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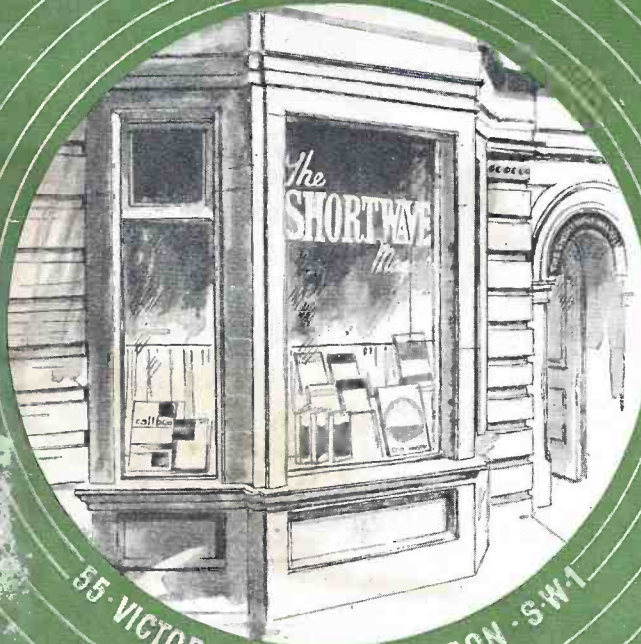
# *The* SHORT WAVE *Magazine*

VOL. XXVIII

OCTOBER, 1970

NUMBER 8

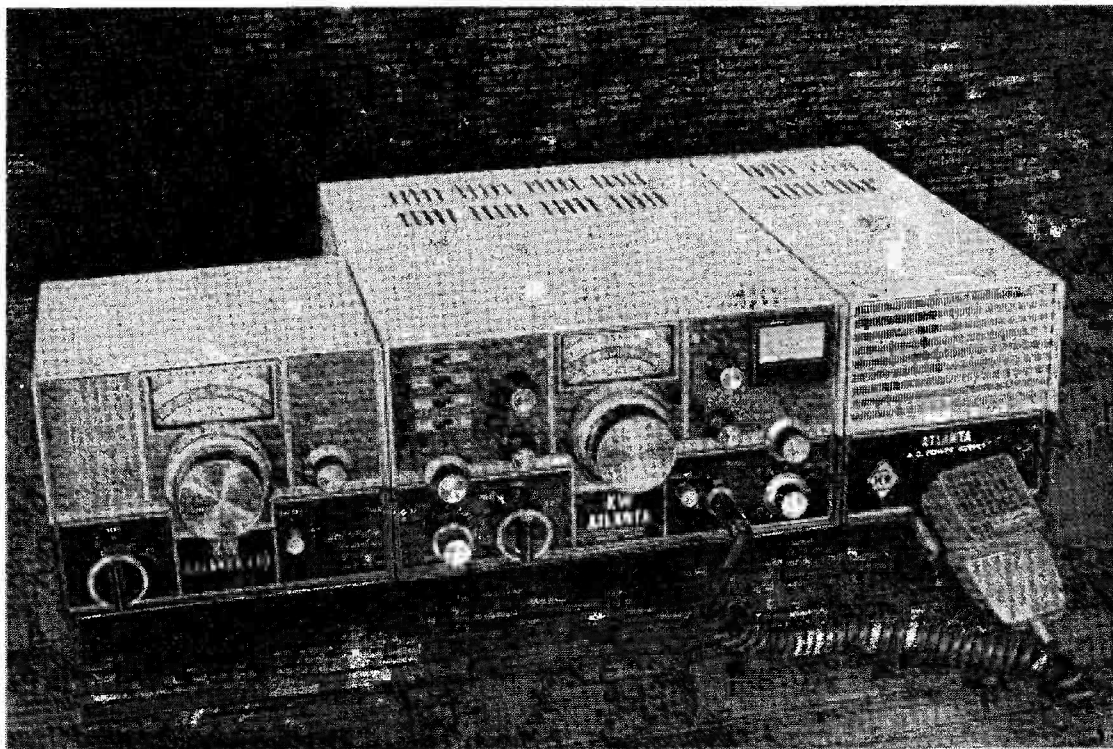
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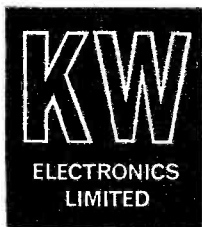
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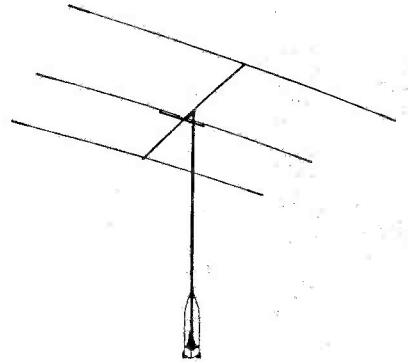
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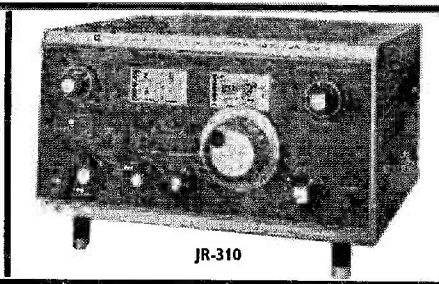
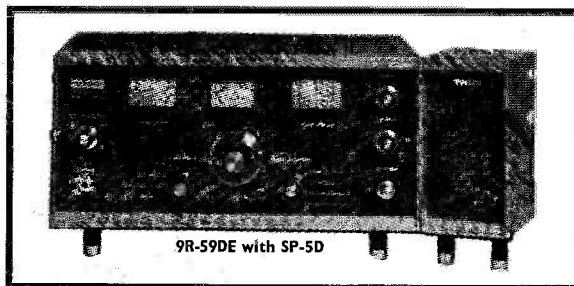
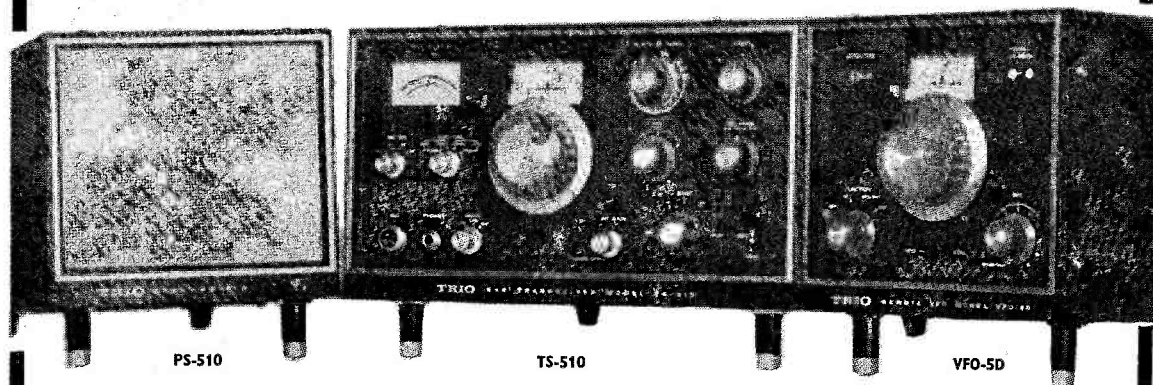
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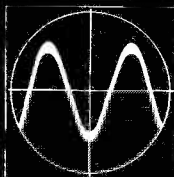
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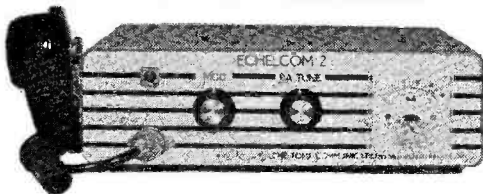
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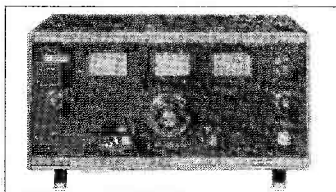
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A few surprises at this year's show, and I imagine everyone is waiting for me to cut prices on Sommerkamp gear. Sorry to disappoint you, but it just can't be done unless Mr. Sommerkamp can reduce his prices to me—and it doesn't look as if he is going to. Seriously though, there's a bit more to it than straight purchase price. I certainly don't blame anyone for trying to save themselves a pound or two, but do be sure you're buying wisely—make sure your guarantee is backed by both the ability and the necessary range of spare parts to service your gear. Listening on 80 the other evening, I heard someone say, "Don't worry about spares—Sommerkamp will supply them." Anybody like to bet on this? The fact of the matter is that whenever someone has got something going and made a success of it, in come the cut-price merchants. Can't blame 'em and can't blame you lads for wanting to save money—all I say is, be quite sure you are in fact saving money—look at your guarantee, the cost and availability of spares, and the second-hand value of your gear.

Anyway, not to worry, pass on to more important matters. In the new line we have stocks of most of the things we displayed at the show, except that we are sold out of Hansen SWR meters (£4) and Teisco mikes (£2 15s.). In the SWR meter line, however, we have the very nice Asahi twin meter job at £6 10s. This reads power out and SWR simultaneously and is very nice. As for mikes, we have in stock the YD844 desk mike which is specially recommended for Sommerkamp gear. It's a very nice job with PTT, lift to talk, and lock switch. High (50K) impedance dynamic and sounds great, £10. We also have fresh stocks of low impedance padded headsets at £2 4s. and the rather nice digital clock we displayed, at £5 10s.

Lots of the other goodies—regulated low voltage power supplies, electronic keyers, monitors, plain keys, mobile transistor p.s.u.'s, Tavasu whips, Medco L.P. filters, Medco H.P. filters, crystal filters, mechanical filters, meters, connectors, etc., etc.

In the small component line, we have just got a fresh lot of screw-in feedthroughs 1000 pF 500v. but sorry to say the price has gone up to 1/6 each, 15/- a dozen.

We also have a few bags of resistors left—I b. assorted bags at least 200 per bag—an excellent buy at 10/-, post free. Other bits and bats :-

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Whole slew of small bits and pieces—why not send a s.a.e. for lists. Please note that postage is extra on all we sell, unless otherwise stated. Going back to the new stuff, we have the latest Sommerkamp, Inoue and FE all in stock for immediate delivery. Talking of Inoue, the IC-2F seems to have caught on with a bang. I honestly expected 5% interest from the chaps who are professionals and 95% hoots of derision from the rest. To my utter amazement, I'm getting only 50% derision, so I've really struck the jackpot this time, so much so that delivery is now 2-3 weeks.

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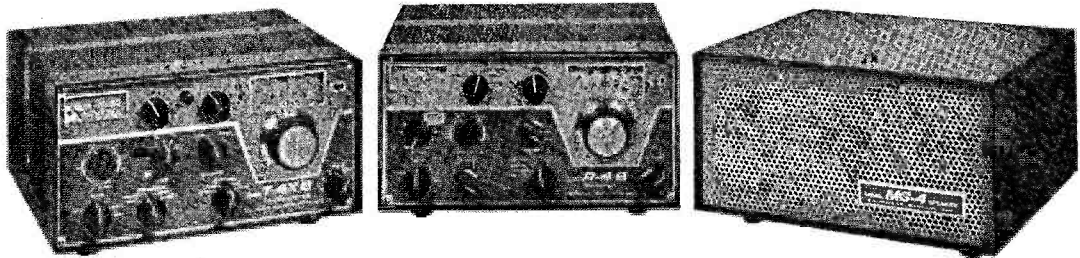


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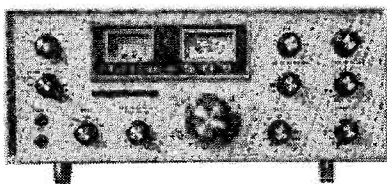
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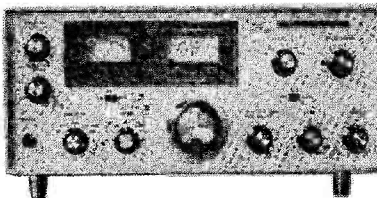
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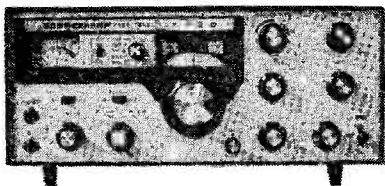
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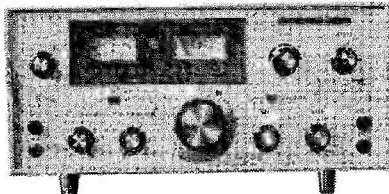
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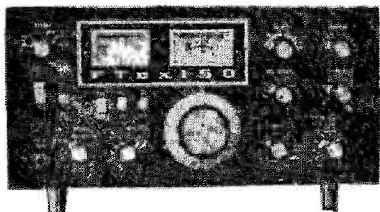
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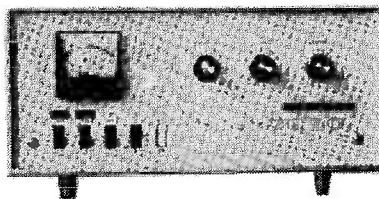
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# SHORT WAVE MAGAZINE

(GB3SWM)

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OCTOBER, 1970

No. 324

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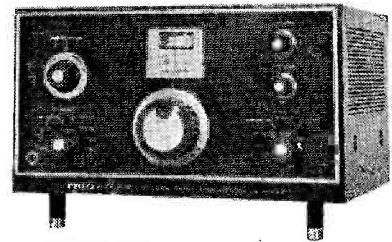
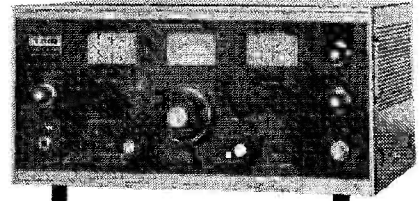
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FOR THE RADIO AMATEUR AND AMATEUR RADIO

# The SHORT-WAVE Magazine

## E D I T O R I A L

**Dreary** *One does not wish to be too disparaging about the Amateur Radio Exhibition just concluded—but this year's effort must surely have seemed rather depressing to anyone who has been a regular visitor to the Show over the last 15 years or so. Fewer stands of real Amateur Radio interest. Too much filling-in with those only vaguely associated. Great areas of empty floor space and bare walls.*

*Naturally, any first-time visitor would have found enough of interest to justify his journey. And no doubt there are exhibitors who feel that they have done well enough to justify their effort, considered in the long term.*

*Of course, as ever there was also the interest of seeing old friends and, for some, the excitement of the special RSGB meeting on the Wednesday evening (about which we shall have more to say at the proper time).*

*But as an Exhibition it did not seem to add up either to a Radio Show or an Amateur Radio Convention. Having had more than 20 years' experience of Amateur Radio exhibitions, this last one was the least interesting with which we have ever been concerned—and we have known them all since the very idea of an Amateur Radio exhibition was first mooted.*

\* \* \* \*

*So far as SHORT WAVE MAGAZINE is concerned, during the period of the Exhibition our sales-counter was open daily till late in the evening. During the period we were glad to welcome more than 300 visitors—rather fewer than last year, but that only reflects the drop in the RSGB Exhibition attendance—most of whom were interested in buying books, taking out a subscription, signing our visitors' book, or just meeting the staff.*

*To them, our thanks for justifying the effort in giving counter service long outside normal office hours.*

*Austin Forster,  
G6FO.*

WORLD-WIDE COMMUNICATION

## GETTING ON VFO FOR VHF/UHF

THE MIXER-MASTER TECHNIQUE—CIRCUITRY TO ENSURE STABLE DRIVE, FREE FROM SPURII

J. C. FOSTER (G2JF)

*Any two-metre operator who hears the impeccable signal radiated by G2JF must be impressed by its stability and quality, on both phone and CW. For many months now his transmissions have been VFO-controlled, enabling him either to use the accepted HF-band technique of calling a wanted station accurately on the latter's own frequency, or to move about the band at will. This article discusses the circuitry and the general arrangement of the VFO-driver unit used by G2JF on two metres—the principles of which, incidentally, are now being applied, with equally satisfactory results, to a Tx running full power on 70 centimetres. The next logical step would be to apply these same principles using transistors throughout—but with valves suitable for the present purpose so freely available, most VHF operators will find this an excellent practical design for going VFO on two metres.—Editor.*

It has been made very clear in the technical press and elsewhere that extreme caution should be exercised when selecting frequencies for mixing purposes, otherwise serious interference problems could be encountered. Provided that one does not endeavour to extract the last milliamp. of drive from the mixer described here, spurious signals can be kept to an almost non-existent level. In the past, much has been written concerning the amount of mechanical stability which one must aim for in the construction of variable frequency oscillators for use at VHF/UHF. Suffice it to say whilst this still holds good, it has become apparent that, because of the mixer technique itself, it is quite unnecessary to go to extremely fine limits. Provided that care in design, e.g., correct positioning of components relative to heat dissipation; sturdy construction of the screening box; and rigid wiring, are adhered to then the HF oscillator will be suitable for use at VHF/UHF. It should be made

THERE is no doubt that variable frequency oscillator (VFO) control in the VHF/UHF part of the amateur frequency assignment is very desirable—if not now absolutely essential. It is useful in permitting the operator to move frequency a little to clear unwanted interference, and it is particularly valuable in making it possible to call a station "on frequency." This latter practice is probably more commonly used by our Continental friends than by stations here in the United Kingdom, though there are indications that more G operators are getting VFO-minded and calling on frequency. It is true to say that the SSB people have done more to promote VFO at VHF/UHF than any other group simply because (a) It is so obviously convenient, and (b) It is, like SSB itself, another modern trend.

The method of approach to the application of VFO to VHF/UHF has in recent years resolved itself into the so-called mixer-master technique. This involves mixing the output from a variable frequency oscillator with that from a known fixed-frequency source such as a crystal oscillator, to produce a signal which can be amplified and so give an output frequency as stable as the original VFO on LF.

### Table of Values

Fig. 1. Clapp VFO for the G2JF Driver

C1, C1A,	L1 = To tune 3.4-4.4 MHz	C5 = .006 $\mu$ F	C6, L2 = To tune 6.8-8.8 MHz
C2, C4 = .001 $\mu$ F	C3 = .0025 $\mu$ H	R1 = 150,000 ohms	R2, R3 = 25,000 ohms

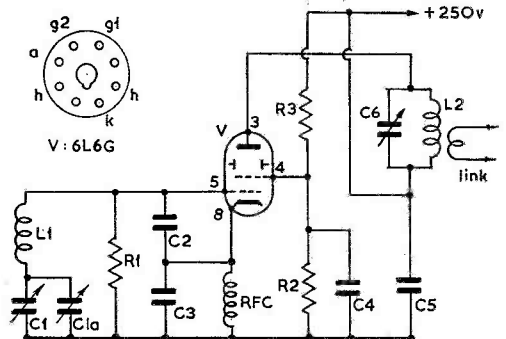
All resistors rated  $\frac{1}{2}$ -watt

### Table of Values

Fig. 2. Crystal Oscillator, Quadrupler and Mixer

C1 = 10 $\mu$ F	R2, R4 = 25,000 ohms
C2 = 150 $\mu$ F	R3 = 47,000 ohms
C3, C4,	R5, R6 = 30,000 ohms
CA = .002 $\mu$ F	R7 = 4,700 ohms
C5, C6,	RFC = 1.5 mH
C7, C8,	V1 = E180F
CB = .001 $\mu$ F	V2 = E810F
R1 = 100,000 ohms	V3 = QQV03-10

Note: Values for capacitors VC1, VC2, VC3 and coils L1-L5 as required to tune frequencies chosen.



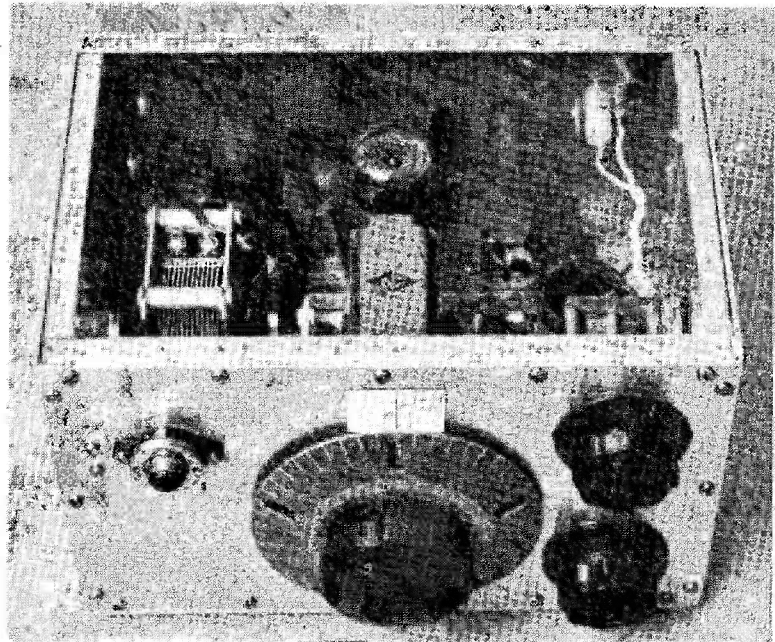
VFO 3.422-4.422 MHz 6.844-8.844 MHz

Fig. 1



Fig. 1. Clapp Oscillator for the Driver Unit.

General view of the VFO section showing the HRO drive mechanism for tuning. Across a segment as narrow as 3.4-4.4 MHz, it gives practically digital read-out. Construction is such that this part of the assembly is virtually RF-tight.



quite clear that these remarks relate to variable frequency oscillators having an upper limit of 7 MHz.

**The VFO**

The variable frequency oscillator in use at G2JF in the two-metre band is a straightforward Clapp circuit with no special features except that the unit is separate from the main apparatus and is conveniently placed for

ease of access and tuning on the operating bench. Tuning of the unit is by an HRO dial and gear box which makes calibration easy. (See Fig. 1 for circuit.)

The VFO sits on a base of foam-rubber latex 2in. thick; this eliminates any vibration which could otherwise impair the quality of note or stability of the frequency. The unit tunes from 3.422 MHz to 4.422 MHz and runs continuously when the station is in operation,

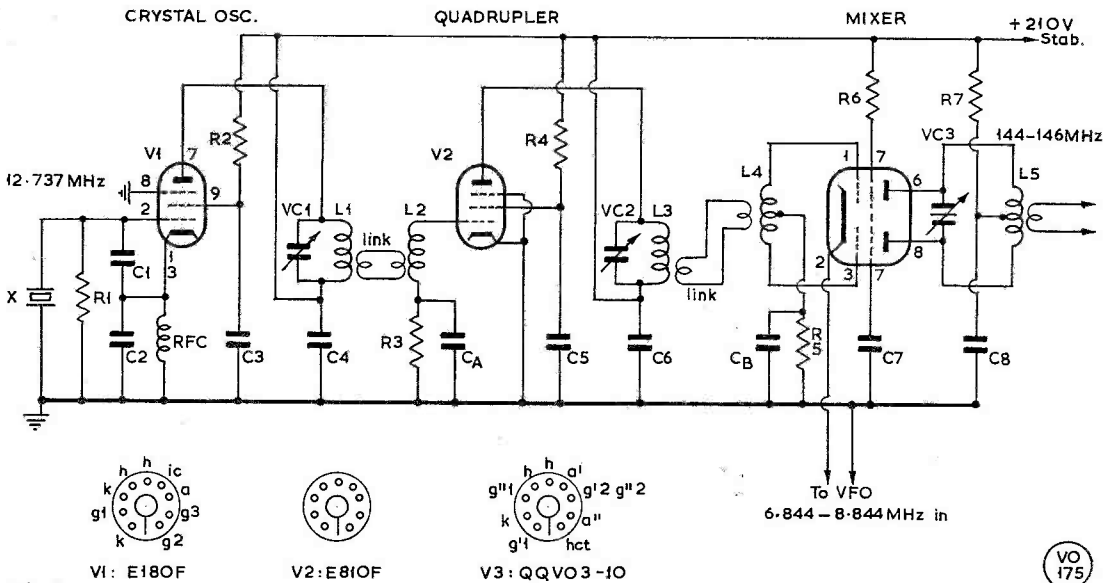


Fig. 2

Fig. 2. Crystal Oscillator, Quadrupler and Mixer.

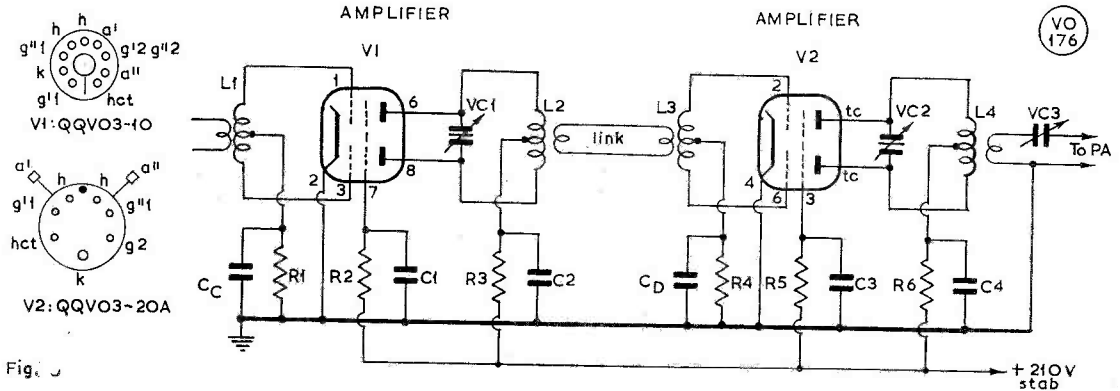


Fig. 3. Signal Frequency Amplifier — see text.

whilst the anode is tuned to twice this frequency, *i.e.* 6.844 MHz to 8.844 MHz. A 6L6G (selected from a number of valves, each of which could have done the job) has proved to be a very good oscillator. It would appear to be reasonable to assume that a large valve such as the 6L6G dissipates heat better than a smaller type and, therefore, has less effect on frequency drift. The voltage on the plate and screen is kept low and the supply should be stabilised.

**Injection**

It should be noted that the anode is tuned to twice the grid frequency, *i.e.*, 6.844 MHz to 8.844 MHz, prior to injection into the QV03-10 mixer. It should also be noted that by adjusting the VFO anode tuning condenser around the resonant point, it is possible to vary

**Table of Values**

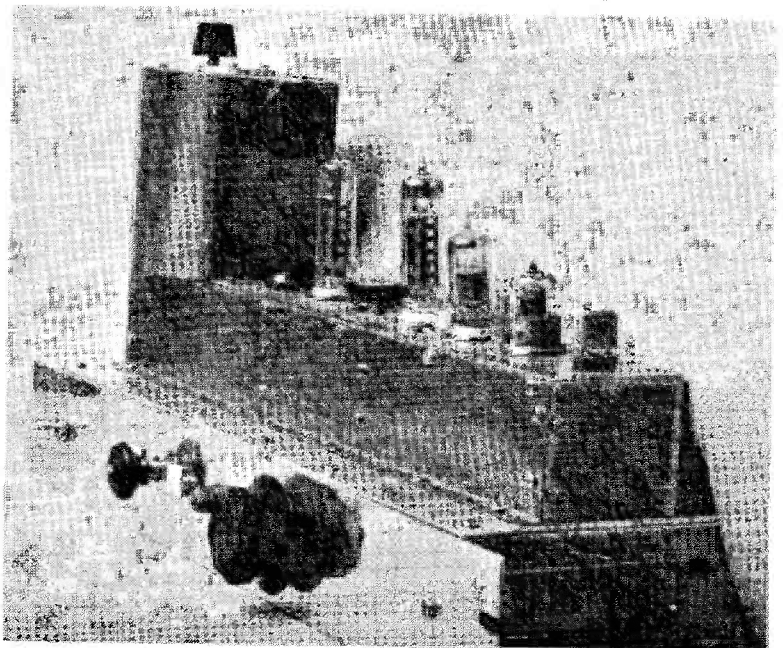
Fig. 3. Signal Frequency Amplifier

C1, C2,	R3 = 5,000 ohms
C3, C4,	R5 = 30,000 ohms
CC, CD = .001 μF	R6 = 4,700 ohms
R1, R2,	V1 = QV03-10
R4 = 15,000 ohms	V2 = QV03-20A

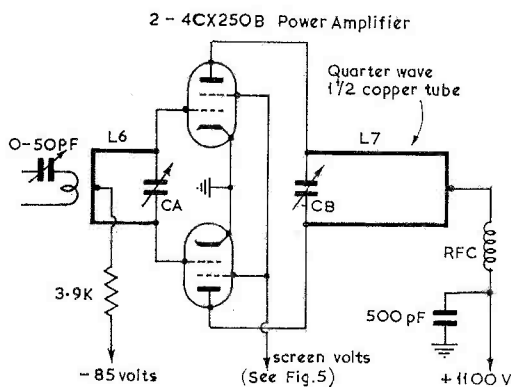
Note: Values for capacitors VC1, VC2, VC3 and coils L1-L4 as required to tune frequencies chosen.

the amount of drive to the final amplifier. The aim should be to keep injection voltage as low as possible, bearing in mind that the greater the drive at low power, the graver the risk of spurious signals at the output end of the equipment. (See Fig. 2.) Significant reduction of spurious signals in the output is achieved by the link

The crystal-oscillator chain for the VFO-driver unit (see Fig. 2) with the boxed-in QV03-20A output stage for driving the final RF amplifier to full power across the two-metre band.







CA - 1" dia. discs  
CB - 2" dia. discs

Fig. 4



Fig. 4. The 4CX250B RF Amplifier Stage.

coupling of all stages; direct capacitive coupling is definitely undesirable in this application.

**Crystal Oscillator**

The crystal oscillator (see Fig. 2) is a Colpitts harmonic generator using the very popular valve type E180F, in the grid of which is a crystal having a fundamental frequency of 12.737 MHz. The anode receives a stabilised source of voltage and, like the VFO, it runs continuously whilst the station is manned.

The anode of the E180F is tuned to three times the fundamental frequency, i.e., 38.211 MHz, and is link coupled by a single-turn loop to the following stage, an E810F, the anode of which is tuned to four times the input to produce an ultimate frequency of 152.844 MHz.

**Mixer Valve**

Following the type E810F in the circuit comes the mixer valve which is a QQV03-10 into which both

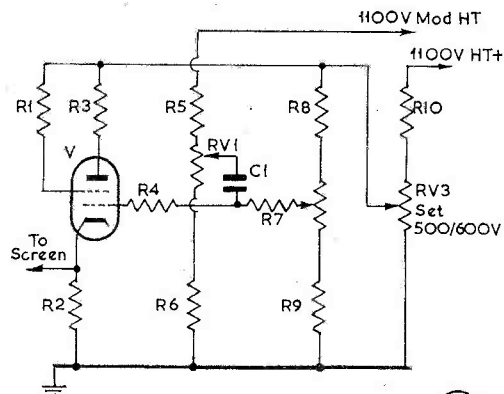


Fig. 5



Fig. 5. Screen-grid HT feed circuit for the PA.

**Table of Values**

Fig. 5. Screen-grid HT Feed for PA

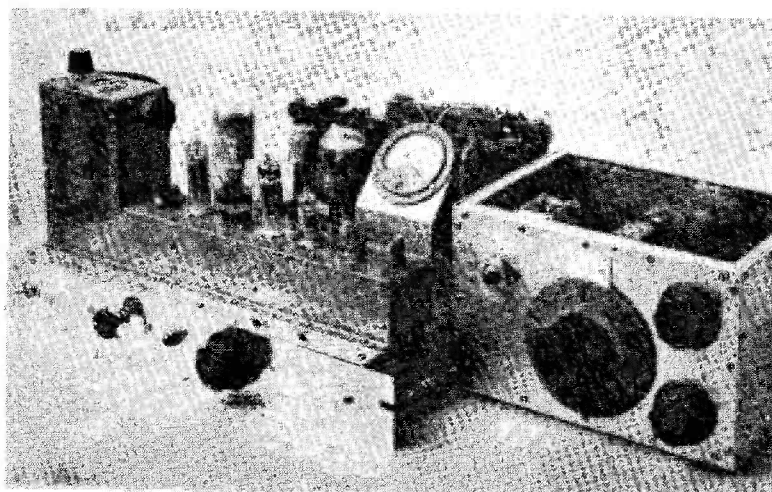
C1 = .01 μF	R8 = 68 ohms
R1, R3 = 22 ohms	R9 = 10,000 ohms
R2 = 68,000 ohms	RV1 = 100,000 ohms
R4 = 1,000 ohms	RV2 = 50,000 ohms
R5 = 47,000 ohms	RV3 = Fixed resistors to give 500-600v. on anode
R6 = 22,000 ohms	
R7 = 330,000 ohms	

signals are injected in the conventional manner, i.e., VFO at 6.844 to 8.844 MHz and the crystal chain ending at 152.844 MHz. In this case the difference yields the drive frequency within the two-metre band.

**Amplifying Chain**

Following the mixer valve, another type QQV03-10 is link-coupled by the customary single-turn loop into the penultimate amplifier, which is an orthodox type QQV03-20A valve. It should be noted that all valves receive a stabilised anode supply. (See Fig. 3.) (over

The G2JF VFO-driver unit complete with its stabilised PSU for all stages. This may look like a "lot of business for the job," but the end-product is highly stable and gives fully variable drive through the two-metre band for a pair of 4CX250B's as a PA running full power.



### Final Amplifier

The final amplifier, Fig. 4, follows general practice and uses 4CX250B valves in push-pull configuration. Voltage for the screen supply comes from a straight cathode follower (see Fig. 5) which also provides the requisite amount of audio on the screen. With this circuit (due to G3FZL) one can make the modulation influence, seen on the anode meter, show incremental or decremental movement of the needle all by the turn of a knob. This latter device has been in use at G2JF since 1961 and is highly recommended especially where VHF/UHF tetrodes are employed.

### Netting

When the station is VFO-controlled it is almost essential to be able to net accurately on to any incoming signal. It is not considered good enough merely to set the VFO within a few kHz of the wanted signal.

To enable this facility to be incorporated in the station control system it became apparent after a few tests that by applying voltage to the E810F stage in the "net"

position as well as to the VFO and CO, but *not* to the QQV03-10 stage, a beat was produced at signal frequency almost comparable in intensity to GB3VHF. It was also noted and confirmed that there was no pulling of the signal when the main amplifiers were switched on.

### Results and Conclusions

This system of VFO control has been in constant use since January, 1968. During that period of 18 months it has performed excellently—furthermore, it appears to be free of spurious signals both inside and outside the two-metre band. It is felt that this immunity from spurious is largely due to three factors: (a) The extreme care in the selection of mixing frequency, (b) *The method of coupling the stages*, and (c) Not pushing the drive to the limit. The stability of the G2JF 144 MHz signal has been proved to be very adequate—so much so that this drive system, or at least the Mark II version of it, is now doing an excellent job in the 70-centimetre band, controlling a 150-watt signal.

## GOOD OR BAD REFLECTIONS

### MORE ABOUT SWR INDICATION

G. R. COBB (G3TMG)

*We did not suppose that the interesting article by VK1AU in our August issue would pass unchallenged—indeed, as much was implied by the Editorial note appearing with that article. Our present contributor, a professional working in the field of transmission systems, writes to show that in fact the Reflectometer (when properly used and having its readings correctly interpreted) is after all still the basic tool for checking on the electrical performance of an antenna. Of course, the actual efficiency of any aerial system in the purely DX-getting sense still depends on the site factor and the capability of the operator at the Tx end. But it is as well to be able to start with having the beam as spot-on as it is possible to make it.—Editor.*

THE writer would like to discuss VK1AU's argument as presented in the article entitled "About SWR Indicators," published in the August issue of SHORT WAVE MAGAZINE.

At the beginning of Harvey's article he suggests that "The practical results discussed here show that the SWR indicator can confuse and mislead." Here the writer disagrees straight away (and from his article so does VK1AU), on the following two counts:

- (1) He shows us how he used an SWR indicator for the purpose of correcting his antenna array, not to ruin it.
- (2) The only way he could test his feeder cable when he suspected something other than the antenna was wrong was with an SWR indicator. Quoting from paragraph 7 of the article, "Terminating the cable with 75 ohms gave an SWR of 1; The feeder was 75 ohms all right."

The real problem with Harvey's effort is the fact that he has done all his good work in the wrong sequence. This is perhaps because of a basic lack of understanding about how impedance, VSWR and matching are really related.

### Problems

Harvey makes a very carefully measured VSWR run, the results of which appear in his Table I (p.340, August), and from these results infers that the antenna is off resonance by suggesting that the array is too short. Why, is not clear, considering the number of interfaces between the reflectometer and the load plus the fact that he already knows that the elements are 5 inches in excess of the correct length.

He goes on to lengthen the elements a further 4 inches, measures a good VSWR but observes with some surprise poor directivity and negligible back-to-front ratio. What do you expect if you alter a parasitic array nearly 5% off of the optimum dimension! As for the "good" VSWR one expects that if VK1AU had taken some rough field strength measurements he would have found near enough that all the power fed to the antenna was being radiated, but probably in all sorts of directions. Therefore, one couldn't really say that the *VSWR indicator* was misleading.

From there he goes on to correct the antenna transmission parameters by altering the element spacing and suggests from the results in his Table III that the beam has been detuned and it now resonates well outside of the band. He then tends to confuse everybody by trying to make measurements in a 75-ohm system with a 50-ohm reflectometer and attempts to compare the two sets of results (*i.e.*, Tables III and IV). This cannot be done, as is implied by the remark "Obviously the shape of the SWR curves doesn't necessarily indicate anything useful."

Therefore, let us try to put things in their proper perspective and define a more logical approach to the matter of beam matching and performance measurement.

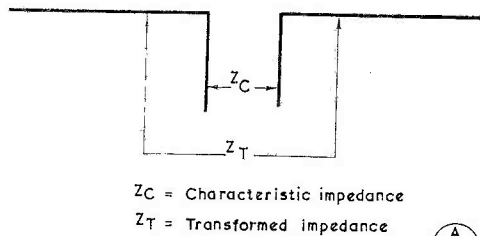


Fig. 1

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**Viewing the Problem**

First let's look at the antenna for what it really is. An aerial is basically a transmission device and therefore it would seem logical that the transmission parameters are the major parameters to be considered in the design. All basic design equations are evolved around this requirement and if some empirical optimisation appears necessary, adjustments are made for these parameters only (*i.e.* gain and beamwidth). When the optimum transmission characteristics have been obtained the antenna will present its own characteristic impedance at its terminals, or at least a transformed equivalent of this at equally displaced points along the radiator. Reference Fig. 1 above.

Yagi antennae are basically balanced, and therefore an essential requirement for this type is that it be fed from a balanced source. This requirement normally dictates the use of a balun which converts the normal coaxial mode (180° current differential) into the balanced-line mode (0° current differential). This device itself has certain impedance properties which have to be matched to achieve correct operation. Therefore, some consideration must be given to the most suitable type for incorporation in any particular Yagi system.

There are a multitude of balun designs for use with HF antenna arrays and a number of ways of setting them up for correct operation. The most commonly used are the 1:1 and the 4:1 coaxial types, probably because they are fairly easy to make and get working. If one of these designs is used with a beam it is quite usual to have to connect the balun to the antenna *via* a matching section in order that the antenna and the balun are both loaded for correct operation. It is most unlikely that one will achieve a terminating impedance for a coaxial balun exactly equal to that of the feed impedance of the aerial, but by choosing the best configuration for the particular case one can get reasonably close to the desired value. Of course, tuned baluns *can* be designed to be exact—but this becomes a combined-tuner-cum-balun anyway, and the electrical problems are much the same as the fixed balun plus a matching section.

Incorrect balun operation will produce squint of the beam, poor back-to-front ratio and apparant loss of power by creating large lobes in directions that wouldn't normally be expected. Indeed, some of these are in fact very difficult to measure with HF beam antennae (*e.g.* high elevation angles). However, this does not necessarily indicate that the antenna is dimensionally incorrect or off resonance.

Finally, the transmission of power from the source

(Tx) to the input of the balun is equally as important as the rest of the system. Of course, one has a choice in regard to using an already balanced or an unbalanced feeder. Both systems have their particular merits, which are adequately documented in the many text books on Antennae.

Whatever choice is made for whatever reason, it is really worthwhile checking and optimising the output of the Tx to operate into the characteristic impedance of the feeder line chosen. This, of course, can be done in the usual way on the bench with a resistive load equal to the impedance of the line and an RF current or voltmeter.

**Practical Approach**

From the foregoing discussion one choice for a possible system can be diagrammatically represented in Fig. 2 below.

Now, the ultimate problem is the feeding and therefore matching of power from the source (Tx) to the load (Ae.). It would appear at first sight that we should start at one end and work towards the other but in fact we have to look into both sides of each box as we go.

**Feeder**

As far as the feeder is concerned it would seem reasonable to choose a type which is readily available, practical and (in most people's case) reasonably pocket-worthy. This tends to narrow the range of impedances to the commonly used coaxial lines, *viz.* 50, 75 or 82 ohms. This would be the logical order in any case bearing in mind the range of impedances that the antenna might produce, also the working range of impedances that typical transmitters like. So we might choose 75-ohm coaxial line for a system. The first thing to do is to ensure the electrical properties of the said line and this can be best done with a reflectometer of the same impedance.

Impedance can be checked by inserting the reflectometer between the Tx and the feeder and terminating the far end of the feeder with a non-inductive resistance equal to its impedance, in this case 75 ohms. Then, by loading the Tx enough to give a reliable reading, a measurement of VSWR can be obtained. (Harvey, during the course of his confusion, had done this and succeeded in measuring the desired VSWR approaching unity.)

Next the loss is to be measured. There are many ways of doing this and two common methods are outlined, as follows:

(1) *End-to-End Comparison:* This involves the use of a good RF voltmeter (something few of us possess) and a reasonable dummy load. When the Tx and feeder are properly terminated the measured voltage across the input of the line is compared with the measured voltage

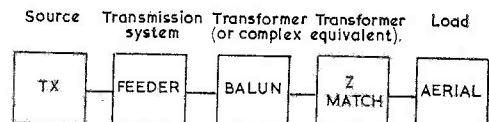


Fig. 2

A  
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across the output and load at the far end. The loss is then calculated from the usual equation:

$$\text{Loss} = 20 \log \frac{V. \text{ out}}{V. \text{ in}} \text{ dB.}$$

Even with the best of instrumentation, errors do creep in with this method and therefore the second is an alternative test.

(2) *Reflection testing:* The reflection method involves the use of the reflectometer in the measurement of high levels of VSWR to evaluate loss. Let us first consider a perfect transmission line. If one terminates the far end of a feeder with a short-circuit, all the power transmitted down the line will be completely reflected and when returned to the feed point, comparison in the reflectometer will indicate a high VSWR. In fact it will, or should be, infinity with a *perfect line*.

Now, in actual fact one never has a perfect line and therefore the reflected power level will be attenuated by an amount equal to twice the cable loss. (The wave is subjected to attenuation from the Tx to the short-circuit and then again from the short-circuit back to the feed point.) In this case comparison in the reflectometer will show a VSWR of infinity *minus* the degradation factor (loss) of the cable. With a little mathematical manipulation one arrives at an equation for loss:—

$$\text{One-way loss} = 10 \log \frac{\text{VSWR} - 1}{\text{VSWR} + 1} \text{ dB.}$$

This can easily be drawn up in tabular form, as Table I.

inf. = 0.00 dB	3.5 = 2.55 dB
10.0 = 0.877 dB	3.0 = 3.01 dB
9.0 = 0.97 dB	2.5 = 3.68 dB
8.0 = 1.09 dB	2.0 = 4.77 dB
7.0 = 1.24 dB	1.8 = 5.43 dB
6.0 = 1.46 dB	1.6 = 6.37 dB
5.0 = 1.81 dB	1.4 = 7.78 dB
4.0 = 2.22 dB	1.3 = 8.84 dB

With a few more points one could probably draw quite a reasonable graph for quick interpolation.

Harvey in his article has accidentally measured the loss of his feeder cable twice and apparently by two methods. First, in para. 9 he makes it 2 dB (by unknown method) and secondly, in para. 14 he measures a 2 : 1 VSWR when shorting the far end of the feeder. From the table however, it can be seen that a 2 : 1 VSWR represents an attenuation of 4.77 dB!

### The Balun

Having satisfied ourselves that the feeder is good and electrically sound, we move on to the balun and impedance matching section. Before we can do this, however, we must have some knowledge of typical load impedances produced by the antenna. All the usual Handbook references tell us that the terminal impedance of a typical 3-ele Yagi array is between values of 10 and 20 ohms—but, of course, by folding the radiator element we can improve this by approximately an order of four, *i.e.*, 40-80 ohms. approx. As this could be around the feeder impedance previously chosen the obvious thing to do is to select a 1 : 1 balun and to choose a simple matching

network to remove the remaining impedance differential.

Having made the decision on this point, the next thing to do (as Harvey eventually did) is to set up the balun using the reflectometer and a resistive termination equal to the output impedance (75 ohms in our example). However, one refinement might be considered here and that is to do it with the input of the balun connected directly to the reflectometer. This eliminates the possible damping effect of the feeder line loss on the measured VSWR.

Each component (feeder and balun) should now be showing low VSWR's individually and the test, of course, is to fit the two together and check the overall match, which should also be good. Incidentally, it is worth a note at this point that the worst VSWR case of two combined mismatches is the two VSWR's multiplied together, *e.g.*, if one had a feeder VSWR of 1.20 and a balun VSWR of 1.20, the best case when the two components are joined together is an overall VSWR of 1.00, or the worst case of 1.20 x 1.20, which is 1.44. Therefore, if one measured an overall VSWR of greater than the worst case one would automatically look for things like dry joints, bad connections, defective plugs and sockets, etc.

### The Load (Aerial)

Now is the time to find out whether or not the antenna is at the optimum dimensions, also to check that external measurements are correct. Trimming the antenna for maximum gain and beam width is all that is called for and is best carried out with the aid of a close local station capable of making accurate field strength measurements. When optimum performance has been achieved, evaluation of the terminal impedance should then be carried out and a configuration for the matching section chosen.

When a choice of matching section has been made, it should be connected in circuit and set up to give an acceptable VSWR. If this cannot be done it does *not* mean that the antenna is incorrect or off resonance. All that has happened is that the chosen matching section has not got the required transformation ratio. Incidentally, as before, to eliminate the damping effect of the feeder, the reflectometer directional coupler assembly should be inserted between the end of the feeder and the balun. This will enable one to set the adjustments of the matching network to produce the best matched condition and the optimum for band width. The true band width of the antenna array can now be checked by utilising your local receiving station who should monitor your signal strength over the band as you change frequency and load to the same power input each time. One must be careful to make sure the checking station is using an antenna that is not frequency conscious, otherwise you will get a curve that is the addition of the two antenna responses. At this point the directivity and back-to-front ratio can be meaningfully measured. Combining this information with the stated gain and VSWR for the array gives the true performance of the antenna.

As far as the matching network is concerned the writer prefers personally the delta match system, where one adjusts the feeding points along the continuous radiator element until a 1 : 1 VSWR is reached, as in

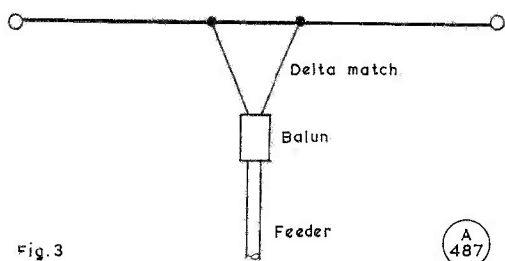


Fig. 3

Fig. 3. (This is fully explained in the Antenna handbooks.)

Where the terminating points end, the impedance between these two points represent the output impedance of the balun and therefore it is very easy to see, physically, which way the impedance is changing, *i.e.*, wider apart is a higher impedance, and closer together is a lower impedance. This is obviously very useful when tuning a known balun impedance into a relatively unknown antenna impedance.

### Conclusions

Although the explanation of a systematic method of building up and checking a beam array looks long-winded and cumbersome it doesn't really take that long and in fact it does save a lot of time otherwise spent in

confusion and doubting the veracity of one's test equipment and measurements. A short summary therefore shows more clearly the sequence of events.

- (1) Choose and test feeder line. Optimize Tx output impedance,
- (2) Expand ideas of proposed antenna design and construction, also with the available information, make an estimate of the probable feed impedance,
- (3) Derive and test a balun transformer most suitable for the impedances involved.
- (4) Optimize antenna transmission characteristics,
- (5) Optimize match of antenna to balun by adjustment of the matching system, then measure antenna performance.

From this it can be seen that one ultimately obtains optimum transmission characteristics with the lowest order of system VSWR. This, in actual fact, must be the nearest to what one might call, *optimum system efficiency*. One might note that all, in the sequence of events except (4) are achieved by the sensible use of a reflectometer.

It is hoped that this article helps to emphasise that the use of a reflectometer is in fact invaluable if it is used for the purpose for which it was designed—and is an essential tool, as implied in the Editorial comment prefacing the article by VK1AU in the August issue.

## VARACTOR DIODE CIRCUITS

### THEORETICAL CONSIDERATIONS, AND SOME PRACTICAL CIRCUITRY

V. ALLISON (G3TNX)

AT a time when an efficient RF Power Amplifier for UHF was relatively expensive, the introduction of the varactor (variable reactance diode) made possible a simple and cheap method of tripling a VHF signal to give a useful output at UHF.

The way this is achieved cannot fully be explained without the use of mathematics—however, a working outline of the basic principles is set out below and the mathematical expressions are stated without proof.

When an 'n'-type material and a 'p'-type material are combined in the same crystal, there is a diffusion of electrons from the 'n'-type into the 'p'-type where they combine with holes, and conversely there is a diffusion of holes from the 'p'-type into the 'n'-type where they combine the electrons. Eventually, a region is set up across the junction in which there are neither free electrons nor holes. This is known as the "depletion region," "space charge region" or "transition region." The thickness of this region is of the order of one micron ( $10^{-6}$ m). As a result of this a point is reached where the region acquires sufficient charge to inhibit further diffusion. If we apply a reverse bias across the junction

the effect is to increase the width of this depletion layer or region. The region can be likened to the dielectric of a capacitor with the 'p' and 'n' materials as the plates.

What we have now in effect is a capacitor whose value can be varied by the application of a variable voltage. A forward bias will bring the "plates" closer together, increasing the capacitance until they apparently touch when forward conduction occurs, (at 0.6v. approximately). Reverse bias will increase the width and hence decrease the capacitance until reverse voltage breakdown occurs.

The capacitance can be expressed by the following equation for a reverse biased varactor.

$$C_t = \frac{C_p + C_j}{\left(1 + \frac{V(\text{bias})}{\emptyset}\right)^n}$$

where  $C_t$  = Total capacitance of varactor  
 $C_p$  = package capacitance  
 $C_j$  = junction capacitance  
 $C_{j0}$  = Junction capacitance at zero bias  
 $\emptyset$  = exponent of capacitance variation

values for  $\emptyset$ : 0.5 to 0.7 volts for silicon,  
 1.1 to 1.2 volts for gallium arsenide

values for n: 0.5 for diffused junctions (1N4387), 0.33 for alloyed junctions (BAY66, BAY96).

With a 1N914 diode the capacitance varies from



4pF to 2pF with reverse voltage variations from 0 to 25 volts. Diodes are available to give 22pF to 120pF. Devices designed to exhibit this effect are known as varactors, varicaps or voltacaps.

**Applications**

It can be seen that this effect can be put to a number of uses, such as automatic frequency control, remote tuning of oscillators and tuned circuits and frequency modulation. Uses that are not so familiar are as a frequency multiplier and as an amplifier at VHF, UHF and on microwaves. The capacitance is not directly proportional to voltage and in this case if it is arranged to be proportional to the square root of the reciprocal of the applied voltage, then the device has a *square-law* characteristic and may be used as a low-level mixer at microwave frequencies.

It should be known that if a conductor is cooled to a very low temperature, random electron movement is inhibited and "Johnson" noise is reduced. Therefore, if a varactor is cooled, say with liquid nitrogen, the intrinsic conduction of the semiconductor and hence the noise-level is kept low and the junction tends to behave as a pure capacitance with very little leakage and the device can be used as an efficient low-level mixer. The IF output can be shown to be many times greater than the incoming signal. This device is known as a parametric amplifier because it obtains amplification due to the variation of one of the diode parameters.

It has already been stated that a varactor can be used as a frequency multiplier, again due to its square law characteristic. If a sinusoidal signal is applied to a varactor circuit the output waveform is that of Fig. 1A. The waveform is severely distorted and can be represented by the expression

$$V = \left(\frac{I}{k\omega}\right)^2 \text{Cos}^2 \omega t$$

$\text{Cos}^2 \omega t$  can itself be expressed in terms of functions of  $2\omega$  therefore the waveform can be seen to contain harmonics of the fundamental frequency.

By suitably doping the material near the junction it can be "tailored" so that the charge of the depletion region can be delivered spontaneously, with the result of a fast cut off in reverse current. This is known as "step recovery" and is illustrated in Fig. 1B. Step recovery enables us to obtain a large amount of useful energy which may be used to increase the harmonic output.

A basic varactor doubler circuit is shown in Fig. 2. L1, C1, C2, form a series tuned circuit at the input frequency and L2, C3, C4 at the output frequency.

It can be shown mathematically that if third or higher harmonics are required they can be generated only if the second harmonic is present when an alloy junction is used. With a diffused junction type they can be obtained without the second harmonic being present but efficiency is reduced. These harmonics can be introduced by means of an idler circuit tuned to the second harmonic. (An "idler" is a circuit tuned to a harmonic which does not appear at the output).

Due to the non-linearity of the capacity/voltage relationship the varactor is liable to give spurious sidebands which can give rise to distortion, therefore it is desirable that a relatively low modulation index be used.

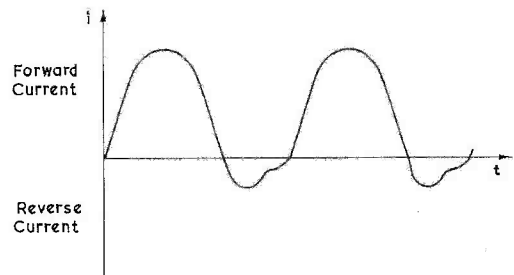


Fig. 1a NORMAL PN JUNCTION

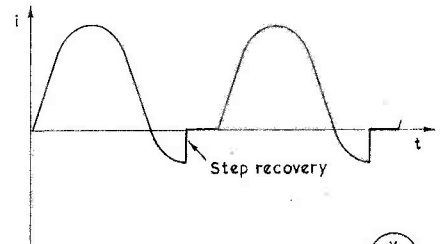


Fig. 1b SPECIALLY DOPED JUNCTION

X 321

Figs. 1A and 1B are discussed in text.

**Practical Circuitry**

Fig. 3 shows a varactor tripler circuit, and its description is as follows: A match is obtained by means of the tap C1, C2 from the bandpass filter. C1, C2 also form a resonant series circuit with L1 and the diode capacitance at the input frequency which is, say, 150 MHz for convenience. This frequency is shunted by the varactor and its self-biasing resistor, R1. Harmonics are generated and the second harmonic at 300 MHz is tuned by the series resonant idler circuit L2, C3. This frequency is fed back into the diode where it is additively mixed with the input frequency, giving  $300 + 150 = 450$  MHz. The output circuit L3, C5, C4 forms a series-resonant circuit with the diode at the output frequency and an impedance match to the second bandpass filter is effected at the junction of C5, C4.

It should be realised that a varactor will generate harmonics of anything that it is given, hence it is essential that the input signal from the VHF amplifier be "clean" and have low harmonic content. A bandpass filter should be used between the VHF output and the varactor. Even so some spurious inputs can be expected. It is also necessary to include a bandpass filter between the varactor

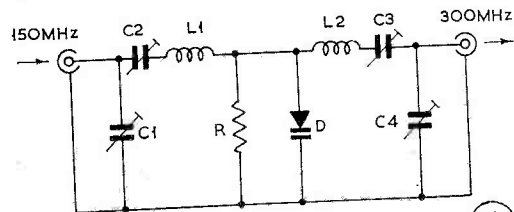


Fig. 2 VARACTOR Doubling Circuit

X 322

Fig. 2. A varactor doubler — see text.

and the antenna as the output will contain higher order harmonics.

With varactor triplers it is possible to obtain an efficiency of 60% and they do not of course have need for a power supply other than the input signal. Used as doubler the efficiency is 88%. The Mullard BAY66 will give about 7 watts out for 12 watts in when used as a tripler. The BAY96, 24 watts for 40 watts (max. ratings). Varactors in the *Sylvania* range are subjected before despatch to 10 days exposure to high humidity and varying temperature (-65 to +150°C), stored for 1000 hours at 150°C, subjected to a variable frequency vibration of 20G, a constant acceleration of 20,000G(!) and shock of 1500G, 0.5m./sec.

One further point: While on the subject of junction capacitance, as this is a function of voltage, when tuning a transistor amplifier, particularly above 100 MHz, the drive to a following stage is increased and hence the bias developed, which in turn alters the junction capacity which in turn detunes the stage. On returning this

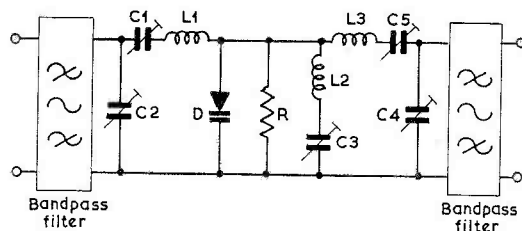


Fig. 3 VARACTOR Tripling Circuit

Fig. 3. A varactor tripler.

stage the loading on the first is altered changing the effective input capacitance due to Miller Effect. A correction to this circuit again effects the second stage. Sometimes one wonders, can they possibly be tuned at all or are they just near enough?

**BREAK-IN WITH KEYER DA-I**

THE Electronic Keyer DA-I as sold suffers from the disadvantage that it cannot be used for break-in CW with many transmitters. However, the Keyer can easily be modified to suit transmitters, such as the FL-200, which require the key contacts to be of the change-over type.

Examination of the innards of the DA-I will show that a double-pole change-over relay is used, but only two (of the available three) contacts are connected to the terminals at the rear, these being the two that are shorted when the key is closed. It is not difficult to remove the circuit board from the case in order to solder a lead to the unused contact of the relay. If the battery terminals are not involved then one of these will be ideal for the third key connection.

Those who like a straight key alongside the bug will find that the remaining two battery terminals can be connected to a straight key. Internally, these two terminals should go to the two sides of the dash paddle. Break-in operation will then be available with the straight key by using the DA-I relay. The DA-I mode switch needs to be in the semi-auto position. Straight-key practice using the internal oscillator will then also be available for the junior op.

G3RSJ

**R.A.E. COURSES — FINAL NOTE**

Though by the time this appears most R.A.E. courses for the winter session—as listed on p.366, August and p.430, September issues of SHORT WAVE MAGAZINE—will be well under way, three more have since been notified. Application should be made immediately, as indicated.

**Lichfield:** At the School of Art & Evening Institute, on Thursdays, 7.00-9.00 p.m., with J. H. Beamond, G3DZT, as lecturer.

**London (Islington):** At De Beauvoir Evening Institute, Tottenham Road, Balls Bond Road, N.1, R.A.E.

booster course for candidates who have previously failed and wish to try again. On Mondays, Wednesdays, Thursdays and Fridays, 7.30-9.30 p.m. Tutor, F. J. Barns, G3AGP.

**Prudhoe (Nr. Newcastle):** At the County Secondary School, Tuesdays 7.00-9.00 p.m. Contact M. Stott, G8BGU, QTHR, or telephone Prudhoe 2020.



“... well, Miss Fanshawe, there won't be much QRM so we should have plenty of fun...”

## K.W. ELECTRONICS LTD. — CHANGE OF POLICY

Henceforth, all K.W. equipment will only be sold direct to the customer, this having been decided upon in order to allow substantial price reductions by eliminating dealer discounts. The new policy is being backed by the best service facilities in the country for amateur-band equipment, and the aim will be to match this service to the high standard of the product.

K.W. Electronics, Ltd. is now the oldest-established U.K. manufacturer in the Amateur Radio field, with vast experience of the needs, interests and practical requirements of the amateur. Their special understanding of the market is one of the reasons for the success of the firm, now doing world-wide business in both the amateur and commercial contexts. The senior staff of K.W. Electronics, Ltd. are in most cases themselves

actively on the air, and the sales manager is G3CMI, who recently joined the Company with considerable commercial experience.

In addition to the range of KW transmitters, receivers and transceivers—in connection with which there is constant research and development going on towards the production of new and improved designs—the latest K.W. catalogue shows an interesting variety of ancillary equipment, such as aerial systems, measuring and monitoring instruments and essential accessories for the modern amateur station. And it is worth mentioning that all the K.W. manufactured equipment is entirely British, emanating from the large and well-developed plant of K.W. Electronics, Ltd. at Dartford, Kent. All information can be obtained on application to the firm.



Rowley Shears, G8KW, chief executive of K.W. Electronics, Ltd., with his new "G-Line for the '70's"—a range of equipment including the KW-202 receiver, KW-204 transmitter and the KW-2000B transceiver. The KW-202 and KW-204 are designed as complementary "separates" and together provide the most modern approach to amateur-band operating, involving equipment of the highest standard of design and construction. K.W. Electronics, Ltd. is now a large indigenous British manufacturer selling amateur-band equipment not only in the U.K. but also throughout the world.

*To keep in touch with the world of Amateur Radio, read "Short Wave Magazine" regularly*

# VFO TTx FOR TWENTY

## EXPERIMENTAL QRP RIG AT LOW COST

A. M. HUNT (G3HHV)

THIS is not meant to be a serious technical article, but rather an interesting project for the beginner or experimenter, that can give hours of fun and contacts for a very small cost and effort.

After some success with a VFO-controlled transistor transmitter on Top Band and Eighty, it was decided to try the same type of circuit on an HF band. For this, 28 MHz was the band chosen as it was thought impossible to go on 14 MHz among the Big Boys, but rather a waste of time.

However, it must be admitted that after a suitable coil was made and tried, it conveniently came out at 14 MHz, so that is why the TTx is on Twenty—anyway, Ten has been unreliable since.

After the Top Band trials, the author was impressed by the stability of transistor VFO's and made up several types, all with fair success.

It was finally decided to use the same Colpitts type of VFO (L1, VC1, VC2, Tr1) as used in the Top Band rig with the same BFY51 transistor. This transistor type is held in fond affection as it has survived several attempts at destruction and still gives out its RF.

Circuit below shows the circuit of the entire transmitter. The power supply is two separate dry batteries, one for VFO-buffer and the other for PA. Of course, a good mains transistor power supply could be used instead.

### Construction

The VFO is made up using all the accepted techniques in HF construction, e.g., frequency-determining components with negative temperature coefficient condenser in a separate screened box on top of the chassis, rest of VFO components underneath chassis, rigid wiring, slow

motion tuning, etc. All condensers are close tolerance.

The chassis is conveniently negative for the n.p.n. BFY51 although the transistors in their heat sinks must be insulated from the chassis (mounted on paxolin in this case as only low voltage is involved). The RF drive is taken from the Tr1 emitter and fed to the base of Tr2, which is a buffer-driver and is keyed in preference to the VFO for stability. In the collector of Tr2 is a parallel tuned circuit L2, C8, broadly tuned to 14 MHz. A tap off this coil capacitance couples through C10 to bases of Tr3 and Tr4, which are also BFY51's, in parallel. In the absence of RF drive the PA is shut down by bias arrangement and draws no current and must be adequately by-passed at all points for stability.

The PA emitter resistors must be of sufficient wattage to cope with the larger PA currents. The writer uses a type of pi-tank circuit (C16, L3, C17) output with suitable values. Other arrangements may be tried; this gave no trouble. The isolating output condenser C18 is a protec-

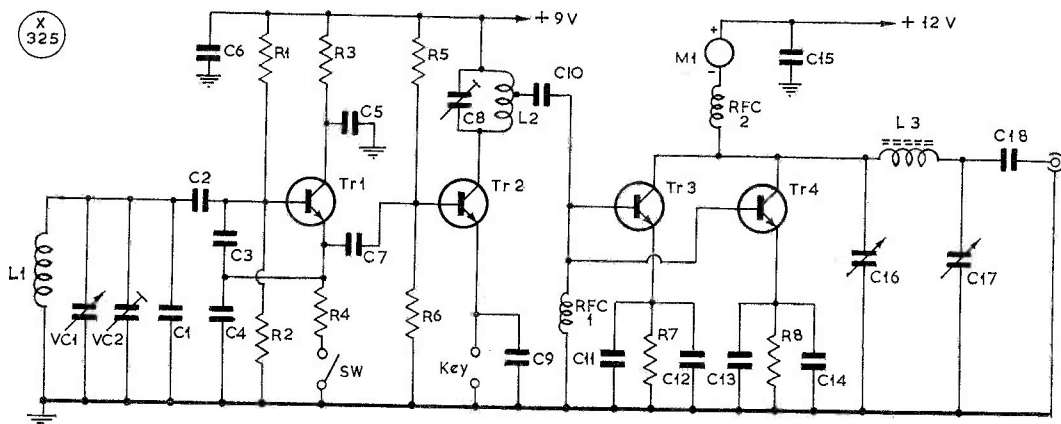
### Table of Values

Circuit of the 20-Metre Transistor Tx

C1 = 15 $\mu$ F	VC1 = 50 $\mu$ F, var.
C2, C7, C8 = 100 $\mu$ F	VC2 = 30 $\mu$ F, pre-set
C3 = 470 $\mu$ F, s/m	R1, R2 = 10,000 ohms
C4 = 245 $\mu$ F, s/m	R3, R4 = 470 ohms
C5 = .01 $\mu$ F	R5 = 22,000 ohms
C6, C9, C18 = .003 $\mu$ F	R6 = 150,000 ohms
C10 = .02 $\mu$ F	R7, R8 = 4.5 ohms
C11, C13, C15 = 0.1 $\mu$ F	RFC1 = 1.5 mH RF choke
C12, C14 = .005 $\mu$ F	RFC2 = 2.5 mH RF choke
C16 = 50 $\mu$ F, var.	Tr1, Tr2, Tr3, Tr4 = BFY51
C17 = 100 $\mu$ F, var.	

### TABLE OF COIL DATA

L1 = 24 turns 22g. spaced on  $\frac{1}{4}$ in. dia. former.  
 L2 = 26 turns 22g. on  $\frac{1}{4}$ in. dia. former, tapped at 8th turn.  
 L3 = 14 turns 22g. on  $\frac{1}{4}$ in. dia. former, slug-tuned.  
 NOTES: Heat sinks should be used when soldering transistor leads. With no RF drive on, PA should be checked for parasitics, shown by meter flicks when tuning. Minimum inter-stage coupling should be used, consistent with drive. PA should always be operated into load, aerial or otherwise. Inter-stage screening should be used. C15 should have 100  $\mu$ F in parallel. Meter to be scaled 0-200 mA or thereabouts.



tion for the PA transistors.

After a long-wire antenna is coupled to the PA via an ATU, tune-up is by an RF field strength meter. Drive is adjusted, PA tuned (C16) and the antenna loaded (C17) until PA collector mA meter reads about 100 mA. Overloading pulls the oscillator and can cause chirp. A good stable T9 note was obtained which was confirmed on the air. It was found better to tune for RF output rather than meter dips — this is characteristic of low-power transistor transmitters.

### Results

On-the-air tests gave results far beyond expectation. In a few weeks of part-time operation 160 contacts were made in 42 countries and in addition twelve W's, UA9, ZB2, EA8, VE and PY have been worked. Signal reports have been well up, the best being 579 Ohio, 589 Archangel. This little rig has given hours of enjoyment although DXCC is already held. The cost of the whole outfit is under thirty shillings and no TVI has yet come to notice.

## DESIGN OF LINEAR AMPLIFIERS

### CONSIDERING THE 4CX/250 AND 4CX/350 TYPES FOR THE HF AND VHF BANDS—SOME PRACTICAL IDEAS AND SUGGESTIONS FOR QRO OPERATION OVER A WIDE FREQUENCY RANGE

I. E. HILL (G6HL)

THE 813 has deservedly enjoyed wide popularity in Class-C RF amplifier service, and although not specifically designed for linear work does give a very good account of itself in that role. It will handle comfortably maximum U.K. licensed power and is effective through the HF bands right up to 30 MHz. Probably the TT21 follows next in popularity but it is necessary to use valves in parallel to reach licensed maximum and efficiency falls off above about 20 MHz.

Valves in the 4CX/250 and 4CX/350 series have been available for some years and are now beginning to appear on the disposal market. Unfortunately, they need forced air cooling and the requisite valveholder often costs more than the valve itself! However, they are available and the number in use is increasing among HF and VHF enthusiasts.

The '250 and '350 versions look alike, are of similar external dimensions and use the same local air-cooled base. In the '250 versions 4X and 4CX categories are available, the latter having a ceramic base and slightly better heat dissipation. The '350 version is available only with ceramic base. Essential characteristics vary between manufacturers and valves but representative performance in Class-AB1 service is given in Fig. 1.

Efficiency in terms of watts RF output for watts DC input improves as the plate voltage is increased towards the maximum but nevertheless these valves work well at low plate voltages. Related to frequency, performance is also good although the makers recommend that above 300 MHz the heater voltage should be reduced.

In the past several years a number of different HF amplifiers have been assembled round the *STC* and *Eimac* 4X/250, 4CX/250 and, more recently, *Mullard* 4CX/350 versions of this valve; results have been very satisfactory. The type appears to be a deserving replacement for the 813 and a valve of interest to the VHF

man. It could in fact be at the heart of a universal linear covering all bands from 144 MHz to 3.5 MHz and suggestions are made later.

### Cooling

Even when heaters only are running this valve needs a continuous stream of cool air directed at its base and passing through the finned anode. A suitable blower is the VBM3 made by *Air Control Installations, Ltd.* which gives 36ft.<sup>3</sup>/min. free air or 15ft.<sup>3</sup>/min. at .5in. water gauge. To be effective the output of the blower must be directed straight at the base of the valve and the best way to achieve this is to insert one end of a 1½in. outer diameter fibre glass tube inside the metal flange on the bottom of the air-cooled valve base. The other end of the tube is cemented to a 2 x 2 x ¼ inch ebonite or other plate bolted directly to the air outlet of the blower. This will avoid any bends in the air outlet and loss of air pressure. There should be no air restriction at the inlet to the VBM3 and adequate ½in. holes should be drilled in the screen/chassis to permit entry of cool air. Provision must also be made for the exhaust of warm air from the PA output, and this can be taken care of by drilling ½in. holes in the chassis/screen above the plate area. Connection to the grid can be made by inserting a 50-ohm 1 watt circular carbon resistor through a close fitting hole in the fibre glass tube.

*Bias* supply should be continuously variable and stabilised; 25 to 70 volts will cover both types of valve. The 4X/250 and 4CX/250 need a wide range of bias voltages from 40 to 65 volts. The makers say this is no problem—adjust bias for correct no-drive input of 100 mA and press on. This is fine for single-valve PA's but presents a problem if it is intended to operate a pair together in parallel or push-pull. In this case the valves must either be matched or provision made for separate bias adjustment. The 4CX/350 seems to be more con-



TYPICAL DATA		4CX/250			4CX/350		
DC Plate Voltage	V	1000	1500	2000	1000	1500	2200
DC Screen Voltage	V	350	350	350	400	400	400
DC Control Grid Voltage*	V	-50	-50	-50	-27	-27	-27
Zero Signal DC Anode Current	mA	100	100	100	100	100	100
Max. Signal DC Anode Current	mA	250	250	250	260	265	290
Max. Signal DC Screen Current	mA	10	8	5	-4	-5	-3
Max. Signal Peak RF Grid Voltage	V	50	50	50	21	21	25
Max. Signal Power Output	W	120	215	300	95	200	385

\*Adjust grid volts to give specified zero signal anode current.

Fig. 1. Typical ratings for Class AB1 operation.

sistent and a number checked have all been satisfied with 27 volts grid bias. In Class-AB1 operation grid current will be zero and one should note makers warnings regarding excessive grid drive or current. Screen supply should also be continuously variable around 350 or 400v. and adjusted to rated value or slightly below—not above. Screen current will be a few milliamps negative for low drive, to zero or a few mA positive for higher drive in Class-AB1. The level of drive giving zero screen-current seems to be near optimum for minimum unwanted products. It is advantageous and in some cases essential to arrange that screen voltage comes on *after* plate and grid. A convenient way is to switch the screen power transformer by use of an AC relay connected to primary of the plate supply transformer, the latter being switched on the "transmit" condition.

Plate supply should be substantial and well regulated preferably with choke input and a large capacitor in the output. The valves are very accommodating on plate voltage, taking anything from 1000 to 2000 volts with slightly improved performance at the higher voltages.

Heater voltage for operation up to 300 MHz should be 6.0 volts. 6.3 volt output transformers have been used satisfactorily by connecting input of 230 volt to maximum primary winding. Above 300 MHz the heater voltage must be reduced and the makers indicate correct values. In general, it is better to use too low rather than too high a heater voltage.

Drive. Both valves in this range are easy to drive Class-AB1 in the HF bands, not more than 20 watts being necessary in passive-grid configuration, but drive requirement increases for frequencies above 30 MHz. Considerably less drive power is required if tuned grid is used.

If a 20 watt driver is conveniently available a very simple linear amplifier can be constructed having a 50 or 75-ohm resistor input and the usual *pi*-section tune, coil and load output adjustments. — see Fig. 2.

Alternatively, it is attractive to build in a driver stage, loading the driver output and amplifier input with decreasing resistance until the drive is just above adequate

on 30 MHz. The resistor used (R in Fig. 3) should be non inductive (carbon) and of about 10 watt rating. Two 6CL6 valves in parallel operating Class-A will provide adequate drive for two 4CX/250 or 4CX/350 in parallel. The 6CL6 driver stage can operate passive grid with a 100-ohm resistor and needs less than 100 milliwatts drive. An alternative driver valve is the EL84. Drive input should be variable or alternatively provision should be made to vary the drive from the 6CL6 by variation of its screen voltage. Variable input is preferable.

Amplifier Construction

Two amplifier designs are offered, one for the chap with a 20-watt driver, Fig. 2, and a second to follow a 100 milliwatt exciter, Fig. 3. It is not proposed to give detailed construction but only to suggest essentials to be considered when building.

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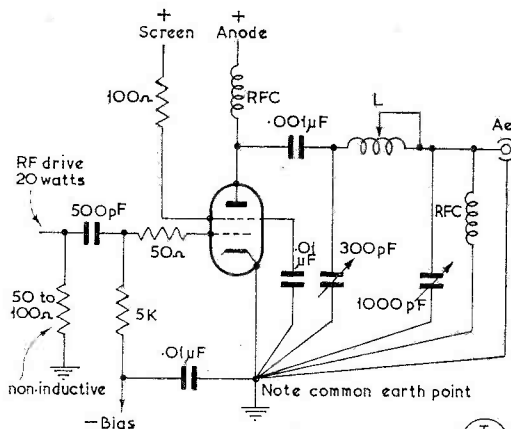


Fig. 2

Fig. 2. Passive-Grid Linear Amplifier — 4CX/250 or 4CX/350.

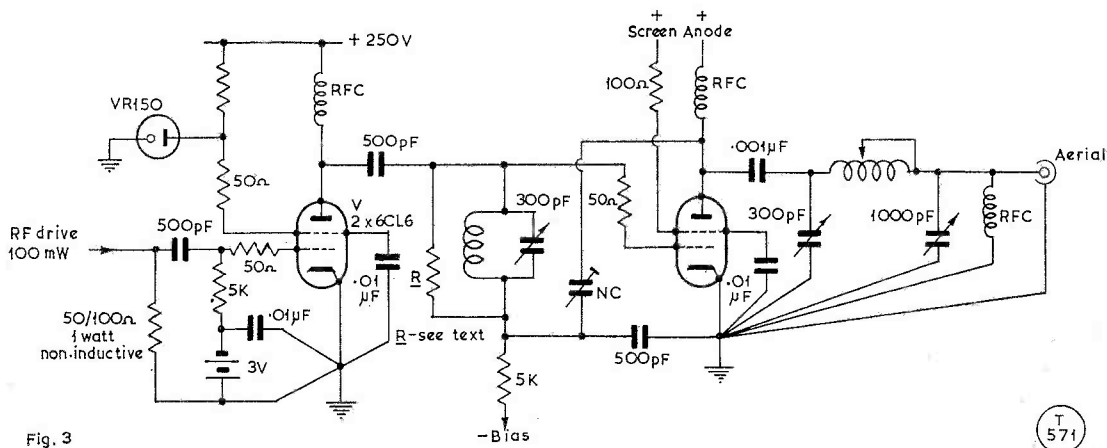


Fig. 3. Tuned grid Linear with driver stage — see text.

Most space will be taken up by the *pi*-section output so perhaps it merits first consideration. The 4CX/250 or 4CX/350 can be mounted in any attitude but remembering that hot air rises it is best to mount the valve upright and blow from the underside. Mount the valve(s) in the centre of the chassis with the blower motor immediately underneath. It will need to be a fairly deep chassis because the blower alone needs 5in.

If tune and loading capacitors are put to the left and right of the valves the plate coil can be positioned centrally between them and the coil tapping switch spaced back from the panel for the passive grid amplifier or flat to the chassis for the tuned grid version. The latter can then be interlocked with the grid coil switch on the underside of the chassis and both controlled from the front panel by use of a bevel gear. The variable capacitors must be insulated from panel and chassis at the panel end and rotors earthed to chassis near to the valveholder. All valve cathode connections are taken directly to chassis.

Underneath the chassis the passive grid amplifier will house only necessary filters for the various supply inputs, heater transformer and the blower motor. The tuned grid amplifier will need switched coils for each band, controlled by a wafer on the same shaft as the plate coil switch, but under the chassis. Bandpass couplers could be used to minimise panel controls but they result in less drive and always some loss of attenuation of unwanted modulation/mixing products. (The grid tuning control can easily be calibrated and it is no real hardship to readjust each time one decides to operate a different segment of a band.)

**Supply Filters**

When using 4CX/250 or 4CX/350 valves it is well to have continuous indication of grid, screen and plate current (and voltage) and separate meters are preferable to a switched meter. Both grid and screen power supplies should be stabilised and the plate supply needs a healthy choke input filter. To put the whole lot into the PA box

will only mean an oversize PA, or overcrowding. It is therefore preferable to confine RF circuits to the PA proper and have power supplies and meters in a separate unit with the exception only of the heater transformer—see earlier.

This necessitates effective RF filtering of all supply inputs to the PA in order to minimise TVI. Quite effective filters can be built into old IF transformer cans using Cornell Dubilier Type 9 fixed capacitors of .005 μF, or greater, capacity and RF chokes each wound with eight or nine feet of 26g. enamelled wire on quarter or 5/8 in. formers. The method of assembly is shown in Fig. 5. One such filter is used in each supply lead and mounted on an internal screen separating the supply outlets from the interior of the amplifier. This type of filter has been

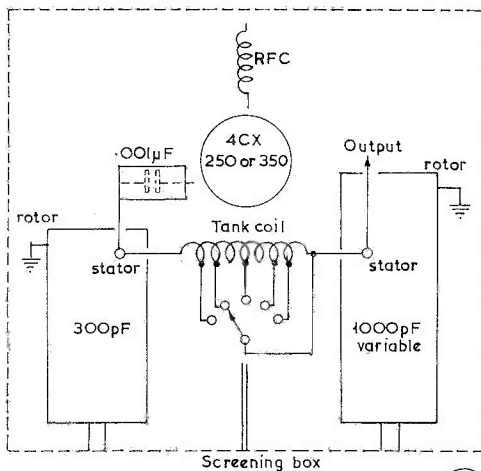


Fig. 4

Fig. 4. Layout of a Linear PA stage.

used in a multitude of equipments, has proved entirely satisfactory, and permits isolation of the power supply and meters from the RF units. Interconnecting leads and the power supplies themselves should of course be screened but "TVI tight" containers are not so critical as in the RF unit itself.

**Application to VHF**

Earlier it was suggested that this valve might be used in a universal VHF/HF amplifier. If this is considered at all seriously it is suggested that the reader should obtain and study a copy of *STC Application Report MS/123* dated September 1963, dealing with their 4X/150/250 series UHF Power Pentodes.

If the HF tuned circuits are grouped to the front of the chassis as in Fig. 4 there can be lots of room at the rear to accommodate 70 MHz and 144 MHz input and output circuits. At VHF the makers recommend that the plate connection should be made to the outer cooling ring rather than at the valve top cap. A switch will be required to make this connection to either the VHF or HF circuits (and it will need very short robust connections of minimum inductance!). No solution is offered—because no practical investigation has been carried out—but it has only to be three-way and should not be too much of a problem. It would also be necessary to switch the grid. As a safety precaution it would be advisable to interlock grid and plate switches and to add another wafer to break the screen supply, just to be sure that volts cannot be applied without plate voltage. Having little practical interest in frequencies above 30 MHz the writer has not proceeded further, but for the HF/VHF man wishing to economise in amplifiers, or space, a universal amplifier might be an attractive proposition, and the *Mullard 4CX/350* is just the valve for the job.

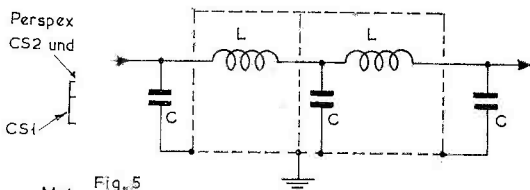
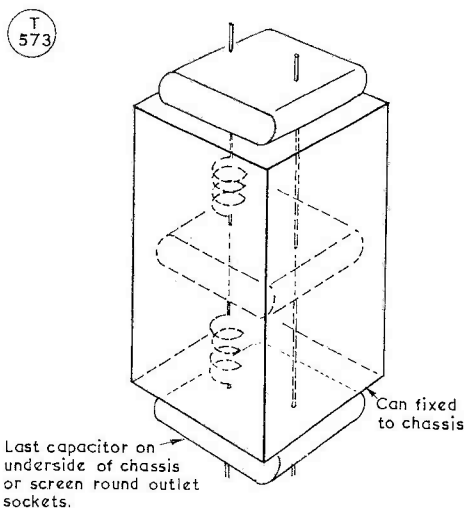


Fig. . Lc

Fig. 5. Circuitry of the supply filters. C should be at least .005  $\mu$ F, adequately rated for the voltage, and inductance L can be 8ft. of 26g. wound on a quarter-inch former.



General view of the Hall during the recent Amateur Radio Exhibition in London. This picture was taken mid-morning on the Saturday, August 22. It suggests rather a disappointing attendance, as well as "the wide open spaces between the stands."

## THE MOBILE SCENE

### END-OF-SEASON REPORTS— TOPCLIFFE RALLY TO COME

WE should before this have announced that on October 3, they are having an Open Day and Autumn Fair at R.A.F. Topcliffe—well known as a Bomber Command operational station during the last War—and now the home of the Air Electronic Operator Training School. Part of the ground display will be devoted to its activities. Additionally, there will be a flying display and flights in light aircraft (Wx permitting, of course). Talk-in stations will be operating on 80/160m. and two metres, signing G3ROF, GB3AF and G3POB, 10.0 a.m. to 5.0 p.m. Entrance is free, there will be ample covered accommodation and refreshments available on site.

R.A.F. Topcliffe is located between Thirsk and Ripon, in the North Riding of Yorkshire, and is easily reached off the A1, Great North Road; there will be adequate local signposting. So, remember Saturday, October 3, for what should be a very interesting event to round off the Mobile Rally season. For any further information, contact Flt.-Lt. W. McLardy, G3LYK, Officers Mess, Royal Air Force, Topcliffe, Thirsk, Yorkshire.

\* \* \*

The Torbay Amateur Radio Society report their Rally on August 16 as having been a great success, the registered attendance being 300 people in 102 cars, of which 33 were /M. The talk-in station G3NJA/A made a particularly interesting contact with an F0/M in the Brest area, and the exhibition station GB3TMR on the ground had nearly 70 QSO's on various bands with stations across the world. Part of the proceeds of the event will be used towards setting up an Amateur Radio station for the new Cheshire Home at Brixham.

\* \* \*

The count at Swindon & District Amateur Radio Club Mobile Rally at R.A.F. Wroughton on August 23 was about 800 people and 200 cars, of which 60 were fitted for Top Band mobile and 22 were /M on two metres—a rather higher proportion than usual, from which one can draw the obvious conclusion. There were eight prize-winners in various categories, among whom we notice G2CDN/M, an old-timer in the mobile context. A large raffle was also held—all in all, the Swindon group can be congratulated on arranging a very successful show, at a site much more convenient for Rally purposes than Lydiard Park, used for some years previously for this event.

\* \* \*

We are asked by the Maidstone YMCA Amateur Radio Society to announce that they have booked Sunday, May 30, 1971, at Maidstone, for their next Rally.



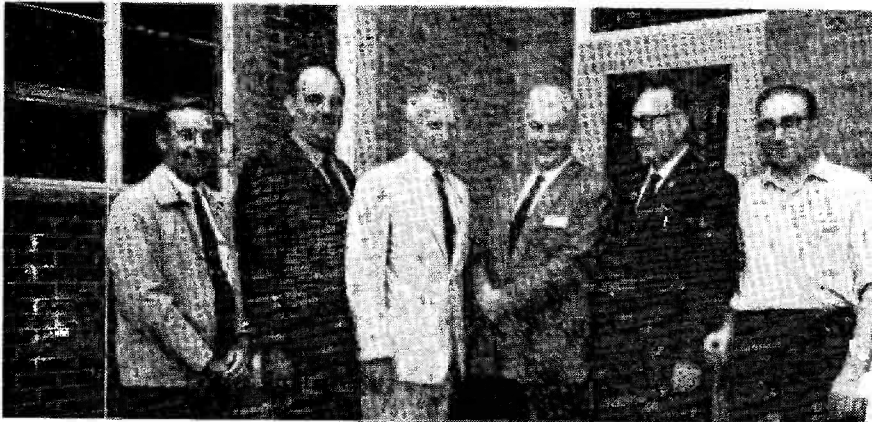
Scene during the big equipment sale at the Derby Mobile Rally on August 16. Can you find yourself here? The total attendance was estimated at about 1,500 people in 700 cars, maintaining the high reputation of the Derby Rally as one of the most important of the Season.



The 160-metre talk-in station for the Derby Rally signed G3ERD/A, the Club's own callsign, and when this picture was taken the operator was G3IFA.



Tom Darn, G3FGY, chairman of the Derby & District Amateur Radio Society and regular conductor of the sale-of-equipment at the annual Derby Mobile Rally.



Among those present at the Derby Mobile Rally on August 16 were, left to right: G2CVV (for many years secretary and organiser of this successful event), G8BAV, WINLB, G2BVN, G4JW and G3FGY (chairman of the Club).

### THE THIRTEENTH J-O-T-A

Further to the list appearing on p.423 of the September issue of *SHORT WAVE MAGAZINE*, of U.K. radio amateur stations participating in the Scout Jamboree-on-the-Air over the weekend October 17/18, herewith a further listing (overleaf).

J-O-T-A is not at all a contest in the accepted sense but, for the stations taking part, an any-band QSO Party, the object being simply to bring together Scout groups not only in the U.K. but throughout the world. Stations involved call "CQ Jamboree"—or otherwise make it clear that they are looking for J-O-T-A participants.

Immediately after the Party, we would be glad to have concise reports giving the following details: Call-sign of station; Scout group involved; bands used during

the event; total of J-O-T-A stations worked; best DX in the Jamboree context; comments of radio interest affecting J-O-T-A, e.g., conditions for DX on the band(s) tried, stations worked of particular Scout interest, etc.

Of course, good photographs of stations with their participating Scout group will also be welcomed (and will be paid for if they can be used).

To ensure the earliest possible publication of our review of the event (intended to appear in the December issue of *SHORT WAVE MAGAZINE*, due out on November 27) we need to have station reports and photographs by *not later than* November 4, addressed "J-O-T-A," *SHORT WAVE MAGAZINE*, BUCKINGHAM. In most cases, this will involve the photography being arranged in good time, and not left to the chance of somebody

having a camera handy!

**GB2BVS:** Organised by the East Lancs. Amateur Radio Club for the Bold Venture Scout Group, from Higher Bold Venture, Darwen, Lancs., running all bands 10-160m. and also two metres.

**GB2NEL:** For the North-East Lancashire Scouts, operating from Bowley, Great Harwood, on all bands 10-160m. and 2m., again provided by the East Lancs. Amateur Radio Club.

**G2SU/P:** Organised by the Northern Heights Amateur Radio Society for the local Keighley Scouts.

**GB3KMS:** Operated by the Kingston & Malden Scout Amateur Radio & Electronics Group from their QTH at New Malden, Surrey, working SSB on 10-15-20-28m. All operators of this station will be active Scouts.

**GB3NBS:** To operate on behalf of the 10th Nelson Scout Group, with activity on all bands 10-160m. AM/CW/SSB, and also AM/CW on two and four metres, under the direction of G3TRK.

**GM3POK/A:** For the 21st West Lothian Scout Group, South Queensferry, operating on 40-80m.

**GB3RSH:** Arranged by the Radio Society of Harrow for the 1st/3rd Ruislip Scout Group, at their Hq. in Ruislip. All bands 160m. to 70 cm. will be worked simultaneously, and an RTTY terminal is also to be set up.

**GB3SMR:** For the Scouts of South Bristol, at the Hq. of the St. Mary Redcliffe group, with G3RKH (QTHR) as organiser and manager.

**G3VUP:** For the 2nd Winterton Scout Troop, at 2 Queen Street, Winterton, Lincs., on 20m. and 80m.

**G3YDD/A:** Representing the 1st Holmer Scout Group, Hereford, arranged by the Hereford Amateur Radio Society for activity on all bands 2-160m.

**G3ZDC:** To represent the 1st Thorpe Lea Scouts, running SSB on all bands 10-80m., and on the air throughout the Jamboree period.

In addition, the following J-O-T-A stations—which we have no fuller details—will be on for the event: GM3BQA, *1st North Berwick*; GB3GP, *Gilwell Park*; GB3HBS, *1st Hale Barns*; GB3PTC, *Croydon Borough Scouts*; GB3WWS, *West Wirral District Scouts*.

With the list already printed in our September issue, this makes a total of 25 U.K. stations known to be planning an active part specifically in the Scout interest. Undoubtedly, there will be others and, though it is now too late for us to be able to print details, there is still time for any AT-station operator to get in touch with his local Scout group to arrange participation—even a morning working the locals on Top Band or two metres could be very interesting for Scouts who have never before visited an amateur station and know nothing about Amateur Radio.

## NOTE ON GRAFTON RADIO SOCIETY

FOR the second time since their formation in 1946, the Grafton Radio Society have transferred the location of their QTH—and shown considerable advantage for the change. For reasons beyond their control the move took longer than intended and this resulted in the 1969/70 season suffering some curtailment of normal activities. It also meant a lot of hard work for many of the thirty-odd members. However, by the time they closed for the summer recess it was possible to take stock of the situation and to record a year of considerable achievement.

As is generally well known the Grafton Club is essentially a development from an R.A.E. instructional class and during the past twenty-four years more than 300 students have passed the examination. The present instructor, Bob Smart, G3MMC, can justifiably be proud of his contribution to this total and with a new, larger and more comfortable lecture room available for his Monday evening classes he is looking forward to another successful season.

Grafton's new headquarters are on the top floor of a school almost opposite the famous Whittington Stone on Highgate Hill. Their antennae are poised 150ft. above ground level and on this elevated site they are in the clear over an even wider line of vision than that which induced the famed Dick to return to London. In this excellent location their antenna needs are served by a mast-top Mosley TA-33Jr. controlled by a CDR unit, this being surmounted by 4-metre and 2-metre arrays. For Top Band they have a rather unique antenna made for them by member G3ONS—this is a large coil with a Vee top-section mounted on a duralumin rod which is fixed on the roof in the clear and counterpoised against

earth. Their K.W. trap dipole (presented to Grafton by G3KDH) is mounted lengthways just below the school roof.

For the first time since their formation Grafton have the advantage of a permanent shack. Gone are the days when their KW-2000A, the home brew Top Band gear, the installations for two and four metres and the SWL receivers need be stored away after a Club session. Even the all-important tea brewing gear is readily available—and much appreciated by all members.

Despite the disruption created by their move, Grafton's past season included participation in an exhibition and two field day events. Their outdoor activities in Clissold Park proved a great success and contacts were made on all bands—with two metres showing a remarkable result using gear constructed and supplied for the event by G3ZKE. The Club's own field day was held during July on Hampstead Heath, in fair weather—making this the climax of an interesting and busy year.

Both the R.A.E. classes and the Grafton Radio Society re-opened in September. Class nights Mondays, Club nights Fridays. The address of the new QTH is:—Archway School Annexe, Highgate Hill, London N.19. Visitors are always welcome, whether they be new to the hobby or old-timers. Full details can be obtained from their Hon. Secretary: Tom Coleman, 14 Norman Court, Stapleton Hall Road, London, N4 4QD.

*Editorial Note:* We would be glad to see similar short articles with up-to-date news of active Clubs with a large membership and covering a wide range of radio amateur interests.



# COMMUNICATION and DX NEWS

*E. P. Essery, G3KFE*

PERHAPS the high spot for your scribe was the receipt of a letter to this piece which discussed the latest in the eternal series of awards. This one, apparently, is to be known as the "worked KFE on Top Band" award, because KFE is alleged to have become "rare DX." To which one can only reply in the old saying "*Bien perdu, bien connu.*" Or, maybe, "*Absence makes the heart grow fonder.*" Anyway, the real reason is simply that G3KFE got cheesed-off with calling DX in the middle of the afternoon and getting no replies.

However, having thus started the piece for this month in somewhat April-ish mood, engendered in the main by the members, one suspects, of the Finchley group, let us proceed to take a more serious view of events.

Conditions are, at the time of writing, beginning the expected upswing with *Fifteen* showing quite reasonable signs of activity on some evenings; *Twenty* similarly although with rather more noise; *Forty* pretty useless in the evening unless one is equipped with both a crystal filter and crystal-filter ears; *Eighty* showing signs of life in the mornings, and Top Band also better in the past few days. Static at the beginning of the period was at a pretty high level, but again this also is abating to a more autumnal state. Indeed, on 160m. already reports of W QSO's are beginning to appear from the early birds. So, by and large, a "progressive" sort of month comes under review by our various reporters.

## Report on MDT

First impressions of MDT ("Magazine Daylight Test") for Top Band on Sunday, September 13, 10.0 a.m. to 5.0 p.m., are that conditions were better than for the last one (on April 12) though—as often when daylight GDX is good on 160m.—QSB was very evident on the more distant signals. The noise-

level, which of course can be the limiting factor in working the weak stuff, was also variable, being low during the morning, high at mid-afternoon and quieter again in the hour or so before finishing time. (The rain in different parts of the country and the presence of HV power lines were, as always, factors affecting local noise-level.)

Activity was certainly much higher than on the previous occasion; most stations heard seemed interested in the Test, and were duly calling "CQ MDT" (though one *hombre* kept sending it as "CQ GMT"—never mind, he was making contacts just the same!).

We have already received some very useful and interesting reports, which at this juncture can only be summarised briefly here, e.g., G3SED (Portsmouth) worked around mid-day G3VRW (at 214 miles), G3PLP (119m.) and G3NXV (153m.); several others were raised at 120 miles or so.

From Horsham, Sx., G3TNO had

a very nice mid-morning double with GC3HFE (Guernsey) and GC3XZC (Jersey); other good contacts for him out of the 17 stations he worked were GW3WRE (Maesteg, Glam.) and GW3SRG (Swansea), at R5 all round.

A nicely-tabulated report from GW3GWX (Llandudno) records QSO's with GM3OXX (180m.), GM3HJB (150m.), GM3FSV (200m.) and GM3YOR (190m.)—he had others, but they were poor or incomplete. Some GW's in South Wales, at over 100 miles and right across the most mountainous of the Welsh terrain, were also being copied.

In contrast to all this, G3VIJ/A in Cockermonth, Cumberland, using SSB, found conditions poor, activity low and had difficulty in working to any great distance—his best was GW3GRY at 100 miles. Rather surprising, in view of the quite exceptional reports turned in by the CW fraternity, as we have already seen.

[over



DK1YK was licensed in 1968 and is active on all bands 10-80m., the antennae being a Hy-Gain 12-AVQ ground-plane and an inverted-Vee which can be energised over any of the bands used. A keen DX operator, he is already at 211/229 in the DXCG context.



Continuing on this theme, G3GMK (Southampton) had seven QSO's, all CW, at distances from 100 to 150 miles, his best being G4QD, and all signals were R5; his best DX heard was G3VRW in Burnley.

G3VZY (Haverhill, Sflk.), using CW/SSB, reports ten contacts, mainly in directions south of him, with G3IMX (I.o.W.) and G3VXM (Portsmouth), both on SSB, as probably the best. From Swanage, Dorset, G3YXW had eight "ranking" QSO's, including G3SVK (London) and GC3XZC.

Another concise and well set-out log came from G3XDY (Cleethorpes, Lincs.) who had no less than 16 CW contacts, most of them at well over the 100-miles mark. His best was GM3OXX (Edinburgh, 220m.), this being in the afternoon, with reports at 559/579.

(For the information of anyone who may be glancing casually through these notes, we are talking about CW working on the 160-metre band under conditions of broad daylight.)

To continue: GM3YOR (Kirkcaldy, Fife) worked six G's south of the Border, also GW3GWX, with signals almost consistently R5 both ways. He also heard the following G's on CW: G3IV, 3XDY, 3YFJ, 4OD and GW3UMB.

From the most southerly station in the British Isles—GC3XZC, Jersey, C.I.—we have a comprehensive report showing no less than 19 stations worked on CW between 10 a.m. and 4.0 p.m., consistently with R5 signals both ways, and all (from where he sits) at over 100 miles. His best DX was GW3SRG (Swansea, 190m.). The "heard" list from GC3XZC includes G3HZL, G3PWY, G3SVK, G3VZY, GW's 3UPL, 3VPL and 3ZEY, also (for some real DX) a couple of PAØ's, these being virtually over a land-wise path.

G2DC (Ringwood, Hants.) was also on for MDT and though plagued by a high noise-level and severe local AM-phone QRM, yet managed 11 contacts between 1047 and 1520, mostly at good distances. His best *could* have been G3YUV/P in Co. Durham, heard at 449, but he got away.

G13WSS (Holywood, Co. Down) was there and lists five ranking QSO's, his best being GM3FSV,

559/449. Another interesting CW contact, though at just under the 100 miles, was EI9J.

At our own listening monitor in N. Bucks. (where the noise-level was mercifully low in the morning but very high by mid-afternoon), the best QSO heard was undoubtedly GM3KLA/G3SVK at 11.55 a.m.

Altogether, a highly successful and most interesting MDT, well supported, with some very good daylight DX worked—of course, 95% of it on CW!

No doubt there will be some further reports to discuss next time but that's the gist of it for now—and our very sincere thanks to all who took the trouble (and it must have been a bother in many cases) to get a report into the post so promptly. Such co-operation is

greatly appreciated. (A.J.D.)

### Ten Metres

Obviously, the laws of propagation being what they are, it is to the highest bands that one must look for the resurgence in activity which indicates the coming of autumn; and during the week prior to writing, the signs became evident.

G3NOF (Yeovil) noticed it; first a few weak Africans, and then just before he wrote the beginnings of the openings to the U.S. which presage the coming improvement. Don made contact with CR7FR, EL2AW, PZ5RZ, TJ1AW, W3, W4, W5, ZE3JO, ZS's (including ZS3HT), 3B8CV, 5H3MM and 9J2PV.

From W6AM (Long Beach) comes a long list of stations worked, one of which was raised on Ten,

### SIX-BAND DX TABLE

(All-Time Post War)

Station	Countries	28 MHz	21 MHz	14 MHz	7 MHz	3.5 MHz	1.8 MHz
G3IGW	211	128	153	168	131	105	47
G3WPO	105	36	24	66	49	31	24
G2DC	338	179	310	329	169	116	20
G3VLX	51	7	12	20	7	27	19
G3VPS	144	49	48	122	60	38	14
G4RS	194	82	114	124	55	41	13
G3PQF	162	105	47	100	84	65	13
G3XAP	104	44	46	47	65	30	13
G3IDG	130	76	96	55	27	18	12
G3KMA	258	198	190	189	131	55	11
G3DO	339	212	249	332	90	83	9
G3YDX	131	69	77	47	54	39	9
G3LZQ	265	140	156	215	72	38	8
9H1BL	189	115	125	140	66	54	8
G3RJB	176	76	59	163	60	37	8
G3XBY	167	110	126	107	74	57	8
W6AM	349	148	159	349	143	118	7
G3DCS	96	1	66	41	5	8	5
G3NOF	319	198	224	308	38	60	4
G3WTV	196	125	124	157	70	74	—

Note: Placings this month are based on the "1.8 MHz" Column. Claims must be made at least every three months to retain a place.

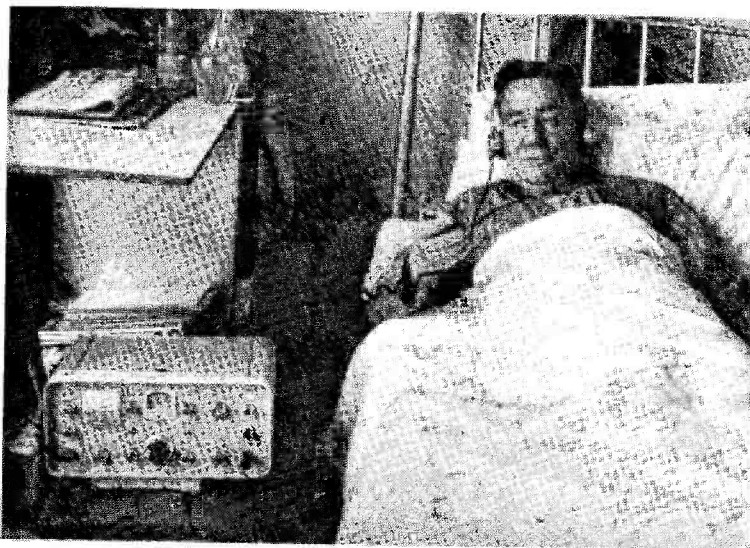
GC2YS/A—short-haul to us, but good DX to the Californian lads.

MP4BIR (Bahrein) sent in a list covering the last six days of August, dealing almost entirely with 14 and 21 MHz, as he found Ten dead. However, Josh does say that MP4BFO managed a few QSO's on the band—the point here being that for the MP4's 10 metres is well and truly useless out of season. As a matter of interest, MP4BIR was licensed on June 24, and to the time of writing, August 31, he had been on the air on 24 days since. This activity yielded a total of 550 contacts, (540 cards sent off), 83 countries worked, and four confirmed, but little hope of making the DXCC figure before he goes QRT on Christmas Day. Only three times was Josh startled by finding himself on the sharp-end of a pile-up—one of 32 and two of a dozen; on all the other days the band just died under the pile before it had time to develop. Josh says he is a slow operator, because he is too soft with the rig-describers!

G3ZCC (Chingford) has blossomed forth with a K.W. Vespa, and has been trying it out on all bands; on *Ten*, it raised a crop of W's and 9J2DT, but that will no doubt be remedied ere long. Mick uses an inverted-Vee of 145-foot leg length, the centre raised to 45 feet, on all six bands.

It is mainly a matter of lack of activity as regards *Ten*, in the view of G2DC (Ringwood)—who should know, he having been studying the vagaries of our bands for many years and from many places. Jack, as most of us will remember, is a CW buff, and he used this mode to raise CR7IZ, 4N2LO, 4X4MR, UL7BG and UK8JAA on 28 MHz.

As for your poor old conductor, all he has managed to do is check the bands in the evening times, with nothing to show for his pains except a close understanding of the noise of a lively receiver on a very dead band. The one evening he decided it was not worth the trouble, it opened up



Dennis Scourfield, GW3SVY, whose home QTH is Llwynyclyn, Bancyfelin, Carmarthen, on the air from Glangwili Hospital, Carmarthen. The KW-2000 transceiver makes a nice compact bedside job for working anything that comes along.

in fine style, as he was soon told next morning!

#### Fifteen

Nice work, if you can get it, the song says, and it applies with some force to 21 MHz for most amateurs in London and the Home Counties. Even this high in frequency the noise-level has been distressing, so much so, indeed, that on one occasion G3KFE was minded to look around for a local source until he had proven it to be from out of the ether. Despite the QRN there have been few evenings on which a quick flip round the dial failed to show at least a few stations at fair to good strength from other continents.

At MP4BIR, all-SSB contacts were made with LU3JAV, 9J2PV, ZS6UP, CR7AQ, CR7BA, CR7CG, EA9AI, EA8GZ, 9M2VI, ZP5CE, EL2BZ, 9Q5YL, ZS1HR, ZS5JT, CR6EF and PY2BOR, most of the QSO's giving reports of RS-58 or better.

Still outside U.K., W6AM across on the West Coast mentions con-

tacts with GW3DZJ, WB6NWW /4X4, 4N2LO, HSIKAK, GC2YS/A and CT1AW, his operating being split between SSB and CW.

Coming a bit nearer home, G3IDG (Basingstoke) makes a welcome re-appearance, with revised scores to enter the Tables, and some comments on this-and-that. As a CW merchant all the way—he pulled the modulator valves out of their sockets and ditched them years ago!—Allan has been looking back through the period since last he surfaced, and finds his interest in the W-Novice band has borne fruit to the extent that he has logged contacts with 507 different ones on Fifteen. So what, you may ask? Well now, the U.S. Novice is on a par with us in terms of power; he is usually very much feeling his way on a very crowded band; and the chances are good that the first time he raises a U.K. station is also the first time he has worked out of his own continent—which is another way of saying that he was bitten by the bug for a life-time by his QSO with G3IDG or, for that matter, anyone from this part of the world who makes time to QRS down to their level. A worthy effort indeed.

Almost all his activity has been on Fifteen SSB, says G3ZAY (Petts Wood), which means he has either kept odd hours or mastered the

## Reporting the HF Bands

dreaded Tee-Vee-Eye. Part of the enthusiasm can no doubt be put down to the erection of a two-element Quad as the main skywire. Contacts of note included ZD8RR, ZD3D, VE8RA, VE7's, VSSRG, YA1GNT, TU2CW, CX2CN, 3B8CZ, FR7AB, FP8CT, KFØNEB/O—yes, another new prefix!—KS6DH, KR6JU, KC4AAD, KC6JC, ZM2GL, AX9KS (AX6CT who hails from Potts Wood, which must have given both of them a thrill) and VR2SA. Just to prove his key was still workable, Martin pumped it for FL8AB.

It is not often that one hears of work generating enthusiasm for DX-hunting, but this is what has happened to G3DCS (Ipswich), who has been testing aerials for the amateur bands. In the course of this work, Enver noticed, he had managed a better countries tally than the lowest on the table. So in comes his entry for the six-bander, all worked since April 19, on a Joystick, with an FTDX-500 on the HF bands or a home-built SSB rig

on 160m. Fifteen came up with CW to 9V1PA, H3ØXJF, HEØAMY, VR3CVZ, EA6AU, PY's, LU2DAW, JW5NM, FM7WF, HS1ACW, TG9RJ, TU2BW, CE2RF, VU2OLK, 7Q7AA, EA8BK, CN8DW, JA's, VS6AF, PJ7VL, CR6FA, FØVB/FC, 9J2MC, 6W8GE, PJ2VD, HC6CL, 9Y4VU, ZS4AK, UO5AW and ZD8JK. SSB gave VU2OLK, ZB2A, ZC4IK, C31CY, CT1IW and M1D.

Our chief DX-ponent on *Fifteen*, GM3JDR (Wick), just missed the deadline last time round. It seems the bands have been none too good at the times Don was able to get at them, with JA's, W6, W7, and ZM3CD. However, this thin list will be improved upon in the near future as we understand the GM3JDR set-up is being modified to take into account the new baby—a three-section mast which will put the aerial up to 66ft. and should do a power of good to the signal on all bands.

Another correspondent who found 15 metres none too good (when he was able to listen) was G3NOF; openings to JA and the Pacific were noted in the mornings, but signals were not very strong. VK's have been less in evidence this year than they were at the same time a year ago. Among the heard-but-not-worked lot were AX9KS, FL8AB, FR7AB, KH6FGA, KW6EG, KX6DQ and 9N1MM. Contacts were made with AX9DM, JA's, UO5BZ and YBØAAO.

"Erratic" is the description of *Fifteen* by G2DC, who found some times when the band was dead, but spent the main part of his operating hours there nonetheless. His patience was rewarded with AX2EO, AX4ZB (both around 2100z), CN8DW, CR5AI, CR6EI, FM7WF, HI7JM, HC2GG, JW5NM, KR6TK, LU8MAH, OA4KF, PJ2PS, PJ2VD, PY1ADA, PY2CDR, PY4PQ, PY5BAZ, PY7ACR, TA3OZ (this time with a beautiful T9x note!), TJ1AW, TR8CQ, UAØJA, VU2USA, CS6AF, VS9MZ, YB3DC, YV5BPG, XW8CZ, ZS5FC, ZS6JK, 4S7EA, 7Z3AB, 9E3USA, all JA and W call areas, VE1-4, VE7 and VE8.

### Comments

From G2HKU (Sheppey) comes a plea for more details on the station

equipment used by our correspondents. He feels it would interest a lot of people, as, indeed, it does Ted. To start with himself, G2HKU runs a much-modified early KW-2000, usually barefoot but occasionally with a home-built linear which contains four TT21 valves. Up in the sky is a "5RV," used on all bands, plus at times a 14-AVQ which does better than the 5RV in certain directions.

For the moment G3PQF (Farnborough) is silent on the HF bands, while he waits for the contest season to start.

An interesting note from GM3ANO (Brora, Sutherland) indicates that he is coming as a reinforcement to the locals—after 16 years off the air, it will be interesting to see how Ian reacts to the inevitable changes that have occurred since he gave up radio so long ago.

One comes in, and one drops out; G3WSF sadly reports that he is moving from his New Milton address, and will have to live in a hotel for some considerable time, so the gear is being put into packing-cases for the moment.

That note a couple of months ago about "GM3WUD/P" raised the real G3WUD, who mentions that this is the *second* time he has been in correspondence with this column over piracy! To set the record straight, anyone who worked a "GM3WUD/P" during the summer was on to a pirate. Bob himself, who, incidentally was for long a correspondent to our "SWL" feature, regrets that the only cure for this piracy seems to be an excess of operation on all bands—which means, as at present he only works Eighty, first doing something about some gear!

Talking of piracy, G3SVK and your scribe between them were able to unmask instantly an alleged "VP8TI" worked on Top Band. The simple way out was to check with the chap who knows all about the VP8 set-up—G3NMH told us straight away there was no such a licensed call. Another DX-pedition by G3SVK is on the stocks, again North of the Border, and this time with G3XTJ side-kicking. They will operate to this itinerary: October 10, *Stirling*; October 11, *Aberdeen*; October 12-15 inclusive, *Shetland*; October 16, *Clackmannanshire*; Octo-

### TOP BAND COUNTRIES LADDER

Station	Confirmed	Worked
<i>Phone and CW</i>		
G2NJ	98	98
G2HKU	98	98
G13WSS	96	97
G3WPO	95	98
G3VLX	95	98
G3XTJ	92	97
G3XDY	88	96
G8HX	86	89
G3YMH	64	91
G3KFE	58	78
G3LXD	44	78
<i>Phone only</i>		
G2NJ	98	98
G3PQF	95	98
G3WPO	91	98
G3VGB	91	97
G3XTJ	78	92
G3XDY	69	89
G13WSS	60	70

(Failure to report for three months entails deletion from the Table. Claims may be made at any time. Six months of "Nil" reports will also result in deletion.)

ber 17, *Roxburgh*. All bands will be used, CW/SSB, and rare WAB areas, particularly in Shetland, activated. The Top Band operating routine will be rather as usual, with CW from 1800 to 2030z; 2030 to 2300z for SSB; and then possibly another spell on the key to pick up the stragglers. G3SVK reports that his QSL arrangements will be that all cards not received within four weeks will be sent *via* the Bureau; but the cards sent direct with s.a.e. will be dealt with first. Turning to his last monster trip a few months ago, all cards have now been despatched *via* bureaux.

G3SVK adds that he still has some cards left over from the printing of his GW batch, when he operated from that place in Wales with the unpronounceable and enormously long name, which is usually shortened to Llanfair P.G. For the benefit of those seeking education in Welsh who worked him from that spot, Fred had special cards run off, which can be obtained by those who worked him there on receipt of an s.a.e. at least twelve inches long and three inches wide. *Blimey!*

All these chaps who spend their spare time building bigger and better output stages instead of bigger and better aerial/earth systems would be well advised to listen to the efforts of G3LHR (London, S.E.14) who has a 50ft. aerial out on Top Band, and *eleven milliwatts* to the PA. With this enormous power, he put out a couple of calls and raised G3ZCC in Chingford, and G3VRW up in Burnley. No question of setting up the QSO on the big rig, or anything like that—just a savvy operator using his gear to the best advantage.

### Twenty

As always, it has had its moments, and also, because of the season and the weather conditions, its setbacks. On one or two evenings when G3KFE bent his ear in this direction he was rewarded with a few S9-plus 11's just breaking through the S9 noise level. On other occasions, it was so beautifully quiet—and dead. Yet others resulted in sessions the like of which make all the others worth while, when your conductor was so fascinated by what unfolded as the tuning was swung that it seemed a shame to miss out by



John Hind, G3XKN, at 100 Green Lane, Leeds 16, runs a home-built all-band Tx and a much-modified HRO as receiver. He is also mobile on Top Band. The fixed-station aerial is 132ft. ended. John has worked 80 counties on Top Band and is an active DX-chaser on 80m. At the other end of the scale, he is also interested in 2m./4m. VHF.

calling someone!

Anyone looking for a QSO with St. Kitts should listen out for VP2KX (Basseterre) who used to be in the U.K. as G3XUT, and wishes to let all his friends with G calls know that he will shortly be open for business on the bands. There is, he says, quite a strong amateur fraternity in St. Kitts, though fully half of them are only mildly active or completely out of action. VP2KX's address, for the record, is: R. L. Edmead, VP2KX, 39 Cayon Street, Basseterre, St. Kitts.

Only a few forays on Twenty were made by G2HKU, late in the evenings or early in the mornings, which raised PY1BOR, PY1IK, VP9AT, the latter at 0100z, all SSB of course.

MP4BIR made good use of his time on Twenty. PY7AZQ, PY3BXW, PY4AP, CE3RR, TA1HY (with poor modulation reducing him to RS 35), YV5BXG, KP4FS, CN8DW, TI2FCD, 9V1NR, PZ1AH, a string of YV's, immediately followed by ZB2A, then FG7TD, YS10, 9Y4VU, AX4JN, AX4KS, HP1CJ, 4S7PB, TG9ER, 7X2AL, TA3HC and, for a change on a dead band, MP4TCJ, who is also occasionally around as

MP4BIK or MP4DAS. The last one to be noted was EP2HL, again worked on an otherwise dead band. Of G's there were very few, and none worked more than once.

Now to W6AM, who keeps an eye on things on all bands; Don winkled out 9Q5QR, 4N2KO, AC0GR, and again GC2YS/A, all with 59 reports.

G3ZAY, as already remarked, spent most of his time on 21 MHz. However, one afternoon was spent in the chase on this band; rewarded by contacts with KL7MF, KL7FBK, AX's and KC6CP, who ran a 59+ signal at 5.0 p.m. The chief gotaway was AX0LD on Macquarie Is. who said he may soon be QRT as his PA valves are beginning to fail and he won't get spares until the supply ship arrives in December.

G3ZCC offers for consideration the gleanings of a short spell on Twenty as EU's, HB0XJK, ZB2BT, C31CY, WA8EZ, W1IDA, K4WCC, all SSB, plus SL3AG and VE3EWY on the pumphandle.

The key was also wielded to some effect by G3DCS who seems not to have used phone at all on Twenty. Enver has entries in his log for CW with 9H1BL, PJ9JT, 4U1ITA,

UF6BD, PY2BBO, VP9GD, UR2OL, LU1FCU, VP8LR, LX1PA, KV4AA, TF2WMB, UL7NG, PY5AVU, AX4TY and LU9WA.

Sadly, G3NOF remarks that he has not been on at 0500 when the action was starting—*Brrr!*—but found things nicely on the boil when he looked in a little later, with VK's to be found as late as 0930 on some mornings, but no Pacific stations at all heard. In the evenings there have been early openings to S.E. Asia and Southern Africa; later the North and South Americas were very strong albeit often plastered with first-hop and short-skip. Contacts were made with G31CY, CT3AS, DU3ZAE, ET3DS, F6AGM/FC, HS3ACV, IT1SEZ/IU (Utica Is.), MP4TCJ, PY0AD, VP8HZ, VS5RG, XE1SO, ZD7SD, ZE1DP, 3B8CR, 4N2KP, 4N2LO, 5Z4JP, 7Z3AB and 9K2AV.

Conditions picked up to VK/ZL in the opinion of G2DC, but not much in other directions. CW was used to raise AP5HQ, CX1JM, HP1BR, PJ2PS, TJ1AW, UA0AF, UL7BG, UL7YP, UI8OL, UG6OM, UF6AM, UF6DD, UF6DT, UF6LA, VP9GD, 4S7DA, all W call areas, VE1-7, VK2-7 and ZL1-4.

#### Forty and Eighty

Having at last decided that something had to be done about keeping up with the CW, your conductor proceeded to inflict his "Martian Morse" on the QRM on Forty, an exercise which resulted in the expected crop of EU contacts, plus

one with G3TNO (Horsham) and also G3TLX (Edgware) who for long was a regular correspondent to this piece. A getaway on SSB one lunch-time was GM3JDR.

For that same GM3JDR, from his new place up in Wick, this month has been all SSB, raising UW9WR, VR5RG, 5Z4KL, ZS1MH, CT2AK, 3V8AB, ZB2A, CN8HD, EL0AK/MM in the Indian Ocean, and 4U1ITU. Turning to his efforts on Forty, we find it mainly CW, with, among the EU's, W6WX, VS5RG, VK3MR, 6Y5GB, AX2EO, 4N2SO, 3A0FH, HB0XJD, PY0AD, CT3AW, CR4ES, Z4DX, W1, W2 and W8. On the SSB side of the balance-sheet there are entries against OY7JD, CN8DW, HS5ABD, 5Z4MD, CR7GJ, ZS1MH, ZS5XA, 5Z4KL, PY1CAD, OY9LV, CR6LV, LU, PY and CR7FM.

Another one to get the 7 MHz feeling is G3XAP (Stowmarket) who is at the moment seriously considering ways and means of directing his power in the right directions by way of phased arrays, in view of the great success which he has been achieving on Forty. Furthermore Phil is going further and looking at the prospects of using only CW on the band, and of eschewing operation elsewhere. However, sad to say this is the heavy season for him in his professional sphere, which has rather cut his efforts to increase his scores.

Looking at the bands from where G2DC sits, Eighty is just waking up, while Forty shows quite definite signs of improvement, albeit with as much QRM as ever. On the former, quite a bit of mixed DX is to be had from 0200 to 0400, and 0600 to 0630z. For instance, LU3ECO, PJ2VD, PY2FCJ, UL7JE, UW9WL, ZM3GQ, ZL4IE, W1-5, and W8-0. Forty came up with JA2KG, JX2HR, LU8MAH, PJ2PS, PY1AWP, PY4BQO, PY7AZQ, UA9's by the bucketful, UA0BA, UL7BG, UL7JG, YV5BPG, VK3MR, AX3CT, AX3FC, ZL2IR and all W call areas.

The odd session of SSB around 2359z gave some interest to G2HKU, who raised PY7AJU, PY7BBD, UW9AF and YV4OY, all at the midnight period.

W6AM finds Eighty to be about the only band on which his rhombic farm does not scare up 599 reports, but Don is no sludge on the weak ones either. Eighty gave him signals

from K8IUA/KL7, VS6DO, CE0AE, CO2AY and PY2BJH, while Forty was a little more forthcoming, by way of KG6JMC, AC0A/GR, VQ9A/A, KS6DH and CE0AE.

For G3ZCC it seems to have been a collection of assorted Europeans on Eighty, the mixture as before on Forty, with the addition on the latter band of an SSB contact with 3V8AH.

It will be obvious, from the size of the bag already mentioned that G3DCS spent most of his time on the HF's, but Forty and Eighty were not completely overlooked. Eighty gave 9H1BL, while Forty copied, as well as adding WB2CKS and K4PQL.

#### Matters Maritime Mobile

Nice to hear again from G3RJS/MM, now back in Stourbridge on a long leave after his spell of duty on S.S. *Oronsay*. Paul was interested in the bit on /MA operation, and adds a rider to the effect that it is surprising how easy it is for G/MM's to get permission to operate /MA in some foreign ports. The VK authorities gave permission for this, effective in any Australian port. After VK3OW had done the donkey-work, G3RJS received immediate verbal permission, with the covering paper-work following on later, the only charge made being about three bob for a copy of the VK amateur licence conditions. In South Africa it was even easier—Paul approached the local marine radio inspector, who instantly gave him verbal permission covering any South African port, again with a confirming letter. G3RJS says that the only thing one needs to be certain about is not to give offence by operating in any way contrary to the local amateur regulations. On a different slant, if you come across G3RJS in the next few months it will probably be /M, as he has some months of leave to go yet. However, he will be applying again for the /MM ticket just as soon as he knows his next ship.

G2NJ (Peterborough) has been continuing his collection of /MM calls, and this month offers LA6JJ/MM, working phone in the English Channel from a tanker, heard on Eighty, also LA7KL/MM west of Majorca and LA2UJ/MM, heard within fifty minutes, both being on

#### "FIRST-YEAR-OF-OPERATION" LADDER

##### Top Band Only

Phone/CW Place of Honour: G3YMH, 89/16

Call sign	Date Licensed	Counties	-Countries
G3YPM	25/8/69	81	15
G3YXM	14/11/69	86	14
G3YPT	20/8/69	70	14
G3ZDY	21/2/70	81	11
G3ZCC	12/3/70	60	9
GM3ZDH	24/3/70	36	5

CW Only Place of Honour: GM3YOR, 80/10

G3ZES	3/3/70	65	14
G3YPT	20/8/69	64	14
G3YXM	14/11/69	15	8
G3ZCC	12/3/70	31	7
GM3ZDH	24/3/70	28	5

A first entry to this Table must contain a statement of the date of first licensing or of commencing operations.

Twenty CW.

MP4BIR is probably in as good a position as any to collect /MM calls—he being near a tanker terminal—and this time offers VK2WX/MM and W4CQC/MM, who was on the way to Bombay before going on to Kuwait in the tanker *Thalia*.

### Top Band Again

First let G3YMH (Staines) have a run. Ron has been absent from this piece for a couple of months, but now finds 160m. returning to a workable condition. During the summer static, two stations who never seemed to have difficulty beating the QRM and QRN were OL4AMP and OK1ATP. PAØSS was a booming signal with his 5 watts one evening, HB9IN, 4U1ITU (for Country No. 17), and OE6HZG/6 to remind us that the OE's *do* use their slice occasionally! On the

more domestic note came EI4AN, GB2GW, GM3FPG (Arran).

Another one to return to the fold after a summer absence is G3XDY (Cleethorpes) who mentions receipt of cards from 9H1BL and VO1HN to help along his Top Band confirmed score, and QSO's with OK/OL, OH1SJ, PAØPN, PAØSE, DJØMR, DK1KH and HB9IN. However, John may be missing from these pages, in the future owing to a new job away from home, although a small SSB rig is on the stocks and, if successful, will be used, probably from Oxfordshire. The county score looks like sticking at 96 for a while, as Alderney has been done fairly recently, and Armagh is just missing and has never been heard. Never mind—keep trying!

From G3ZES (Barking) comes a first entry for the Ladder, indicating very clearly a CW-minded operator who has been piling up counties

and countries at a rate of knots since his first day—the ticket came through the letter-box on March 3, 1970.

At G3ZCC (Chingford) the event of the month has been the adding of a K.W. Vespa to the shack. Mick found the only 160m. contacts of interest to be OK1XC and GD3TNS. A call from W2IU he dismissed as from a pirate—which must make G3ZCC about the first Top Band operator in recorded history to turn his nose up at a Transatlantic QSO!

### Sign-Off

There it is for another month, albeit somewhat compressed to get it all into the space. Deadline for next time is **October 12**, addressed "CDXN," SHORT WAVE MAGAZINE, BUCKINGHAM. Till then all the best—and make a note that the deadline for the December issue is November 9. 73 de G3KFE.

### IMPORTANT JUBILEE CELEBRATION

As part of their golden jubilee celebrations Mullard, Ltd.—one of the world's oldest and best-known firms in the field of radio engineering and electronics in the modern context—will be staging a three-week public exhibition at their Electronics Centre, Mullard House, Torrington Place, London, WC1E-7HD. It is believed to be the first such showing of its kind ever mounted. The exhibition will trace the history of electronics—linked with the Company's own history as pioneers in the field—over the past 50 years.

Admission will be free, and dates are October 5-24, 10.0 a.m. till 6.0 p.m. daily (except Sundays). One of the main attractions inside will be an amateur-band transmitter built and operated by licensed members of the firm. Some of the early Mullard valves are to be used in its construction—which should be interesting!

### ABOUT SMALL ADVERTISEMENTS

During the last five years or so we have printed something like 5,500 paid Readers' Small Advertisements, through which an enormous quantity of equipment of every sort and description, worth many £1000's, has changed hands. This has established the second-hand value of a very wide range of apparatus of radio amateur interest—and it is an interesting fact that certain items have actually become more attractive, price-wise, while others have held their value in spite of the passing of time. (We would not here attempt to discriminate but observant scrutineers of our Readers' Small Adv. columns could put a finger on some of them!)

The cost of a Reader's Small Adv. is basically 5s., which allows 20 words including address. (This is a

minimum charge; if yours only comes to 12 words, it is still 5s.) Any notice of more than 20 words is charged at 3d. a word, with an additional 25% for bold-face print. For instance, a 32-word insertion is 8s. If it is to be in bold, add 25%, making it 10s. And if you want it to appear anonymously under a Box No., add another 1s. 6d., for a total of 11s. 6d.

### "MCC—MAGAZINE CLUB CONTEST"

The annual Club Contest on Top Band—this year's will be the 25th in the series, no less—takes place over the weekend November 7/8. Rules and full details appear in the "Month with The Clubs" section in this issue. It will be seen that in addition to working one another to score, Clubs can also gain a point from contacts with individual (non-entrant) stations—which will be known by the fact that they will have no identification code. If you are interested in fast CW operating under really hot competitive conditions, be on during the Contest periods and see how many Club stations you can raise. We would be very glad to have check logs from any 160m. operators who care to take part.

### THE AUDIO FAIR

This is an annual exhibition of great interest to the audio and hi-fi enthusiast and takes place this year in the National Hall, Olympia, London, during October 20-24, 10 a.m. to 9.0 p.m. daily. Many well-known firms will be showing the latest equipment and ideas in the field of Sound and Music—its recording, reproduction and presentation. This year's Audio Fair is also to have an international flavour, with exhibitors from overseas.



# VHF BANDS

A. H. DORMER, G3DAH

**P**ROPAGATION conditions on all the VHF bands have oscillated generally about a mean lying between average and good, although they were pretty marginal for the Four-Metre contest of August 15-16—see p.424 last time out. Best DX direction has appeared to be East/West, with a little bit of South, since good-strength contacts were made easily with ON, PA and F on several days during the latter part of August. One bonus was the appearance of GI3GXP on two metres in the South on the night of August 17. No other EI or GI stations were coming through at the time, and a search in the general N.W. direction did not produce contacts. The German beacon, DLØPR, up on the Danish border, was audible at good strength over August 24-25, although no particularly high level of G/DL working was observed. GC5AOM in Guernsey was a very good signal at this time and although he was working into the U.K. he was more interested (somewhat naturally, since he was there on holiday from Germany) in trying for the DJ/DL's. From then until the end of the month, the nearer Continentals were good signals well up into the Midlands. The weekend saw excellent DX with OZ and DL on the SSB channel, and reports are that OK was worked from the East Coast. LX1SI was 59 on Two in Kent on the morning

of Monday, August 31, and was also worked by several stations on 70 cm, though at slightly reduced strength. A juicy morsel! By mid-afternoon on the 31st, the 70 cm. path to Holland was well and truly open, with PAØHVA and PAØSHT particularly strong.

Reasonable conditions prevailed on all bands right up to the weekend of VHF/NFD. "Reasonable" is used here advisedly, since, although the DX was there, the paths were generally pretty unstable, and even signals over 50 miles or so were subject to heavy QSB in most instances, making the completion of a long-haul QSO a bit of a business.

## IARU Region I Contest

Fates were kind to the intrepid portable station operators over the weekend of the major contest of the year, September 5-6. Fine weather conditions were reported over most of the country, with warm, sunny days, pleasant nights and a welcome absence of the high winds which have played so much havoc with field days in the past. A quick skirmish about the bands in the afternoon augured well for the evening activity, with things looking particularly promising to the West, and indeed the first contact which your conductor had on Two was with GW8DXO/P near Brecon at RS59. One has the impression that East/West was probably the best axis throughout the Contest, in spite of the appearance of a couple of GM stations on the Saturday night, the signal from GM3OXD/P being particularly good. Mention should also be made here of the minor auroral manifestation on Four on the early afternoon of the first day, but this was very localised and by no means extensive or particularly active.

*Four Metres:* Activity was high on this band with good, all-round DX available for most of the time. If there was any activity in EI and GI, it was not intense and, in the South at any rate, GM was also absent. The Welsh portables, as might be expected, were cracking good signals all the time, and were putting up some fairly hefty scores quite early on in the proceedings. Operating practices were good, some very nifty CW being heard at the bottom end, and no blatant cases

of bad modulation or manners.

*Two Metres:* Here also, activity was high and propagation good, permitting contacts with LX, HB9 and DJ as well as with the nearer Continentals. GD3VXK/P was past the 100 mark by a couple of hours or so after midnight, and by midday, the GW portables were making a fine haul—GW3MAR/P near Welshpool, for example, passed 59180 to your scribe at 1100z on Sunday. Final scores are not known in every case, and in any event, the ultimate placings must depend upon distance covered, but towards finishing time the following were noted as being well up with the leaders:—G8DDC/P, G8CVD/P, GW3ITZ/P, G3NNG/P. GW6OI/P, GW3NUE/P, G3VER/P, G8BPS/P, G3RHE/P and G3EBR/P, the latter two from the far North of England, and likely to have some useful distance scores. There were a few bad cases of out-of-band operation, notably at the HF end, and some really shocking over-modulation from a couple of the portables, but by and large, it is gratifying to be able to report a steady and substantial improvement in operating over the last couple of years or so.

*70 Cm.:* Of the three VHF bands, it seemed that 70 cm. came off the worst from the point of view of both propagation and activity. Few long-distance contacts were heard, and at one time it seemed as if the major use to which the band was being put was to arrange details of mutual operations on 23 cm. (and there is nothing wrong with that, one hastens to add). The results at GW3ITZ/P, the RAF Club from Sealand, who were operating from near Wrexham, are probably typical of the situation generally. Towards the end of the contest their scores were: on *Four*—121; on *Two*—164; and on *70 Cm.*—40. From the personal observation of your scribe, who was active on all those bands at one time or another, that just about describes the situation in terms of results and activity.

So, a satisfactory event must be the assessment at this stage, and it now only remains for those sturdy souls on the Contest Committee to gird up their loins, polish up their slide-rules, make with the adding machines and let us have the result by next week at the latest!



### Seventy Centimetres

The comment in this Column last month about the lack of activity on 70 cm. has certainly provoked some replies, as indeed it was intended that it should, and from them it appears that there are some pretty wide divergences of opinion on what does constitute activity on this band. There can be absolutely no doubt that activity on 70 cm. is high compared with that on 23 cm., for example, but low related to that on two metres—surprisingly low compared with what it was when the B-licensees were restricted to 70 cm. and above, and despite the considerable increase in such licences. No actual count has been made, but from discussions on the air it is safe to say that most new G8/3's go straight to two metres when they get their tickets, and this, together with the fact that many previous occupants of 70 cm. have migrated to Two in the belief that DX is better on that band, or that it is easier to get gear going for it, has raised considerably the activity on two metres, to the detriment of 70 cm.

But, let one thing be quite clear from the start. This is a most interesting band, and those who are not on it are missing a good thing. The DX can be as good, and indeed is sometimes better, than on Two. A great variety of transmission modes is available, for example, E.M.E. is possible (rarely practicable on Two) and A/TV operation is exclusive to 70 cm. The standards of general operating and expertise are very high, and the same spirit of camaraderie exists there as on the other VHF bands. But all this does not alter the fact that band occupancy can, and should, be higher.

Two operators, very well known for their 70 cm. work, have decided to do something about this, G8APZ in London and G8AWF in Cheshire.

They have sent out some 150 letters to operators known to be active on 70 cm., drawing their attention to a contest which they are arranging, the rules for which are outlined herewith. This event is designed solely to promote activity, and is arranged in such a way that the scoring is simple and everyone who puts in a log has a chance of winning a prize. This seemed such

a good idea that SHORT WAVE MAGAZINE has undertaken to support the scheme, and to that end is offering free subscriptions as part of the prize. So what about joining in?

**Period:** October 1-December 31, 1970, all QSO's to count for points.

**Scoring:** One point per two-way contact, irrespective of distance, plus 1 pt. bonus for each five stations worked on any one date. Additional bonus of 50 pts. for stations having QSO's on 50 days within the contest period.

**Sections:** (1) Fixed, or /A, /P, /M. Points gained using any of these suffixes may be aggregated for the final score.

(2) A/TV. Half-points for one-way video exchange, provided both stations are on the 430 MHz band.

**Logs:** Entries to be tabulated in three columns: (1) Date, (2) Station worked, (3) Points claimed. No other information required, except c/s and QTH of entrant.

**Entries:** To go to: Adjudicators, c/o 64 Beresford Gardens, Hounslow, Middlesex, post-marked not later than January 14, 1971. Judges' decision final.

### VHF Century Club Awards

Peter Briggs, G8BWW, of Southport, Lancs., gains Certificate No. 73 for his two-metre work. He says that the rig is nothing unusual, the Tx running 20 watts input to a QQV03-20A. The Rx is a nuvistor converter, into a Heathkit RA-1. The ten-element beam is at 40ft. Most contacts have been made using AM, but a SSB exciter/driver is under construction and a few contacts have been made using that

THREE BAND ANNUAL VHF TABLE  
January to December, 1970

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		TOTAL pts.
	Counties	Countries	Counties	Countries	Counties	Countries	
G3DAH	34	3	67	14	14	5	137
G3OHH	46	7	50	6	16	2	127
G2AXI	36	3	48	9	6	1	103
G8ATS	—	—	53	10	32	8	103
G2JF	—	—	53	10	29	8	100
G3COJ	—	—	43	11	22	6	82
EI6AS	13	8	51	10	—	—	82
G8APZ	—	—	43	8	24	4	79
G3IAR	35	4	30	7	—	—	76
GD2HDZ	—	—	49	8	14	3	74
G8BKR	—	—	44	6	9	2	61
G8CVD	—	—	44	7	—	—	51
G3EKP	14	4	18	5	4	3	48
G3FIJ	—	—	37	5	1	1	44
G3ZIG	—	—	34	7	—	—	41
G8BWW	—	—	35	6	—	—	41
G8AUN	—	—	30	8	1	1	40
G8BHD	—	—	35	5	—	—	40
G8CCH	—	—	29	5	—	—	34

The Three Band Annual Tables show total claims to date from the year commencing January, 1970. Readers are reminded that claims should be sent as heretofore to: SHORT WAVE MAGAZINE, BUCKINGHAM. Summaries by band are given from time to time.

mode. In the near future, a QQV06-40A will be added as a linear, and this should extend the range a bit. Peter will also be on 70 cm. shortly.

From Spondon, Derbyshire, G8DKV gains Certificate No. 74 for two metres. He runs 10 watts input to a QQV03-10 and modulates with a pair of EL84's. The receiver is a G3LGK converter into an AR88. The J-Beam six-over-six slot is mounted at 40ft. up on a home-built steel tower at 200ft. a.s.l. Although active for only 60 days or so since getting his ticket, Martyn has had over 200 contacts in 34 counties and four countries.

Clive Cunnington, G8CVD, also operates on two metres, and has been awarded Certificate No. 75. The site, just west of Nuneaton in Warwickshire, is 420ft. a.s.l. and the take-off is reasonable in all directions with the South and East having a slight edge over other headings. The Tx runs 30 watts input to a QQV03-20A modulated by a pair of 6V6's. A portable job is also available which takes 16 watts input. The converter uses TIS88A's and feeds the Hammarlund SP-600JX as the tunable IF. The antenna is a 10-ele Skybeam at 38ft., on which he has heard EI and GI. Clive is very interested in portable working for which he uses an Eddystone EC-10 and a miniaturised version of the TIS88 converter. Under construction is a linear for two metres with a pair of 4X150A's and a box cavity with a single 4X150A for 70 cm.

Certificate No. 76 goes to John Jenkinson, G8CVS, of Oxford. The main Tx runs 11 watts to a QQV03-10 modulated by a single EL84, but a QRP transistor Tx and modulator are also used from time to time. For reception, John uses the DL6SW design converter into a Hammarlund BC779B, tuning 4-6 MHz. The antenna is a four-over-four slot at 28ft., at which height it does not completely clear the roof of the house, and so there is some screening even from 200ft. up. However, things can't be too bad as PA, ON, F and GD have all been raised. To date the score of stations worked on Two is 265 in 40 counties and six countries since operations commenced on November 16, 1969. Opportunity to contact G8CVS

will become less frequent after October of this year, as he will be working for his degree at Bristol University, but look for him during the vacations.

Finally, from Chelmsford in Essex, G3YDY obtains Award No. 77, again for two metres. The transmitter runs 8w. output from a QQV03-10, plate-and-screen modulated by a pair of EL84's. The converter uses 2N3819's in the RF and mixer stages, and tunes 24-26 MHz into a Marconi CR-150. The antenna is an 8/8 about 30ft. above the ground, 150ft. a.s.l. Since he was licensed as G3YDY (he used to be G8BGV). Paul has worked about 270 stations and has QSL cards from 115 only. Since becoming engaged recently he has not been very active on the bands, but hopes to remedy this, although he does not say how!

One point that comes very clearly out of these Award records, is the small number of claims made for bands other than Two. This again must surely be a reflection of the relative level of activity!

#### Notes and News

In connection with a hamfest at Bentheim, near the Dutch frontier, the Germans launched a man-carrying balloon on August 30, with a two-metre Tx aboard, signing DC8QK/AM on 145.5 MHz, AM phone. Some success was achieved

by the EU's, but little has been heard of anyone making a contact from this country. Yet a QSO ought to have been possible as the idea was to attain an altitude of about 5,000ft. and conditions were quite good. The difficulty may have been the gear at the airborne end, as from all accounts it was somewhat primitive.

Nice to hear again of Constance Hall, G8LY, now on four metres from Lee-on-Solent; she worked G3DAH during the contest (and mentions that she still possesses her copy of Issue No. 1 of SHORT WAVE MAGAZINE, dated March 1937).

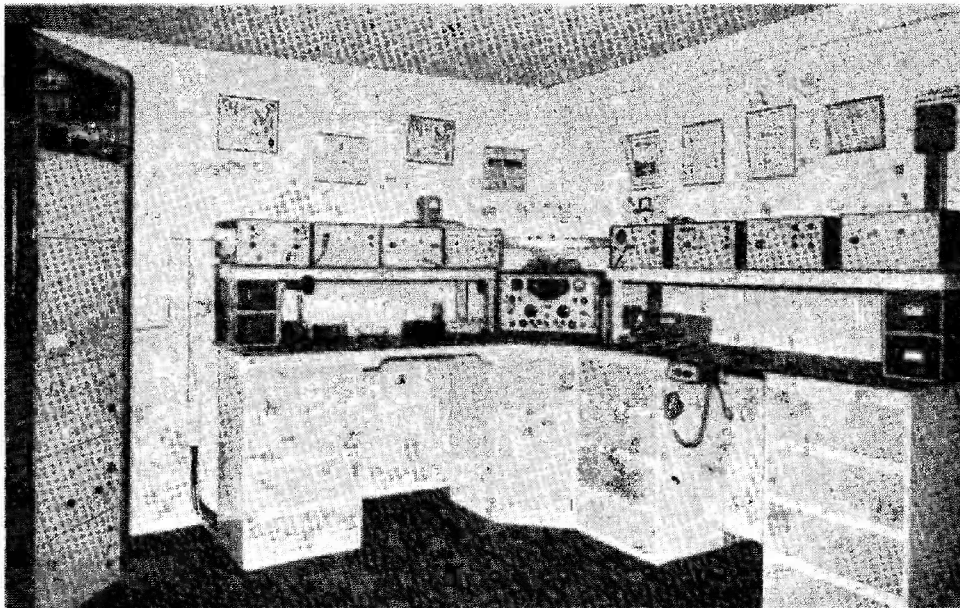
G2AXI (Basingstoke) reports a concentration of his activity on four metres, with a consequent substantial improvement in his score for the VHF Annual—he did particularly well with the G3SJV/P foray into the fastnesses of East Anglia, working them in four counties.

We've not heard from G3RND (I.o.W.) for some time, but he writes to say that he is in favour of the idea of Dinner Meetings—see this space last time out.

In doing some experimental work with a 2m. TTx, GW8CMY (Bangor) conceived the idea of a small transceiver involving a super-regen. on the Rx side. On August 26, when band conditions were good, EI2A was raised on the main Tx—then GW8CMY tried the "pip-squeak"



Concerned with events laid on for the B.A.T.C. Convention at Cambridge over the weekend July 25/26 were G3REH, G8DIY, G8BBB and G3VZV. This was the 25th anniversary of the foundation of the British Amateur Television Club. One wonders if anyone on this occasion remembered Mike Barlow, G3CVO, who was largely responsible for starting it off.



Station of G8ATK, Mike Hearsey, Halcyon, Lawday Link, Upper Hale, Farnham, Surrey, active on two metres and 70 centimetres. It may surprise you to know that, with the exception of the main Rx and a small transceiver, all the gear shown here is home-built or contrived. Every unit is on the modular system, for inter-changeability, with 12/24v. relay actuation. The 6ft. rack on the left carries the QRO RF amplifiers, with associated PSU's and modulators. The very neat console assembly and operating benches are made simply of the white-wood kitchen cabinets you can get at your local D-I-Y shop, topped with hardboard. The extensive aerial system available at G8ATK is as shown on p.555 of the November 1969 issue of "Short Wave Magazine."

rig (without EI2A knowing it at the time) and got a 53 from him. The power output of the GW8CMY transceiver is just the  $7\frac{1}{2}$  milliwatts, and the path length for the QSO is 108 miles—nice going, and it shows what can be done when things are just right.

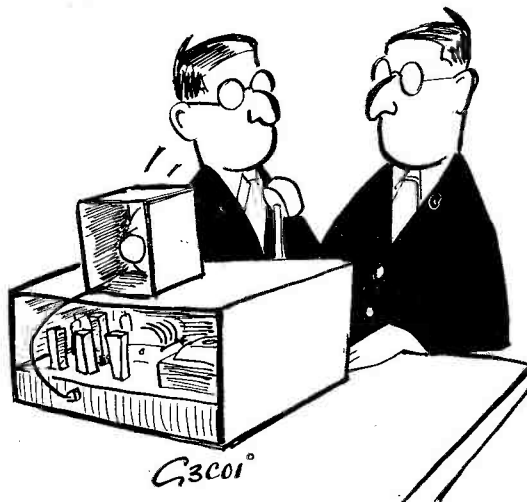
G8AWZ (Norwich) mentions a decided opening on August 30 in the direction of PA0 from the Norfolk coast. So he slipped out a CQ on two-metre SSB and got back in turn OZ9SW, OZ3IN and OZ5KG. Interesting that at the time no DL/DJ at all could be heard.

From the same direction G3XSK (Lowestoft) points out that in notifying the award to him of VHFCC parchment No. 72, his callsign was printed incorrectly—but he is much more concerned about the fact that during the Sept. IARU contest he failed to get a single QSO!

For G3IAR (West Kingsdown, Kent) the Contest was an opportunity for him to have a go on four

metres with his new Emsac Tx, which has three valves, six switched xtal channels and runs about 15w., using series-gate mod. for AM phone. G3IAR also remarks that as well as

hearing the Sheffield beacon, he found the 4m. band consistently open throughout the contest period to Wales and the West, also north-west to Cumberland and GD, GI. Inci-



"... Please send doubles old man, we're not copying two easily here ..."

dentially, also during the contest G3UES/P worked GD on all three bands.

The well-known Mow Cop beacon, G3OHH, is making nice progress in the Three-Band Annual, having clocked up six more counties during the period—his 4m. contact with EI2VDE/P (G3VFD over in Co. Wicklow) gave a 5 & 9 signal, compared with their EI2VDH transmission on two metres at 5 & 8. Roger also mentions the nightly sked G6CW-PAØPCD on 145.52 MHz SSB, this being mainly a land-wise path over which G6CW in Nottingham receives PAØPCD at a pretty consistent RS-56.

To re-emerge on 70 cm. after an absence of two years will shortly be G8ADD (Birmingham), with the

old Tx but a new all-transistor receiver which has taken him about eight months to finalise! However, G8ADD is somewhat put about to find that during his absence from Seventycems the Band Plan has been changed, and in consequence his existing crystals are out-of-zone. He feels that an established system should not have been changed without good reason—true enough, but there *were* good reasons, and the re-zoning was all explained at the time of the change—see SHORT WAVE MAGAZINE, October 1969, pp.506-507.

\* \* \*

Contests to come include the Region IARU UHF/SHF event over the weekend October 3/4, and the Two-Metre CW over November 7-8.

The MDT ("Magazine Daylight Test") on two metres is scheduled for **Sunday, October 4**, 1100-1800 clock time, and the general idea was explained on p.428 of our last—simply be on to make what contacts you can at distances *over 100 miles*, and let us know your results by October 10 at the latest.

#### Deadline

And that brings us to the closing date for next time, which is—**Saturday, October 10**, with all your news, views, claims and discussions of VHF interest, addressed: "VHF Bands," SHORT WAVE MAGAZINE, BUCKINGHAM. For the nonce, 73 de G3DAH and, as A.J.D. has had a bit of a hand in the preparation of this piece, 73 from him, too.

#### CRIGGION VLF STATION

Recent extensions and rebuilding at the Post Office VLF station at Criggion, near Welshpool, Montgomeryshire, have involved a new transmitter installed by Redifon, Ltd. and an enlarged aerial system with masts up to 700ft. high. Criggion has now become the counterpart of the famous Rugby Radio, GBR, and can radiate 30 kW on 19.6 kHz, giving it world-wide coverage.

#### OUR COUNTER SERVICE

Readers interested in the books and maps we offer in our regular advertising are reminded that we are always glad to see visitors at our Office at 55 Victoria Street, London, S.W.1. (The sketch on p.339 of the August issue of SHORT WAVE MAGAZINE shows you how to find

us, though the way to the exhibition hall is no longer relevant.) Any bus along Victoria Street will drop you off within a few yards—ask to be put off either at New Scotland Yard or the Army & Navy Stores. Our counter is open from 9.30 a.m. till 5.15 p.m. daily, Monday to Friday—you can come in and look round without being pressed to buy.

#### NICE NEW VALVE

The Mullard YL-1470 is a ceramic-to-metal, air-cooled power tetrode for coaxial mounting, with a gain of over 200—for 50 watts of drive it will give 10½ kW at frequencies up to 110 MHz. It warms up to the point of full output in less than two seconds, and so can be kept on stand-by. The application is, of course, to high-power BC and TV transmitters on VHF.

Taken at our Office at 55 Victoria Street, London, S.W.1—where all the Magazine administrative work is done. Left to right are the Editor, Austin Forsyth, G6FO/G3SWM; Mike Dormer, G3DAH, of "VHF Bands"; Maria Greenwood, in charge of admn. and advertising; and Bee James, assistant. The Editorial office, where Short Wave Magazine itself is actually produced, is out at Buckingham, in the quiet of the country.



# THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for November issue: October 9)

(Please address all reports for this feature to "Club Secretary," SHORT WAVE MAGAZINE, Buckingham.)

Elsewhere in this piece will be found the full Rules for the Twenty-Fifth MCC. As will be immediately seen, the Rules this year have been given a new twist, with contacts to be scored on a Zonal multiplier basis, to apply to both stations in the contact. The object of this is to meet the objections of those who maintain the previous rules gave an undue bias to GM, not enough to GC, GI, EI, and GD, and nothing at all to the Eastern Counties. The new Rules meet all these objections, at the expense of adding a little extra complication to the scoring.

Again we have tried to provide something which is of value as a Contest to go out to win; or to use as a training entry—the new rules should make clear the role of the loggers!—or just as a fun-station. If your Club is not listed, write in immediately for an Ident. Code. No B-station codes have been shown, as these seem to fluctuate wildly from year to year; if anyone wants to enter a second (or third) station, they are perfectly welcome to apply for extra codes for them.

Which leaves room for us to say how much we hope that once again we shall find invigilating a pleasure, with sporting operating, clean signals (KW-2000 owners please do *not* overdrive them!) and fun for everyone entering—in fact the traditional MCC spirit.

And don't forget to put requests for additional identifications in right away, so that a Supplementary List can appear in the next issue.

## Club News and Reports

Having discussed MCC, we now proceed to the main part of our story, namely the Club activities known to be taking place in October around the country. Once again the reports are split up into regions, and the first pile to be dealt with includes the few who cannot be lumped into particular regions.

Such a one is I.A.R.C., with its Hq. in Geneva and a total, at the time of their last *Newsletter*, of 394 members in many countries. They have a station set up in the ITU building in Geneva, with first-class equipment and beam aerials. Quite apart from the facilities it gives to members when they are Geneva, and the awards they offer, perhaps the most important of their functions is that of showing their station and explaining what Amateur Radio is about to the various visiting delegates to ITU meetings—a most important function for the continuance of Amateur Radio, one would feel.

R.A.I.B.C. caters for the invalid and blind followers of the hobby; the current copy of their *Newsletter* has

the chuckle of the month as far as your scribe is concerned—G3KPO's description of his week of training in the arts and crafts of dinghy sailing at West Cowes.

In a letter from the new Secretary of the British Railways group, we learn that the constitution has been amended to take in not only those professionally employed on the Railways but also the chaps who have railways or steam locomotion as a second interest in addition to Amateur Radio.

October 27 is an important date in the records of the Civil Service Radio Society, as it is set aside for the Annual General Meeting, which all members are asked to make a special effort to attend. Incidentally, readers may be interested to hear that the explosion in the Civil Service Sports Centre recently reported in the national press was close enough to the Club shack for its door to be blown in, although happily no damage was sustained by the gear.

## Scotland and the North

The October programme for the Lothians crew includes About VHF receivers on October 8 and a Visitors' Night on the 22nd. We also have a new hon. secretary to take into the Address Panel. In future months we shall doubtless have more to report, once the new committee have had time to sort things out for the coming year.

Up in Inverness, a change of hon. sec. also appears in the *Newsletter*; however, we do not have his address and so, for this time at least, must refer you to GM3NSK at the address in the Panel for the up-to-date details.

Coming south of the Border the next port of call is Derby Nunsfield House; one notes five dates for October, all on Fridays. October 2 is an Open Evening, when it is rather likely there will be an inquest on what went wrong at VHF NFD. A week later, October 9, there is an Evening on the Air. October 16 is the big night of the month, as G3OZ will be giving Part 2 of his series entitled "Introduction to the Oscilloscope." A Film Show fills the time on October 23, and the month is wrapped up with a Surplus Sale on October 30. Venue for all these is of course at Nunsfield House, which is in Boulton Lane, Alvaston.

Every Tuesday evening the Eccles and District lads get together, at Bridgewater School, Worsley. A Junk Sale is down for October 6, but it is understood that Morse tuition is available at every session, and there is also a Top Band net at 2030 GMT each Thursday.

Quite a programme has come up from Spen Valley,

giving their weekly syllabus right through to the next AGM in July 1971! Every Thursday evening it is, at the Grammar School, High Street, Heckmondwike, unless they are on an outside visit.

Another group which has come up with a full year's forward programme is Northern Heights, where G3MDW, in spite of all his protestations, is still firmly fixed in the secretary's chair. Apart from the regular Thursday evenings at the Peat Pitts Inn, Ogden, one notes that the Club call G2SU will once again be at the service of Keighley Boy Scouts for Jamboree-on-the-Air over the weekend of October 17-18.

Every Friday evening the Conservative Divisional Office, 449 Palatine Road, Northenden is used by the South Manchester lads for their get-together; in addition the VHF section of the Club have Monday evenings booked at the shack, which is at Greeba, Shady Lane, Manchester 23. On the Friday sessions, we have some more details; October 2 is given over to a talk on Equipment Fault-finding by G3WFT, and on 9th G3MBQ has the floor to talk about RAEN. The following Friday, 16th, will be when G3FNM will demonstrate modern SSB equipment, and on the 23rd the lads are going out to Welman House, Altrincham, to hear G3BA answering the question "Why VHF?" October 30 sees them going out again, this time to the Woodcourt Hotel, Brooklands Road, Manchester 23, for the Annual Hot-Pot Supper. Looking at the outside activities, it is pleasing to note that the club call, G3FVA, will be making a determined effort to take the honours in the CQ WW DX Contest over the weekend October 25-26.

Their weekly meetings are held at 592 Hessle Road, says the hon. sec. of Hull, and she adds some details, as for instance on October 2 an Open Night with a Junk Sale and film show of the Club activities over the past year. October 9 will be a "must" for the VHF types, when G3SSA explains all about QRA Locators. October 16 is given over to the SWL's, while the 23rd is again VHF, this time the Club's own 2-metre project. October 30 is a Constructional Night. As if all this were not enough, they have an R.A.E. course in stew for the winter, and give Morse tuition at Hq. every Friday evening. Evidently, a very active group.

The Otley Radio Society is to hold a house-warming in its new premises at 14 Back Courthouse Street, Otley on October 20. There will be talk-in stations on 160m. (G3XNO) and two metres (G8BZY), on the air from 7.15 p.m. Highlight of the evening will be the judging of the annual constructional contest; light refreshments will be available throughout the evening and a trade stand for members' and visitors' convenience will be provided by J. Birkett, Lincoln.

### Wales and the West

On the second Tuesday of each month the Rhyl lads are to be found at the Mona Hotel, Market Street. For the October affair they have a treat in store, for John Lawrence, GW6JCA/T, will be coming along to talk about Amateur Television. Incidentally, Rhyl have pre-booked the call GW4ARC for themselves, and are now eagerly awaiting its issue.

North Devon is a large area, but the amateurs in it can usually be found at Crinnis, High Wall, Stickle-

## MCC—TWENTY-FIFTH ANNUAL TOP BAND CLUB TRANSMITTING CONTEST

### RULES

- 1. Duration:** Saturday, November 7, and Sunday, November 8; on both days between the hours of 1700 and 2100 GMT (eight operating hours in all).
- 2. Frequency and Power:** All contacts to be made in the 1800-2000 kHz band, using CW, with a power input not exceeding ten watts to the final stage.
- 3. Call-signs:** Where a Club has its own call-sign, that is to be used; if no club call-sign is held, the call of a nominated member may be used.
- 4. Scoring:** Other Club stations may be worked once in each session, the contacts counting three points each time. Non-club stations may be worked once, in each session to count for one point each time.
- 5. Contest Exchanges:** Inter-Club contacts will take the form of an exchange of RST *plus* the allocated Club Ident. Code. (*see p. 497*). Non-Club contacts to be an exchange of RST and QTH.
- 6. Logs:** The contest logs are to be legibly set out as follows: One side only of quarto or foolscap sheets should be ruled into nine columns, with the Club name and call-sign on every sheet. *Col. 1*, Date and time. *Col. 2*, Call of station worked. *Col. 3*, Outgoing exchange. *Col. 4*, Incoming exchange. *Col. 5*, outgoing RST (non-Club). *Col. 6*, Incoming RST (non-Club). *Col. 7*, QTH of non-Club station. *Col. 8*, QSO points. *Col. 9*, points claimed after multiplier applied.
- 7. Final Tabulation:** To each club contact, apply the correct Zone multiplier; to each non-club contact, regardless of distance, apply a multiplier of ten. Total the points claimed after multiplying to obtain final score. Add a declaration that the station was operated in the rules and spirit of the Contest. Comments on the rules, equipment in use, experiences, and so on are specially welcomed and should be written in at the end of the log.
- 8. Disqualification:** This is at the discretion of the invigilators, and reasons will be given. Typically, disqualification would result from a consistently rough signal, deliberate interference with other stations, or excessively long CQ calls.
- 9. Contest Call:** Call "CQ MCC."
- 10. Logs:** addressed to "Club Secretary, "SHORT WAVE MAGAZINE, BUCKINGHAM, must be posted to arrive not later than Friday, November 20. Results will appear in the January 1971 issue of SHORT WAVE MAGAZINE, due out on January 1, 1971. The Editor's decision is final on all matters affecting the Contest.

path, Barnstaple, twice each month. This time the dates are the 14th and 28th, the first one being a talk, and the latter a Ragchew. For more details, contact G4CG, address as Panel opposite.

Cornish have, for various good and sufficient reasons, had to transfer their date of October 1 to Camborne School of Mines. To find the venue, go through Camborne main street to the square, where the clock tower is, and then turn sharp right. G2BVN will be doing the talking at this one.

At Torbay, the Hq. are at Bath Lane, rear of 94



Belgrave Road, Torquay, and here they will be entertaining Mr. Cordingly of the GPO on October 31. Looking on to November 28, Mr. Budden will be talking about some of his experiences with radio and television.

\* \* \*

The secretary of Bristol University group takes your scribe severely to task for, he alleges, not getting his write-up on their activities right, and not bringing the hon. sec's. address up to date. So perhaps this is the time and place to take up the whole question of how reports should be filed. If there is a change of address to be noted, please *indicate* it as a change so that it is picked up and transferred to the card-index from which the address panel is made up. It should be evident that the addresses of some three hundred Club secretaries cannot be memorised and in the case of an occasional reporter such as Bristol the change will not be noticed if no *clear* indication is given that a change is involved, particularly if the name and call remain the same! As for the matters of special importance that the Club would like stressed, it is essential that this be indicated clearly in the letter—after all, we can hardly expect to be *au fait* with the internal politics of every group in the U.K.! Finally, if, as a result of inadequate or misleading information, we write a paragraph which is not quite to your taste, then please ensure that the matter is taken up with the individual responsible, and not with us. (After all, we don't have to print anyone's report unless we want to!)

However, to revert to **Bristol Univ.**, it is understood they have made an alteration to their rules so as to permit members of the Polytechnic to join. Meetings take place at 2.30 p.m. in the Department of Physics—which day of the week is not mentioned, but by delving into earlier correspondence we find it could be Saturdays, and add to this that the Dept. of Physics is in Royal Fort, Tyndall Avenue.

### The Midlands

**Rugby** are top of the pile this time; they have Hq. at 10 Drury Lane, where they can be found every Tuesday evening. The scheme of things here is to save the first Tuesday of each month for some formal programme, a lecture, films, tape lecture or whatever.

The "scouts" are out to round up all the members of **Solihull** group in time for the meeting of October 20. The reason is that this is the night of the AGM—be there promptly, so that the business may be despatched in time for the slide show covering the year's activities.

Quite an interesting effort starts the **Hereford** October, by way of a pre-arranged QSO with W5JSM from Hereford, Texas; one hopes for everyone's sake this comes up all right and that Murphy and his Law do not take a hand. To find them, any Friday evening, go to the Civil Defence Hq. in Gaol Street, Hereford.

**Wolverhampton** are to be found at Neachells Cottage, Stockwell Road, Tettenhall, where they meet every Monday. October 5 is down for the AGM, the 12th for

### Names and Addresses of Club Secretaries reporting in this issue:

ACTON BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, Acton, London, W.3.  
 BASINGSTOKE: P. Sterry, G3CBU, Ashley, Orchard Road, Salisbury Gardens, Basingstoke.  
 BRISTOL UNIVERSITY: C. G. Elliott, G8ADP, 37 Seymour Road, Bristol (421864), BS7-9HS.  
 BRITISH RAILWAYS: R. Woods, 15 Grant Avenue, Slough, Bucks.  
 CIVIL SERVICE: J. Luxton, 8 Twyford Crescent, West Acton, London, W.3.  
 CORNISH: J. Farrar, G3UCQ, Elm Cottage, Ventonleague, Havle.  
 CRAWLEY: G. Bowden, G3YVR, 51 Leighlands Road, Pound Hill (3523), Crawley, Sussex.  
 CRAY VALLEY: D. MacLennan, G3KGM, 52 Pinewood Avenue, Sidcup, Kent (01-300 0747).  
 CRYSTAL PALACE: G. M. C. Stone, G3FZL, 11 Liphook Crescent, London, S.E.23 (01-699 6940).  
 DERBY (Nunfield House): N. Gregory, G3LCV, 21 Back Lane, Chellaston (3516), Derby.  
 DORKING: R. Greenwood, G3LBA, 8 Deacon Close, Down side, Cobham (2628), Surrey.  
 EAST WORCS: R. J. Mutton, G3EVT, Summerhayes, Mill Lane, Oversley Green, Alcester (2041), Warks.  
 ECCLES: R. W. Mothersole, 57 Devonshire Street, Salford, M7-0BE (792-4813).  
 ECHELDFORD: R. Hewes, G3TDR, 24 Brightside Avenue, Laleham-on-Thames, Middlesex (Staines 56513).  
 FARNBOROUGH: A. L. Stretton, G8BVM, 10 Sinhurst Road, Camberley (22867), Surrey.  
 GREENFORD: F. C. Reid, G3VMD, 34 Carlton Avenue, Harlington, Middlesex (01-848 0235).  
 GUILDFORD: R. L. Ramsay, G3ARM, Rock Hill, Sidney Road, Guildford (62325), Surrey.  
 HARROW: R. H. Medcraft, G3JVM, 134 Dulverton Road, Ruislip Manor, Ruislip (38726), Middx., HA4-9AG.  
 HEREFORD: S. Jesson, 181 Kings Acre Road, Hereford (3237).  
 HULL: Mrs. M. E. Longson, 4 Chester Road, Wold Road, Hull, HU5-5QE.  
 I.A.R.C.: T. Robinson, F8RU, Box 6, Geneva 20, Switzerland.  
 INVERNESS: G. Hillier, GM3NSK, 15 Mill Crescent, Charleston, Inverness.  
 LOTHIAN: D. E. Ferguson, GM3YNX, 1 Braidburn Crescent, Edinburgh, EH10-6EL (031-447 2858).

MAIDENHEAD: E. C. Palmer, G3FVC, 37 Headington Road, Maidenhead (20107), Berks.  
 MELTON MOWBRAY: R. Winters, G3NVK, 32 Redwood Avenue, Melton Mowbray (3369), Leics.  
 MIDLAND: H. L. Bate, G8AMD, 88 Darnick Road, Sutton Coldfield, Warks.  
 NORTH DEVON: H. Hughes, G4CG, Crinnis, High Wall, Sificklepath, Barnstaple, Devon.  
 NORTHERN HEIGHTS: A. Robinson, G3MDW, Candy Cabin, Ogden, Halifax (44329).  
 NORTH KENT: A. Watt, G3WZJ, 67 Glenhurst Avenue, Bexley (Crayford 22564).  
 OTLEY: H. Moore, G3WVD, 269 Leeds Road, Ilkey, Yorkshire.  
 PLYMOUTH: I. Dawe, 345 Crownhill Road, Plymouth, PL5-2LL, Devon.  
 PURLEY: A. Frost, G3FTQ, 62 Gonville Road, Thornton Heath, Surrey, CR4-6DB.  
 R.A.I.B.C.: Mrs. F. Woolley, G3LWY, 331 Wigan Lane, Wigan, Lancs.  
 RUGBY: J. L. Wood, G3YQC, 73 Hillmorton Road, Rugby.  
 SILVERTHORN: A. Mitchell, G3YJZ, 6 South Road, London, E.9. (01-804 8074).  
 SKEGNESS: N. Hodgson, G2ABK, 53 Main Road, Hundleyby, Spilsby, Lincs.  
 SOLIHULL: H. D. L. Clark, G3YOY, 18 Marsland Road, Solihull, Warks. (021-706 0485).  
 SOUTH LONDON MOBILE: W. Hardcastle, G3XQX, 13 Carlwell Street, Tooting, London, S.W.17.  
 SOUTHGATE: A. F. Hydes, G3XSV, 6 Glenbrook North, Enfield, Middx. (01-363 7847).  
 SOUTH MANCHESTER: D. Holland, G3WFT, 7 Alcester Road, Sale, Cheshire, M33-3GW.  
 SPEN VALLEY: N. Pride, G8BSC, 100 Raikes Lane, Birstall, Leeds (Batley 3925).  
 SURREY: S. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, Croydon, CR2-8PB (01-637 3258).  
 THANET: R. Trull, G3RAD, 1 Approach Road, Broadstairs.  
 TORBAY: Mrs. G. L. Western, G3NQD, 110 Truro Avenue, Hele, Torquay.  
 WIMBLEDON: W. Hardcastle, G3XQX, 13 Carlwell Street, Tooting, London, S.W.17.  
 WOLVERHAMPTON: J. P. H. Burden, G3UBX, 28 Coalway Road, Wolverhampton, WV3-7LX.



a Natter session, 19th for a members' slide and film show, and the monthly committee meeting fills in the 26th—although we believe the Hq. is open to all on that evening also.

After quite a long absence it is pleasant to see a note from **Melton Mowbray**. They are still in the same Hq.—The St. John Ambulance Hall, Asfordby Road, Melton Mowbray—and we believe the date for the October doings will be October 16. However, again, to be on the safe side, contact the hon. sec. first—see Panel—and he will doubtless lay out the red carpet.

A late letter from **Midland** confirms your scribe's "educated guess" that the meeting would be on October 20 at the Midland Institute in Margaret Street, and adds the more important news that the meeting in question is the AGM, which all good and paid-up members are to attend without fail, so that the future of the Club may be looked at.

The Autumn Hamfest and Junk Sale of the **Skegness** and district chaps comes round again on October 16, at 7 p.m. Venue, the Bull Hotel, Spilsby. Admission 2s. 6d., which includes refreshments. Apart from the Junk Sale, Birketts of Lincoln will have a stand, there will be raffles and a bar. This event is one traditionally very popular with amateurs from a wide area around.

The **East Worcs.** group meet at the old People's Centre, Park Road, Redditch, where on October 8 G3AYJ will lecture on "Ignition Suppression in Motor Vehicles," at 8.0 p.m. The 22nd will be an informal evening.

### Southern England

**Farnborough** first; they get together on the second and fourth Tuesday in each month, at the Railway Enthusiasts' Club, 310 Farnborough Road. Visitors are very welcome to any meeting.

From his holiday retreat G3FVC writes to let us know that **Maidenhead** are still going strong; on October 5, Integrated Circuit Logic will be discussed by G8BUQ, and on the 20th there will be the usual informal evening, with light refreshments available. Both sessions are at the Victory Hall, Cox Green, Maidenhead.

October 17 is the date for **Crystal Palace**, to hear G3XFT talking about simple transistor circuits, at Emmanuel Church Hall, Barry Road, S.E.23.

Over to **Purley**, for the first and third Fridays of each month at the Railwaymen's Hall, 58 Whytecliffe Road; the first one in October being the Natter Nite and the other a Junk Sale.

Moving off in a south-westerly direction leads us to **Basingstoke**, where they put out a most interesting and informative newsletter. From this we get it that they have the first and third Saturday booked each month at Chineham House. October 17 is noted in the forthcoming events section as being devoted to a home-construction competition, and there is also a possible visit to Solatron which was not completely finalised at the time of writing.

**Harrow** are now getting together at the County School for Boys, Sheepcote Road. Vero Electronics will be giving the talk on October 2, while on the 9th they have G3LBA to show how his home-brewed Integrated Circuit Counter is made to do its stuff up to 25 MHz. For October 16 the programme combines

practical work with a bring-and-buy sale, while on the 23rd G3FZL and G3OOU will be coming along to talk about VHF FM Techniques. On 30th, the W1BB Mark II tape-and-slide lecture will explain how to work DX the hard way.

If you live anywhere near **Dorking** you will know the Wheatsheaf. Here, on October 13, the locals get together to have a natter and to continue work on some of the group equipment. Then, on October 27, they reassemble and this time with intent—for a Junk and Surplus Equipment Sale.

**Silverthorn** have to report a new Secretary, as the previous incumbent could not, for various reasons, continue in his office. They now have two contest managers, one for HF and the other for VHF, so that preparations for such activities are easily made. Every Friday they get together in Friday Hill House, Simmons Lane, Chingford, the third session in each month being devoted to business matters; there is also an AGM in the offing soon, albeit the date is not certain.

Some years ago the **South London Mobile Club** had to be folded up for various reasons, but the name was preserved by embodying it into the Wimbledon Club. It is now understood that the S.L.M.C. is coming out of its mothballs and several of the old South London mobile crew are taking an active part again. For details, contact G3XQX, see Panel, p.495.

As for **Wimbledon** itself, they continue their activities, centred on St. John Ambulance Hall, 124 Kingston Road, South Wimbledon, where the booking is for the second and last Friday in each month.

**Thanet** foregather at Hilderstone House, St. Peters Road, Broadstairs, starting at 7.30 p.m. October 2 looks like a bring-and-buy sale, and on October 9 there will be a tape-and-slide lecture. A visit to Wye College on October 16 is for the purpose of attending the VHF group meeting there, while on the 23rd there will be a talk by a member of the local Hospital Broadcasting Service.

**Crawley** will be entertaining Reigate on September 23—an event which will be over by the time this reaches print; however the letter from their Secretary does mention that the formal meeting is at Trinity Congregational Church, Ifield, Crawley, on the fourth Wednesday of October and every month. In addition there is an informal on the second Wednesday of the month, details of which are obtainable from the hon. secretary.

On to **North Kent**, who assemble at the Congregational Church Hall, Bexleyheath, adjacent to the Clock Tower, on October 8 and 22. The former is, as usual, the Natter Nite, but on the 22nd G3VFD is to speak on "Operating Portable."

(NOTE: Opposite are all Clubs who have submitted a log in MCC during the past three years. Other Clubs desiring to enter this year's event should write in, immediately, for identification codes, enclosing a stamped addressed envelope. Letters should be addressed "MCC," SHORT WAVE MAGAZINE, BUCKINGHAM.)

#### EXAMPLES FOR OPERATING

Coventry works Derby and sends 579C6, receives 579C7; Kirkcaldy works Jersey, sends 559A3, receives 559H3.

#### EXAMPLES FOR SCORING

Coventry works Derby. Each claims 3 points x multiplier of 10 = 30 points.  
Kirkcaldy works Jersey; each claims 3 points x multiplier 20 = 60 points.

THE MCC ZONES

The Zone in which a Club is located is indicated by the initial letter of the Ident Code (see below). The multiplier for a contact with another Club is defined by the Zone letter sent and received, and will be the same for both stations (see Scoring Table). The Zones are as follows:

- Zone A: All Scottish counties.
- Zone B: Northern England—Northumberland, Durham, Cumberland, Westmorland, Lancashire, and Yorkshire.
- Zone C: The Midlands—Cheshire, Derby, Shropshire, Stafford, Hereford, Worcester, Warwick, Nottingham, Leicester,

- Zone D: Rutland, Northampton, and Huntingdon.
- (or U): The South—Somerset, Dorset, Gloucester, Wilts, Berks, Hants, Oxford, Bucks, Herts, Middlesex, Surrey, Sussex, Kent, Essex, London, and Bedford.
- Zone E: South-Western—Devon and Cornwall.
- Zone F: Wales—all GW counties.
- Zone G: All EI/GI/GD.
- Zone H: The Channel Isles.
- Zone J: Eastern—Cambridge, Norfolk, Suffolk, and Lincolnshire

IDENTIFICATION CODES FOR CLUBS IN "MCC"

<b>Zone A—Scotland</b>		Wirral	C45
Lowland R. Sigs.	A2	Wirral DX	
Kirkcaldy	A3	Association	C46
Moray Firth	A4	Worcester	C47
Radio Club of Scotland	A5	235 Sqn ATC	C48
<b>Zone B—Northern England</b>		<b>Zone D(U)—Southern</b>	
Bradford G.S.	B2	Acton, Brentford and	
Eccles	B3	Chiswick	D2
Hallamshire	B4	Addiscombe	D3
Leyland Hundred	B5	Ampfield Contest	D4
Liverpool	B6	Barking	D5
Manchester University	B7	Bishops Stortford	D6
Newcastle University	B8	Brighton Tech. College	D7
Northern Heights	B9	Bristol	D8
N.W. Durham	B22	Bristol University	D9
Otley	B23	Brunel University	D22
Pudsey	B24	Chesham	D23
Scarborough	B25	Cheshunt	D24
Sheffield	B26	Chiltern	D25
Sheffield University	B27	Cheltenham	D26
South Manchester	B28	Chippenham	D27
South Shields	B29	Clifton	D28
Spenn Valley	B32	Crawley	D29
Stockport	B33	Cray Valley	D32
Sunderland	B34	Crystal Palace	D33
Wakefield	B35	Dover and Deal	D34
W. Riding Contest	B36	Dursley	D35
<b>Zone C—Midlands</b>		Ealing	D36
Albright & Wilson	C2	East Barnet	D37
Bromsgrove	C3	East Cheam	D38
Burslem	C4	East Surrey	D39
Chester	C5	Echelford	D42
Coventry	C6	Edgware	D43
Derby	C7	Fareham	D44
Derby (Nunsfield)	C8	Farnborough	D45
Henley-in-Arden	C9	Finchley	D46
Hereford	C22	Gosport	D47
Keele University	C23	Govt. Communications,	
Kings Norton	C24	Cheltenham	D48
Leicester	C25	Guildford	D49
Macclesfield	C26	Greenford	D52
Mansfield	C27	Harrow	D53
Midland	C28	Hemel Hempstead	D54
Newark	C29	Henley G.S.	D55
North Staffs.	C32	Hillingdon	D56
Nottingham	C33	Isle of Wight	D57
Nuneaton	C34	Leyton and	
Painton	C35	Walthamstow	D58
Rugby	C36	Loughton	D59
Salop	C37	Luton	D62
South Birmingham	C38	Maidenhead	D63
Staffs College of		Maidstone	D64
Technology	C39	Marconi Apprentices	D65
Stoke-on-Trent	C42	Mid-Herts	D66
Stourbridge	C43	Mid-Sussex	D67
Stratford-on-Avon	C44	Nailsworth	D68

Northwood		<b>Zone E—South Western</b>	
R. Aux.A.F.	D69	Cornish	E2
Oxford	D72	North Devon	E3
Plessey (West Leigh)	D73	Saltash	E4
Purley	D74	Torbay	E5
Reigate	D75	<b>Zone F—Wales</b>	
Royal Navy		Blackwood	F2
(Petersfield)	U2	Cardiff	F3
Salisbury	U3	Conway Valley	F4
Shefford	U4	Flint	F5
Silverthorn	U5	Haverfordwest	F6
Southampton Group	U6	Maesteg	F7
Southampton		R.A.F. Sealand	F8
University	U7	Univ. Coll. of N. Wales	F9
South Bucks.	U8	Univ. Coll. of S. Wales	F22
Southdown	U9	<b>Zone G—Ireland and the Isle of Man</b>	
Southend	U22	Ballymena	G2
Southgate	U23	Bangor	G3
Speedbird	U24	Isle of Man	G4
STC, Harlow	U25	Limerick	G5
Stevenage	U26	<b>Zone H—Channel Isles</b>	
Stroud	U27	Guernsey	H2
Surrey	U28	Jersey	H3
Sussex University	U29	<b>Zone J—Eastern</b>	
Swindon	U32	Bury St. Edmunds	J2
Vange (Basildon)	U33	Cambridge	J3
Verulam	U34	Cambridge University	J4
Veteran Operators	U35	R.A.F. Digby	J5
Wessex	U36	Grimsby	J6
Wimbledon	U37	Lincoln	J7
Woking	U38	Norfolk	J8
Worthing	U39		
Yeovil	U42		

Scoring Table

Multipliers to be applied to Club Contacts.

Contact with own Zone, multiplier 10

Contact between		C	"	G	13
Zones A and B	11	C	"	H	15
A " C	13	C	"	J	11
A " D(U)	15	D(U)	"	E	11
A " E	17	D(U)	"	F	11
A " F	13	D(U)	"	G	15
A " G	15	D(U)	"	H	15
A " H	20	D(U)	"	J	11
A " J	14	E	"	F	11
B " C	11	E	"	G	15
B " D(U)	13	E	"	H	12
B " E	15	E	"	J	15
B " F	13	F	"	G	11
B " G	13	F	"	H	12
B " H	20	F	"	J	12
B " J	13	G	"	H	12
C " D(U)	11	G	"	J	15
C " E	12	H	"	J	15
C " F	11				

Contact with non-Club station, regardless of location, attracts multiplier of 10.

The *Greenford Newsletter* for August starts with an article of bitter wit on the subject of the public reaction to TVI, which could well be "required reading" for anyone before they attempt to show how to deal with a TVI complaint in practice. G3OHX was the author of the piece in question. The lads meet at the Community Centre, Oldfield Lane, on alternate Fridays, which yields dates of October 1, 15, and 29. The activities are not as yet determined, but it is understood that there will be *something* going on, in the way of a lecture, films or whatever.

Over to *Surrey*, where there seems to have been a bit of controversy with regard to the venue, with some in favour of an extra meeting-night at a different spot where they could have, for instance, a Club rig permanently set up. All this, coupled with the fact that we are not quite up-to-date in our information makes it look as though we should refer you to G3FWR, *see* Panel.

*Cray Valley* have Hq. at Eltham Congregational Church Hall, 1 Court Road, London, S.E.9. The main meeting is on October 1, when G2CCD will be talking about Aerials. The mid-month meeting is usually an informal natter, and this month is no exception. On a different note, one of the lads has been up to the North Riding of Yorkshire, and discusses in the *Cray Valley Newsletter* just what the difference is between the northerner and the southrons as far as his approach to his hobby is concerned, and why this should be.

*Guildford Newsletter* does not mention the date or venue for the October meetings but does give a rather interesting breakdown on the relative levels of attendance over 1969 and 1970. For all the details, please contact the

hon. sec. at the address shown in our Panel, p.495.

*Acton, Brentford and Chiswick* will be entertaining F5TK on October 20 at Hq., which is 66 High Road, Chiswick. It is understood F5TK will talk about the differences between Amateur Radio as it is here and in France.

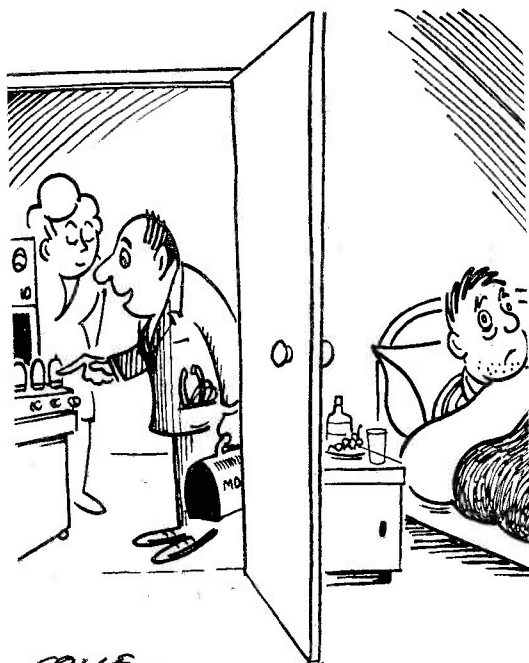
St. Martins Court, Kingston Crescent, Ashford, Middlesex is the Hq. of the *Echelford* crowd, where they get together twice monthly; however, we have no details of the activities planned for later than September 14 in the issue of the *Newsletter* which is currently on file, and so we have to refer you to G3TDR for the latest details.

Integrated Circuits will be the theme of the talk *Southgate* are to hear on October 8, which will be given by Mr. R. A. Joyce of Mullard Ltd. The Club Hq., where this meeting will be held, is at the Civil Defence Hut, Bowes Road, N.21, opposite Arnos Grove Tube Station.

*Plymouth* report a successful mobile picnic event at Yelverton on August 23, and give their programme as follows: October 15, open meeting; November 6, G3VCN talks on his Naval experiences; and November 14, annual dinner and dance.

#### Conclusion

So we come to the end of another lap of the Clubs circuit; next time we want the November activities, to arrive by first post **October 9**. The address, as always, is "Club Secretary," *SHORT WAVE MAGAZINE*, BUCKINGHAM. Closing date for the December issue will be November 6.



CRUE...

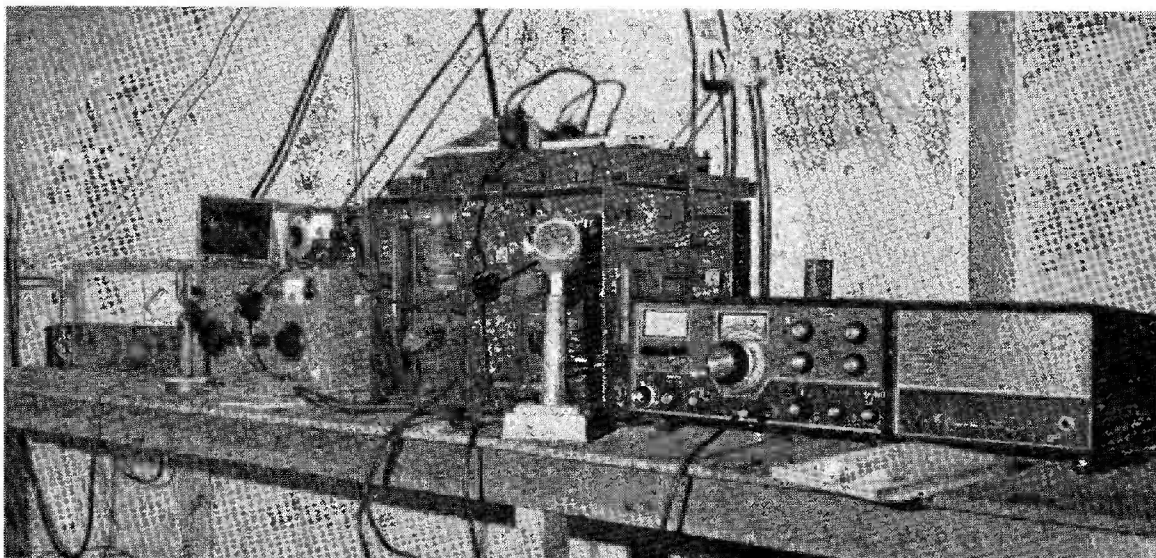
"... looks to me as if a valve transplant may be necessary ..."

#### SPECIALLY ON THE AIR

**GB3MAN, Till Oct. 17:** Put on by the University of Manchester Institute of Science & Technology to coincide with the intake of new students for the forthcoming year. Operation on all bands 10-160m., CW/SSB, and on two metres with AM. It is intended to mind a special QSL card for the occasion. Further enquiries (particularly from prospective students holding licences or interested in Amateur Radio) to: A. M. Davies, Amateur Radio & Electronics Society, UMIST Union, P.O. Box 88, Sackville Street, Manchester M60-1QD. (Tel: 061-236 1281.)

**GB3REC, October 2-4:** At the Phasels Wood Scout Camp, Kings Langley, Herts., programme of activities covering many aspects of Amateur Radio interest—including A/TV demonstration, SWL contest, D/F hunt, and operation of amateur-band equipment. Sponsors are G3YVI, G8CBU and G8CKT, all concerned with the Scout movement. It is hoped to make this an annual event at an established Scout camping centre. Details and information from: M. H. Tooley, G8CKT, 59 Oatlands Avenue, Weybridge, Surrey.

**GB3CC, October 2-4:** Camping Club of Gt. Britain's Nottingham Goose Fair Meet at Cockcliffe Farm, Arnold, Notts., with operation on 160/80m. and 2m. Information: R. E. Heathcote-Walker, Amateur Radio Group, Camping Club of Gt. Britain, 84 Beverley Road, Hessle, Yorkshire, HU13-9BP.



## THE OTHER MAN'S STATION

**G3YRR**

THE subject of our story this time is Charles Ekberg, 17 Cambridge Street, Cleethorpes, Lincs., now aged 48 and a family man. Professionally, he is a journalist and public-relations consultant running his own business.

Though an active SWL as long ago as 1938, it was not until 1965 that he really got down to Amateur Radio—inspired by the appearance of an amateur-band station at the Great Grimsby Exhibition of that year, which he was promoting.

An Eddystone 840C Rx was acquired and a correspondence course started in October 1966 with the British Radio School. (At this stage, Charles admits to having had great help with the maths. from his younger son at grammar school). He learnt his Morse at Grimsby Technical College and got through that without difficulty in August 1969. The licence was finally granted in September last, and G3YRR burst forth on Top Band with gear lent by local radio amateur friends, of whom by this time he had made quite a number—apparently mainly by what he describes as “Sunday morning sessions at the Wheatsheaf!”

G3YRR started on the HF bands early this year and now runs the outfit shown in our picture. Some 60 countries have been worked so far, the equipment including a Codar A.T.5, Swan 500C, Class-D Wavemeter and the necessary ancillaries.

The Ae. system is quite extensive: A Joystick,

130ft. end-fed wire, Mosley Vertical Trap antenna for 10-80m., a dipole for 15 metres and another Mosley Trap Dipole for 20 metres. Some of these antennae are in the roof-space.

An attic-room on the third floor of one of those mid-Victorian houses serves as the shack itself. A wooden bench or platform 14ft. long runs the whole length of the room. On this shelf all the equipment is mounted, the aerial leads being fed through a door into the roof-space. The bench provides a working area and there is plenty of stowage for spares and what we all call “junk.” QSL cards are kept in a special folder, as G3YRR says he doesn't like wallpaper.

Normal operating times are Saturdays and Sunday mornings (before adjourning to the “Wheatsheaf!”) and occasionally in the evenings. G3YRR says he finds Amateur Radio, through which he has made many friends, a great relaxation from business and therefore very helpful to the pattern of his life. His other interest—is in projecting the public image of Amateur Radio for what it really is and not what the BBC and some sections of the Press imagine it to be—our Editorial in the September issue has some bearing on this. As G3YRR says “If you have a professional publicity man in the movement, why not make use of him”—why not, indeed.

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*Our regular Book Lists include all titles of general Amateur Radio interest and cover the whole field for specialised texts.*

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# NEW QTH's

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

**EI5CD**, D. J. Walsh (G8CEF), Coombe Down, Ballylynch, Carrick-on-Suir, Co. Tipperary. (Tel. Carrick-on-Suir 54.)

**EI7CC**, P. R. Ball, 3 Glenageary Terrace, Dun Laoghaire, Co. Dublin.

**EI7CD**, S. Nolan, 2 Montpelier Parade, Blackrock, Co. Dublin.

**EI8CC**, G. Gervin, 6 Montpelier Parade, Blackrock, Co. Dublin.

**G3ZJT**, R. Clayton (9VIPO), 17 Argosy Close, Chalgrove, Oxford.

**G3ZKJ**, H. E. Harris, 55 Priest Avenue, Canterbury, Kent.

**G3ZLW**, R. Dunkling, 34 Rose Avenue, South Woodford, London, E.18.

**G3ZMP**, R. Beckerleg, 40 Treverbyn Road, St. Ives, Cornwall.

**GM3ZNC**, J. Mulheron, 10 Devonview Place, Airdrie, Lanarks. (Tel. Airdrie 65507.)

**G3ZNK**, D. L. Hainsworth, 48 Greenacre Park, Rawdon, Leeds, Yorkshire. LS19 6AR.

**G3ZNR**, D. Bailey (VE8YL/ex-VOIDE), 17 Norfolk Hill, Grenoside, Sheffield, Yorkshire.

**G3ZNW**, R. J. Blasdell, 341 Walton Road, West Molesey, Surrey.

**G3ZNZ**, R. A. R. Matthews, Old Post House, Louthorpe, Driffield, Yorkshire, E.R.

**G3ZOD**, G. J. Smith, 22 Naples Road, Stockport, Cheshire. SK3 OTN.

**G3ZOJ**, B. D. Corper, 54 Nightingale Place, Woolwich, London, S.E.18.

**G8DCG**, C. J. Wollard, 20 Queens Road, Malling, Lewes, Sussex.

**G8DQB**, A. E. Moggridge, 12 Knighton Drive, Four Oaks, Sutton Coldfield, Warks.

**G8DSL**, K. R. Diamond, 209 Allerton Road, Liverpool, 18. L18 6JL.

**G8DWD**, J. I. Bateman, 80 Budleigh Crescent, Welling, Kent. (Tel. 01-303 9083.)

**G8DWK**, A. W. Brown, 22 Poplar Street, New Ollerton, Newark, Notts.

**G8DWT**, C. F. H. Young, 18 Wincroft Road, Caversham, Reading, Berks. RG4 7HH.

**G8DWY**, S. Haydock, 60 Tong Street, Dudley Hill, Bradford, Yorkshire, BD4 9LX. (Tel. Bradford 681460.)

**G8DYC**, F. W. Munslow, 1 Lonsdale Place, Derby. DE3 3LP.

## CHANGE OF ADDRESS

**G2FRX**, G. Wakeham, Fairview, Newton Road, Bishopsteignton, Devon.

**G3AG**, F. Inchley, 3 Streetly Drive, Sutton Coldfield, Warks. (Tel. 353 3455.)

**G3COI**, J. Worthington, 65 Hurst Street, Birmingham 5.

**G3FIU**, W. B. Gray (ex-GM3FIU), 13 Dalboyne Park, Lisburn, Co. Antrim.

**G3FNO**, G. W. Morgan, Kettles Cottage, Crowbrook Road, Askett, Aylesbury, Bucks.

**G3JFF**, M. J. Matthews, 32 Briar Close, Portsmouth, PO8 9ED, Hants.

**G3NGF**, Rev. A. W. Shepherd, 178 Manchester New Road, Middleton, Manchester, Lancs. M24 4DA. (Tel. 061-643 2368.)

**G3NJB**, WAMRAC Headquarters, 178 Manchester New Road, Middleton, Manchester, Lancs. M24 4DA. (Tel. 061-643 2368.)

**G3NXB**, Dr. W. F. Luke Fava, 18 Coombe Drive, Wood Lane, Fleet, Hants. (Tel. Fleet 6803.)

**GM3OQY**, S. Pairman, 5 Warwick, Calderwood, 14, East Kilbride, Lanarks.

**G3PJR**, M. Ellis, 7 North Parade, Grantham, Lincs.

**G3PMR**, A. H. Jubb, 24 Venator Place, Minster Park, Wimborne Minster, Dorset, BH21 1DQ.

**G3PPU**, P. J. Smith, 3 Compton Close, Church Crookham, Fleet, Hants.

**G3PTO**, J. A. Reynolds, 24 Shaldon Road, Horfield, Bristol 7, BS7 9NW.

**G3PWK**, J. Braithwaite, 30 Martin Close, Tidworth, Hants.

**G3SPR**, T. E. Clark, 62 Dallas Road, Chippenham, Wilts.

**G3SSI**, R. Simpson, Apple Acre, Forester Road, Soberton Heath, Southampton. SO3 1QG.

**G3TRD**, J. Bellany, 53 Pilgrims Way, Spalding, Lincs. PE11 1LJ.

**G3TWG**, P. J. Patrick (ZB2BO), 59 The Avenue, Alverstoke, Gosport, Hants. PO12 2JX.

**G3UUA**, J. E. Whittaker, Maitland, Noggarth Road Fence, Nelson, Lancs.

**GM3VEQ**, H. Gordon (ex-9VIPI), 1 Hatton Way, Kinloss, Morayshire.

**G3WQH**, G. B. Yearsley, The Depot Regt. R.E., Brompton Barracks, Chatham, Kent.

**G3XWO**, T. S. Lowe, 6 Highfields, Barrow-upon-Soar, Leics.

**G3YJE**, P. R. Merriman, 108 Whitehouse Avenue, Boreham Wood, Herts.

**G3YKR**, J. Rush, 2 Fairfield Close, Emsworth, Hants. (Tel. Emsworth 5612.)

**G3YLR**, F. R. Blake, 13 Raymond Road, Bicester, Oxon.

**G3YNX**, A. E. Robbins, 46 Northwood Crescent, Carterton, Oxford.

**G3YPK**, S. N. Wallis, Greenwich Baths, Greenwich, London, S.E.10.

**G3YVY**, D. Hanley, 54 Stainton Road, Wolviston Court, Billingham, Teesside.

**G5FH**, L. H. Lee, 18 Kilmington Way, Highcliffe, Christchurch, Hants. (Tel. 0425-2 5974.)

**G5GK**, G. E. Webster, The Tiled House, 34 Panton Street, Cambridge.

**G5VU**, S. W. P. Henton, 3 The Lawns, Whatton, Nottingham. NG13 9EZ.

**G8BCJ**, A. E. Unsworth, 66 Chichester Close, Aveley, South Ockendon, Essex, RM15 4TA. (Tel. Purfleet 6407.)

**G8BDG**, R. H. Clayton, 17 Hudson Drive, Pilgrim Square, Coningsby, Lincoln.

**G8BLH**, J. H. McDonald, 47 Queens Avenue, Meols, Wirral, Cheshire.

**GM8BOW**, L. P. Farrell, 12 Harefield Avenue, Dundee.

**GM8BRM**, I. B. Petrie, The Schoolhouse, Keig, Alford, Aberdeenshire, AB3 8BH.

**G8DPV**, J. F. Hunting, B.L.S., R.A.F. Brize Norton, Oxford.

**G8CIL**, J. A. Guy, 57 Coleridge Road, Cambridge.

## SOME BOOKS IN STOCK

### 101 QUESTIONS & ANSWERS ABOUT TRANSISTORS

This book is written to fill a gap in existing technical literature on transistors and their applications. In the years since the appearance of the transistor, much has been written about it. The questions contained in this book are the most often asked, and the answers are easy-to-read and simplified. Schematics, graphs, and photographs are used to illustrate the answers.

The book is divided into five parts. The first part contains basic questions and answers about the transistor itself—types, characteristics, and testing. Biasing is discussed as are the three basic configurations that the transistor can be used in as an amplifier, etc.

The remaining four parts of the book are devoted to applications that use the transistor as an amplifier at audio and radio frequencies, as an oscillator, and as a switch for control purposes. Questions and answers about bias stabilisation, preamplifiers, superregenerative detectors, phase-shift oscillators, AND and OR circuits, and flip-flops are covered in these parts.

Hobbyists, technicians, students, and anyone desiring to learn more about transistors and their applications will find this book especially helpful and practical.

25/6

### HAM ANTENNA CONSTRUCTION PROJECTS

For the many amateur radio operators who like to construct their own antenna gear, and for those interested in getting into the fascinating field of Amateur Radio, here is a practical guide to building and operating many types of ham antennas.

Although the antennae described in this book cost little to construct, many will out-perform some of the best-designed, ready-made designs on the market. By using parts you already have on hand (wire, 2 x 4's, insulators, etc.), you can build radiators that will allow you to DX places like Singapore, Moscow, Berlin, and the North Pole.

Besides full details on many useful and interesting types of aeriels, Ham Antenna Construction Projects includes complete information on long-lasting construction methods, as well as how to position your antenna to achieve maximum distance with a given radiation pattern. In addition, much easy-to-understand technical information on tuning antennas and the use of test equipment is presented.

27/6

### ABC's of SHORT-WAVE LISTENING

Have you ever listened to a radio and thought how enjoyable it would be to hear broadcasts from faraway places, such as Toronto, Berlin, and Tokyo, as well as signals from ships at sea and satellites in space. All these broadcasts can be at your fingertips, offering a fascinating hobby.

*ABC's of Short-Wave Listening* a non-technical guide, will help you get started, or give you added pointers if you are now engaged in this hobby. The mysteries of radio waves are revealed in a manner that anyone can understand, providing priceless knowledge about the ever-expanding world of short-wave radio.

Even though you may not have a basic knowledge of radio principles, author Len Buckwater introduces you to the subject by first explaining just what short-wave listening is, what makes a radio wave and a "meter," and just how these short waves travel in the earth's atmosphere and space.

Using a unique collection of photographs, drawings, charts, and authoritative text, this book tells how the short-wave receiver works; what the various controls are for; and what to look for when selecting equipment. In addition, antennae are presented and explained so that you can better receive those elusive foreign stations on your set.

Finally, this book lets you in on the secrets of how best to set up and operate your listening station; how to track and "hold" DX (distant stations); and how to locate and listen to the space satellites and manned space vehicles.

19/6

### ABC's of RADIO & TV BROADCASTING

This is a book for those who want to know what goes on at the transmitting end in radio and television broadcasting. It explains how the radio and television signals are formed, built up, and transmitted. In addition to the discussion of basic transmitter circuits, information is provided concerning metering and monitoring circuits and procedures.

*ABC's of Radio & TV Broadcasting* is a basic survey of transmitter equipment and operation. The first chapter deals with the principles of electromagnetic radiation. Then two chapters cover audio and video modulating signals. The next two chapters treat the origin and amplification of the transmitter carrier signal. Two following chapters discuss modulation, both amplitude and frequency types. The remaining chapters deal with power supplies, transmission lines, standard broadcasting antennas, FM and television antennas, and remote transmitter operation.

The author has avoided a detailed mathematical treatment, keeping the text basic and the essentials in view. Review questions are included at the end of each of the twelve chapters. The answers are given in the back of the book.

21/6

### SWL ANTENNA CONSTRUCTION PROJECTS

Anyone who enjoys listening to short-wave broadcasts from all over the world will naturally be interested in improving his reception. Constructing a suitable antenna is an excellent way of doing this, and it may be done at little expense. This book supplies all the information you need to construct 35 different short-wave aeriels.

Two chapters cover the basic principles of antennae and the knowledge necessary for construction of the projects which are given in the following pages. The antenna projects themselves are divided into six classes. First are the dipole aeriels such as segmented and inverted types. Following them are the vertical antennae, including array and beam types. Then horizontal beam systems (Yagis) are considered. Various low- and high-band and multiband triangle antennae are also discussed. The next section deals with long-wire antennae, such as vee beams and rhombics, for those SWL'ers with a sizeable plot of land available. For SWL'ers without land, indoor antennas, which are included in the final section, may be a solution. Three useful appendices are provided at the end of the book.

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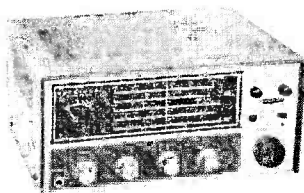
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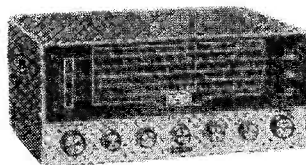
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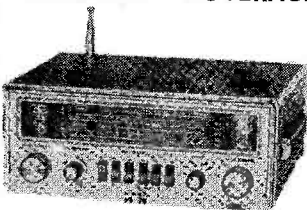
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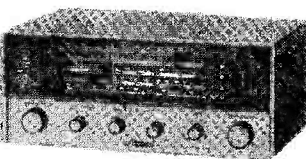
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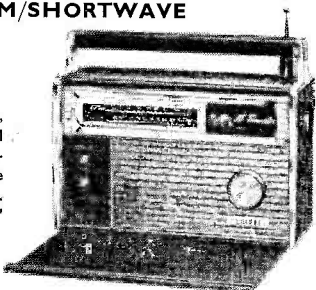
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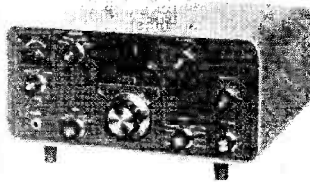
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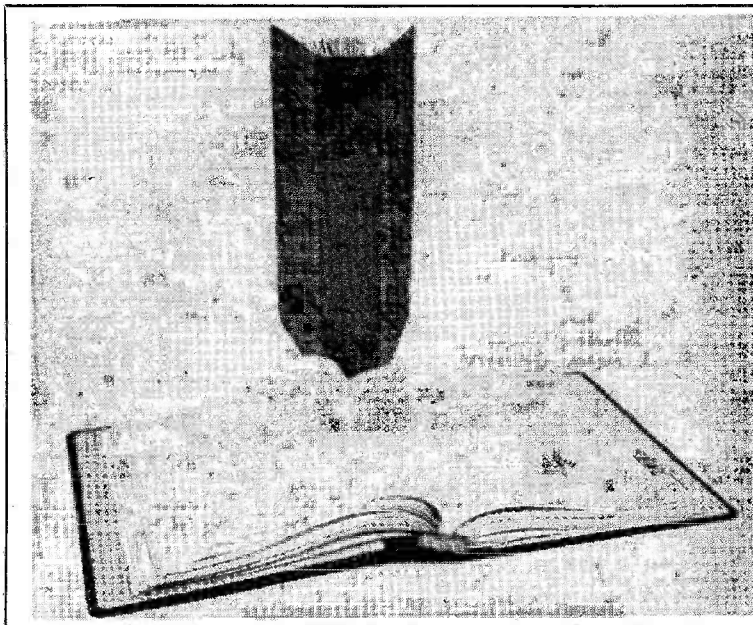
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Offers should be submitted to the Forestry Division of the Ministry, Room 23, Dundonald House, Upper Newtownards Road, Belfast BT4 3SB, not later than 3 p.m. on Friday, 30 October, 1970.

**WANTED:** For collection, World War II pattern German magnetic field telephone. Must be complete and in reasonable condition; please give description and price asked.—Box No. 4943, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**SALE:** Bush VHF-90A mains receiver, working but needs attention, price £5 10s., collect on a Sunday.—15 Waverley Gardens, Grays, Essex.

**FOR SALE:** R.C.A. AR88LF receiver, £30; R.1475 Rx, £5; PSU for R.1475, 60s.; ART-13 Tx, coverage 2.0 to 18 MHz, £12 10s.; W.S. 12 Tx, 1.2 to 17 MHz, 230v. input, £8. All complete with valves.—Ring Jay, 021-454 8305 (Birmingham).

**WANTED:** R.1084 ex-R.A.F. receiver and an RME-69 Rx. **SELLING:** National SW-54 receiver, covers 550 kHz to 30 MHz, with auto-transformer, £10. Also standard Joystick, 55s.—Box No. 4945, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**FOR SALE:** In as-new condition, books on Amateur Radio published by Foulsham-Sams, at half price.—Box No. 4944, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**SELLING:** BC-221M frequency meter, calibrations accurate, £15. CR-300 Rx with internal PSU, £15. CR-300 less PSU, £10. Aircraft Rx Type R.7303, 50s. U.S.-type ATU, £5 10s. Wattmeter AF No. 1, a real beauty, at £5. Cross-over scale meters, ex-R.A.F., 0-100 microamp movement, 20s. Avo Type 47A in case, £9. Rotary ceramic switches, 4-bank 24-position, 25s. Johnston Radio CV2 converter, just built, with instructions, etc., 50s. ATU Type 7305, including relays, rotary inductor and other good components, £4. New Alloy X-brackets for Quad, £7 pair. Many other components, valves, etc., s.a.e. for list, pse. All items carriage paid. **WANTED:** Good VHF Rx covering 20 to 170 MHz approx.—McCraig, GM3BQA, Woodlands, North Berwick, East Lothian, Scotland. (Tel: North Berwick 2519, evenings.)

**OFFERING:** Sideband filter crystals, 464-815/466-667 kHz or 468-519/470-370 kHz, both 1.85 kHz apart, 10s. a pair, or £1 for a set of four.—Dobie, 1 Tudor Close, Chessington, Surrey.

**FOR SALE:** Eddystone EC-10 Rx, with mains and battery PSU's, also Codar PR-30 preselector, in perfect condition, price £40 or near offer.—Rowe, G2RW, Ashleigh, Little Burstead, Billericay, Essex.

**WANTED:** Urgently, a VCR-138 CRT, with mu-metal screen. State price and condition.—Bennett, 35 Queens Road, Fleet, Hampshire.

**SALE:** Class-D Wavemeter, mains version, with headphones, manual, etc., £6.—Ring Dobie, 01-636 3676, Extn. 309 (Office), or 01-397 5552 (evenings).

**FOR SALE:** K.W. Viceroy Mk. IIIA, with 6146B's in final and extra half-lattice filters, nice CW/SSB transmitter, also a KW-77 receiver, with Dow-Key coax antenna change-over relay and inter-connecting cables. Price £150.—De la Mothe, G3VIE, QTHR, or ring West Forest 4048 (Berks.).

**SALE:** R.C.A. AR88D receiver, condition as new, with manual and speaker, price £50 or near offer.—Ring Billington, 01-656 9882 (London) after 8.0 p.m.

**FOR SALE:** Condition as new, Trio TS-500, fully guaranteed, can be heard daily on 7 MHz around 1000-1130 BST, price £130, carriage/insurance paid.—Jones, G5ZT, 3 Bircham View, Austin Crescent, Eggbuckland, Plymouth (T76552), Devon.

**OFFERING:** Fully modernised terraced house, three-bedroom, garden contains 44ft. wooden mast supporting 132ft. end-fed aerial and 7 MHz vertical wire; also 32ft. Heathkit tower, with planning permission; all available if required.—Roth, G3DMJ, apply Williams, Mountain & Crossley, Somerton, Somerset.

**WANTED:** Case for CR-150/4 receiver; also Morse key, Marconi, Admiralty pattern, or similar.—Tew, 1B Morton Road, Morden, Surrey.

**SALE:** Sommerkamp FT-DX500 transceiver in immaculate condition. Buyer to inspect and collect, price £210.—Wyse, G3IWE, 36 Wilmslow Crescent, Thelwall, Warrington (64178), Lancs.

**WANTED:** T.W. 2-metre Communicator; must be technically perfect and clear of the "Ten Village Idiots." For Sale: Eddystone S.640 Rx, with manual, £24. (South Midlands).—Box No. 4941, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**SELLING:** BC-221 frequency meter, complete and in perfect condition, £15.—Jackson, 4 Severn Road, Bulkington, Warwickshire. (Tel. Bedworth 5724.)

**FOR SALE:** Heathkit GC-1U Mohican receiver, recently aligned and serviced by Daystrom; in as-new condition, six months old with manual and maker's carton, price £28 or near offer.—McCall, GM3ZBS, 45 Coxton Place, Glasgow, E.3, Scotland.

**FOR SALE:** CDR rotator and control unit, £10. RF-40 field strength indicator, 30s. HRO receiver with nine GC coils and PSU, £18. Indoor Joystick plus Joymatch, 20s.—Rowlands, 37 Hampton Road, Oswestry, Shropshire.

**SALE:** Codar A.T.5 Tx; crystal microphone; T28, matching speaker in case with batteries; Codar 12 M/S, 12 R/C and 250/S units; also G-Whip for 80/160m. All little used, The Lot for £50.—Rose, G3WGF, QTHR.

**FOR SALE:** Codar CR-70A receiver with instruction manual, just reconditioned by Codar factory; also Codar PR-30 Preselector and headphones. Price £15.—Pearce, Canada Cottages, Byworth, Petworth, West Sussex.

**WANTED:** Petrol-electric generator, output 12 volts at 80 watts, or similar; must be in good condition. For Sale: K.W. Valiant AM/CW transmitter, coverage 10 to 160m., price £15. (Midlands).—Box No. 4942, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**SALE:** Mains isolating transformers, 375 VA taped primary, output 240v., brand new, £5 15s. plus 10s. post/packing.—Bamber, 20 Wellington Street, Littleport, Cambs.

**CLEARANCE:** Two R9'er preselectors, 40s.; three PSU's, 50s.; 100 valves, 20s.; 50 copies magazines, etc., 25s.; odds and ends, 15s.; Grundig TK-14 tape recorder, as new, £15.—Thompson, 1 Church Road, East Molesey, Surrey. (Tel. 979 4503).

**WANTED:** By SWL, circuit diagram and info for fitting S-meter to CR-100 Rx; also any information about mods to this receiver.—Holmes, 45 College Avenue, Gillingham, Kent.

**SALE:** TR.101 Tx/Rx, coverage 2.0 to 8.0 MHz, PSU 12v. DC/250v. AC, complete with microphone, headphones and ATU, all as new, price £14.—Cruttwell, G3SJM, Mile House, Lansdown Road, Bath, Somerset.

**WANTED:** By two frustrated R.1475 owners, any information regarding this receiver—beg, borrow or buy. Tnx!—Peat, 37 Hillbrow Road, Bromley, Kent.

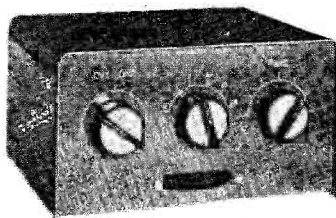
**FOR SALE:** Eddystone S.640 Rx, in excellent condition, £20 or near offer and carriage paid U.K. mainland. Optional extras: Two-metre converter, and S-meter.—Matthews, G6CC, QTHR, or ring 021-308 1737 (Birmingham).

**SELLING:** K.W. Vespa Mk. II, 220 watt SSB Tx, in as-new condition, complete with power supplies and cables. Will ship to anywhere in U.K. or Germany at £85 or near offer.—Grainger, DL5YA, 32 Engineer Regt., B.F.P.O. 30.

**SALE:** Hallicrafters SX-146 Sideband Rx, 9 MHz IF, 2.1 kHz filter, sensitivity 1 microvolt 20 dB, current list price £169, asking £75 or near offer. Would take a receiver in part-exchange.—Snowden, Swainsea Lane, Pickering, Yorkshire.

**OFFERING:** K.W.2000 CW/SSB Tx, in excellent condition, with AC/PSU and Shure 210 microphone, at £100 or near.—Crisp, G3ELJ, QTHR.

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**WANTED:** Racal RA-17 cabinet.—Sloan, Newton-butler Road, Clones, Co. Monaghan, Eire.

**FOR SALE:** Labgear LG.300 RF Unit, with spare 813, circuitry and notes, £12. National HRO Senior receiver, with PSU, coil packs and handbook, £12.—Stone, 39 Purrett Road, Plumstead, London, S.E.18.

**WANTED:** Receivers B.40, Hallicrafters S.36A, also Radiotelephone equipment, and PSU for Indicator Unit Type 300, with manual.—Bell, 82 St. Catherine's Avenue, Luton, Beds.

**OFFERING:** Heath SB-300 Rx, with CW/SSB filters and speaker, at £85. Also Heath SB-400 transmitter, £135. Offers considered.—Ring Baines, Clay Cross 863755 (Derbyshire).

**SELLING:** Trio receiver JR-5000SE with matching speaker, in mint condition, three weeks use only, at £50.—Cockayne, G3DAA, 9 Foresters Terrace, Teignmouth (3303), Devon.

**EXCHANGE Or Sell:** HW-30, £15. Ranger, with Tx on two metres, £10. Pye base station, needs attention, £12. CR-100 Rx, £10. FET converter, with xtal, needs attention, £5. All on near offer, or Exchange W-H-Y? Send s.a.e. for list of many bits.—Box No. 4952, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**SALE:** National HRO, table model, complete with PSU and most coil packs, £17. Hartley Type 13A Oscilloscope, complete with probe and cables, in FB condition, £20. Advance constant voltage and isolating transformer, 190-260v., 1 kW loading, as new, £12 10s. Signal Generator, Marconi TF-144G, complete with spares case, £15. RTTY: Creed Type 6S/3 auto-tape transmitter, £6; Creed Type 7P/N3 tape perforator, £7 10s.; complete Terminal Unit, comprising GCRE FS/10 and high-speed keying bridge Type 12/D2 for direct connection to printer, £12 the pair; PSU 80 + 80, 70s. As new for FSK working, B.40 Model D with associated B.41 Model C receiver, all miniature valved, complete with cable-forms and pluggery, £75 the pair. Also a Type RN-1-C Regenerator, transistorised, produces automatic RY's and V's and regenerates incoming signal; requires interrupted 1 kHz tone input and connects direct to printer, price £20.—Ring Phillips, Haywards Heath (Sussex) 50265.

**OFFERING:** Canadian Marconi 52 Set in steel cabinet, with PSU, price £10 or near, plus carriage.—Johnson, 29 Reynolds Street, Warrington, Lancs.

**FOR SALE:** Peto-Scott studio Vidicon camera, complete with wave-form monitor, electronic viewer, cabling and Vidicon tube, price £40.—Levitt, 33 Broadhey, Romiley, Cheshire. (Tel. 061-430 2451.)

**OFFERING:** Heathkit general-coverage Rx RG-1, factory aligned and as new, £30 or near offer.—Clarke, 16 Trewint Close, Cedars Estate, Exhall, Coventry, CV7-9FG, Warks.

**FOR SALE:** Trio items, 9R-59DE receiver, £33; JR-500SE Rx, £42; TS-500 transceiver with PSU, £130. All fully guaranteed, insured and carriage paid.—Jones, G5ZT, 3 Bircham View, Eggbuckland, Plymouth (76552), Devon.

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**RADIO Amateur returning from overseas contract requires unfurnished family accommodation, London area.—Box No. 4931, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.**



**WANTED:** Redifon Tx/Rx GR.410/R/A 714 and 780 (Service Type SR.C14), coverage 2.0 to 16 MHz AM/SSB, preferably complete with mains PSU, AMU, etc. Please state condition, price required and send photograph if you can.—Box No. 4950, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**NOVEMBER Issue Short Wave Magazine, due out October 30.** Single-copy orders 4s. (or 4s. 3d. "first-class") post paid to reach us by Wednesday, October 28, for despatch on Thursday, 29th. These copies are sent flat in an envelope.—Orders, with remittance, to: Circulation Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**SELLING:** Bits and pieces, cheap to callers, e.g., 200 microamp. edge-reading meters (list 52s. 6d.) at 20s.; meter 0.1 mA, 240° scale, 3½ in. square (£6 list), 40s. K.110 SWR/Power meter (listed £10) at £5. Minijacks and sockets, crystal microphone inserts, 600v. wkng. tubulars in most values, 3d. each. All new and unused. FT-241A crystals, 470 kHz range, 5s. each, 1.85 kHz spacings available. **WANTED:** Good BC-221.—Ring Dobie, 01-397 5552 (Chessington).

**WANTED:** Pye F27AM, Cambridge, Bantams, Westminster, Motaphone. Please, gentlemen, if you have 2702's, Reporters, Rangers, Hudson or BCC 69D's, don't ring me, I'll ring you! Also Wanted working and unmodified Walkie-Talkies on either 27 or 28.5 MHz.—Kates, G3PHS, QTHR, Caterham (Surrey) 46692.

**SALE:** Transistor Tx for 160m., 10-12 watts, small, 12v. + earth, £15. Labgear 160 Twin Tx, 80/160m., miniature mobile, £12. Labgear PSU, 12v. pos. or neg., 300v. HT, £5. AC/PSU 6v., HT 300v., £5. Converter for 80m., tunes on car radio, 40s.—Warrick, G3VCJ, QTHR.

**FOR SALE:** Tiger TR.300 Transmitter with Z-Match and trolley; bought as stand-by and little used. Price £50 or will consider offers from worthy causes. Buyer collects Midlands.—Box No. 4953, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

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**WANTED:** CW/SSB HF-band Tx. Up to £50 offered for suitable rig. Would prefer to inspect and collect Hants.—Box No. 4955, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**SELLING:** Trio JR-500S receiver, with Top Band coverage added; one year old. Quite stable and accurate, with handbook, £42.—Handy, 105 Humber Avenue, Coventry (22201), Warks.

**OFFERING:** Oscilloscope and VTVM by Jason. Heathkit transistorised GDO and ditto Resistance/Capacity Meter. Single-track quality tape recorder. All in very good condition.—Everley, G3PPK, QTHR, or ring 01-573 0496 (office hours), evenings Uxbridge 36989.

**OFFERING:** R.216 VHF receiver, with PSU, speaker and manual. Marconi "Atlanta" receiver, coverage 15 kHz to 28 MHz, with speaker and manual. BC-221 frequency meter. What offers? Also spares for BC-221 and LM-14 freq. meters, valves, manual and parts; s.a.e. details (North-West). —Box No. 4954, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

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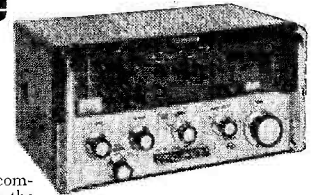
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**MORSE KEYS,** 6s. each, post 2/6. **CT82 NOISE GENERATORS.** Used for comparative measurements of noise factors on receivers, VHF converters, etc., etc. We sell them like hot cakes at £3 10s. each plus 15s. post. **CT52 MINIATURE OSCILLOSCOPES,** supplied with carrying case and set of leads, and handy item for the shack. Price £17 10s. each, post 2/6. We are always interested in buying for cash good quality second-hand receivers, transmitters, etc., so contact us if you have something to sell. Terms: Cash with order. Tel.: Portsmouth 60036 (STD 0705)

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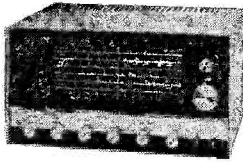
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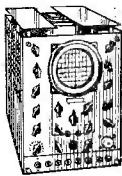
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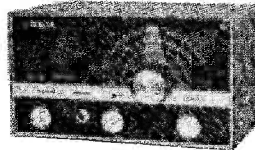
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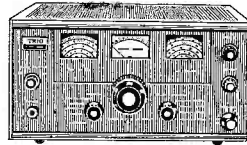


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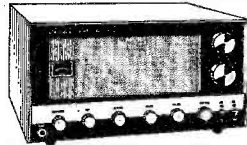
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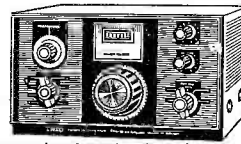
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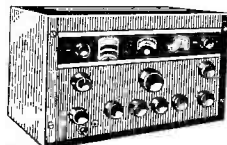


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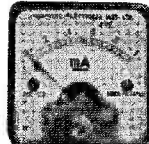
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