station at Sutton Park was on the two-metre air (with gear lent by G3HAZ) and attracted a good number of contacts; on August 7, GB3SP was visited by several of the VHF fraternity, and the following found themselves in personal QSO: G2ATK, G2CVD, G3BA, G3BW, G3EJO, G3EKX, G3GGR, G3JWQ, G3LAY, G3LGJ, G3LKA and G8VZ. For G3JWQ/G8VZ the occasion was of particular interest because it was their first meeting after having kept a regular schedule for many months. G3GSO also went down

to Sutton Park, meeting G2CVD, G2DCI, G3BA, G3HAZ and W2RLE, who went on the air from GB3SP.

G2AHY (Crowthorne, Berks.) is pleased with a new 4/4 at a mean height of 35 ft., and moves up in both tables; he now has five crystals in his zone, so can get away from severe QRM; a better converter is in hand, and a new transmitter is nearly finished. G3DLU (Sheffield) continues to do well, and has registered with GC at last — both GC2FZC and GC3EBK were worked on August 2. For G3DKF/A, the highlight of his trip to Cornwall was not what he was able to work from there on two metres but the evening he spent with the Cornish boys on their Falmouth club night — apparently, the /A location is badly screened, and only a few contacts were possible, though F8MX was heard for a workable signal; next time, G3DKF says, he will go /P from a chosen site, and hopes to do better.

Not only did Bob of G5MA work the GW3KEQ expedition in all seven Welsh counties they were giving, but he also got in with HB1RG and LX1SI, the latter for a new country on the evening of August 2; for GDX, G5MA had three contacts with GM3EGW (phone both ways on the last one), four with GD3UB and worked all three GI's — 3CWY, 3GXP and 8DV.

Mac at G3GHO (Roade, Northants.) is one of the three U.K. operators at the 16C level in Countries Worked — his contact with LX1SI came on August 2. Then he went off on holiday, visiting G2DDD at Littlehampton, and remarks " compared with his, my QTH is on a mountain top, and I take off my hat to him and all VHF types in similar locations who press on in spite of the handicap."

G2CIW (Cambridge) has no progress to report, having missed the openings due to absence on business, but does mention hearing F8MX on 70 centimetres, on which band G2CIW has the very creditable total of 16 counties worked. G3FUR (Stamford, Lincs.) has now got his 6/6 slot-fed beam hoisted to the very useful height of 63 ft., which has improved things for him, and he mentions the " phenomenal " strength of PE1PL at mid-day on August 20 — as we have already remarked, PE1PL does make himself heard! G3FUR has only been on two metres since April, and is making good progress.

An SWL Note

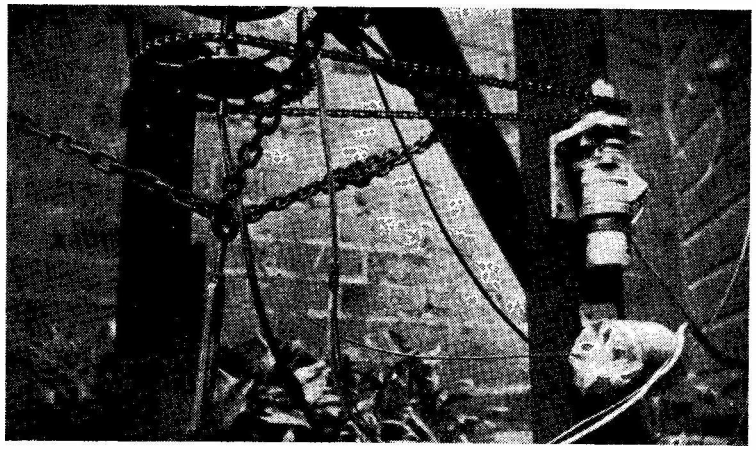
Your A.J.D. feels he should apologise to the several SWL's who, reporting last month, were not mentioned in August " VHF Bands "— however, all their calls-heard lists duly appeared, and it was only because we have no rubber type (printer's jest) that they did not get into the column!

This month, SWL's Stokes (Ruislip), Tomlinson (Malvern) and Winters (Melton Mowbray) report. The latter was able to spend a good deal of time listening to the field-day activities on August 18, and estimates the total number of stations available that day at about 80; though conditions were not good, SWL Winters heard a lot more than on the previous VHF field-day, and is now wondering if this was due to an aerial change made the day before. From his location, the propagation path (what there was of it) was east-west, very few stations being heard north-south.

SWL Stokes writes that he is moving to North Cornwall — we hope that when he gets settled and on the Rx again, we shall be having some useful calls-heard lists from him; it is a long time since we have had any regular reports from the West Country.

This reminds your A.J.D. to say that if we do get a sufficient number of (useful) heard-lists from SWL's — say, not less than six in a month — we shall be glad to show them under a separate heading. In this connection, we might also suggest that SWL's should divide their lists into CW and phone; this would make them more interesting for everybody.

[over



Base mounting and beam rotation gear at G3GSO, Derby. The head is a slot-fed 4-over-4 which, compared with the old 4-ele flat top, is giving very good results on two metres.

TWO METRES

COUNTRIES WORKED

Starting Figure, 8

16 ON4BZ (DL, EI, F, G, GC, GI, GM, GW, HB, LA, LX, ON, OZ, PA, SM, 9S4)

16 G3GHO, G5YV, G6NB (DL, EI, F, G, GC, GD, GI, GM, GW, HB, LA, LX, ON, OZ, PA, SM)

15 G4MW

14 G2FJR, G2HDZ, G3IOO, G5BD, G5MA, G8OU

13 G2XV, G3BLP, G3CCH, G3DMU, G3GPT, G5DS, 6GXM, G6XX

12 F8MX, G2HIF, G3FAN, G3GHI, G3JWQ, G3KEQ, G3WW, G6LI, G6RH

11 EI2W, G2AJ, G3ABA, G3DVK, G3HAZ, G4RO, G4SA, G5UD, GM3EGW

10 G2FQP, G2HOP, G3BK, G3BNC, G3DLU, G3EHY, G3GSE, G3JZN, G3WS, G5MR, G8IC, GW5MQ, PAØFB

9 G2AHP, G2CZS, G2DVD, G3DKF, G3FIJ, G3FUR, G3IUD, G3LHA, G5ML, GC3EBK

8 G2CIW, G2DDD, G2XC, G3AEP, G3AGS, G3BOC, G3GBO, G3HCU, G3HWJ, G3VM, G5BM, G5BY, G8SB, GC2FZC

SEVENTY CENTIMETRES

ALL-TIME COUNTIES WORKED

Starting Figure, 4

Worked	Station
29	G2XV
26	GW2ADZ
23	G3BKQ, G6NB
20	G3HBW
19	G3KEQ
18	G3IOO
16	G2CIW, G6NF
15	G4RO, G5YV
14	G2HDZ
12	G5BD
10	G2OI, G3IRW
9	G2DDD, G5DS
7	G2HDY, G3JHM
6	G3FAN, G3JMA, G3KHA, G3WW
5	G3FUL, G3IRA, G3IUD, G5ML
4	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

The Tabular Matter

For this month, the most significant movements have been in Countries Worked, though most claims received were for Annual Counties. That Table closed at midnight clock time on August 31 — of course, after this issue went to press, so we cannot show the final placings for the year until next month. All who have a claim to make should get it in by the closing date (September 18) for the next issue, after which no amendments can be accepted.

Annual Counties for 1957-'58 opened again on September 1st, and we hope to have enough claims in to show the first Annual Counties table for the new season in the November issue.

It should be noted that all our Tables, including Annual Counties, are intended to be a record of progress rather than purely competitive; of course, they are to a degree competitive, but it is not cut-throat, and the whole idea is really to show what can be done on VHF, and how much ground can be covered. All-Time Counties is a record of two-metre progress since the band was opened to us, and Annual Counties is a year-by-year summary of GDX results.

We hope that all two-metre operators will support these Tables, and in particular that the newer stations will come in on Annual Counties just as soon as they can qualify with the necessary 14 counties worked.

European VHF Contest

This event is scheduled for September 7/8, and should produce widespread activity if conditions open up — our own view is that if the VHF bands *are* open, the activity will be there anyway; if conditions are indifferent, a contest for its own sake does not attract much support, these days. The period of this contest is 1700-1700 GMT, stations participating exchange RS or RST reports followed by a number starting at 001 for the first QSO made, and for two metres the scoring is on the basis of one point for contacts of 0-100 kilometres; 2 pts, 100-250 km; 4 pts, 250-500 km; 8 pts, 500-700 km; and 10 pts for any QSO's over 700 km. The "loading" for the 430 mc band is 10 times the points over the same distances as for two metres, and the final score is the sum of all points claimed.

As this is an IARU event, it is open only to members of IARU societies, who make their own arrangements for collecting the logs.

We shall be glad to publish any claimed scores calculated on the basis shown above, irrespective of whether the operator concerned is entering officially for the contest. Logs not required — just send a claimed score with notes on the highlights of the event. And if it happens that you do not see this until after the contest is over, you can still work out a score from the contacts made; distances in miles can be converted to kilometres by multiplying by the factor 5/3, taking 60 miles as being, near enough, equal to 100 km.

VHFCC Certificate

There are no elections to record this month, but there are a few questions to answer about the VHF Century Club. Its certificate, the only established VHF award in the world, is granted on *production of the cards* showing two-way contact with not less than 100 stations on the VHF bands from and including 50 mc (6 metres) upwards, post-war only. Claims, accompanied by a detailed *check list*, should be addressed to A.J.D.

In the last ten years, a total of 217 VHFCC certificates has been issued; though the great majority have gone to U.K. operators, there have been many overseas claimants. The number issued, and the rate of claim, proves (*a*) That the VHFCC certificate is regarded as worth having, and (*b*) That while being attainable, it is not so easy as to make it "cheap." As to this latter point, your A.J.D. would be the first to agree that what most claimants say is that nowadays working the required 100 VHF stations is a good deal easier than getting the cards to prove it!

Dead-Line

This must be **September 18** for the October issue, as we publish unusually early (October 4) next month. Please address it all, and in good time, to : A. J. Devon, "VHF Bands," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. And there is no use whistling for a wind as this is sent to press — it's blowing about Force 7 from the south-west already, and the wind is shrieking through A.J D.'s quivering beam, with all the running gear on the move. . . .

THESE INCREASING COSTS

As yet, it is not generally realised what the increase in postage charges, to come into effect on October 1st, really means. In our own case, it is going to cost 5s., or 1/6th of the 30s. he pays, merely to send a subscriber his copies for a year of twelve issues! The letter-post rate, which is now 2½d. for 2 oz., goes up to 3d. for *one* ounce, and 4½d. for 2 ozs. The G.P.O. says that most letters do weigh less than 1 oz., but many of ours seem to be over the ounce, making them liable to the 4½d. letter rate. We must make the point, once again, that all correspondence to which a reply is expected *must* be accompanied by full return postage — and be sure to make it at least 3d. after October 1st.

Techniques for Two Metres

THE FRUITS OF EXPERIENCE WITH TRANSMITTERS AND RECEIVERS

Part II

B. SYKES (G2HCG)

In this second part of his discussion on VHF design and construction, our well-known contributor deals with the transmitting side, bringing out many important and interesting practical points. The first part of this article, on VHF Receivers, appeared in the August issue.—Editor.

THE fundamental problem in the design of a VHF transmitter is the attainment of sufficient drive to the final amplifier. Correct modulation and efficiency of the final is impossible when the drive is low. It is perhaps not generally realized that on those peaks of modulation, so vital to the readability of an S2 signal, the PA is operating, momentarily, at twice the HT voltage, and therefore needs sufficient drive for full output at this doubled HT voltage. The designers of the SCR-522 transmitter obviously had this in mind when they applied modulation to the drive stage as well as the final. This method, although apparently easy, is not to be recommended for many reasons, one of which is the impossibility of obtaining correct modulation of a multiplier stage. The only answer is correct design of the initial stages. When planning a VHF transmitter it is advisable to keep one cardinal point in mind — namely, that it is easier to multiply at low frequency than at high frequency. All tripling should therefore be carried out in the early stages, arriving at 72 mc with sufficient power to enable the last doubler to operate at maximum efficiency and provide adequate final drive.

Commencing at the beginning, experience has shown that the most efficient way of obtaining good output at 24 mc from an 8 mc crystal is the oft-maligned Squier circuit. The Pierce is good on second harmonic, but output at 16 mc renders the attainment of 72 mc impossible and necessitates a tripler driving a tripler—which usually does not come off without an intermediate buffer. The Squier circuit becomes quite docile providing the following points are observed:

The valve used must be of high slope, *e.g.* 6J6, 12AT7, triode connected EF50 or 6AC7. A valve of low slope such as the 6C4 makes adjustment extremely critical.

The coil should be split into a tuned winding and a coupling winding, instead of the usual tapped coil.—*See* Fig. 11.

Adjustment of coupling is greatly facilitated by arranging the circuit to come to resonance with a dust-core fully inside the tuned winding, so that further movement of the core causes it to enter the coupling winding as well, thus providing a convenient means of varying the coupling.

The coupling condenser to the next stage should not exceed 30 $\mu\mu$F.

The stage must be adequately decoupled; wire-wound resistors are very effective for VHF decoupling, having the high impedance of an RF choke without the disadvantage of resonance, which can cause parasitic oscillation.

Moving on through the multiplier chain the following points are applicable to all the stages:

Avoid the use of cathode bias; grid leak bias with just sufficient protective bias (from LTneg. on mobile gear) is preferable.

Mount all adjacent coils at right-angles to each other. Even though the stages are at different frequencies, coupling between coils can still give feedback, positive or negative (that doubler that never seemed to work correctly was probably suffering from negative feedback).

Isolate the rotors of tuning capacities to enable the coil to be connected directly across the condenser, without the use of a condenser in series with the tuned circuit.

It is surprising how hot (and therefore lossy) a mica condenser will get when carrying the circulating current in the anode circuit of even quite a low-power stage. Should mechanical considerations make it imperative that the condenser rotor be earthed, use a ceramic isolating condenser and return its earth side to the rotor tag, *not* to any old earth point on the chassis, as then the piece of chassis between that earth point and the tuning condenser rotor becomes part of the tuned circuit; a solder tag and a piece of chassis do not make a very efficient section of coil.

Perhaps the most important part of the multiplier chain is the last anode circuit and the coupling to the final grid. The PA grid circuit should be a split self-resonant coil (about 2½ turns either side, ½ inch diameter, for an 832)

with the last doubler anode circuit fitting into the gap between the two halves of the grid circuit. When the final grid coil is self-resonant, optimum power transfer takes place at quite loose coupling, with the coils only just "meshing." The last doubler anode circuit should be series tuned (about six turns ½ inch diameter tuned with a 30 $\mu\mu$F Philips trimmer about ⅓-meshed with earth side to cathode pin of the driver). Adjustment of both inductance and capacity of this series tuned circuit is essential. The tuning capacity should be the same as the anode capacity of the valve and this can be achieved by stretching or compressing the coil until touching the centre of the coil (HT connection *via* a wire-wound resistor) with a pencil point does not effect the drive to the final. The dead point of the coil will move about as the inductance is varied and the circuit kept in resonance with the condenser. If the dead point is towards the anode end of the coil the inductance is too great (open out the turns) and *vice versa*.

LT Feed Points

The layout of heater and cathode connections to the usual twin-tetrode output valve is very important as a considerable amount of drive can be lost in heating the heaters! This applies particularly to an 832 running with 12-volt heater connections for 6 volt operation. The cathode should be earthed to the centre of a nice thick copper wire or strap, soldered at each end to tags under the adjacent holding-down bolts of the valve-base. The two heater contacts at the opposite end of the valveholder should be earthed similarly to another strap between the other two mounting bolts, and the heater tap taken *via* a choke to the 6·3v. supply; incidentally, make sure it *is* 6·3v., not 5·9.

Mechanical balance of the coils in a push-pull stage is most important. The proximity of one end of a push-pull grid coil to the chassis or panel will result in unequal drive and, more important, the same thing on the anode circuit may result in the dip in one half of the valve occurring at a different setting of the tuning condenser from that of the other half. This results in hopeless inefficiency as it is impossible to resonate both halves of the valve at the same time.

RF Centre Tapping

Push-pull circuits should always be isolated at the feed point on the coil with a wire-wound resistor. The valve capacities provide a centre tap if the cathode is earthed and any attempt at using an external centre tap to earth will result in losses unless great care is taken to find the dead point on the coil (use a pencil as previously mentioned for the series tuned circuit). The practice of earthing the rotor of a split stator condenser is highly undesirable for the same reason — that one is forcing another centre tap on to the coil, almost certainly in the wrong place, thus effectively producing shorted turns and consequent losses. Certain push-pull circuits, notably at 70 cm, use an RF choke in series with the cathode and heater leads. In this case the valve does *not* supply the centre tap and it is necessary to earth the centre of the circuit; this is usually achieved by earthing the rotor of a split-stator tuning condenser, or by-passing the centre of a Lecher line shorting strap. It is more than ever important when deliberately earthing the centre of a push-pull circuit that mechanical balance is achieved.

Correct neutralisation of the PA at VHF is essential for efficiency and good modulation, and a great deal of care is taken by the manufacturers of twin-tetrode valves to ensure that the valve itself does not require neutralising. Careful design and layout can ensure that no external coupling between input and output takes place and it is possible, and desirable, to overcome the necessity for external neutralisation.

Perhaps the greatest cause of neutralising difficulty is capacity coupling between the drive stages and the PA output circuit. The usual 2-metre transmitter has the valves in a line along the chassis, with the last driver within an inch or so of the PA. Considerable coupling takes place between the PA anodes and the driver anode under these conditions, and due to phase shift in the grid coupling circuits no amount of experiment with neutralising wires will give satisfactory operation. The cure is very simple—fit a can over the driver valve (and paint it black inside and out to dissipate the heat).

Most twin tetrodes have an internal screen-grid by-pass condenser, which is quite adequate at VHF. The fitting of an external by-pass will usually cause trouble, and the screen should therefore be fed *via* a wire-wound dropping resistor only.

The normal method of checking for correct neutralisation by removing HT, and watching for grid current changes when varying the anode circuit, is not sufficiently accurate at VHF. Although this method can be used as an initial check, correct operation is only in-

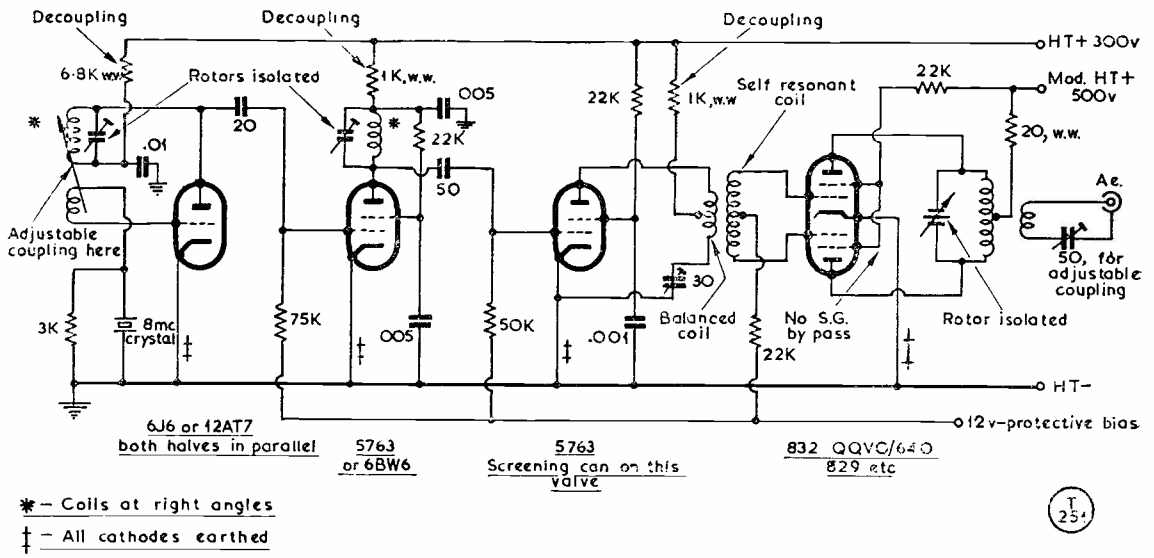


Fig. 11. The points to watch in the layout and construction of a two-metre transmitter, if stable operation is to be obtained under full modulation. The circuit values as shown are correct for the 144-146 mc band, and coils are as normally used; some data are given in the text. It will be noted that for de-coupling, low-value wire-wound resistors are used; the advantage of this is explained in the article. The circuit as shown here represents good modern practice in VHF design and technique.

dicated with HT and drive applied, when varying the PA anode tuning condenser should show a slight peak of grid current coincident with the dip in anode current. This ideal is difficult to achieve, but it is possible when great care is taken, particularly with mechanical balance of the stage.

Modulation

All the previous remarks about neutralisation apply here, as a PA will not modulate correctly unless it *is* properly neutralised. Assuming correct operating conditions in the PA, the next violent snag which arises is RF feedback into audio stages. The easiest answer to this problem is to avoid complication in the speech amplifier and modulator. The simplest and most effective circuit utilises a moving coil or carbon mike into a transformer with push-pull secondary, a twin-triode AF stage (12AT7-6SN7, etc.), driving a pair of output valves (6V6-6L6, etc.). Only three valves are used and the push-pull circuit discriminates against RF pick-up. (This circuit has been used with no filtering, and no trouble, on a mobile rig with everything on the same chassis.)

Plans for recorder playback or the use of low output microphones may necessitate a more complicated speech amplifier and in this case a sure-fire cure for RF feedback is to isolate *every* lead to the first valve. Wire wound grid, screen and anode stoppers should be used, with RF chokes in the cathode and *both* heater leads. It is no good roaming about the chassis with a 100 $\mu\mu$F condenser trying to find the place where the feedback ceases, because when that condenser is finally soldered into a promising position one usually finds it has made no difference! A general rule in all cases of RF feedback is that chokes (wire-wound resistors) are far more effective than condensers, and there is of course the additional advantage that the higher audio frequencies are not cut.

Question of Quality

A great deal of mental confusion seems to exist regarding the best audio frequency response to use for maximum intelligibility. The problem is entirely different from that prevailing on the LF bands, where the issue is that of intelligibility through QRM, whereas at VHF a weak signal has to be readable against a continuous steady background of noise. There is also no problem of restricted channel width at VHF and the experience of the writer has shown over and over again that a high fidelity audio response with plenty of bass is preferable. The question of a balanced response is most important and a "woofy" signal with full bass and no top is useless. Similarly, a signal with no bass response will not compete with the noise level.

It is most important to guard against distortion and, contrary to LF practice again, a

modulator for VHF should have *audio power output equal to the DC input to the final.* This is again at variance with the usual recommendations, but providing the final is perfectly neutralised and operating correctly it *is* possible to use more than 100% modulation without splashing about all over the band.

Certain well-known high-power transmitters operated on two metres are not entirely blameless in this respect; the root of the trouble is undoubtedly incorrect neutralisation! The point here is that a stage which does not self-oscillate at 400 volts HT may not be so stable on those 800v. peaks of *modulated* HT. And if you are using something with about 1200v. on the plate . . .

A correctly driven, correctly balanced and correctly neutralised PA should indicate slight upward anode current kicks and slight downward grid current kicks under conditions of heavy modulation. If *yours* doesn't—think of your neighbours!

Checking Modulation on VHF

An exceptionally useful VHF modulation indicator was stumbled upon by the writer, and although it is in the nature of a "lucky circuit" it is passed on for what it is worth. While experimenting with a normal cathode-ray tube modulation indicator feeding RF and AF to the CRT to produce the usual trapezium or wedge-shaped patterns, the AF was accidentally disconnected. The presentation then was a *circular* pattern under *steady* carrier conditions. The effect of modulation was to make the normally thin sharply-focussed ring on the tube into a broad ring, and increasing modulation to 100% resulted in a disc of light of twice the diameter of the original ring. Over-modulation is indicated by a bright spot of light at the centre of the disc.

The upward modulation potential of the transmitter is shown by the size of disc which can be produced and it is most instructive to adjust the transmitter with a steady tone (probably a whistle) for maximum disc size. A little practice at viewing the patterns produced soon gives one a reliable check on transmitter operation, *e.g.*, the size of unmodulated ring is an indication of RF output and the cleanness of the ring is an indication of hum free T9 output—even a small parasitic in the drive stages will show up as a thickening of the ring. Lastly, and most important, correct modulation is shown by a smooth, even, disc of light; any striations, or patterns, inside the ring are a sure sign of some sort of instability under modulated conditions.

The circuit of this modulation indicator consists simply of the normal DC connections to the electrodes of a 2½ in. CRT with a push-pull tuned circuit across the Y-plates. A link is taken from this tuned circuit *via* a length of coaxial cable and loosely coupled to the aerial feeder, the easiest way being to use a Philips trimmer mounted on the aerial changeover relay. The X-plates of the CRT are, apart from DC connections, left floating. The effect of altering the tuning is to change the shape of the pattern on the tube from a straight line, through an ellipse to a circle, and back through an ellipse to a straight line.

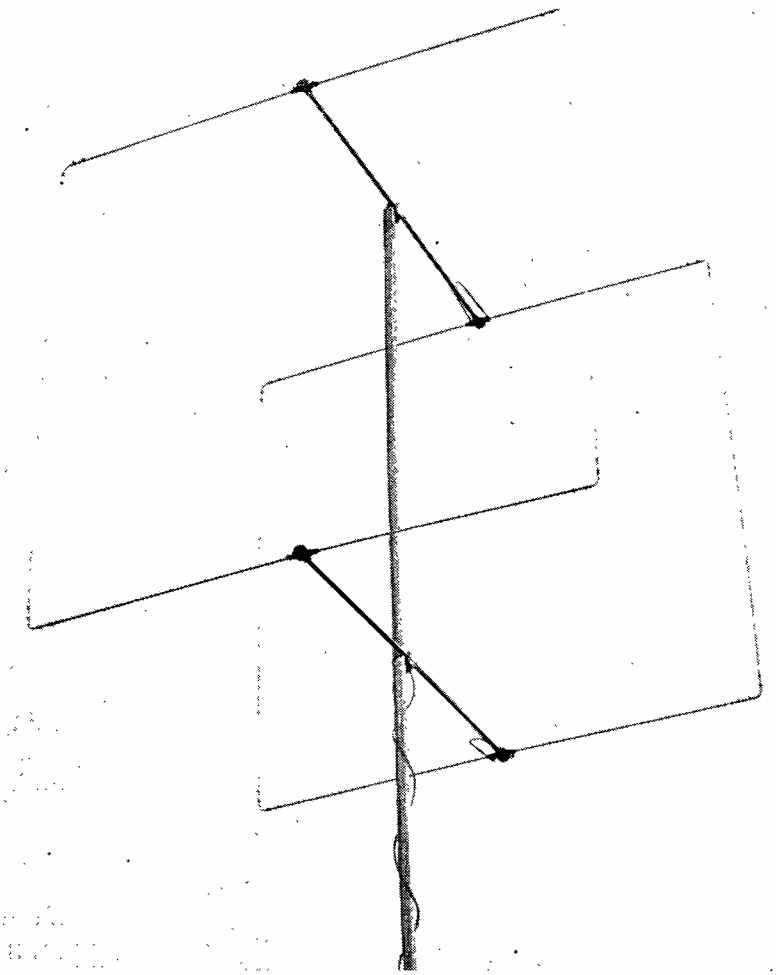
The method of operation is obviously that the X-plates (although with no apparent signal), receive input 90° out of phase to that on the Y-plates, by means of stray coupling. No hard-and-fast rules can be laid down for this circuit as a 90° phase shift at 145 mc is very much a matter of individual layout, with a lot of co-operation from "Lady Luck." However, the indicator is so very useful that a few hours spent literally playing around may produce one of those invaluable "bits of kit" that most amateurs have "cooked up" at some time or other.

Good modulation is so important at VHF that where modulator power is restricted, as in portable or mobile gear, it is worth considering screen control. It must be borne in mind that a valve, say an 832, capable of running 30 watts input with plate modulation, *must* be reduced to 15 watts input by reducing the SG volts when screen modulation is used, but if only 10 watts of audio is available it is better utilised modulating 15 watts (with 30 available on CW) than under-modulating 30 watts. Correct operation of SG modulation is indicated by the usual coincident downward grid current and upward anode current kicks. Adequate drive and adjustable aerial coupling is essential for screen modulation, if those meters are going to be persuaded to kick the correct way. Incidentally, separate power packs for modulator, drive and PA should be used. Keying is best accomplished in the screen of the PA, to avoid variation of load and voltage on the drive stages resulting in chirp. No spacer will be in evidence if the PA is correctly neutralised. Fig. 11 shows a typical two-metre transmitter circuit with indications of points to watch, as discussed above.

Labgear "Bi-Square" Transmitting Beam

The array illustrated here is based on one of Labgear's most successful TV designs for Band I reception. They are now producing a scaled-up version of this aerial for operation on the 10-metre (28 mc) band. Though it has only half the horizontal span of a normal Yagi type, it will out-perform any 3-element beam when correctly erected. The power gain is rated, conservatively, at 10 dB, and it is believed to be the world's smallest aerial giving this order of gain in the 28 mc frequency area.

In operation the Bi-Square behaves as a 4-element beam and the effect of stacking, inherent in the design, tends to concentrate energy at low angles, so desirable for DX working. The small size overall of this beam makes it easy to erect, and the feed point matches into 75-ohm line, without complications. Leaflets on the "Bi-Square" can be obtained from Labgear, Ltd., Willow Place, Cambridge.



The new Labgear Bi-Square design, a directional array for the 10-metre amateur band. With a horizontal span of about 8 ft. only, it is claimed to out-perform any usual type of 3-element beam (which would have a span of not less than 16 ft.) and to give a power gain of at least 10 dB, with a concentration of low-angle radiation. Though the Labgear Bi-Square looks like a Cubical Quad, electrically it is quite different; it has the characteristics of a 4-element beam and the front-to-back ratio is of the order of 35 dB. The Bi-Square is available in knock-down kit form at £9 15s. nett, and will match directly into standard TV type 75-ohm coax cable.

Motor-Cycle Portable/Mobile on Two Metres

SIMPLE TRANSCEIVER AND AERIAL SYSTEM

J. P. WREN (G3IRA)

One might imagine that going /M on two wheels, particularly on two metres, would present some pretty serious difficulties. This article shows how our contributor, who is regularly active on VHF, successfully solved the problem of producing QRP mobile equipment.—Editor.

THE transmitter/receiver described here is a small unit for portable operation using a very limited power supply. The original design was for a lightweight 150 c.c. motor-cycle and dry batteries were to be provided for power.

The circuit is necessarily simple. The receiver is a super-regenerative type, having two valves, one of which is common with the modulator. The super-regenerative detector stage is a 955 acorn, followed by half a 12AU7, the output being ample for headphones.

The transmitter is crystal controlled, the first stage being a conventional overtone oscillator with an 8 mc crystal, the second half of the 6J6 tripling to 72 mc. Better results were obtained with a 6J6 than a 12AT7 at the low HT voltage available. The final RF stage is a 6AK5 doubling to 144 mc.

The modulation is applied to the screen of the 6AK5 in the manner suggested by G3MY in his article in *Short Wave Magazine* for September, 1953. This was found to be a very effective and economical system, although the quiescent RF output is probably less than 100 milliwatts. The interstage transformer T1 must have a ratio of at least 3:1 because a large voltage swing is necessary at the grid of the second half of V4.

Experiments on the design shown here have included the addition of an RF stage for the receiver, and another 6AK5 as a straight PA, but the slight increase in performance was achieved only at the cost of at least a 50% increase in power consumption; this could not be accepted.

The chassis used by the writer measures 6 ins. x 3¼ ins. x 1⅜ ins. This fits into a metal box 6 ins. x 3½ ins. x 3¼ ins. The bottom has a sliding Tufnol panel to give access to the tuned circuits and the "business" under the chassis. Controls, brought out at the front, are receiver tuning, regeneration control, send-receive switch and pre-set PA tuning.

No shielding should be necessary, but a little care has to be taken over the super-regenerative stage — L6 should be kept clear from L3 to prevent "dead spots" on the receiver tuning. The 955 acorn V3 is soldered straight into the circuit, no base being required. (A thermal shunt should be used during this operation to avoid damage to the 955.)

Transformer T2 happens to be a small American type designed for the purpose, but if difficulty is experienced in obtaining such a transformer, it is suggested that an ordinary interstage transformer be modified by adding a small winding for the carbon microphone; the actual number of turns would have to be found by experiment.

Alignment and Operation

Transmitter alignment should be straightforward. It will probably be found possible to pep up the output a little by adjusting LC ratios and possibly by employing additional decoupling at various points, using 1,000-ohm (or so) *wirewound* resistors for the purpose.

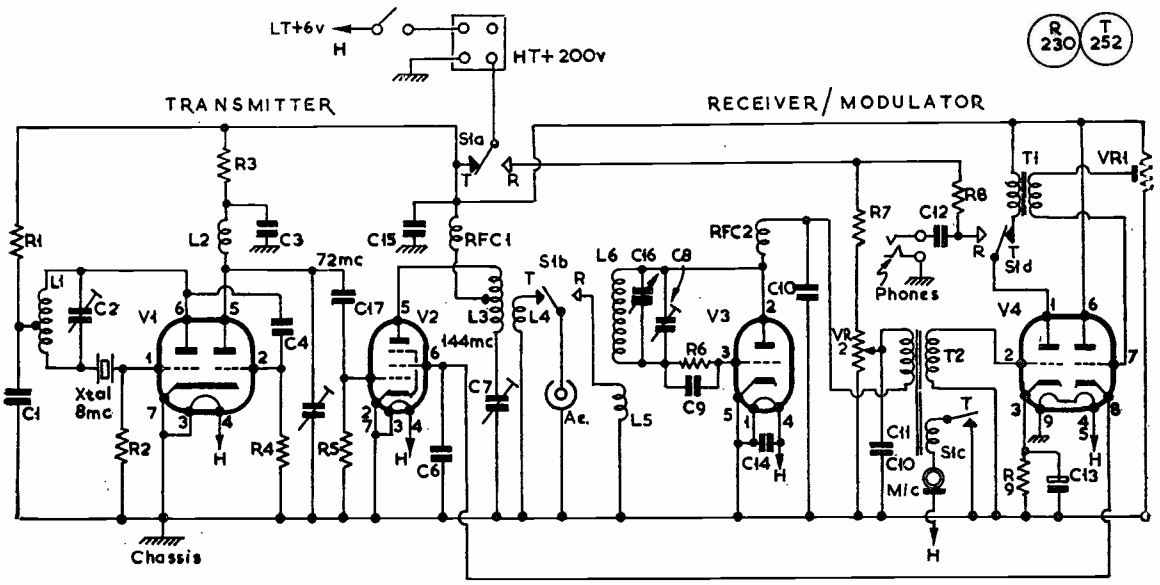
It may be necessary to adjust the circuit elements L6, C9, C15 and R6 to suit a particular layout. The position of the coupling coil L5 is fairly critical. It is suggested that initially L5 should be tightly coupled to L6 and then adjusted for best performance on a weak signal.

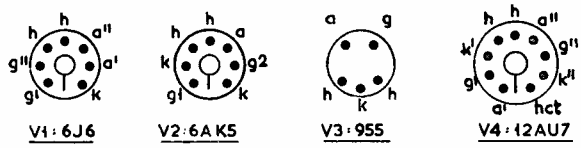
The modulation control VR1 should be set so that the screen of the final 6AK5 stands at about 50 volts. With modulation this value should swing up to 100 volts or so, as indicated by an "Avometer." A noticeable increase in output should also occur.

Power Requirements

It was found that a standard 6-volt lantern battery used for LT quickly dropped to 5 volts or less. But then a 6-volt accumulator system was fitted to the motor-cycle for normal use and this was also the solution to the problem of LT supply.

A 180-volt HT battery was used for some time, but was later replaced by a small vibrator pack, run from the 6-volt LT accumulator. The HT current on "transmit" is 15 to 20 mA and about 3 mA on "receive." The total





Circuit of the portable/mobile two-metre transceiver designed and described by G3IRA, who is well known at Mobile Rallies. The complications of VHF reception have been overcome by going back to the super-regenerative receiver, within its limitations capable of giving very good results on signals strong enough to suppress the quench-noise — and under portable conditions most signals within "the area of local influence" will do this. In G3IRA's case, all power for the transceiver is obtained from the 10-amp. hour accumulator on his motor-cycle. The switching is arranged so that the 2nd-half of V4 is the modulator, driving on the screen of V2, the RF doubler to 144 mc. V3 is the super-regenerative detector for the receiver section, into one stage of audio (1st-half V4), with regeneration ("quench effect") controlled by VR2.

LT current is 1 amp., which is an acceptable load for the type of accumulator used.

Aerial

Early experiments were made with a horizontal wire dipole on a telescopic mast at the rear of the machine; being encouraged by excellent results, a more ambitious aerial was tried. This is now a skeleton slot, constructed from $\frac{1}{8}$ in. diameter aluminium wire, measuring 15 ins. x 40 ins. and fitted in place of the dipole.

The transceiver is mounted on top of the petrol tank by means of four rubber suction pads.

Results

This was the equipment used by the writer at the recent New Forest Mobile Rally—see p. 258, July *Short Wave Magazine*. Operating from the Marlborough Downs, many contacts have been made under normal conditions up

Table of Values

The G3IRA Transceiver for Two Metres

C1, C3, C6, C14, C15	=	.001 μF, ceramic
C2, C5	=	30 μμF, ceramic trimmer
C4	=	10 μμF ceramic
C7	=	30 μμF, air spaced pre-set
C9	=	30 μμF, ceramic
C10	=	.002 μF, mica
C11, C12	=	.01 μF
C13	=	25 μF, 12v.
C16	=	Small single-plate, insulated spindle, about 5 μμF
C17	=	20 μμF, ceramic
R1, R3,	=	1,000 ohms
R2	=	27,000 ohms
R4	=	47,000 ohms
R5	=	15,000 ohms
R6	=	6.8 megohms
R7	=	33,000 ohms
R8	=	100,000 ohms
R9	=	2,000 ohms
VR1	=	0.5 megohm pot'-meter, mod. level control
VR2	=	100,000-ohm pot'-meter, regen. control
S1a-S1d	=	4-pole, 2-way rotary C/O switch
T1	=	5 : 1, or 3 : 1 minimum
T2	=	*See text*
RFC1	=	VHF RF choke
RFC2	=	24t. 28g. enam. on high-value 1-w. resistor body
L1	=	15t. 30g. on $\frac{1}{4}$-in. dia. former tapped at 3t.
L2	=	5t. 16g., $\frac{1}{4}$-in. dia., $\frac{1}{4}$-in. long
L3	=	9t. 16g. 3/8-in. dia. 3/4-ins. long, centre tapped
L4	=	1t. 3/8-in. dia. at centre of L3
L5	=	2t. 16g. 3/8-in. dia.
L6	=	4t. 16g. 3/8-in. dia., 5/8-ins. long

(NOTES: L1, L5 are close-wound; other coils spaced out to lengths given. All resistors are $\frac{1}{2}$-watt rating).

to 80 miles. In conclusion it can be said that the results obtained have been most successful and it is hoped that this short article may prove helpful to anyone contemplating a similar venture.

(*EDITORIAL NOTE:* Though a super-regenerative receiver will not take straight CW, G3IRA has chosen about the most effective circuit possible for VHF reception where simplicity is the main object. A serious disadvantage of the super-regen. is that it radiates strong "sharsh"; this can be considerably reduced by the use of an RF stage, either tuned or untuned. In general, super-regenerative detectors should never be used if there are other receivers within range. However, for portable/mobile operation, as envisaged by G3IRA, this objection would not often arise.)

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 allowauce each month. Please write clearly and address on a separate slip to QTH Section.

DL2DE, T. D. Bittan, *QSL to* G3JVQ, 17 Moscow Road, Clive Vale, Hastings, Sussex.

EI2AC, H. Spencer, Main Street, Roscrea, Co. Tipperary.

G3GLQ, W. V. Sutton, 57 Ashfurlong Crescent, Sutton Coldfield, Warks.

G3HJM, D. Outram, 1 Culross Buildings, Battlebridge Road, London, N.W.1.

G3LCV, N. J. Gregory, 785 Harvey Road, Alvaston, Derby.

G3LCV/A, N. J. Gregory, c/o 124 Stenson Road, Normanton, Derby.

G3LDI, R. J. Cooke, 128 Drayton Road, Norwich, Norfolk.

G3LIX, A. Charlesworth, 21 High Bank, Thurlstone, nr. Sheffield, Yorkshire.

G3LKE, W. Ekert, Luton Lodge, Warberry Road West, Torquay, S. Devon.

G3LMI, B. Watkins (*DL2ZS*), 7 Lees Cottages, Lees Street, Winson Green. Birmingham. Warks.

G3LRT, B. J. Simpkin, 40 Ridgway Road, Brogborough, Bletchley, Bucks.

G3LSY, D. Morris, 16 Locket Road, Wealdstone, Middlesex.

G3LSZ, A. Seldon, 30 Hanover Street, Bolton Brow, Sowerby Bridge, Yorkshire.

G3LTF, P. K. Blair, 24 Highwood Grove, Mill Hill, London, N.W.7.

G3LTI, P. Hillman, 378 Upminster Road, Rainham, Essex.

G3LTI/A, P. Hillman, Hut 357, R.A.F. Station, Locking, Weston-super-Mare, Somerset.

G3LTP, R. Flavell, 141 Clyfford Road, Ruislip Gardens, Middlesex.

G3LTT, H. A. Gray, 36 Bosworth Street, Tudor Road. Leicester, Leics.

G3LTV, W. E. Robinson, 244 Utting Avenue, Walton, Liverpool 4.

GM3LTW, A. F. Hunter, 7 Miller Terrace, Maybole, Ayrshire.

G3LUB, D. R. Bowman, 3 The Crescent, St. Bees, Cumberland.

GM3LUC, 4668 Cpl. Bate, E., Signals Section, R.A.F. Station, Kinloss, nr. Forres, Morayshire.

G3LUF, W. L. Chick, 28 Albion Road, Christchurch, Hants.

G3LUF/A, 4129097 Cpl. Chick, W. L., Hut 367, 3 Wing, R.A.F., Station, Compton Bassett, nr. Calne, Wilts.

G3LUG, S. G. Gorham, 12 Lloyd Drive, Greasby, Upton, Wirral, Cheshire.

GM3LUM, Leven and District Radio and Television Club, c/o J. Taylor, Chemist, Main Street, Methilhill, Fife.

G3LVC, G. Reid, A.M.I.E.E., Church Cottage, Fleet, nr. Weymouth, Dorset. (*Tel.: Weymouth 3322*).

G3LVM, R. E. Ault. Lill Kurk, Clare Hill, Esher. Surrey. (*Tel.: Esher 2981*).

G3LVQ, W. Bates. 61 Whitfield Avenue. Glossop. Derbyshire.

CHANGE OF ADDRESS

G2AO, F. E. Wingfield. 86 Leigh Sinton Road. Malvern, Worcs.

G3APS, A. F. Shergold, 87 Perry's Lane, Wroughton, Swindon, Wilts.

G3AWA, Dr. A. J. Woiwod, 21 The Avenue, Beckenham, Kent.

G3BOI, A. W. Post, 35 Yovell Avenue, Gorleston, Norfolk.

GW3CIJ, W. R. Peterham, 11 Henfaes Road, Tonna, Neath, Glam.

G3CWZ, D. R. Layzell, 3 Foxdown House, Wellington, Somerset.

G3DXO, R. J. Lewis, 67 Rothmans Avenue, Gt. Baddow, Chelmsford, Essex.

G3ENB, W. E. Gates, 18 Valley Road, Thornhill, Dewsbury, Yorks.

GM3HGU, D. Melville, 14A Cross Street, Kirkcaldy, Fife.

G3JAU, C. R. Davies, 107 Talbot Road, Winton, Bournemouth, Hants. (*Tel.: Winton 4078*).

G3JCH, J. Harvey, No. 8 Woodlands, Sun Street, Isleham, Ely, Cambs.

G3JMT, E. Smith, 151 Cheviot Road, South Shields, Co. Durham.

G3JYS, R. G. Finch, 8 Chalfont Close, Allesley, Coventry, Warks.

G3JZV, T. R. Mortimer, 26 Hampshire Terrace, Southsea, Hants.

G3LDL, A. D. Moore, 50 Kings Hedges Road, Cambridge, Cambs.

G3LLK, J. A. Gale, Wild Hedges, Crookham Common, nr. Newbury. Berks.

THE MONTH WITH THE CLUBS

By *"Club Secretary"*

(Deadline for October Issue : SEPTEMBER 13)

ONCE more the time has come round for us to make the initial announcement for the *Magazine Club Contest*—the Twelfth MCC.

The dates this year will be November 16/17 and November 23/24. The operating times will be the same as last year, covering the period of 1600 to 1900 GMT on each of the four days and giving a total operating time of 12 hours.

In all respects the rules will be unchanged from those of last year. They will be published in full in our next, but clubs wishing to refer to the details before then will find them in this feature (p.441) in our issue of October 1956. Only the dates have been changed—to keep pace with the calendar!

We hope for a record entry this year; last year we equalled the previous record of 36 Clubs, and we see no reason why we should not exceed the 40 mark this time.

Clubs will be well advised to think seriously about aerial maintenance while they still have daylight and good weather in which to act on their thoughts. And so to this month's Activity Reports.

Aldershot held a Junk Sale at their last meeting, but holiday time has since thinned things out. The August meeting is being devoted to discussion of the autumn programme. Next meeting after publication date is September 18 — thereafter on alternate Wednesdays.

Bradford meet for the first time in their new session on September 10—no details to hand. **Clifton** hold their Eleventh AGM on September 13, and on the 27th they have arranged a Quiz. Four teams took part in their recent Transmitting Field Day; G3HZI and R. Poppi were the winners, with G3DIC and N. Moore the runners-up.

Crystal Palace will be meeting on September 21 for a talk by G2FKZ on Receiver Design, and his own specialised IF strip. On October 1 G2FKZ will give the first talk in the new R.A.E. series, the subject being Condensers.

Edinburgh meet every Wednesday, 7.30 p.m. at Unity House, Hillside Crescent, and on September 11 Alex Dow will lecture on Wobbulators and Oscilloscopes. In October there will be a talk on TV Fault-Finding, a Sale, and a Magazine Review.

Flintshire will have held their September meeting before publication date; the next is on October 2, when Mullard films will be shown at the Marine Hydro. Rhyl. October 7 will be a New Members' night.

Grafton announce the results of their Top-Band Contest for the G2AAN Cup: G3KQX was the winner, with G2HGT second and G3KGM third. Their recent Field Day on Hampstead Heath enjoyed its usual success. The Club reopens on September 6; the AGM is on September 13; and the R.A.E. and Morse classes start again on September 23.

Enfield, through their *Lea Valley Reflector,* tell us that their September lecture (no date given) will be by G3HRH, of the BBC, on the subject of Aerials and Feeders as used for the VHF and TV transmissions. On September 20 and 21 they are taking part in the Enfield Show, running a station and showing home-built equipment.

Liverpool, in their News Sheet *5 & 9,* devote much space to the activities of pirates who are openly using calls belonging to Club members, and generally making themselves a nuisance in the neighbourhood. This particular News Sheet is just what it claims to be, and keeps their members in touch with one another's activities. Unfortunately it gives no details of future meetings, so that we cannot help in this respect.

Lothians open their new session on September 12, meeting at 7.30 p.m. in the Chamber of Commerce Rooms,, 25 Charlotte Square. All prospective members and interested visitors will be welcome.

Nottingham (Amateur Radio Club) will in future meet on Tuesdays and Thursday, 7.15 p.m. at Woodthorpe House, Mansfield Road. A full and attractive programme is planned for the autumn; full details available later. Short Morse sessions will be held every Club night, and new members will be welcomed.

North Kent have a Film Show on September 12 and a Junk Sale on the 26th; both meetings 8 p.m. in the Congregational Hall, opposite Bexleyheath Clock Tower. **Plymouth** gather on Tuesdays at Virginia House Settlement, St. Andrews Cross; on September 22 they are paying a visit to North Hessary Tor TV station, and on the 24th they hold the competition for the G5ZT Trophy (for the best home-constructed apparatus).

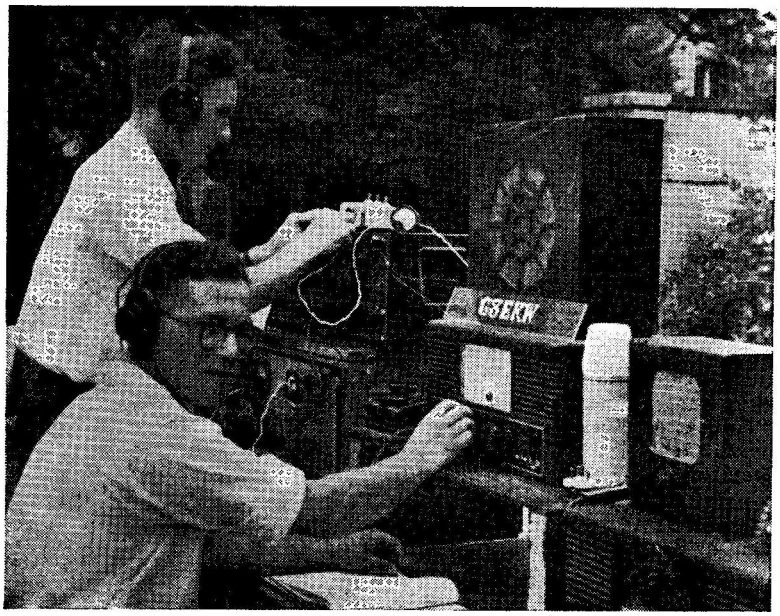
All Clubs and local groups are invited to use this space for publicity and the reporting of their activities. Reports should be addressed to "Club Secretary," "Short Wave Magazine," 55 Victoria Street, London, S.W.1 and posted to arrive on or before the date given every month at the head of this article. Reports received late cannot usually be taken into this feature. Photographs suitable for reproduction are always welcome.

Slade have a demonstration of the Eddystone 888 Receiver on September 13, and on September 27 a lecture on Microphones by Mr. A. E. Robertson (BBC Engineering Training Dept.). On September 22 they hold the Harcourt Trophy D-F Test.

Sutton and Cheam have a meeting on September 17, when Mr. A. Pratt, of Pullin's, will lecture on Measuring Instruments. **Purley,** for their August meeting, had a talk from G2KU on his miniature home-built receiver for the HF bands. From September onwards they are running two meetings a month—on the first and third Fridays—the first being known as "Activity Night."

Poole, a newcomer to these columns, report a membership of 20, with nine transmitting members and a lot of keenness; they will not be meeting until an unspecified date in September, but promise to keep us posted. A permanent clubroom is being sought.

Torbay met in August to hear a talk by DL2YU, on leave from Germany. Next occasion is on September 14, 7.30 p.m. at the YMCA, Castle Road, Torquay.



At the annual garden party o the Sherwood Community Association, the Amateur Radio Club of Nottingham put on a station. It was a fine day, and the operations of G3EKW/A created much interest, many good loud-speaker contacts being made. In this photograph G3CDC is standing, with G3JKO at right.

NAMES AND ADDRESSES OF CLUB SECRETARIES REPORTING IN THIS ISSUE:

ALDERSHOT: S. E. Hume, 25 Kingsway, Aldershot.
BRADFORD: D. M. Pratt, G3KEP, 27 Woodlands Grove, Cottingley, Bingley.
BURY: L. Robinson, 56 Avondale Avenue, Bury.
CLIFTON: C. H. Bullivant, G3DIC, 25 St. Fillans Road, London, S.E.6.
CORNISH: J. Brown, G3LPB, c/o W. A. Thomas, 38 Lower Market Street, Penryn, Cornwall.
CRYSTAL PALACE: G. M. C. Stone, G3FZL, 10 Liphook Crescent, London, S.E.23.
EDINBURGH: M. Darke, GM3KGK, 44 Howe Street, Edinburgh 3.
ENFIELD: V. Croucher, G3AFY, 15 Nelson Road, London, N.15.
FLINTSHIRE: J. Thornton Lawrence, GW3JGA, Perranporth, East Avenue, Bryn Newydd, Prestatyn.
GRAFTON: A. W. H. Wennell, G2CJN, 145 Uxendon Hill, Wembley Park, Middx.
LIVERPOOL: W. D. Wardle, G3EWZ, 16 Mendip Road, Liverpool 15.
LOTHIANS: A. A. Dewar, 37 Calder Circle, Edinburgh 11.
NORTH KENT: D. W. Wooderson, G3HKX, 39 Woolwich Road, Bexleyheath.
NOTTINGHAM (Amateur Radio Club): F. V. Farnsworth, 32 Harrow Road, West Bridgford, Nottingham.
PLYMOUTH: C. Teale, G3JYB, 3 Berrow Park Road, Peverell, Plymouth.
POOLE: A. E. Harvey, G3IUG. 39 Curlieu Road, Oakdale, Poole.
PURLEY: E. R. Honeywood, G3GKF, 105 Whytecliffe Road, Purley.
READING: L. R. Mitchell, G3BHK, 965 Oxford Road, Reading.
SLADE: C. N. Smart, 110 Woolmore Road, Birmingham 23.
STOCKPORT: G. R. Phillips, G3FYE, 7 Germans Buildings, Buxton Road, Stockport.
SUTTON AND CHEAM: F. J. Harris, G2BOF, 143 Collingwood Road, Sutton.
STOKE-ON-TRENT: W. Luscott, 36 Rothsay Avenue, Sneyd Green, Hanley, S.-o.-T.
TORBAY: G. Western, G3LFL, 118 Salisbury Avenue, Barton, Torquay.
WEST LANCS: K. Wright, G3KVE, 24 Stuart Road, Liverpool 20.

Cornish Radio and Television Club had a good attendance at their August meeting, and entertained three visitors. A feature of the meeting was a demonstration of the "Television Detector Van" used by the GPO. The Club visited North Hessary Tor TV Station on August 25. The September meeting was arranged for September 4, and so will have gone by the time these notes appear.

West Lancashire now have their Club Tx on the air, thanks to the efforts of G4BM. Their winter programme will soon be announced, and Morse classes continue under G3KKU's guidance. New members and visitors always welcome at the Clubroom, 157 St. Johns Road, Waterloo, Liverpool — meetings every Tuesday at 8 p.m.

Bury get together on the second Tuesday of the month at the George Hotel, Kay Gardens, and on September 10 they will be having a talk on The Panda by G3DZU. At the following meeting (October 8) G2IG will lecture on Matching Matters. They also have a Hamfest fixed for September 14, at the Derby Hotel. Details from the Hon. Sec.

Reading Amateur Radio Club, newly formed, will meet at the Palmer Hall, West Street, at 7.30 p.m. on September 28, when G5TP will talk and demonstrate a Table-Top 150-watt Transmitter. All visitors will be welcomed at this meeting. *See* panel for Secretary's QTH.

Stockport report good attendances despite holidays, and their next meetings, at the Blossoms Hotel, Buxton Road, will be on September 11 and 25. **Stoke-on-Trent** meet on Mondays and Thursdays at 8 p.m., with constructional classes on the Mondays, and theory for newcomers on Thursdays. A new "Country QTH" is being prepared, and should house the club station before long. This comprises three or four acres and a derelict building—the Club members will do the rest!

BBC TV TRANSMITTING STATION AT ROSEMARKIE

The BBC's new Scottish television station at Rosemarkie, near Inverness, opened on August 16, serves an area including most of the counties of Nairn and Morayshire, a substantial part of Inverness-shire, including the Royal Burgh of Inverness, and the eastern coastal areas of Ross and Cromarty and of Sutherland.

It will radiate in Channel 2 (vision 51.75 mc., sound 48.25 mc.), with horizontal polarization. The two sets of vision and sound transmitters are identical and are arranged in two pairs, the reserve transmitters operating on the same frequencies and with the same powers as the main transmitters for which they act as a stand-by. Each vision transmitter produces a peak-white output power of 500 watts and each sound transmitter a carrier power of 125 watts. In conjunction with the aerial system a maximum effective radiated power (ERP) of 1.5 kw. is produced.

Each pair of transmitters is mounted together in one compact assembly but are quite independent, each being provided with a separate isolator and interlock system, enabling maintenance to be carried out with safety on either transmitter while the other is on the air. Each transmitter is provided with a test load so that tests may be made without the transmitters being connected to the aerial system.

The transmitters face a control desk of BBC design, on which are mounted two picture monitors, a waveform monitor, a sound programme meter and switches for controlling incoming lines and programme input equipment. The starting up and shutting down of the transmitters themselves is controlled from push-buttons located on the actual transmitter cabinets.

The vision transmitter is fed with signals picked up directly by radio from the Meldrum TV transmitter, some sixty miles distant. There are two Yagi receiving aerials, one at about 350 feet up near the top of the mast, and the other at about 200 feet. The two aerials enable a choice to be made which is helpful when reception conditions are difficult.

Mast and Aerials

The main television transmitting aerial is at the 256-ft. level of the 350-ft. lattice steel mast. The same mast will also support the aerial for the VHF sound transmissions when this service is extended to Rosemarkie later.

The television transmitting aerial is a two-tier array of the unipole-V type, with one feeder connected to each tier. With this type of aerial (which was developed by the BBC) each element consists of two folded unipoles, one above the other, protruding horizontally from the side of the tower. Each unipole has an input impedance of 140 ohms, so that, when the two are linked to form the complete element, they match a 70-ohm feeder. The elements are assembled from a set of standard parts, and can be adjusted to work on any channel in Band 1. They are mounted on two adjacent sides of the tower only, and are fed in antiphase. This produces an oval radiation pattern which is often a useful compromise between an omnidirectional and a highly directional polar diagram. The maximum variation at different azimuths is some 4 dB, and the array can be orientated to direct the maximum radiation in the direction of greatest population density. Normally, the two tiers are operated simultaneously, but switching arrangements have been provided so that, in the event of faults developing in the feeder or aerial system, the full-power combined vision and sound programme can be fed to either half of the aerial alone, thus maintaining the service, though at reduced power.

NEW MULTI-TAP LINEAR POTENTIOMETER

A new precision linear potentiometer which can be readily adapted to provide a wide range of non-linear functions has been developed by Salford Electrical Instruments Ltd., an associate of the G.E.C.

Primarily a linear potentiometer with an electrical angle of 340°, the winding is tapped at 10° intervals and the connections taken to turret-type terminals spaced around the potentiometer body. It is particularly suitable for producing non-linear functions by connecting shunt resistors across sections of the winding. The large number of taps enables a wide range of functions to be accurately reproduced. Of robust construction and low starting torque the potentiometer can be supplied in a range of resistance values from 1,000 to 100,000 ohms.

BROADCAST RECEIVING LICENCES

During June the number of television licences increased by 50,811. 14,588,452 broadcast receiving licences, including 7,169,509 for television and 314,797 for radio sets fitted in cars, were current in Great Britain and Northern Ireland at the end of June, 1957. It should be noted that TV licences now carry an "excise duty" of £1, payable on issue or renewal, so that the total cost is now £4.

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.

SITUATIONS VACANT

RADIO TECHNICIANS IN CIVIL AVIATION. A number of appointments are available for interesting work providing and maintaining aeronautical telecommunications and electronic navigational aids at aerodromes and radio stations in various parts of the United Kingdom. Applications are invited from men aged 19 or over who have a fundamental knowledge of radio or radar, with some practical experience. Training courses are provided

SITUATIONS VACANT—*continued*

to give familiarity with the types of equipment used. Salary £561 10s. 0d. at age 25 rising (subject to a practical test) to £671. The rates are somewhat lower in the Provinces and for those below age 25. Prospects for permanent pensionable posts for those who qualify. Opportunities for promotion to Telecommunications Technical Officer are good for those who obtain the Ordinary National Certificate in Electrical Engineering or certain City and Guilds Certificates. The maximum salaries of Telecommunications Technical Officers are: Grade III, £830; Grade II, £980; Grade I, £1,190. — Apply to the Ministry of Transport and Civil Aviation (ESB1/RT), Berkeley Square House, London, W.1, or to any Employment Exchange (*quoting Order No. Westminster 2109*).

OVERSEAS. Electronic technicians to maintain and operate on seismic field crews: Academic qualifications to H.N.C. or equivalent, or genuine practical experience to this standard. Liberal home leave. Permanent career for men prepared to accept responsibility and work in camp conditions in all parts of the world. — Box No. 1905, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

TRADE

QSL CARDS AND LOG BOOKS, G.P.O. APPROVED. CHEAPEST, BEST. PROMPT DELIVERY. SAMPLES. — ATKINSON BROS., PRINTERS, LOOE, CORNWALL.

TELEVISION INTERFERENCE. — Receiver Filters: High-pass E.5037, 30/-; Low-pass E.5031, 30/-; Composite Band I/III, 49/6. Transmitter Filter E.5034, 80 dB, 1 kW, £6. — Labgear (Cambridge), Ltd., Willow Place, Cambridge.

QSL's and Logs by Minerva. The best there are.— Samples from Minerva Press, 2 New Road, Brentwood, Essex.

WANTED: BC610 Hallicrafters, ET-4336 Transmitters. BC-312 Receivers, BC-221 Frequency Meters and spare parts for all above. Best cash prices.—P.C.A. Radio, Beavor Lane, Hammersmith, W.6.

BEGINNERS' Morse Records (L.P. 33⅓). Complete course with booklet, designed to pass G.P.O. test at 12 w.p.m. easily; only 45/-. Send P/O now. Course by return.—45 Green Lane, Purley, Surrey. (*UPL 2896*).

G3CGD QSL's. Fixed and mobile samples on request. Printing enquiries welcome. — 30, St. Luke's Road, Cheltenham.

READERS' ADVERTISEMENTS

3d. per word, min. charge 5/-, payable with order. Please write clearly, using full punctuation and recognised abbreviations. No responsibility accepted for transcription errors. Box Numbers 1/6 extra. Replies to Box Numbers should be addressed to The Short Wave Magazine, 55 Victoria Street, S.W.1.

EXCHANGE: 250w. Tx, 250w. audio, for tape recorder / 35mm. camera / enlarger. Offers? — 65 Woodstock Gardens, Blackpool.

SMALL ADVERTISEMENTS, READERS—*continued*

CANADA BOUND.—Amateur selling AR88D, with matching LS, and handbook, £55. R.1155E, unmodified, £8. Top and Trawler Band Command Rx, £3. All in good condition. Lots of other gear.—Forsyth, 4 New Beech Road, Stockport, Cheshire.

HALLICRAFTERS Rx. 550kc.-18mc., 13v. Double superhet, 1.75-30 mc. New S. G. Brown's Type F headphones, speakers 10in. and 8in. Mint W/S 19 Mk. II, 12v. input, 807 PA. Two Top Band Tx's, 6V6 PA, ML6 PA. Dismantled TU6 and TU9, with cases. Command Tx 4.0-5.3 mc. S.a.e. details. All cheap to clear. Offers?—Robinson, Bungalow, Peacemarsh, Gillingham, Dorset.

THE RADIO HANDBOOK, 14th Edition, brand new, £2. Crystals in holders, 3560, 3570, 3581, 7005, 7042 kc, 12s. 6d. each.—G8UA, 406 Higher Brunshaw, Burnley, Lancs.

EDDYSTONE S.640 Receiver, good condition, £20 o.n.o.? Power unit, Type 376, 6.3v., 9.5v. AC (lots of amps.) 500-0-500v. 250 mA, 360-0-360v. 250 mA, £7, delivered.—Hodgson, G2ABK, Main Road, Hundleby, Spilsby, Lincs.

MULLARD GNE-510 Transmitter - Receiver, G.P.O. approved for small ships, 1.5-9.0 mc, perfect. Pye PTC-283. VHF Tx Rx, 60-90 mc, 230 AC, complete. Denco DCR19, £23; 160-80m. phone Tx, in perfect order, £12 or £30 for both.—Broadbent, 385 High Street North, London, E.12.

EXCHANGE: Eddystone 750 and S-meter, good condition, for CR150 or AR88 or SX28.—Cleave, Beggars Roost, Gwithian Towans, Nr. Hayle, Cornwall.

AR88D, perfect condition, also R.C.A. phones, speaker and manual, £55. Buyer collects.—Matthews, 40 Braedale Avenue, Motherwell, Lanarkshire (*Motherwell 124—evenings*).

COMPLETE STATION in excellent order, £50 the lot or parts. 150w. all band, CW/phone, fully band-switched, relay control, high level mod., semi-table top Tx, R1155A, 75 kc - 90 mc, with refinements, Q5'er and freq. meter. Usual junk + aerials, masts, UHF gear, books, etc.—R. Bennett, Broomhill, Clutton, Nr. Bristol.

LG300 with power supplies, high level modulator, relay controlled, £70. Panda Minibeam, steel tower and rotary mast, coax matched feeder, magslip, AC drive and indicator, £30. — 63 Birley Road, Whetstone, N.20 (*Hillside 6994*).

WRITER and lecturer prepares scripts, articles and notes on scientific and general subjects.—G4XB, 19 Woodfield Avenue, Farlington, Cosham, Hants.

AMATEUR retiring, going overseas, has for sale lot of gear for SSB and mobile use. Complete set seven Command Rx Units, converted in various ways. 144 mc Tx Units. Modified HRO, ASB8 Units. Also components. S.a.e. for list.—Wilford, The End House, Hilderstone Road, Meir Heath, Stoke-on-Trent (*Blythe Bridge 2107*).

130 WATT CW Tx, bandswitched 80, 40, 20, in two s/c units, xtals, aerial tuning unit, S.640, speaker, S-meter, £28. — 8 Harthall Lane, Kings Langley (*2773*), Herts.

SMALL ADVERTISEMENTS, READERS—*continued*

FOR SALE: American Receiver BC-1147, 1.5-30 mc, 13 valves, superb condition, £17 10s. 0d. o.n.o. — Full details from Box No. 1904, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED urgently: March and April 1957 issues of *Short Wave Magazine*. — Box No. 1906, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

TABLE TOP Medium Power TVI-proof all-band transmitter required. — Full details, please, to G3BOR, 37 Marlborough Road, Shipley, Yorkshire.

EDDYSTONE 750 S-Meter, mounting blocks, just overhauled by makers, nearest £50. Will deliver reasonable distance. — G2DSF, 49 Baggrave Street, Leicester.

SALE: Command Receiver 1.5/3 mc, new, £2 10s. 0d. R.1475, 2-20 mc, £3 10s. 0d. R1132, covers Band II, £2 10s. 0d. Power unit No. 3, suit any above, £3. R.109, input 6 volts DC, 1.8-8 mc, speaker, £2 10s. 0d. Globe-King QRP Rx and Coils, 10/180 mtrs., as new, £3.—Box No. 1907, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

AR88 (CR91) brand new, used few hours only, complete with manual and tools, £65. Exchanges considered, buyer collects Lancs.—Box No. 1908, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Good communications receiver, mechanically and electrically sound. Full details, please.—5 Dell Road, Ewell, Surrey (*Ewell 7804*).

FOR DISPOSAL: Early model Panda PR120V, complete instruction book, nearest £75.—G3GEJ, 12 Springwell Terrace, Darlington, Co. Durham.

CR100, Black Crackle, £13.—G3COI, 65 Hurst Street, Birmingham.

FOR SALE: HRO (MX) complete with P/Pack, speaker and 6 coils, 10BS 14-30 mc, 7-14 mc, 3.5-7.3 mc, 180-330 kc, 100-200 kc, front end modified as per *Short Wave Magazine*, Sept. '56. Signal-to-noise ratio very good, £20 o.n.o. BC-348 in good condition, with built-in power pack, cal. very good, £14 10s. 0d. o.n.o. Spares for AR77: Complete set IF's inc. TAL IF parts of coil pack, inc. tuning cond., switch wafers, dial assembly, £1 5s. 0d. One trans., for 'scope, 15s. One HT trans., 10s. — D. Patrick, 2 Wilberforce Street, Analby Road, Hull.

FOR SALE: G.E.C. Cathode-Ray Oscilloscope ("Miniscope"), completely overhauled recently by manufacturers, together with Double Beam Unit and IF Alignment Unit, and complete with 74-page instruction and servicing manual.—Offers to: Watts, 62 Belmore Road, Thorpe, Norwich.

R1392 Communications Receiver 90-150 mc, £7, delivered 50 miles. Wanted: S-27 Receiver.—Knight, Homefield, Upper Nazeing, Waltham Abbey, Essex.

CR-100, maker's noise limiter fitted, manual, excellent condition, £16. Also table-top transmitter, comprising W/B amplifier 7-14-28 mc, 807 PA, modulator, aerial relay, professional job, £30.—

SMALL ADVERTISEMENTS, READERS—*continued*

SALE: R.107 receiver with instruction manual, £9 5s. 0d. Buyer collects or pays carriage.—Box No. 1909, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

PHOTO ELECTRIC CELLS for sale, Type 90 AV; brand-new, boxed; daylight type; bargain, 25s. each.—Thurlow, 69 Fenlake Road, Bedford.

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TRANSISTORS

JUNCTION TYPE P-N-P

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RED-SPOT 800 kc/s Audio Frequency..... 10/-
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All Transistors are Tested and Guaranteed.
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Simplified construction enables this set to be built easily and quickly into an attractive lightweight cabinet supplied.

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(No Aerial or Earth required)
Medium wave variable tuning. Total cost, as specified including Transistors, Transformers, Coils, Condensers and Battery, etc., with circuit and plastic case.
77/6 POST FREE

All items sold separately.
With single phone, **82/6.** With Acos Mike, 90/-. With Min. Hearing Aid, **92/6.**

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Complete Kit with 2 Transistors, Components, Phones with Circuit and plastic case, 42/6.

MINI-TWO 2 TRANSISTOR MINIATURE POCKET RADIO
(No Aerial or Earth)
The smallest Transistor Set offered on the market. Variable tuning. Drilled chassis, plastic case, size 3 x 2 x ¾in. Miniature hearing-aid, two transistors and all components including 1½ v. battery, circuit and full practical layout diagrams. Total cost **55/-** complete.

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