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VOL. XXI DECEMBER, 1963 NUMBER 10

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FOR THE RADIO AMATEUR AND AMATEUR RADIO

The SHORT WAVE Magazine

EDITORIAL

Reflection

The tragic event which horrified the world on November 22 has been the subject of unending speculation and discussion, public and private, ever since. In the same way that Americans respect our own Royal family and take the greatest interest in its affairs, so do all intelligent people in Britain have a similar concern for the President of the United States.

One indirect result of the assassination could well be that the Republican nomination for next year's presidential election may go to Senator Goldwater. And what, you may ask, is the particular significance of this, even if Senator Goldwater were to be elected?

The answer is that we would then have, as President of the United States, the one-time holder of an active radio amateur callsign, with quite recent experience of Amateur Radio and its affairs.

★ ★ ★ ★ ★

It is now the time of year when it is our pleasure to offer good wishes for the Season and the New Year to all our readers, at home and overseas; to our trade friends and supporters; and to our colleagues and contemporaries in the world of radio advertising and publishing.

From the Editor, Management and Staff of

SHORT WAVE MAGAZINE

WORLD-WIDE COMMUNICATION

CONVERTER FOR TEN AND FIFTEEN METRES

BOTH BANDS COVERED— CIRCUITRY, CONSTRUCTION AND OPERATION

J. N. Roe, M.I.R.E., F.R.S.A. (G2VV)

This is the sort of converter which will transform the performance of any of the older types of receiver on the 21-28 mc bands—and will give coverage of those bands in the case of receivers not tuning above 15 mc or so. Being crystal-controlled, with the oscillator set mid-way between the two bands, not only is a very high degree of front-end stability attained, but both bands are tuned over the same range of the main receiver and the converter coverage at signal frequency is such that neither switching nor coil changing are required.—Editor.

THIS converter, employing a single crystal and no switching, will have special appeal to users of surplus-type communication receivers which do not cover the 10-15m. bands. Used in front of some of the older receivers, like the HRO, SX-28, S.640, and such already covering these bands, the increased performance resulting is quite outstanding. Operated in this manner the front end of the main receiver becomes a tunable IF amplifier—the whole receiver chain becoming double-conversion, in line with present-day communication receiver design.

The at-a-glance details are:

Chassis, 7 ins. x 5 ins. x 2 ins.
HT Supply, contact-cooled rectifier, 200-250 volts AC input.
Mixer Output to Main Receiver in the 3·5 mc range.
Tuning Range approximately 17 - 35 mc.
Crystal Frequency 25 mc.
Valves, 6AK5 RF stage and ECF82 mixer-oscillator.

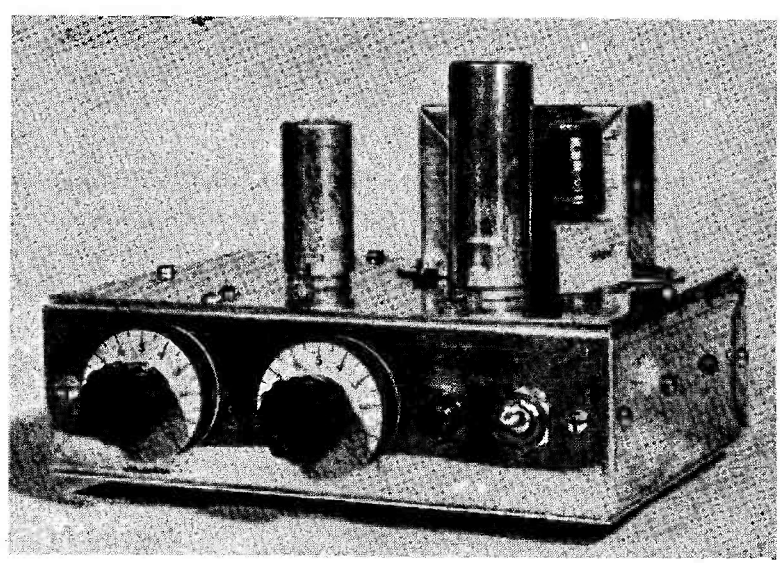
Briefly, the converter output (from the mixer) is the difference between the oscillator frequency (25 mc) and that of the incoming signal. Taking the CO at 25 mc, an incoming signal in the 21 mc band is tuned at around 4 mc on the main receiver (25-21 mc, osc. on the high side) and for the 28 mc band, the process is reversed—with the oscillator on the low side, a signal at, say, 29 mc would likewise be tuned in the 4 mc range on the main receiver. The required signal-frequency (band) is simply peaked on the converter, its own tuning range being such that either the 21 or 28 mc bands can be covered.

Construction

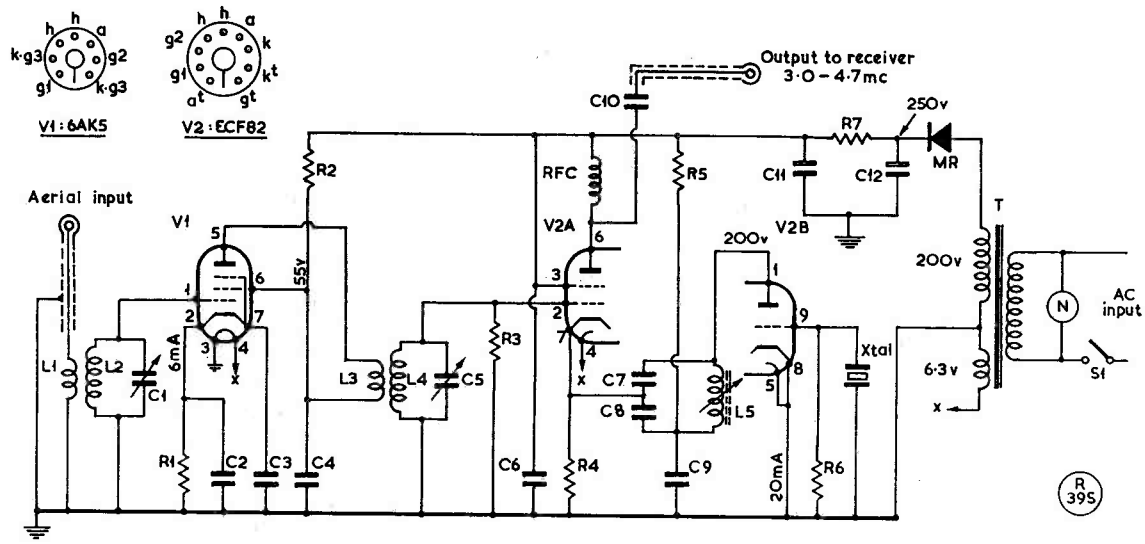
The actual chassis used (Universal type, *Home Radio*) is 7 ins. x 5 ins. x 2 ins. and is supplied in separate sections which are finally bolted together. This greatly facilitates construction. Components on the front, back and side pieces can be mounted and partly wired prior to final assembly. The main under-chassis wiring can be completed before assembling the whole unit. Placement of the parts can be followed from the photographs and should be adhered to within reasonable limits. Make all wiring as direct as possible, using common earth points. The majority of small components are wired direct to appropriate valve pins. A metal screen must be placed between the input and output sections of V1. The valveholder should be mounted so that pins 1 and 2 are on the left of the screen (as shown in the under-chassis photograph) and pins 5, 6, 7 are on the right hand side.

The coils L1, L2, L3, L4 are self-supporting and wired direct to the appropriate valve pins. Coupling between L3-L4 is fairly close—*see* photograph.

The mains lead and screened converter output lead—which should be kept as short as possible—are taken out at the rear of the chassis. Small rubber feet are mounted at each corner of the baseplate which is secured in position by self tapping screws.



The two-band constant-tuning converter, for 10-15m., as described by G2VV. Controls are, left to right, RF tuning, C1; mixer tuning, C5; neon indicator; mains on-off. A converter of this type, giving IF tuning around 4.0 mc, will rejuvenate any of the older types of receiver, which probably have a poor HF performance anyway.



Circuit of the two-band (10-15m.) converter described by G2VV and illustrated in the article. The crystal-controlled oscillator is at 25 mc, mid-way between the two bands, and thus gives a similar tunable IF range by either addition or subtraction of the injection frequency. The signal-frequency circuits are arranged to tune over the whole range covering both bands, so that band selection is merely by setting the converter tuning to the required band, and then tuning through the band over the appropriate IF range. There will be a reversal of IF tuning direction for the 15m. band, since the oscillator is on the high side of the signal frequency.

Testing

Following a routine wiring check—always well worthwhile—connect converter to mains supply and, with valves and crystal removed, check heater volts on each valveholder, pins 3 and 4 on V1 and pins 4 and 5 on V2. Check for about 250v. DC at R7. See that HT voltage appears on pins 5 and 6 of V1 and on pins 1, 3, 6 of V2. The neon signal lamp should be illuminated. Assuming the foregoing checks are in order, switch off and insert valves and crystal. Switch on and proceed as follows: Check HT on pins 5 and 6 of V1, which should be around 55 volts; on pin 1 of V2, about 200 volts, and on pins 3 and 6 around 225 volts. For valve consumption checks, measure at cathodes, when current readings should be near enough: 6 mA for V1 and 20 mA for V2. With everything working as outlined the converter can now be connected to the receiver.

Operation

Remove aerial from receiver and connect to converter aerial input. Connect converter "live" lead to receiver aerial point and screening to receiver chassis. Set the main receiver range to cover roughly 3 - 4·7 mc. Once the required *band* setting, for 21 or 28 mc, has been found on the converter, band *tuning* is carried out with the receiver tuning control in the normal manner. Where a signal generator or local signal is available to provide a 28 and 21 mc check at signal-frequency the bands can easily be found on the converter controls C1, C5 which will usually remain closely in step. Peak these controls for maximum signal (or noise level) at about centre of the desired band; this should hold good for full band coverage on the receiver tuning. A slight adjustment of C1 and C5 on a given signal will ensure peak performance.

Table of Values

Converter for Ten and Fifteen Metres

C1, C5	=	40 $\mu\mu$F var., ceramic insulation (*Wavemaster — Home Radio*)
C2, C3, C4, C6, C9	=	.01 μF disc ceramic
C7	=	5 $\mu\mu$F silver mica
C8	=	270 $\mu\mu$F silver mica
C10	=	100 $\mu\mu$F ceramic
C11, C12	=	16 μF + 16 μF 450v. elect.
R1	=	100 ohms
R2	=	35,000 ohms
R3	=	47,000 ohms
R4	=	1,500 ohms
R5	=	1,000 ohms
R6	=	100,000 ohms
R7	=	1,000 ohms 5-watt, wire wound
RFC	=	50 μH (Type RFC6 with LF Ferrite Core — *Electroniques*)
MR	=	Contact cooled rectifier, Type 18RA1-1-16-1 or FC116
N	=	Neon lamp (Type D841/250v. *Bulgin*)
T	=	Mains xformer (Osmabet Type TM26A — *Home Radio*)
Xtal	=	25 mc (Type FT-243, *G3SJ Quartz Crystals*)
V1	=	6AK5
V2A-B	=	ECF82

COIL DATA

L1, L3	=	5 turns 16g. enamelled copper, ¾in. diameter air wound, close spaced.
L2, L4	=	10 turns as L1, L3.
L5	=	2/3 mH (Type RFC1 with LF Ferrite Core—*Electroniques*)

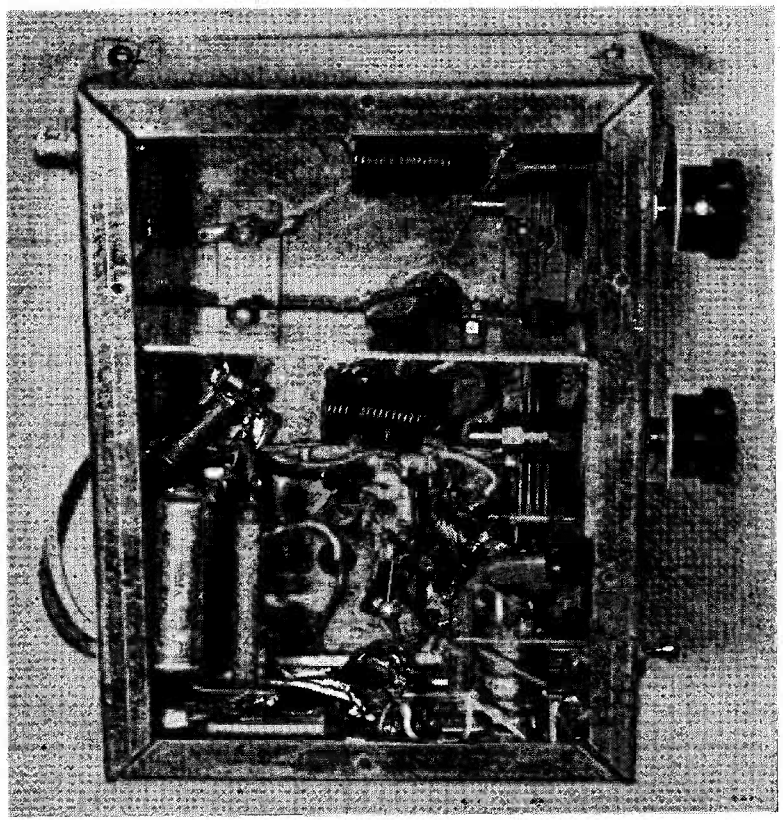
Note: L1 and L2 can be wound as one 15-turn coil with earth tap at 5 turns. All resistors are rated ½-watt except as stated for R7.

Where no source exists for a local signal the converter must be tuned up against incoming signals. There are a number of commercial stations operating around 21 mc which will assist here, and when the amateur band is open there should be no difficulty in bringing the converter into line. Unfortunately, at the present time, conditions on 28 mc are far less reliable but, nevertheless,

there are quite often a number of local ground-wave signals to be heard, particularly at weekends. One can come across periods when the band is open for DX signals for several hours.

In general—at whatever frequency within its range of 17-35 mc the converter is being operated—the procedure is to peak C1 and C5 for maximum signal. It will probably be found that settings for C1 are fairly broad with sharper tuning on C5. It will be realised, of course, that because for one band the oscillator is adding to signal frequency and for the other it is subtracting, the tuning on the main receiver will be in opposite directions, *i.e.*, 3·0-4·5 mc for 28-29·5 mc coverage of the 10-metre band; and from 4·0 to 3·55 mc for the 21-21·45 mc of the 15-metre band.

Finally, a word or two regarding the oscillator section V2B. No difficulty should be found in making the crystal go off. Where a receiver is available capable of tuning to 25 mc quite a strong beat should be picked up from the oscillator. The degree of oscillation can be varied by adjusting the core of L5. Should it be found that, in addition to the 25 mc signal, spurious emissions also exist (oscillator "squegging") the anode voltage of V2B should be reduced by increasing the value of R5 until a clean crystal beat is obtained.



Underneath the two-band converter, showing the general arrangement. The unit is self-contained for power, and the contact-cooled rectifier is mounted on a side-wall of the chassis.

SOME EXTRAORDINARY FIGURES

According to the City & Guilds returns for the November, 1962, and May, 1963, Radio Amateurs' Examinations, the total of candidates passed was 1,156. A study of the 1962-'63 G-prefix *Call Books* (issued on G.P.O. authority) shows that the number of new AT-stations licensed for the comparable period was less than 700. In other words, about 450 of those who passed the R.A.E. last year have not gone on to qualify for a full licence. *What* do they do with their R.A.E. pass certificates? We would be interested to know!

GOING BACK A BIT

Every now and again, we take a bit of space to tell you what was being talked about in SHORT WAVE MAGAZINE 25 years ago. This is quite a slice out of anyone's life-time, and takes us right back to the period just before Hitler's War. In our December, 1938, issue the technical articles included a discussion on the CRT; constructional details for a ¼-kW power pack (1000v. at 250 mA, and still in use!); a CW transmitter design, called "The Two-Band Two," for 7-14 mc operation, running 25w. in the PA; an article entitled "Speech for Eighteenpence," describing a home-constructed transverse-current microphone; and a note on an audio oscillator for Morse practice and MCW transmission. A. J. Devon's VHF feature illustrated a neat 5-metre CC transmitter, by G2HQ, with some interesting activity reports. The subject of "The Other Man's Station" (a hitherto regular feature for which recently we have been unable to find the space) was G5OH, then of Bournemouth. The "Club Activities" section covered the doings of 24 Clubs (compare this month's Clubs feature, on pp.569-573!)—and Webb's Radio, still at 14 Soho Street, W.1, were offering the American Harvey UHX-10 transmitter, giving up to 20w. output on all bands 5-160 metres, at £19. Times have changed!

BOOKS FOR CHRISTMAS

It is said that the most lasting of all presents is a good book. In the field of Amateur Radio, we offer many such, over a wide price range. Look at the advertisement on p.522 of this issue and at the review notes on some selected titles on pp.502-504 of the November issue of SHORT WAVE MAGAZINE.

UNDERSTANDING TRANSISTOR CHARACTERISTICS

THEIR MEANING AND MEASUREMENT — TRANSISTOR TEST CIRCUITS

M. I. DAVIS, B.Sc.

This useful and interesting article aims to take the mystery out of transistor nomenclature for those whose basic theory has hitherto been confined to a knowledge of the characteristics of the three-electrode valve. Our contributor shows that thinking about transistors and how to select and use them can be quite simple once the essential facts are grasped. He also offers a design for an effective and easily-constructed transistor test set for the amateur work-bench. Without some such equipment progress in transistory is likely to be more difficult and far less satisfactory than it should be.—Editor.

ANYONE who has tried recently to choose a transistor for a particular circuit by reference to manufacturer's data (where available) will probably have been faced by an imposing array of terms, symbols and figures, which have apparently little or no bearing on his simple practical problem, which might be "Can I get 20 dB of gain at 7 mc from an OC44 using this circuit?"

The purpose of this article is to give a simple explanation of the meanings of the terms one is likely to encounter. Also, bearing in mind that especially with the domestic range of transistors such as the amateur is most likely to acquire, manufacturer's "production spreads" are very wide, some methods of testing transistors will be described.

The necessity for these will become apparent by reference to the imaginary problem above. On referring to the excellent data sheets produced by Mullard Ltd., we find that although the typical current gain we may expect at 1 kc in common emitter configuration is 100, actually the current gain may be anything between 40 and 225. This, of course, presupposes that the transistor is new. It may have been damaged, or had its parameters drastically changed by overdoses of voltage or current. Thus the need for appreciation and knowledge of the parameters of the transistor we intend to use becomes apparent.

Definitions

(I) *Current Gain.* This quantity appears under various guises: α', h_{fe}, β, h_{fb}, α. Now α', h_{fe} and β are all identical and will henceforth be referred to as β. Similarly, α' and h_{fb} will be referred to as α. β is the current gain in the common emitter configuration, whilst α is the current gain in the common base mode. These arise from the equations: $I_c = \beta I_b + I'_{co}$ for common emitter and $I_c = \alpha I_b + I_{co}$ for common base.

The equations tell one the collector current to expect for a given base current. α and β are also related by: $\beta = \frac{\alpha}{1-\alpha}$, and since α is very slightly less than one, β may be very high. Both α and β vary with voltage, current and frequency; hence these qualities should always be specified, *e.g.* Vc = −6v., Ic = 1 mA, β = 100 at 1 kc.

(II) *Leakage Current.* This is quite straightforward: I_{cbo} or I_{co} is the leakage current in common base mode, and I_{ceo} or I'_{co} represent the leakage current in common emitter configuration. Again, these vary with power dissipation and temperature, so the voltage, current and temperature at measurement should be stated. The importance of the magnitude of leakage current is noticed when one has a transistor operating at a low quiescent current, since leakage may be larger than the required current and hold the transistor to a voltage much nearer to earth than the normal collector voltage excursion.

(III) *Cut-off Frequency.* Here we are faced with a whole crop of terms: f_{co}, f_α, f_{cob} and $f_{c\alpha}$ are one and the same thing, and tell us the frequency at which the current gain in common base is 3 dB down on the DC value. Similarly, F'_{co}, f_{coe}, and f_β refer to the common emitter mode. *Fmax* is the highest frequency at which the transitor can be expected to oscillate. f_1 is officially: "The frequency at which the modulus of the common emitter short-circuit current gain equals unity." Or, more simply, the frequency at which the value of β has fallen to one. f_T is usually called the gain-frequency product, and as such is self-explanatory. A transistor with a gain of 3 at 28 mc has an f_T of 84.

At this stage it should be pointed out that the current gain of a transistor is a "complex" quantity (in the mathematical sense) and hence phase shifts are introduced. It is felt, however, that to consider these in what is supposed to be a simple discussion would unnecessarily complicate matters! Those requiring information on this aspect of the problem are referred to *Junction Transistor Circuit Analysis*, by S. S. Hakim, where the whole subject is extremely thoroughly treated.

Another simple relation worth remembering is:

$$f_\beta = \frac{f_\alpha}{\beta}$$

which is a convenient rule-of-thumb method for finding one cut-off frequency when the other is known.

(IV) *Voltages, Currents, Power and Temperature.* More transistors languish in dustbins due to ignorance of the accurate meanings of these parameters than for all other reasons put together. The usual story is that it "just burnt out." Why this actually happened is sometimes not particularly

obvious at first sight. The reason may be punch-through, due to excess voltage; diffusion of collector and emitter into the base region caused by excess dissipation; or thermal runaway, which is usually a result of bad circuit design. The latter is a cumulative process, and unless the circuit has an inherent stability for DC, damage to the transistor is almost certain to result. A small increase in power dissipation leads to a rise in temperature, causing extra leakage current, so that extra power dissipation results . . . and you've had that transistor.

Let us consider the voltage and current ratings first. There are, for each transistor, a set of absolute maximum ratings. These are quite simply statements that if the given values are exceeded, damage to the transistor will ensue. They may be given as peak, average or DC values, *e.g.*:

$$V_{cb} \text{ (av.) max} = -10 \text{ volts}$$
$$I_c \text{ (peak) max} = 10 \text{ mA.}$$

Now this "average" value will be specified over a certain period, *e.g.* 20 mS. These voltage ratings must be derated when high currents are passed through the transistor. Then there is a set of "small signal" parameters which give one a set of typical working conditions for the transistor. These can be found in the *Wireless World* Valve and Transistor Characteristics manual (also known as *Radio Valve Data*), which most readers probably have on their bookshelves.

Next on the list are V_{be} and $V_{ce\ sat}$. V_{be} is the voltage across the base-emitter junction, and is usually between one hundred and five hundred millivolts. To forward-bias the transistor, the base must be made negative (in a p.n.p. transistor) by more than this amount with respect to the emitter. $V_{ce\ sat}$ is simply the voltage across the transistor, in common-emitter configuration, when it is "bottomed" or saturated. This is again of the order of a few hundred millivolts, and is virtually independent of current, provided the current is large enough to cause saturation.

Power and temperature are inseparably connected. The absolute maximum power dissipation (P_{tot} or P_{max}) is given by the relation:

$$P_{max} = \frac{T_{j\,max} - T_{amb}}{\phi_H + \phi_M} \text{ watts.}$$

This may, at first sight, seem to be a bit awe-inspiring, but in fact it is quite straightforward, and is rather similar to an Ohm's Law, but applying to dissipation. $T_{j\,max}$ is the maximum allowable continuous junction temperature. T_{amb} is the ambient temperature. ϕ_M is the thermal resistance of the transistor, and is the rise in temperature, above the can temperature, for unit dissipation; it is quoted in degrees centigrade per watt. A typical figure for power transistors is 1·5° C/watt. ϕ_H is the thermal resistance of the heat sink (when used). A 7in. square matt-black aluminium cooling fin 1/16th in. thick has a ϕ_H of about 3°C/watt, increased by around 0·5°C/watt if mica washers are used for electrical insulation. So the smaller ($\phi_H + \phi_M$) is, the more power we are allowed to dissipate.

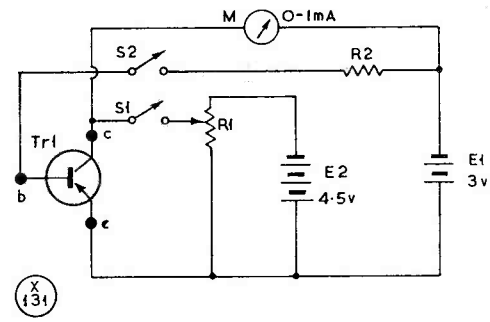


Fig. 1. The simple tester for PNP transistors, explained in the text. Values are: R1, 5K linear potentiometer; R2, see text; Tr1, transistor under test; M, 0-1 mA m/c meter; E1, 3v. battery; and E2, 4½-volt dry cell.

Example: An OC35 transistor (with $T_{j\,max} = 90°C$) on the aforementioned heat sink has a maximum dissipation at an ambient temperature of 25°C given by:

$$P = \frac{90 - 25}{1{\cdot}5 + 3} \text{ watts} = 14{\cdot}4 \text{ watts.}$$

So whilst the rated maximum is stated to be thirty watts, the actual maximum under the conditions given above is about half this figure. In fact, the figure of 30 watts applies only if the can is at a temperature of less than 45°C. This is the sort of trouble outlined previously that tends to result in burnt-out transistors.

(V) *Capacitance and Rise-Time.* This aspect must be dealt with very briefly. If a full equivalent circuit of a transistor is drawn, some of the components will be capacitors. These lead to internal phase shifts and undesired feedback in the transistor at high frequencies, and to finite times elapsing before the transistor can be turned on or off. The main capacitances occur between collector and base, and collector and emitter (C_{bc} and C_{be}). A typical value for C_{be} in an OC44 is 400 $\mu\mu$F. Charge is stored in these capacitors, and this must be moved in order to change the state of the transistor. The capacitors cause the collector current to rise exponentially in response to a step of base current. The time taken for the collector current to rise from 10% to 90% of its final value is called the rise time (t_r), and t_f, the fall time, is the corresponding quantity when the transistor is turned off.

This, it should be stressed, is an exceedingly curtailed and simple account, and readers are again referred to Hakim for a fuller description.

Transistor Testing

There are many commercially available transistor testers on the market, from simple I_{co} and β testers run off a 9v. battery, to extremely complex curve-tracing oscilloscopes. All are most useful—but are expensive for the amateur, for whom they will probably only be an occasionally used instrument. Of course, some people do test transistors with an Avo, a battery, some resistors, and a few croc. leads.

Table of Values

Fig. 2. Tester for PNP and NPN Transistors

R1 = 1,000 ohm lin. potentiometer
R2 = 500 ohms
R3 = 300,000 ohms, 1% high stab.
R4 = 3 megohms, 1% high stab.
R5 = *see text*
R6 = 22 ohms, or to suit meter
M = 0-100 μA, centre zero, 200 ohms
S1 = SPST toggle
S2 = DPDT toggle
S3 = 3-pole, 4-way, wafer
Tr1 = OC71, OC72, or similar
Tr2 = Transistor under test
E1 = 6v. dry battery

But this process is not to be recommended, for instance, in the selection of a matched pair of transistors from a batch of a dozen.

The best plan is actually to build a transistor tester. Once this is decided, the first question is, "How much do I want to test?" Is the instrument to be restricted to p.n.p. types only, or are n.p.n. transistors to be accommodated? Also, of course, the question of component availability arises. This should not present serious problems in view of the simplicity of the circuits involved. For instance, Fig. 1 shows a very simple I_{coe} and β tester for p.n.p. transistors only.

With S1 and S2 open, the meter reads I_{coe} at the voltage of E1. If S1 is closed, this reading can be backed off to zero by R1. Closing S2 then injects a known current into the base *via* R2, and the collector current is read on the meter. By suitable calibration, this can be made to read β directly, *e.g.*, suppose a 1 mA meter is used, scaled 0 to 100, and E1 is chosen as 3v. A 300K resistor for R2 will inject 10 μA into the base. Now a β of 100 will cause a collector current of 1 mA, and $\beta = 100$ will be read on the scale. It would be a simple matter to use a more sensitive meter to read I_{coe} more accurately, and then to modify S2 to shunt the meter on the β range. Transistors with a β of more than 100 could be accommodated either by shunting the meter or by altering R2. This simple tester has two disadvantages. One is that false readings result when the battery voltage falls, and the other is inability to deal with n.p.n. transistors.

Fig. 2 shows a circuit which, although based on the same general principles, is somewhat more refined. In this circuit TR1 acts as an emitter follower with R2 as load, to provide a low source-impedance variable output voltage, which, in position 1 of S3, can be set to a required value by means of R1. The author takes three volts for this. R5 is chosen to bring the required voltage to a suitable mark on the dial; during initial setting-up, the voltage across R2 is measured with a fairly accurate voltmeter, and adjusted to the required value using R1. R5 can then be made up to suit. The meter used was a centre-zero 100 μA type, but if a suitable centre-zero meter is not available, an extra bank on the n.p.n./p.n.p. switch (S2) could be used to change over the contacts of an ordinary meter.

Across R2 there is now an accurately-known voltage, which can be changed in sign for n.p.n. or p.n.p. transistors by means of S2. In position 2 of S3

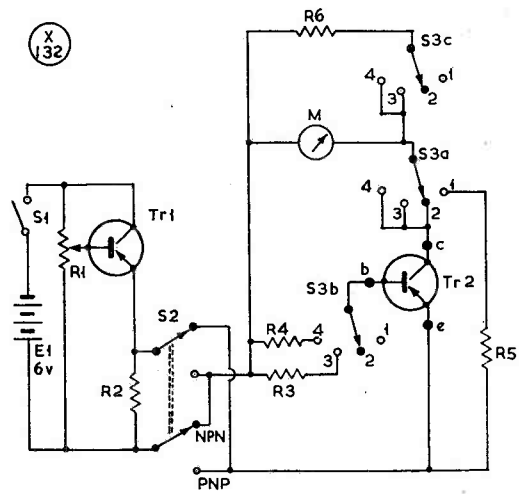


Fig. 2. The improved transistor tester, accommodating both PNP and NPN types. The method of use is discussed in the article and all values are given in the table. The switch positions are: 1, set volts; 2, for collector-emitter leakage current; 3, beta range 0-100; 4, beta range x 10 (0-1000).

this voltage is applied, through the meter, across the transistor, and hence the leakage current can be read off. In position 3, a known current is injected into the base of the transistor under test *via* R3, and the current gain can be measured. Position 4 arranges for one-tenth of this current to be supplied, thus coping with transistors with very large values of β. Whilst testing β, R6 is shunted across the meter to increase the f.s.d. to 1 mA.

The unit can be mounted in a small case with three panel terminals of the push-down, spring-loaded type, or the usual screw terminals could be used. If a three-pin socket for the increasingly-popular TO-5 transistor mounting can is available, it may be fitted on the front panel, and wired in parallel with the three terminals. Three leads with spade terminals at one end and miniature croc. clips on the other will simplify the testing of power transistors.

It is hoped that readers will be able to adapt this particular design to suit their own requirements, when they will find that the little effort and expense involved in its construction pays a large long-term dividend in the selection and testing of transistors.

MODERN SSB TRANSMITTER FOR THREE BANDS

POWER SUPPLY DETAILS—NOTES ON TRANSMITTER ASSEMBLY—TUNING UP PROCEDURE—GETTING ON THE AIR

PART III

J. D. HEYS (G3BDQ)

This concludes the description of the new Sideband/CW transmitter designed and constructed by G3BDQ. The first two parts of his article appeared in our October and November issues, Part I covering general design considerations and the construction of the SSB generator, and Part II going into details of the Frequency Converter, Driver and Linear PA stages. To make the best of the information given by our contributor, it is essential to read the three parts of the article in the proper order. Those who do not know a great deal about Sideband will be much instructed thereby, while those who are well up in SSB techniques will agree that G3BDQ has produced an outstanding design. Indeed, this transmitter, with his receiver as published in these pages last year, makes G3BDQ one of the foremost designers of modern, practical amateur-band equipment for the home-constructor. His lucid articles have, additionally, the particular merit that, if followed intelligently, they result in an entirely satisfactory piece of apparatus.—Editor.

SPACE considerations make the use of silicon diode rectifiers obligatory, and altogether 22 diode units are used in the power supply (Fig. 4). Valve rectifiers are low-efficiency devices and create a great deal of unwanted heat which is not desirable in a compact high-power design, such as this, where an internal VFO is used. Silicon power diodes are now available at prices which compare very favourably with valve rectifiers, and if used correctly they have a working life extending well beyond that of the equipment into which they are incorporated. The writer always attempts to design equipment which will operate without break-downs, and apart from occasional valve replacements expects trouble-free use for at least ten years. This policy is especially important when power supplies are being considered owing to the physical danger to the operator engendered by faulty constructional techniques and the difficulty, in most compact designs, of getting at u/s power supply components.

Four power pack transformers T1, T2, T3, T4 are used, with interlocked sequential primary switching. To protect the 4X150A Linear Amplifier valve the blower operates as soon as the mains supply is connected—it comes on before SW1 is made. SW1 energises the heater transformer T1, and SW2 puts on the bias and 240-volt HT supplies. The HT and stabilised screen voltages for the PA are switched by SW3. Suitable fusing arrangements are incorporated within this sequence of switching, and there can be no accidental putting-on of the HT voltages unless the bias voltage is also present. The three double-pole mains switches are mounted together in line along the bottom of the transmitter front panel and are marked 1, 2 and 3 to indicate the switching order.

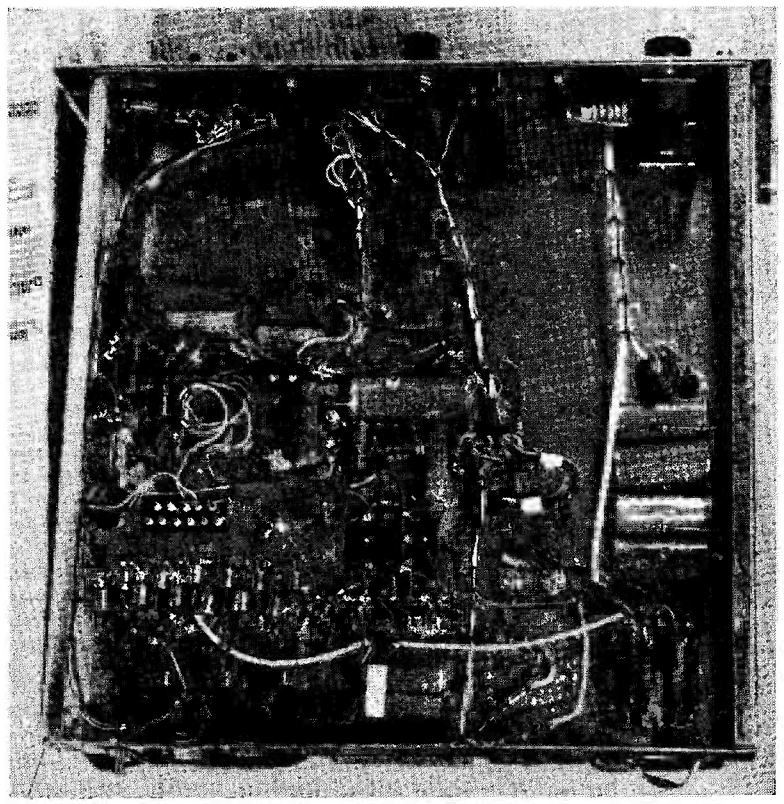
The resistor R1 (Fig. 4) is in series with the 4X150A heater supply and ensures that this valve receives 6 volts. To drop 0·3 volt at 2·6 amps requires a series resistance of only 0·11 ohm; by using thinner heater wiring than is customary no additional resistance will be needed. It is suggested that an AC voltmeter be put on the PA heater pins to check the actual operating voltage, for the life of a 4X150A is greatly reduced when its rated heater voltage is exceeded. T2 and T3 are both arranged in full-wave rectifying circuits, each of the silicon power diodes being shunted by voltage equalising resistors. C4 and R13 are transient suppressing components across the paralleled primaries of T2 and T3. Anti-surge resistors R6, R14, R15 and R22 provide additional protection to the diodes. R10 is adjusted to give 50 volts negative bias for the Linear Amplifier when the send/receive switch or relay is in the "send" position. In the "receive" position the bias voltage rises to the anode current cut-off value. The send/receive function can be carried out from SW4 on the front panel or by an external relay in parallel with this switch. The use of a choke input smoothing circuit Ch1 in the 240-volt HT supply protects the silicon diodes and C5. An OB2 neon stabiliser valve (V1) produces the 105 volts HT for the VFO, and its anode dropper R23 is located well away from the heat-sensitive silicon power diodes.

The EHT Line

The short duty-cycle under CW and SSB operating conditions permits the use of an EHT transformer rated at only 144 watts. This transformer T4 has its secondary winding connected in a full-wave bridge rectifying circuit employing a dozen silicon diodes each rated at 1000v. p.i.v. It is a C-core transformer of a type readily available on the surplus market and it operates coolly and silently with excellent voltage regulation. Again, voltage equalising resistors are employed, and a choke input filter Ch2 is used. This may seem contrary to amateur design practice where the filter condensers are connected directly across the rectifier output, but it is felt that the bulk and expense of Ch2 are more than justified by the increased safety margin gained. When choke-input smoothing is used after a bridge rectifier the transient suppressing components C6, C7 and R38 must be connected as shown in Fig. 4 and *not* in the transformer primary circuit. The use of four filter capacitors in series, each rated at 450 volts, together with equalising resistors (R39 to R42) eliminates the possibility of premature break-down. The effective capacity of this network is 16 μF, which is adequate fo

CW and SSB work.

Two series-connected OA2 stabiliser valves (V2, V3) provide the 300 volts for the screen of the 4X150A. VR150/30 stabilisers were not used owing to their larger physical size. R43 was made up from eight 15,000-ohm 12-watt resistors which were on hand and which fitted more conveniently beneath the chassis than a single 40-watt component. R23 and R43, which both give off considerable heat, must be positioned beneath the chassis where groups of ventilators can be drilled, and *not* beneath transformers or the valved sub-units. Some idea of the power supply component distribution is given by the photograph here of the underside of the main chassis. The silicon diodes associated with T3 are positioned either side of a tag strip near the circular hole for the transformer terminals, and those in the bridge circuit are soldered to the lugs of a multi-connection terminal block which has been raised ¼-inch from the chassis beneath T4.



Underside of the G3BDQ Sideband transmitter, showing general wiring layout and the arrangement of the numerous rectifier diodes.

Transmitter Assembly

The complete transmitter is housed in an AR88-type steel cabinet obtained from E. J. Philpotts Metalworks. Its dimensions are 19ins. x 10½ins. x 17½ins. deep (front to back) and it has a 3-inch slot running across the rear to allow for mains connection and access to fuses and the send/receive socket. The lift-up lid is made from perforated metal to improve ventilation, and the whole unit is finished in black crackle. A 2-inch deep heavy aluminium chassis to fit, together with a 10g. aluminium panel, were supplied by the same manufacturer. The panel is finished in light grey hammertone. (Strong 10g. aluminium side brackets could no doubt also be supplied, but the writer had a pair on hand and made use of them.) Owing to the weight of the iron-cored components in the power supplies, the panel and chassis assembly must be sturdily constructed. The complete transmitter weighs about as much as an AR88 receiver.

There is little pleasure to be derived from building up the various transmitter modules—and then discovering that they will not fit inside the main chassis and cabinet when they arrive! It is suggested that the metalwork be obtained before the actual construction work is begun. The various control spindles of the small units project through the front panel and are not fixed to it in any way. The Basic SSB Generator and the Frequency Converter are each fixed to the main chassis at their rear by a single 4BA bolt, and they can easily be removed if necessary. To do this a clear space equal to the length of their control spindles must be left behind each of the units. This is noticeable in the top view photograph of the complete transmitter (*see* p.409 October issue). The heavy power supply components were the last to be bolted into place, and considerable time was spent moving them around on the chassis to determine the most economical spacing arrangement of these items.

Only hand tools were used in the construction of the transmitter and the large holes in the chassis and panel were made with piercing saws set in a fret-saw frame. The control knobs are Eddystone, and the two rotary switch grips are made by Bulgin. Plated bolts and washers give a professional finish to the front panel. Cable lacing and careful wire routeing help to avoid the "tangled wool" appearance of many home-built equipments and a personal colour coding of the wiring aids construction and later lead tracing should this be necessary. The final job was the application of suitable

lettering transfers to the front panel—an operation taking considerable time and patience owing to the fact that few available word transfers are suitable for a SSB transmitter, and much individual letter cutting was required.

Tuning and Operation

The first attempts at tuning-up must be made with a suitable dummy load connected to the transmitter output socket. A 100 watt 75 or 80 ohm *carbon* resistor should be used, as electric bulbs present the wrong sort of impedance to the *pi*-output circuit and make nonsense of the correct tuning and loading condenser settings.

With the mains supply connected the blower should be heard. If after several hours running the blower rattles, the bearing screw should be adjusted; this is usual during the initial running-in period. It is a good idea to oil the motor bearings with " 3-in-One " light oil at regular intervals. SW1 can be closed and after a minute or so allowing the valve heaters to reach operating temperature SW2 can also be closed. Tuning up is done in the CW mode, and for this the AF gain control is turned right down and the carrier insertion control right up. The ALC pre-set potentiometer must be set in the maximum back-bias position. The key is inserted and the bandswitches are turned to 80m. With the send/receive switch (SW4) or relay set to " send," the key may be closed and the driver tuning control adjusted. When this is tuned to the band, PA grid current will be indicated on M1 (Fig. 3, p.469 November) providing that the meter switch SW2 (Fig. 3) is in the correct position. It is likely that the grid current will be in excess of 1 mA and this can be backed off by reducing the amount of carrier insertion. With the key open, SW3 (Fig. 4) may now be closed, so putting HT and screen voltages on to the Linear Amplifier. The anode current indicated by M2 (Fig. 3) should be about 50 mA. Closing the key now will cause this to rise to a high value, and the PA anode controls should be rapidly adjusted in the normal way for dip and loading. It should be possible to load up the 4X150A to at least 200 mA anode current with less than half a milliamp. of grid current. A note can be made of the PA tuning and loading condenser settings, for similar settings should be correct when the aerial system is coupled to the transmitter.

The setting-up procedure is repeated for the two other bands, and at the same time the VFO tuning can be swung over its range to test the WBC coverage, remembering to peak up the driver tuning control.

When the CW testing is complete the SSB operation can be checked. First tune up as for CW, then switch out the carrier and advance the AF gain control (with a suitable crystal microphone connected). The key must now be removed, or switched to the closed position. It should then be possible to talk-up the Linear Amplifier to the anode current indicated in the CW position. If the grid current meter kicks up against its stop the pre-set ALC control must be set to limit grid current peaks to less than one milliamp. Listening on a suitably muted monitor receiver is very useful, and some idea of the correct AF gain setting may be obtained. With ALC it is possible to have a much higher AF gain without " flat topping " and thus to increase the average talk-power of the transmitter. The co-operation of a neighbouring station equipped with a modern receiver is useful for carrying out the final tests, and he will be able to report on the quality, sideband, and carrier suppression of your transmission. Do not forget, when changing bands, also to change the sideband selection switch if necessary. An upper sideband transmission on 80m. is often reported as unintelligible spitch! Netting is achieved by switching off the PA HT supply and advancing the carrier insertion control. This will produce a CW signal in the receiver strong enough for this purpose.

Conclusion

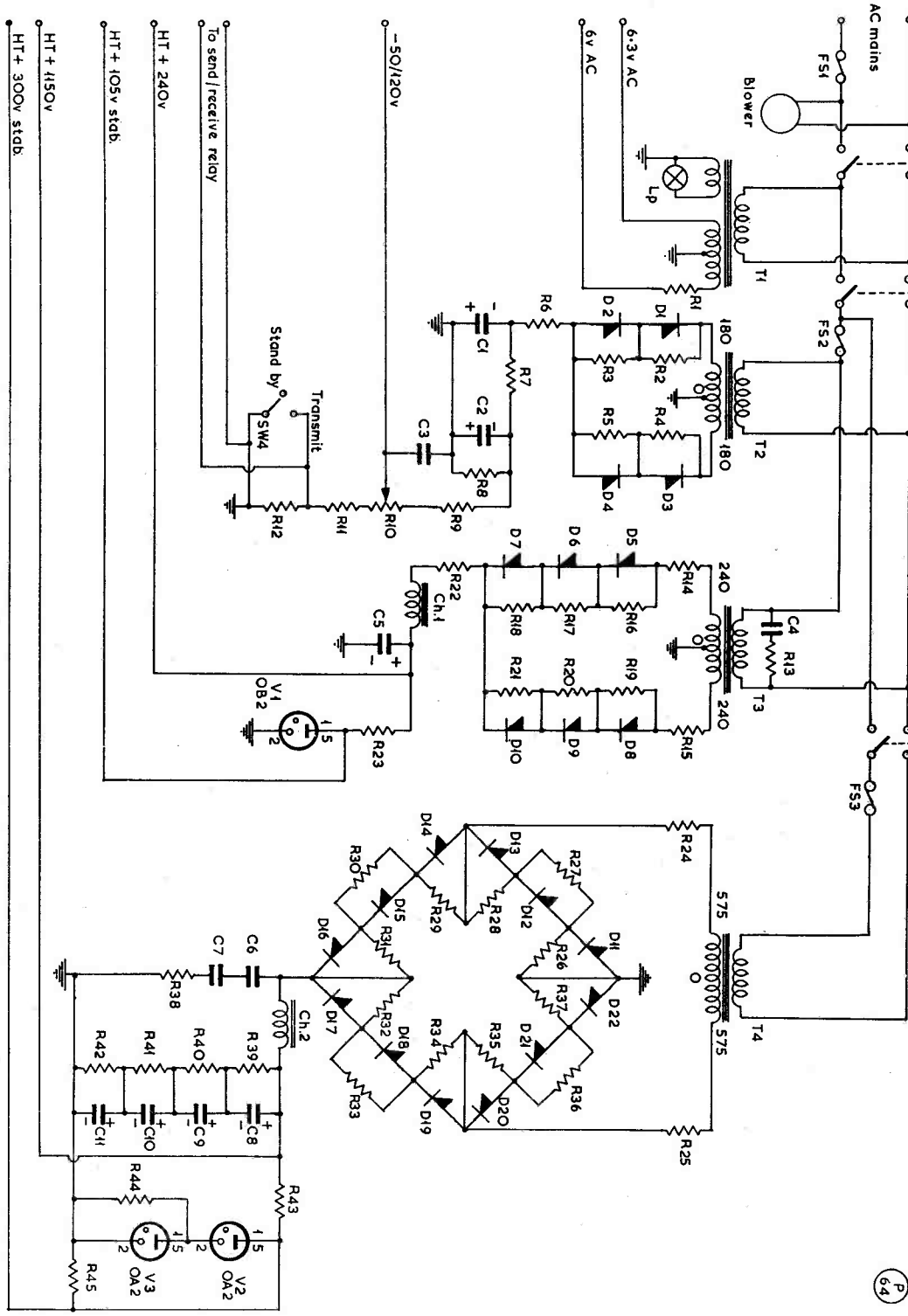
At the time of writing, the transmitter has been in almost daily use for three months and the only fault to develop was a blown pilot lamp. (On examination this proved to be a 2·5 volt bulb which did not appreciate

Table of Values

Fig. 4. Power Supply Circuits

C1, C2 = 8 μF elect, 350v. wkng.
C3 = .001 μF disc ceramic
C4 = .01 μF 800v. AC (*Radio-spares*)
C5, C8, C9, C10, C11 = 64 μF elect. 450v. wkng.
C6, C7 = .02 μF 800v. AC (*Radio-spares*)
R1 = *see text*
R2, R3, R4, R5, R39, R40, R41, R42 = 200,000 ohms
R6, R22 = 100 ohms
R7 = 1,600 ohms, 5-watt
R8 = 15,000 ohms, 10-watt
R9 = 5,000 ohms, 5-watt
R10 = 400 ohms w/w pot., 3-watt
R11, R38 = 2,500 ohms, 5-watt
R12 = 7,500 ohms, 5-watt
R13 = 5,000 ohms, 1-watt
R14, R15, R24, R25 = 10 ohms
R16, R17, R18, R19, R20, R21 = 150,000 ohms
R23 = 5,000 ohms, 10-watt
R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37 = 470,000 ohms
R43 = 30,000 ohms, 40-watt
R44 = 470,000 ohms, 1-watt
R45 = 270,000 ohms, 1-watt
FS1 = 5A. fuse
FS2 = 1A. fuse
FS3 = 3A. fuse
PL = 6v. pilot lamp
CH1 = 5 Hy 100mA choke
CH2 = 5 Hy 250mA choke
SW1, SW2, SW3 = 2-pole 2-way toggle
SW4 = Single-pole 2-way toggle
Blower = Type 26BT 220/240v. AC (*Airflow Developments*)
T1 = Heater transformer with 6.3v. at 1A. and 6.3v. at 5A. twice
T2 = Bias transformer 180-0-180v. at 40 mA
T3 = HT transformer 240-0-240v. at 150 mA
T4 = C-core HT transformer 575-0-575v. at 250 mA
D1, D2, D3, D4, D5, D6, D7, D8, D9, D10 = Silicon power diodes 420v. p.i.v. at 200 mA
D11, D12, D13, D14, D15, D16, D17, D18, D19, D20, D21, D22 = Silicon power diodes 1,000v. p.i.v. at 450 mA
V1 = OB2
V2, V3 = OA2

See October and November issues for Figs. 1–3 Transmitter circuits



POWER SUPPLY CIRCUITS FOR THE THREE-BAND SSB TRANSMITTER DESIGNED BY G3BDQ

the 6·3 volts it had been receiving!) Reports have been excellent, there being no complaints of drift, distortion or spreading. The 80m. pundits appear to have been dismayed, there being no faults for which they could offer remedies. No complaints of TVI have been received, and no low-pass filter has so far been used—only a well matched ATU and an SWR indicator which is always in circuit. It is hoped that many readers will find this article useful and confidently construct transmitters wholly or in part on the lines suggested.

Since the preparation and publication of Parts I and II of this article, it has come to the writer's notice that all the coils for this transmitter, including L7 and L8 (p.468, November) may be obtained from Electroniques, Ltd. The latter are specially produced " Codar-Qoils " and their use would simplify the construction of the PA unit.

In conclusion the writer must thank Electroniques (Felixstowe) Ltd., for their support in producing the special coils and other components for this design. Thanks also to the many amateurs, especially G3GSI, for advice, reports, and encouragement, without which this article would not have been possible.

(Concluded)

TO THOSE WHOM IT MAY CONCERN

The callsigns GB3SWM and G3SWM have been reserved by the G.P.O. for issue to SHORT WAVE MAGAZINE, with Austin Forsyth, G6FO (Editor of the *Magazine*) as the responsible operator. The licence for GB3SWM has already been issued, and that for G3SWM is to follow in the G3S - - callsign sequence.

LAPSED LICENCES—ANOTHER WARNING !

When sending in his callsign/address for the " New QTH " page, GM3KJZ remarked that though he had held this call before becoming VS6DC for a time, because he had not informed the G.P.O. and so kept the licence " alive," he had to take the R.A.E. and the Morse Test to get GM3KJZ back again.

A view across the main hall, taken during the late afternoon of Friday, November 1st, at this year's International Radio Communications (Amateur Radio) Exhibition. The " Short Wave Magazine " stand is at lower left, with Webb's Radio immediately opposite, on the right. The total attendance at the Seymour Hall this year was around 8,000 and about 15% up on 1962. We were happy to welcome a large number of readers and visitors — in fact, there are more names in our visitors' book this time than ever before. The Exhibition itself was quite the most interesting and best-attended yet, and good business was reported round the stands. There were several exhibitors new to the Show, including our neighbours on the other side, Aveley Electric, with hi-fi and stereo demonstrations as well as their well-known transistorised power supply units. The largest exhibitor was K.W. Electronics, with three stands.

A G3GMN print

CRYSTAL SWITCHING IN A TRANSISTOR BFO

USING DIODES FOR SIDEBAND SELECTION

M. T. McCABE

THIS article sets out to show how a transistor, crystal controlled BFO, with sideband switching, can be simply and effectively screened. Considerable interference can be caused by radiation from the oscillator circuits. This usually takes the form of saturation of the AVC amplifier, and spurious responses or " birdies " on the main receiver tuning. It is obvious, therefore, that effective screening and filtering must be provided to prevent such interference.

The block diagram of the receiver employing a crystal controlled BFO is shown in Fig. 1. Switching between upper and lower sidebands is accomplished by changing the crystals used in BFO and LO2. Normal practice would be to perform this crystal switching on a ganged rotary switch. However, in order to maintain a high degree of isolation between the two oscillators, and between the oscillators and the RF and IF amplifiers, the use of such a switch would necessitate quite complex mechanical screening and construction. The ideal form of this construction would require the two oscillators to be positioned around the switch, in order to prevent hot lead runs and troublesome couplings. This has the disadvantage that both oscillators are mechanically tied to the switch and as they feed into different parts of the receiver this would further complicate the layout of the IF circuits.

A secondary disadvantage in the use of a ganged rotary switch, is that it requires a considerable amount of room to mount a good quality switch in small transistor equipment.

Electronic Switching

From the above discussion it can be seen that the ideal form of construction would be one in which the rotary switch is eliminated and the oscillator is completely screened. The lead carrying the oscillator output from the screened enclosure would be run in coax cable and its run would be as short and direct as possible. All other wires leaving the oscillator enclosure, including the power supply leads, would carry no component of the oscillator signal.

In order to eliminate the rotary switch, some other switching device is necessary and investigation showed that this switching function could be carried out by the use of two semi-conductor diodes. The diagram of the circuit in its final form is given in Fig. 2.

In the circuit of Fig. 2, the frequency of oscillation is controlled by one of crystals X1 or X2. The selection of one of the two crystals is made by a DC control signal applied to diodes MR1 and MR2. R1 and R2 form a DC attenuator chain to hold the point X at approximately —4·5 volts with respect to the 0-volts line. If the point Y is joined to the 0-volts line, a DC current will flow through diode R4 and MR2 to point X. At the same time diode MR1, being connected in the opposite polarity, will have a reverse voltage placed across it and, ideally, no current will pass through MR1 and R3. Since MR2 passes DC current it will appear as a very low impedance at the oscillator frequency and X2 will be effectively connected to earth through MR2 and C1. The reverse-biased diode MR1 will appear as a high impedance and will effectively open circuit the path from X1 to earth. Since only X2 is connected, the oscillator will go off at the frequency of X2.

Frequency Reversal

To change the oscillator frequency to that of X1, the point Y is connected (switched) to the —9 volt line. MR1 will now conduct and MR2 will be reverse-biased. This will connect crystal X1 to earth through MR1 and C1 and the circuit will oscillate under the control of X1.

Feed-through capacitor C2 filters out any oscillator signal that may appear at the junction of R3 and R4. Hence the point Y and the external lead from it carries no component of oscillator signal. The lead from point Y is not, therefore, hot and hence it need not be run in screened wire, nor is its lead run critical. Sideband switching can now be carried out on the front panel of the receiver simply by a small SPDT toggle switch.

Choke RFC2 and condensers C9, C10 and C11 form a *pi*-filter to prevent signals from the oscillator leaking

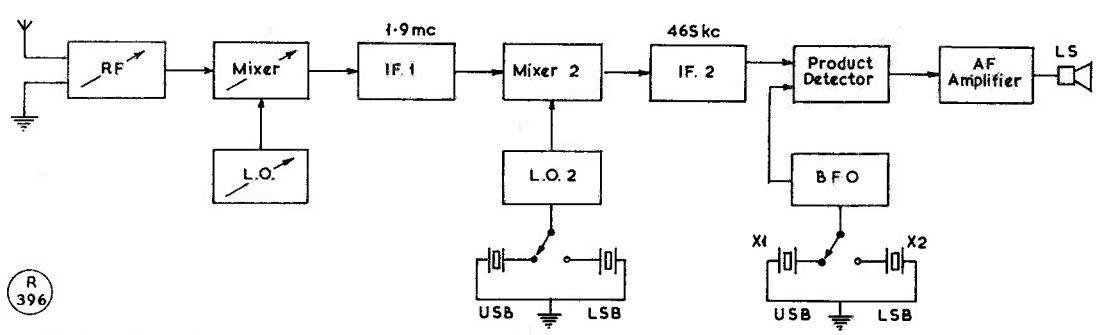


Fig. 1. Simplified block diagram of a receiver using crystal switching for changing sidebands. The article explains how the BFO can be switched by reversing polarity across diodes, thus enabling the BFO unit to be fully and effectively screened, this being essential to avoid unwanted beats.

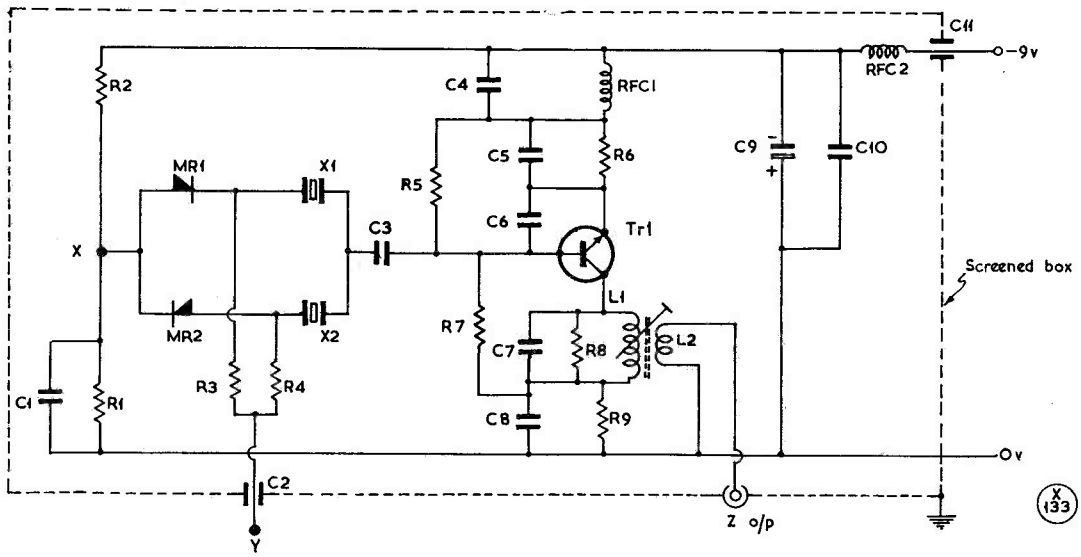


Fig. 2. Circuit complete of the crystal-switched BFO, as described in the text. Switching is effected by connecting the Y-point either to the 0-volt or the -9v. line, thus simplifying construction, since the need for elaborate screening of the c/o switch is avoided. The unit as a whole can be built into a small screening box, located anywhere conveniently on the chassis.

Table of Values

Fig. 2. The Diode-Switched CC BFO Unit

C1, C5, C8, C10	= .01 μF disc cer.	R9	= 1,000 ohms
C2, C11	= .001 μF cer. f/thru	RFC1, RFC2	= 1.5 mH RF chokes
C3	= .001 μF disc cer.	L1, L2	= 465 kc IFT (*see text*)
C4, C7	= 220 μμF, silver mica	Tr1	= N-P-N silicon, *Ferranti* ZT20 (or similar)
C6	= .0015 μF, silver mica	MR1, MR2	= Germanium diodes, OA91 *Mullard* (or similar)
C9	= 50 μF, 12v. elect.	X1, X2	= FT-243A (*see text*)
R1, R2	= 5,000 ohms		
R3, R4, R5, R7	= 22,000 ohms		
R6	= 3,900 ohms		
R8	= 7,500 ohms		

All resistors rated ± 10%, ½-watt

into the —9 volt supply rail and coupling into other circuits. The oscillator output is taken from the point Z and run in coax cable to the product detector.

An oscillator built to this circuit can be effectively screened, and the complete oscillator can be physically positioned in the receiver where it is most convenient for the layout of the IF circuits. In fact, the complete oscillator as shown in Fig. 2, including crystals, has been built on to the inside lid of a small Eddystone die-cast box (No. 896, 4½ins. x 2½ins. x 1in.).

Diode Selection

Diode switching of the oscillator frequency is not, however, as ideal as it may appear at first sight. A diode is not a complete open circuit to RF when reverse DC bias is placed across it. It has a slight reverse DC leakage current, and a space-charge capacity which varies as an inverse function of the applied reverse voltage. In order to reduce these effects the diodes chosen were germanium, point-contact devices. In this circuit they are quite suitable on normal IF ranges of around 465 kc. If it is required to operate a similar circuit at frequencies much above this, it may prove necessary to use a silicon diode of the fast-switching, computer variety, such as the Fairchild 1N3067.

To reduce the circuit sensitivity to diode reverse capacity, relatively heavy damping, in the form of resistor R8, is placed across the oscillator tank circuit. This damping also serves to reduce changes in oscillator output signal amplitude, if the activity levels of crystals X1 and X2 are different. It holds the output signal level relatively constant no matter which crystal is in use.

The crystals used were surplus FT-243A's which were ground to the required frequency. The coil assembly L1/L2 is a small, commercial 465 kc IF transformer designed for the OC45 series transistors. Any such coil could be used but a final IFT for coupling into the detector stage is most suitable from the point of view of turns ratio. The value of C7 should be adjusted to suit the IF transformers chosen and with certain types of IFT it will already be fitted inside the screening can.

The transistor specified for this oscillator is an n-p-n silicon device, manufactured by Ferranti. A p-n-p germanium type such as the OC44 or the OC170 could be used; this would entail reversing the supply polarities, increasing the bleed current through R6 and R7, and trimming the operating point for the higher-gain germanium devices.

ZONE MAP AMENDMENT—SIXPENCE

For those who already have a copy of our wall-mounting *DX Zone Map* dated October 1962, we have produced an amendment-and-correction list to bring the prefix allocations under the Zone headings up to date (to October 1963). This list costs 6d. only —please apply with an s.a.e., or include return postage. Ask for "Zone Map Amendment."

CLASS-C PA CLAMPING BY RELAY

DRIVE CONTROLLED CIRCUIT

J. D. HARRIS (G3LWM)

THE use of a valve to protect a Class-C RF amplifier operating with auto-bias is already well known (Fig. 1). In the absence of grid drive the clamp valve V2 will conduct, reducing the screen voltage to the PA, effectively limiting the PA anode current. With the increasing use of higher power PA stages and the trend to reduce the physical size of transmitters, constructors may be tempted to do without a clamp valve. This is a most unwise and often very expensive step, especially if using modern high-efficiency PA valves. In mobile or portable rigs the temptation is naturally increased as a 6L6 or similar type with a heavy heater current will have to be utilised as the clamp valve.

However, the use of a relay as shown in Fig. 2 offers a very simple and effective method of clamping the PA. Until grid drive reaches a sufficient value to operate RLA, the PA screen will be at earth potential, thus limiting the PA anode current. When the grid drive does increase sufficiently to operate the relay, contacts RLA1 will open, causing the working screen voltage to be applied to the PA. By using a relay with more than one normally closed contact, visual or audible alarm of failure of grid drive could be indicated. The system is "fail to safe," for in the event of relay failure the PA will remain inoperative. The wattage of the PA screen resistor (R2) should be increased in the case of prolonged periods of operating the PA without grid drive; alternatively, the HT feed to the screen resistor could be placed in series with a normally open contact.

No extra power is needed to operate this system, and a number of commercially available miniature relays costing less than 20s. are suitable for this application. Surplus P.O. type 3000 relays with a coil rated for the current involved will also be satisfactory.

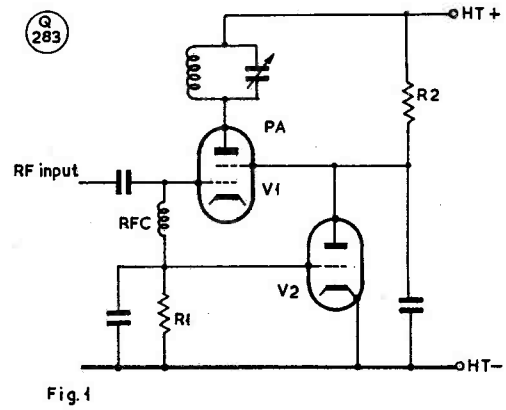


Fig. 1

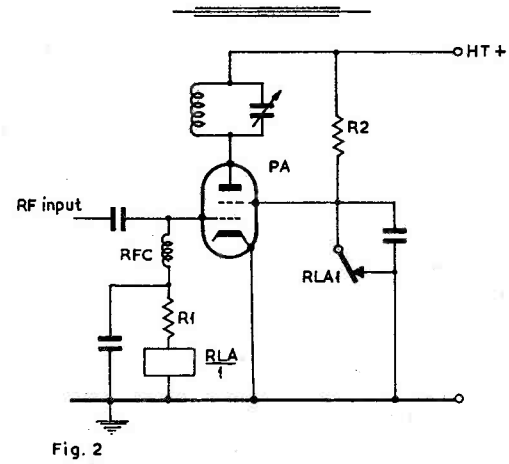


Fig. 2

These diagrams show the screen-control modification suggested by G3LWM. Doing away with the usual clamp valve, it is particularly recommended for mobile rigs. The leak resistor value should be R1 plus the DC resistance of the relay.

MCW ON A SIDEBAND TRANSMITTER

Since an SSB Tx can be modulated by speech, it can also be modulated by an audio tone. If that tone is keyed, the resulting output is MCW, or modulated continuous-wave, or A2J. The tone can be a sharp, 1000-cycle note. If taken on a receiver using a BFO, or with a product detector having a variable beat oscillator, the pitch of the incoming CW-type signal can be varied at the receiving end (as in the case of any CW signal). Variation of receiving pitch can be used to give discrimination between similar MCW signals on the same frequency. Since on a Sideband transmitter, the power-ratio considerations apply equally to tone-CW as to speech, it follows that the transmitter will give a much stronger signal on tone-CW than on "straight-CW" (full carrier). As this goes with pitch discrimination at the receiving end (BFO adjustment) the end-product of the whole system is *(a)* A stronger CW signal for the same mean input as on speech modulation, and *(b)* The ability to work several such MCW transmissions at the same carrier frequency, relying on pitch discrimination for separation at the receiving end. Commercial systems are already building in this facility, and it is high time it was in full use on the amateur bands. All that is required with any existing Sideband transmitter is a little, keyed audio oscillator in place of the microphone. This AF keyer can consist of no more than a transistor in the usual feed-back circuit. Anybody see any flaws? Try it, and see.

DX COMMENTARY

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

WITH the first sunspots of the new cycle already visible, we can assume that we are pretty well at the bottom of the trough of the old one. And if conditions don't go much below their present level, no one will have much cause for complaint.

All six bands under review have been showing plenty of activity—thank goodness a few more people are using *Ten*. Rare DX has been there for the picking, mostly on *Twenty* and *Forty*.

Top Band has been a little disappointing, perhaps, but there is every hope that it will really turn into a DX band for a couple of months, judging by last year.

More and more, we are glad to see, readers' letters are becoming an interesting commentary on the bands rather than just a list of callsigns. We have always encouraged this tendency, as we know that people will *read* a genuine commentary, but pass over a page or so of thickly-packed callsigns. Argument, opinion, even grouses—these are what we want from readers. But, of course, on the subject of DX! (Even a spot of satire wouldn't come amiss.)

At the time of writing, great gales and storms are lashing the southern part of England, and from what we have heard on the bands, the Quads and Yagis are lying pretty thick on the ground. (The "bit of wire" here is still hanging up, thank you!) It seems that some of our aerial farmers leave their annual maintenance session a little too late; the summer and autumn are the time to replace those guys, inspect the roof masts, and thoroughly overhaul the beam and the rotator. But we send our sympathy to those who are minus antennae just at the season when they are most needed.

Another hazard at this time of year is the appalling noise put out by some of the cross-country HV lines in wet weather; many amateurs have been heard complaining about it, and it is a thing that one can do very little to cure, except wait for the weather to dry out. Ah, well, there's always something. . .

DX Gossip

The long-awaited Kuria Muria Islands sortie—mounted by the R.A.F. group from Aden, under VS9AAA (G3NAC)—started up on November 16, clashing, unfortunately, with a phone contest on 21 and 28 mc, and also with the ARRL "SS" affair on the CW bands. However, contacts were made, and no doubt many more are on the way during the rest of their stay. VS9HAA, VS9HRK and VQ4IN/VS9H were all hard at it.

VK9DR, 9MD and 9XI, all on Christmas Island, have been infuriating certain DX-hungry W's by playing chess matches with each other! If this isn't cruelty to animals, we don't know what is . . . YVØAA (Aves Is.) was activated very successfully, November 9-10 . . . ZD7BW has now gone from St. Helena, bound for ZS1, but has left a trap-dipole behind, and ZD7SE is still there.

First station in the world to achieve 300 confirmed on SSB is TI2HP. He collects the K6MLS Trophy for this wonderful feat . . .

VS4FS is a new one, reported on 14080 kc CW . . . YK1AA, on 14 mc AM, appears to be genuine . . . VP8RG, on 14 mc CW, is on South Shetland Is. VP8GQ, who has activated the South Orkneys so brilliantly for nearly two years, is now bound for the Falkland Is.

K1KSH/VK9 and VK5KO have been keeping skeds on *One-Sixty* at 1000 GMT Thursdays (presumably with W's) . . . Small crop of suspected phoneys—EA9DM, PYØAC, CEØZL and ZD3AL . . . W4VGL/KG6 works from Marcus Is. daily on 21413 kc (2200 and 0100 GMT) . . . CEØZI put in a good many hours from Juan Fernandez after arriving four days late.

7G1IX appears to be genuine . . . FS7MB, working contest-style QSO's from St. Martin for about a week, was W3ZQ, to whom the QSL's should go . . . ZS2MI is frequently on 14060 kc CW at week-ends, but seldom seems to hear Europe through the U.S. QRM.

ZS6BBB will be operating as ZS6BBB/ZS8 from January 3-7, and under ZS6BBB/ZS9 from January 8-13. He *may* possibly have the calls ZS8Z and ZS9Z—which would make things a bit tidier! SSB operation, 14105 and 14345 kc, listening 14255-14265; 21105 and 21445 kc, listening 21410-21420; and 7098 kc, listening 7098 and 7200-7210 (thanks to G2HFD for this gen.).

KV4DE is a new station on from St. Croix, Virgin Is. . . . VP8HF still has hopes of getting to the South Sandwich Is. in February, but probably with 40 watts on 40 metres only . . . The rumour that SD1 would be the new prefix for ZS7 was just a rumour. It apparently applies to motor-cars but not to radio licences!

Bouvet Is., activated briefly by Gus as LH4C, may become a weather station. If so, there *might* be an amateur among the crew . . . VQ9HB may possibly appear from VQ8C, VQ8R, VQ8B and Agalega, some time in February . . . Angus Murray-Stone has been active on Twenty CW signing HZ2AMS—in response to many requests to come off phone for awhile!

FU8AG can still be found—if you're lucky—on 14015 or 14040 kc CW . . . FK8AU has also been

heard, mostly 14 mc SSB . . . VS9PHH (Perim Is., but counts as Aden) will be there for two years and is expecting a beam shortly.

CONTEST DATES

December 7-8:	OK CW DX Contest
January 11-12:	ARRL CD Contest (*CW*)
January 18-19:	ARRL CD Contest (*Phone*)
January 25-26:	"CQ" Worldwide 160-metre Contest French (DUF and DPF) Contest, *CW*
February 8-9:	ARRL DX Contest (*Phone*)
February 22-23:	ARRL DX Contest (*CW*)

The annual **Top Band Trans-Atlantic Tests** (*not* a contest) will take place on the mornings of December 15; January 5 and 19; and February 2 and 16. Time, 0500-0730. W and VE stations call during the first, third and fifth five-minute periods, and so on. Europeans call during the second, fourth and sixth periods (*e.g.* at 0505-0510, 0515-0520 and so on). Europeans **DO NOT** call in the 1800-1830 kc sector, *at all*. Logs to "DX Commentary," please, after each morning of the tests. The idea is to operate *cross-frequency*, in order to avoid local QRM. U.K. stations who call blind CQ's on top of the DX will not be popular, to say the least!

DX from the Business End

A letter from Gus Browning, in W4KVX's *DX*, includes the following noteworthy remarks: "I am very glad we have not had to stoop to the level of the 'buck per QSL.' We send QSL cards to every QSO in the entire log book, regardless of whether any donation is made or not We want help only from the fellows who can afford to help us—no one else . . . It's hard to believe that when the bands are open I find that almost every signal is the same strength out here . . . but there is nothing that is better for your chance of a good QSO than to choose the *exact moment* when skip is at its peak. Lots of times this 'just right' skip lasts only 5 or 10 minutes, so I say, boys, watch for that peak skip—it passes you very fast.

"As a further tip, I still like the *edges* of the pile-up—usually the edge away from my frequency . . . I still hear lids calling on my frequency, and there are quite a number of stations who have never worked me because they insist on doing so. I wonder why they think I send '5 kc up' or '7 kc down' etc.? . . . Boys, remember one thing when I am set up and on the air: I will be on some band if it's open to anywhere in the world. I can get by with 4 hours or less sleep per day. All I want is some band be open to somewhere, so I can have more QSO's. The bigger the pile-up, the more I love it. It's not possible for too many to call me, but I will admit that it does reduce a fellow's chances for a quick QSO when the pile is 'way up high."

Gus adds that he has about 7,200 colour slides of his trip, and that his health is the best he has ever enjoyed. What a man!

Georges Demey, ON4OJ, of 28 Graaf de Brieylaan, Bruges, Belgium visited our stand at the recent Amateur Radio Exhibition and left this photograph. The lady is Mme. Demey, who was with him. ON4OJ has a KW-77 Rx, and his transmitter is a home-constructed 120w. job. Licensed originally as EB4DC more than 30 years ago, his main interest is in CW/DX on the HF bands.

News from Overseas

Peter, VP8GQ, leaving the South Orkneys very shortly, will be staying with VP8HJ in Port Stanley, Falklands, for a while. Then he will return home and become G3LET again, after having done a tremendous job of consistent operating, with outstanding DX worked on six bands.

G3RJJ is a frustrated listener aboard m.v. *Crystal Sapphire*. He writes from VQ8-land, having travelled there from the U.K. *via* Canada, and much outstanding stuff was heard on the latter part of his trip; he thinks the easiest place from which to work rare DX is probably the Indian Ocean. In Lourenço Marques he met the CR7 gang, one of whom was presented by a W with an SSB rig—just because the W "wanted CR7 on SSB"! In Mauritius, G3RJJ encountered K1IZB, passing through with an Oceanographic Research Vessel packed with electronic equipment (W5GTJ is also aboard as one of the scientists, K1IZB being the "sparks").

G3RFH/MM duly became VP8HF/MM, having first worked quite a lot of DX on 28 mc—*see* under heading "Ten Metres." From now on he will take advantage of the reduced restrictions and will doubtless be using the other bands.

Likewise a long list of stations worked on 28 mc appears under

REPORTING ACTIVITIES ON SIX BANDS

the same heading, from ZE2JA (Borrowdale)—quite a noted ten-metre diehard.

W1WY, contest manager of *CQ*, sends an advanced list of the Contest Calendar for 1964. If you are looking for a week-end *not* clobbered by some contest or other, QRX until June 13-20—that's the first one. We will publicise the worthwhile events month by month, as always.

G3RWF has just acquired the call 9L1NH, in Freetown, and is busy completing a CW rig (60 watts) for Forty and Twenty. His reaction, so far, is that "if some of the lesser brethren could hear themselves out here, even they would improve their operating standards." He will be in Sierra Leone for a year and wants to work all the G's.

Around the Bands

Quick summary: *Ten*, interesting but neglected; *Fifteen*, DX-worthy but only on certain days and times; *Twenty*, open to somewhere all the time except for a few hours during the night; *Forty*, all right if you know how to dig; *Eighty*, a good band for the night owls; *One-Sixty*, dull for DX as yet, but surely beginning to wake up.

FIVE BAND TABLE

Station	14 mc	21 mc	1.8 mc	3.5 mc	7 mc	DXCC Total
W6AM	306	87	8	30	59	327
G3DO	306	223	10	74	69	315
G2DC	295	273	14	103	155	314
G3FXB	290	270	9	105	164	314
G3FPQ	273	258	28	120	139	301
G3NOF	215	188	2	33	23	256
G2YS	190	131	22	75	99	213
G3KMQ	189	77	13	47	65	210
G3IGW	132	127	28	53	102	184
G3NFV	112	125	17	57	44	177
G3PEK	109	51	14	36	81	125
G3RFS	109	30	7	9	56	112
G2BLA	100	99	10	40	77	153
GW3CBY	81	34	20	37	56	103
G3RFE	67	69	1	25	4	112
GW3PSM	62	34	1	27	39	84
G3IDG	53	66	11	17	27	94
G3NYQ	42	31	12	31	38	69

NOTE: *This is the last appearance of the Five-Band Table for the time being. See text for details of the new "Zone-Band Table," to start next month.*

Ten Metres

G3NOF found good openings to West and South Africa, and to South America; even one or two to the States. Worked, on AM: G3RFH/MM off West Africa, LU1DAB, ZS4F and 5OA, 5A4CW, 5N2JKO, 6W8AE. On SSB: CX8BM, ZD7BW, K2UUY, W8FGV.

G6FB, with 75 watts of CW, worked VP8GQ (1740), 9Q5AB (1500) and VQ2BC (1400)—all on a 21 mc indoor ground-plane! G3IDG heard 17 countries, nine of them on CW, nearly all African, but including also CX2CO (1120), PY7JZ (1625) and 4X4WF. The ZE's, VQ2's, ZS's and a CR7 were all logged during the mornings. ZD7BW was heard on CW at 1615.

G3SEF lost very little time getting on the band with 60 watts of AM (to a 14 mc G-P!) and got 59 reports from DJ and DM.

G3RFH/MM, on H.M.S. *Protector*, sends a report of his doings between the English Channel and Dakar. He worked a load of Europeans plus 9Q5EH, VQ2BC, VP8GQ, ZS's, W5NMS and KØILA (from Gibraltar); 6W8AE, 5H3IW, LU and more W's (south of Canary Is.); and, of course, quite a number of G's, from Gibraltar downwards, some of whom said it was their first 28-mc contact. G3RFH says he hears most of his stations from 1500 onwards. By now he should be near the Antarctic regions, as the ship is starting another tour of duty down there.

ZE2JA sends a long list of stations worked, including many G's, and most of *his* contacts occurred between 0900 and midday, with another small peak around 1500 on some days. Other interesting ones worked from ZE2 were W3FSF, VE1OC, W4PQR, W4FT, 5B4's, PY, LU, and a well-spread batch of Europeans.

SWL R. R. Loe (Colchester) covered the 10-metre band between 1500 and 1700 GMT. At this time he heard CE3SH, CR6, CR7, CX's, PY1-5, VQ2WZ, ZD7BW, 9 ZE's, 12 ZS's, 9G1EC and 1DM, 5N2JKO and 2HJA, LU's. He remarks that most of the South Americans heard were the same stations that he logged on the band last year.

Fifteen Metres

More and more people seem to be leaving *Twenty* for the comparative peace and quiet of *Fifteen*, with varying degrees of success. SSB doesn't seem to be made enough of, although GW3AHN can't be criticised on this score, since he worked CR7, CX's, ET3, HC2JT, KP4's, PY1MCC, VP2KI and 2KT, VP9BY, VQ4, YVØAA, ZD7BW, 6O1WF, VS9HAA and MP4QBF, all on SSB. On CW, VP8GQ, YVØAA and the VS9H boys.

G3LPS worked phone with VE1-3, 9G1DM and 5N2RSB. G3MBL likewise with ET3GN, ZS1BV and VQ1IZ. G6FB, with his indoor ground-plane, had CW contacts with VP8GQ, ZD8WF, ZD3A, HK7CT, MP4DAH, CR6, KG4, 5N2, 9Q5, TI2, 5H3, 5X5 and many others.

G3NOF comments on the frequent morning openings to Africa, Near East and VK. On AM he worked HI8MMN, VP2SY, VP7CX, ZD3A, 5N2CKH, 2JKO, 5X5IW. 5JK, 9G1AB, ICC and 9Q5HF. On SSB, CX's, ET3RT, KP4, TT8AJ, TU2AU, VQ2 and 4, ZD7BW, 5N2's and 9G1EX.

G3NWT, on AM, collected ET3USA, VP2SY, FG7XL, CX, VP7NX, VQ8BS, PZ1BK, 6YALT, ZP5EB, 9Q5FD, CR6GO, 9G1's, 5N2's, VQ2's and 6W8AE. Heard, but not worked — FB8XX, 7X2REA, HC, ZD6, ZD3A, ZS7L, ZS8X, CR5, M1B, FM7, HI8, all on AM.

Twenty Metres

We now come to the territory where there is so much DX that only the very best will filter through from some of the long lists received. G3DO worked SSB with AC5A/AC4, VK4JQ/Willis, TU2AU, PJ5MF and 5T5AD.

GM3JDR worked CW with AC3PT, AC7A, AP2AR, EL8AC,

M1XS, MP4DAH, TL8SW, VP8GQ and 8HD, ZD8HB, ZS2MI and 9N1MM; SSB with AC3PT, HS1X, JA's, JT1KAA, KA2RJ, KG6, KL7, MP4TAX, PJ5MF, VK9DR, VP2KT, 2VS and 7NS, VS4RS, YA1A, ZD7BW, 5T5AD and 9N1MM.

G3SEF (75 watts and ground-plane), on CW, collected M1XS, ZD8WF, 6W8AC, VP8GQ, MP4QBF, VS9, VU, VK, W's and PY8's; on AM, PX1MO, W's, VE's and VK6RX (at 1410). This, with the 10-metre activity, added up to 54 countries in his first three months on the air—now for SSB!

G3LPS, on CW, raised VK7SM, FB8XX and VS9H G6FB, same mode, got VP8GQ and JA1BN plus "usual stuff," as he says. G3NOF, on SSB, made it with BV1USE, FG7XT, KG1FY, TC3ZA, TT8AN, TI6CAL, PJ5MF, VE7 and 8, VK4JQ, VP2KT, VS9H, YA1A, YVØAA, ZD7BW, 5X5FS and a lot more.

GW3AHN mentions only CT4AR and YVØAA on CW, but from a very long SSB list we quote CEØZI, DU1AA, HC2JT, HL9KH, HI8XAA, PJ5MF, TG9GZ, TIØRC, VP2GAC, 2KI and 2KT, VS4RS, YA1A, YVØAA, ZD7BW and VS9H.

Forty Metres

G2DC reports for this band only this month. On CW, with his newly-erected ground-plane, he collected FY7YK, HC1DC, JT1CA, UI8, UL7, UM9, VK3XB, VP8GQ, VQ4IV, VE, W, ZL, 6W8DD, 9Q5AB and the VS9H boys, plus AC3PT, VS9OC and 9N1MM for new ones.

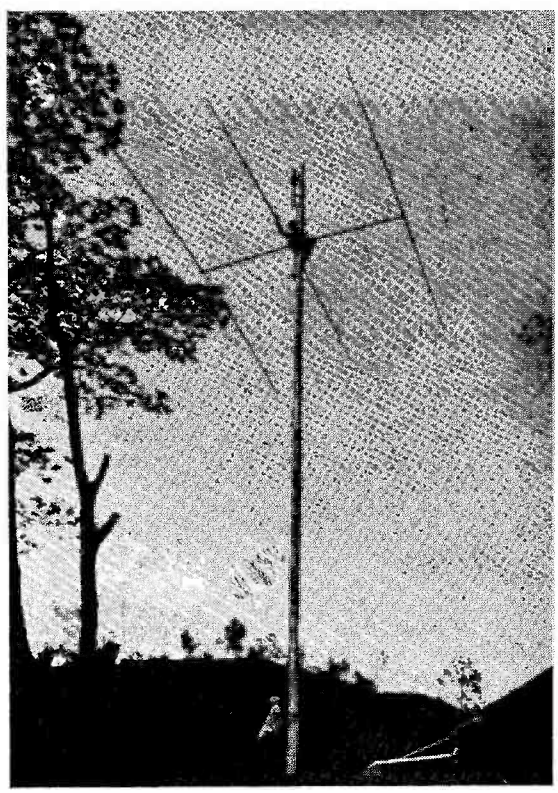
G3LPS, also using CW, netted VK3XB and 5KO, ZL4JP, VP3YG, ZD8HB, 6W8DD, MP4QBF, ZD7BW, PX1CR, K6AHV (2315), OX3DL and PY8DI.

G3DO is the only one to report on 40m. SSB; it scooped up VQ2WR, 5A1TW, TI2JIC, VS1LP and MP4BBW; he intends to spend more time on this band and Eighty "during the dark evenings."

Eighty Metres

Hardly anyone mentions this band, although the DX has been there. SWL Barry Cushing (Whyteleafe) logged the ZL's (1AIX, 4LM and 4OD) many mornings (0620-0705), and also heard OX3JV, 5A3CJ, 4X4DK, ZB1CR, F9RY/FC and TIØRC, plus plenty of W's and VE's—all on phone. The ZL's were best from October 8-23, after which

[*cont'd. p.554*



Ian Wollen, 4S7IW, Cannavarella, Namunukula, Ceylon, has sent us a series of photographs taken during the erection recently of a 70-ft. pole surmounted by a 3-ele beam for 20 metres — quite an undertaking! Even with plenty of estate labour available, the operation had to be carefully planned and directed if nasty accidents were to be avoided. The mast is actually a trimmed eucalyptus tree, cut from close beside his bungalow, and the first problem was to get its butt into a 14-ft. hole. The photograph on the left shows the mast at the critical angle. On right, the beam — which is a Hy-Gain, for 14 mc — is on its way to the top. And in case you thought this mighty erection was to clear some local obstruction, Ian remarks that his bungalow is already 4,300 ft. a.s.l. — all of which explains 4S7IW's punching signal in the U.K.

LIST OF COUNTRIES BY PREFIXES

(Corrected to December 1963)

CURRENT PREFIXES ONLY

AC3	Sikkim
AC4	Tibet
AC5, 7, 8, 9	Bhutan
AP	East Pakistan
AP	West Pakistan
BV	Formosa
BY	China
CE	Chile
CE9	*see* Antarctica
CEØA	Easter Island
CEØX	St. Felix
CEØZ	Juan Fernandez
CM/CO	Cuba
CN	Morocco
CP	Bolivia
CR4	Cape Verde Is.
CR5	Portuguese Guinea
CR5	St. Thomas and Prince Is.
CR6	Angola
CR7	Mozambique
CR8	Timor
CR9	Macao
CT1	Portugal
CT2	Azores
CT3	Madeira
CX	Uruguay
DJ, DL, DM	Germany
DU	Philippines
EA	Spain
EA6	Balearic Is.
EA8	Canary Is.
EA9	Spanish Morocco
EA9	Ifni
EA9	Rio de Oro
EAØ	Spanish Guinea
EI	Eire
EL	Liberia
EP	Iran
ET3	Ethiopia
F	France
FB8	New Amsterdam
FB8	Kerguelen Is.
FB8	Crozet Is.
FC	Corsica
FG7	Guadeloupe
FH8	Comoro Is.
FK8	New Caledonia
FL8	French Somaliland
FM7	Martinique
FO8	French Oceania
FO8	Clipperton Is.
FP8	St. Pierre and Miquelon
FR7	Reunion
FR7	Glorieuses Is.
FR7	Juan de Nova and Europa
FR7	Tromelin
FS7	St. Martin
FU8	New Hebrides
FW8	Wallis and Futuna Is.
FY7	French Guiana
G	England
GC	Jersey
GC	Channel Is. (*excluding Jersey*)
GD	Isle of Man
GI	N. Ireland
GM	Scotland
GW	Wales
HA	Hungary
HB	Switzerland
HC	Ecuador
HC8	Galapagos Is.
HE (HB--/FL)	Liechtenstein
HH	Haiti
HI	Dominican Republic
HK	Colombia
HKØ	San Andres Is.
HKØ	Malpelo Is.
HKØ	Bajo Neuvo Is.
HL, HM	Korea
HP	Panama
HR	Honduras
HS	Thailand (Siam)
HV	Vatican City
HZ	Saudi Arabia
I	Italy
IL	Pelagian Is.
IP	Pantellaria
IS	Sardinia
IT	Sicily
JA, JB	Japan
JT1	Mongolia
JY	Jordan
K	*see* W
KA	*see* JA
KAØ	*see* KG6I
KB6	Baker, Canton, Howland and American Phoenix Is.
KC4	*see* Antarctica
KC4	Navassa Is.
KC6	Eastern Caroline Is.
KC6	Western Caroline Is.
KG1	Greenland
KG4	Guantanamo Bay
KG6	Guam Island
KG6	Marcus Island
KG6I	Bonin Is. and Parece Vela
KG6R, S, T	Marianas (Rota, Saipan, Tinian)
KH6	Hawaii
KH6	Kure Is.
KJ6	Johnston Is.
KL7	Alaska
KM6	Midway Is.
KP4	Puerto Rico
KP6	Jarvis and Palmyra Is.
KR6	Ryukya Is. (Okinawa)
KS4	Swan Is.
KS4B	Serrana Bank and Roncador
KS6	American Samoa
KV4	Virgin Is. (U.S.)
KW6	Wake Is.
KX6	Marshall Is.
KZ5	Canal Zone
LA	Norway
LA-/P	Jan Mayen
LA-/P	Svalbard (Spitzbergen)
LA, LH	Bouvet Island
LA--/G	*see* Antarctica
LU	Argentina
LU-Z	*see* Antarctica
LX	Luxembourg
LZ	Bulgaria
M1	*see* 9A1
MP4B	Bahrein
MP4D	*see* MP4T
MP4Q	Qatar
MP4M	Muscat and Oman
MP4T	Trucial Oman
OA	Peru
OD	Lebanon
OE	Austria
OH	Finland
OHØ	Aland Is.
OK	Czechoslovakia
ON	Belgium
OR4	*see* Antarctica
OX	*see* KG1
OY	Faeroe Is.
OZ	Denmark
PA, PI	Netherlands
PJ	Dutch West Indies
PJ--M	Sint Maarten
PX	Andorra
PY	Brazil
PY	Fernando do Noronha
PYØ	Trinidade Is.
PZ	Dutch Guiana
SM, SL	Sweden
SP	Poland
ST	Sudan
SU	Egypt
SV	Greece
SV	Crete
SV	Dodecanese Is.
TA, TC	Turkey
TF	Iceland
TG	Guatemala
TI	Costa Rica
TI9	Cocos Island
TJ8	Republic of Cameroon
TL8	Central African Republic

TN8 Congo Republic
TR8 Gabon
TT8 Tchad Republic
TU2 Ivory Coast
TY2 Dahomey
TZ Mali Republic
UA1-6 USSR (Europe)
UA1 Franz Josef Land
UA1 *see* Antarctica
UA2 Kaliningradsk
UA9, Ø USSR in Asia
UB5 Ukraine
UC2 White Russia
UD6 Azerbaijan
UF6 Georgia
UG6 Armenia
UH8 Turkoman
UI8 Uzbek
UJ8 Tadzhik
UL7 Kazakh
UM8 Kirghiz
UN1 Karelo-Finnish Republic
UO5 Moldavia
UP2 Lithuania
UQ2 Latvia
UR2 Estonia
UT5 *see* UB5
UV, UW *see* UA
VE Canada
VO Newfoundland and Labrador
VK Australia and Tasmania
VK Willis Is.
VK Lord Howe Is.
VK9 Christmas Is.
VK9 Cocos-Keeling
VK9 Nauru
VK9 Norfolk Is.
VK9 Papua Territory
VK9 New Guinea
VKØ *see* Antarctica
VKØ Heard Is.
VKØ Macquarie Is.
VP1 British Honduras
VP2 Anguilla
VP2A Antigua and Barbuda
VP2D Dominica
VP2G Grenada
VP2L St. Lucia
VP2M Montserrat
VP2K St. Kitts and Nevis
VP2S St. Vincent
VP2V British Virgin Is.
VP3 British Guiana
VP4 Trinidad and Tobago
VP5 Cayman Is.
VP5 Turks and Caicos Is.
VP6 Barbados
VP7 Bahamas
VP8 Falkland Is.
VP8 South Georgia
VP8 South Orkneys
VP8 South Shetlands
VP8 South Sandwich Is.
VP8 *see* Antarctica
VP9 Bermuda
VQ1 Zanzibar
VQ2 Northern Rhodesia
VQ8 Mauritius
VQ8 Chagos Is.
VQ8 Cargados Carajos
VQ8 Rodriguez Is.
VQ9 Seychelles
VQ9 Aldabra Is.
VR1 British Phoenix Is.
VR1 Gilbert and Ellice Is.
VR2 Fiji Is.
VR3 Fanning and Christmas Is.
VR4 Solomon Is.
VR5 Tonga
VR6 Pitcairn
VS1 Singapore
VS4 Sarawak
VS5 Brunei
VS6 Hong Kong
VS9 Aden
VS9O *see* MP4M
VS9M Maldive Is.
VS9H Kuria Muria Is.
VS9K Kamaran Is.
VU India
VU Andaman and Nicobar Is.
VU Laccadive Is.
W U.S.A.
XE, XF Mexico
XE4 Revilla Gigedo Is.
XT2 Upper Volta
XU Cambodia
XW8 Laos
XZ Burma
YA Afghanistan
YI Iraq
YJ *see* FU8
YK Syria
YN Nicaragua
YO Rumania
YS Salvador
YU Yugoslavia
YV Venezuela
YVØ Aves Is.
ZA Albania
ZB1 Malta
ZB2 Gibraltar
ZC3 *see* VK9, Christmas Is.
ZC5 British North Borneo
ZC6 Palestine
ZD3 Gambia
ZD6 Nyasaland
ZD7 St. Helena
ZD8 Ascension Is.
ZD9 Tristan da Cunha, Gough Is.
ZE Southern Rhodesia
ZK1 Cook Is.
ZK1 Manihiki (Danger Is.)
ZK2 Niue and Aitutaki
ZL New Zealand
ZL Chatham Is.
ZL Campbell Is.
ZL Kermadec Is.
ZL5 *see* Antarctica
ZM7 Tokelau Is.
ZP Paraguay
ZS1, 2, 4, 5, 6 Republic of South Africa
ZS2 Marion Is.
ZS3 South West Africa
ZS7 Swaziland
ZS8 Basutoland
ZS9 Bechuanaland
3A2 Monaco
3V8 Tunisia
3W8 Vietnam
4S7 Ceylon
4U1 United Nations
4W1 Yemen
4X Israel
5A Libya
5B4 Cyprus
5N2 Nigeria
5R8 Madagascar
5T5 Mauritania
5U7 Republic of Niger
5V4 Togoland
5W1 Western Samoa
5X5 Uganda
5Z4 Kenya
6O Somali Republic
6W8 Senegal
6YA Jamaica
7G1 Republic of Guinea
7X2 Algeria
8J1 *see* Antarctica
9A1 San Marino
9G1 Ghana
9K2 Kuwait
9K3 Neutral Zones
9L1 Sierra Leone
9M2 Malaya
9N1 Nepal
9Q5 Republic of the Congo
9U5 Burundi
9X5 Rwanda

Antarctica: CE9, KC4, LA--/G, LU--/Z, OR4, UA1, VKØ, VP8, ZL5, 8J1—*all apply.*

they seem to have vanished.

The habitual DX-chasers did find things going off a bit after October, but there seems to be no lack of W's and VE's, both late at night and early in the morning.

Top Band Topics

The DX season has not really opened up yet, but everyone feels that it is going to be terrific. The dates for the official tests are quoted elsewhere (*see* p.549) and we wonder when the big morning is going to be—late January or perhaps early February? Stew Perry promises something special, with an inverted V-doublet—the apex 260 feet high—over salt water

TOP BAND COUNTIES LADDER

Station	Confirmed	Worked
CW and Phone		
G2NJ	98	98
G6VC	97	98
G3GGS	97	98
G3NPB	94	98
G3LWQ	94	95
GM3KLA	93	95
G3REA	92	93
G3OLN	86	92
G3RFE	85	90
G3NFV	85	87
G3PLQ	84	93
G3PHO	76	92
G3PDM	74	82
GM3IKD	65	75
G3RHM	62	66
G3REP	60	77
G3RJH	54	76
GM3PPJ	52	69
G2BP	52	59
G3IDG	50	53
G3HZL	25	52
Phone only		
G3FS	88	89
G3NPB	85	86
G3RHM	55	60
G2NJ	50	51
G3OLN	36	49
G3LHJ	27	31

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

on the very edge of the Atlantic.

He points out that these 160-metre Trans-Atlantic tests are "symbolic of the original pioneering crossings by Deloy, Schnell, Reinartz and Godley in 1921, and held every year since 1932."

Other flashes from W1BB's bulletin: VE2UQ "cracked the Arctic Circle" by operating from Baffin Island, whence he raised W2EQS (first), VE1ZZ, K9YWO and W1BB. VE2UQ also made a DX-pedition to Prince Edward Island, to raise G3OUV and several W's.

K1KSH, a keen Top Band man, is in Port Moresby, Papua, with permission to hang a wire from two 150ft. towers and to operate in the band 1840-1860 kc.

Don't forget the *CQ* Worldwide Top Band Contest on January 25-26 . . . 5N2JKO, who made a "first" on the band with W1BB in September, has a 530ft. wire up in readiness for the coming season . . . W8GDQ and others have been working ZL3RB quite frequently.

G3GRL found OH3NY on the band again, with 579 signals, but apparently no one after him; he also worked 5B4KG, HB9QA and 7X2BM (Algeria) for a new one, at midnight on 1829 kc.

G3PLQ, while 13 miles off Sierra Leone, logged DL1FF, G3PU, G3OUV and G3GRL. Others heard while off the coast of Morocco and Rio de Oro were G2FIX. 3LYW, 3GKQ and DL1VW. He says he would hear far more "if the QRN would die down sometimes." By November 25 he was expecting to be back in Liverpool and then "shanghaied to another ship."

G3PHO, after trying to get across for two years, worked VE1ZZ on October 6, although he thought conditions quite poor. Heard, the same morning, W1BB, 1TX, 2KHT, 2EQS. G3PHO uses "260ft. wire bent five times"!

GM3KLA (Shetlands) has apparently got up a mammoth aerial consisting of a 130ft. vertical radiator and an earth system including 3,500 feet of wire.

The usual county-chasing and European work has been going strong. We haven't the space to cover it here, but would like to acknowledge letters and WABC scores from G3REA, G3PPE, GM3JFS, G3RHM, G3RJH and G3FS.

Finally, G3IDG remarks that with the activity from VK, VQ4 and 5N2, the total possible on this band from the U.K. is now 83. DXCC one day?

General Chat

The Cotswold Radio Contest Club (secretary, G3OLN) have originated an award called "15 on Top"—for fifteen countries worked on One-Sixty. One of the first applicants was (guess who?) —W1BB! The Club is accumulating quite a lot of equipment and a goodly collection of aerials. It's *operators* that are in short supply.

The first G station (and one of the few in the world) to collect the CHC's Top Honours—for holding more than 200 awards—is G2GM, who had a nice mention in the Home Service recently on this score. Unless we mis-heard the item, it appears that the very first of these Top Honours Awards went to a Mexican station, and a *national holiday* was proclaimed in his honour. The Isle of Wight did no such thing for G2GM, much as he deserved it!

G3IDG has a new Pet Hate: Newly-licensed G3S-- stations who call "CQ GDX" on Top Band, are not yet in the *Call Book*, and don't sign their county as they call—so who is GDX and who isn't?

G3LPS had the GPO investigating some break-through on a Hi-Fi set-up, and was asked to transmit for about ten minutes. So he called CQ DX on Forty—and back came VK5KO!

G2DC has been off for some weeks owing to his "annual overhaul of equipment and aerials," in the middle of which his XYL was taken ill. However, all is well now; most important, the XYL; and, outside, the 3-band Quad is rebuilt and motorised, the 275ft. Zepp raised to 40 feet, the 7 mc ground-plane re-furbished, and the Minibeam dismantled. All is now set for the contest season. (Jack has won the WAE for six years running, from the U.K. point of view, and the *CQ* Worldwide for the last two years . . . he would

like some competition from the U.K., especially from some of those who deride contests and say "anyone can do it if they've got the time.") Incidentally, he had a good laugh at last month's suggestion (from G3RUS) that he hadn't been to sleep at night for the last ten years, and says that that crack is roughly 25 years out-of-date.

G3FYR, now in Bromley, is ex-GM3FYR, and is looking for a good QTH. He is convinced that, while a beam and high-powered SSB helps considerably, a large share of the battle is a *good QTH*, from which even an old "steam radio outfit" will achieve worthwhile DX. He had an excellent one at Stornoway, and used to work stations (with 30 watts and a vertical) that other GM's couldn't hear. Somewhere around Bromley there must be a place like that, and he hopes to find it (if G8KS hasn't already annexed the only one!). At present he has to do the best he can from a furnished flat.

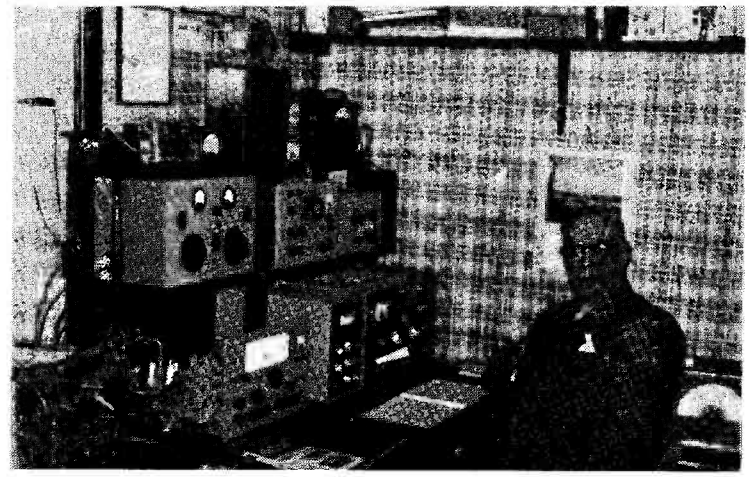
TOP BAND LADDER

(G3P-- and G3R-- stations only)

(Starting Date, July 1st, 1962)

Station	*Counties*	*Countries*
G3REA	93	16
G3RRU	91	16
G3PLQ	90	15
G3RBP	87	25
G3PVK	83	15
G3PWY	83	14
G3RJH	76	12
G3RHM	73	11
G3PPE	71	13
G3RFT	68	8
GW3PPF	67	12
GM3PPJ	61	12
GI3RCS	61	9
G3PRT	53	10
G3RQT	49	10
G3PMR	46	10
G3RJM	45	10
G3RJI	45	5
G3RDQ	42	8

(NOTE: *The final appearance of this ladder will be in the February, 1964 issue, including all scores up to December 31, 1963).*



On p.471 of the November issue, we mentioned GM3SLW, Halkirk, Caithness, who passed his exams. and has come on the air at the age of 62. Much of his gear has been built from Magazine designs, and he particularly recommends the G3BDQ receiver (June-July, '62) and the transistorised broad-band amplifier (April, '63). His aerial is a small V-beam, as described in our issue of April '62. With the DX-100U run in the AM mode, he made more than 40 contacts in about 10 countries in less than three weeks. GM3SLW says he feels that this is "not too bad for an old fellow who is only a beginner" and that the enormous enjoyment he is getting from Amateur Radio has made it all worth while. Good luck to him in the DX stakes for many years to come.

DX News from Readers

From G2DC: VKØVK said there was no present activity from Heard Island, but there might be by January or February. Macquarie is now available, VKØDM being active, and he is being persuaded to come on at suitable times for G stations, now that the 14 mc channel is open again . . . VS9OC, worked on 7 mc, said he was packing up and leaving for home within a few days. He will complete the outstanding log of QSL cards from his G QTH.

From G3NOF: 5N2RSB will be taking an SR-150 and SX-117 on his DX-pedition to TJ8 (first week in December); then to 5U7 (first week in January) and to TY2 (first week in February) . . . Rundy, TC3ZA, confirmed that he is the only station in Turkey authorised to work the amateur bands. The call belongs to a Naval Experimental Station, and is used on the amateur bands to make propagation studies. Other TA's are in Turkey, all right, but "under cover."

From GW3AHN: The CEØZI sortie, by W4QVJ, went off very well, and the best time for Europe proved to be 0800-0830 . . . YVØAA likewise excellent on 14 and 21 mc, with a few European contacts also on 7 and 3·5 mc . . . VS4RS, hitherto on 14301 kc SSB, now has crystals also for 14260 and 14120 kc . . . YK1AA, in Damascus, active on 14315 kc AM and also on CW at the low end; *Call Book* QTH is OK . . . HL9KH has a licence for operation from Cambodia, but he is not allowed to work the U.S.A. from there; he was due to leave Korea on December 1.

From G3NWT: VQ4HX is now in Sierra Leone with the call 9L1DO . . . VQ4AQ was planning a 300-ft. vertical Top Band, off one of the stays of his TV mast, and "the most harrowing piece of recent listening was hearing a well-known G2 in a famous University town telling him that the trouble with a sked was that we were confined to 10 watts."

From SWL Dave Gray (Easington): VS4RS, with a Quad, now radiates a 14 mc signal comparable with his fine effort on 21 mc AM . . . VP8GQ was heard on one of his rare excursions on SSB (14290 kc) . . . VS1MB (G3NJM) also has a fine SSB signal, 14260 kc, around 1415 GMT . . . After successful sorties as MP4MAP and MP4TAX, Angus Murray-Stone is settled at Riyadh, Saudi

Arabia, signing MP4MAP/HZ, and plans a 10-wavelength rhombic for 14 mc, aimed on the U.K. (We have since heard him signing HZ2AMS—both on SSB and CW.)

The Exiles

Among all those who use the DX bands for purposes other than the mere pursuit of DX for its own sake, the Ex-G Radio Club must rank high in terms of satisfactory achievement by members. They are now about 150 strong, and continue their "Ex-G Net" on 14345 kc at 1900 on Sundays (this will be subject to change as winter conditions dictate). Their new U.K. secretary is G3NMH *(QTHR)*, from whom full details are available. Any G going overseas for six months or more, and acquiring a callsign in the process, is eligible for membership.

The New Table

The Five-Band Table is temporarily suspended from this issue onwards, probably to reappear in January, 1965, with the addition of the 28 mc band (which might be quite interesting even as soon as that). Meanwhile its place will be taken by a new **Zone-Band Table,** which will give our 'chasers fresh scope, and, perhaps, sort them out in a different order. Requirements are simple: Zones Worked on each of the *six* bands, Ten to One-Sixty. And the "total" column, on the strength of which the placing in the table will depend, is simply the sum of the Zones Worked figures for the six bands.

This should stimulate those who have already worked all 40 Zones on Ten, Fifteen and Twenty to get cracking on the LF bands; and also those who have hitherto neglected Ten to start looking around whenever that band is open. The idea is a completely new one, and we hope it will produce some lively competition. CW, AM, SSB—everything goes.

Late Flashes

Whether HL9KH operates from Cambodia or not, he is said to be making for FU8 on his way back to the States—probably mid-December . . . TL8SW is the former 3V8CA, and operates on 14050 kc CW, around 1900 daily . . . VK9MD (Christmas Is.) reported on 14060 kc CW, 1530 . . . VP2GAC, now active again, usually 14115 kc SSB and listening 14250-260 . . . VQ8 (Rodrigues Is.) —ZL1AAS hopes to operate thence for about two weeks in February.

Peter Dodd, formerly VQ3PBD and VQ4PBD, was home for a while as G3PBD but has now taken off again and will be in ZD6-land for 2½ years. So, if you hear ZD6PBD . . . but he may not get it this time.

ZL3 (Chatham Is.)—a party of ZL's and a W7 will be there, January 9-29; SSB operation included; QSL's to W7PHO . . .

Sign-Off

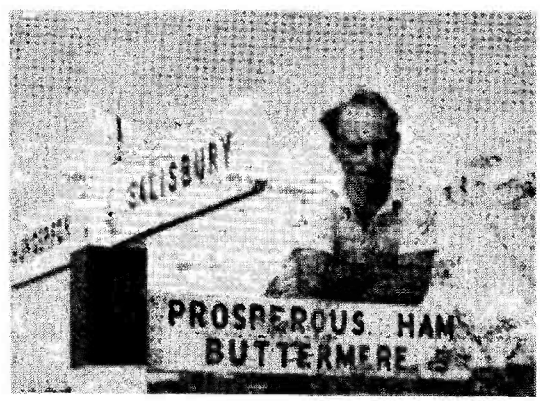
Before this reaches you, we shall probably be hearing the advance guard of "Mri Xmas" and "MX" in our QSO's. And this, though early in the month, is the last opportunity for us to send Christmas greetings to all our good friends, at home and overseas. So, to all our regular reporters and supporters, to the *West Gulf DX Club*, to W4KVX and his staff, to W1BB ("King of the Top Band"), to the *NCDXC* and all the other overseas radio clubs and DX clubs who keep in touch for much of the time—a Merry Christmas and a Happy and DX-laden New Year. Next deadline, **first post on Monday, December 16.** The address is "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. Don't be late, or the Christmas postal delays will assuredly beat us. So, for the last time in 1963 we bid you all 73, MX, HNY and—BCNU!

QUITE LEGITIMATE CALLSIGNS

We are informed by GI3SHI (Bangor) that. as well as being licensed /MM, he is also permitted to use /MA when the ship is alongside in certain U.K. ports. Thus, he can be heard either as GI3SHI, GI3SHI/MM or GI3SHI/MA.

FOR THOSE INTERESTED IN RTTY

It is much regretted that, due to a combination of circumstances over which neither W. M. Brennan, G3CQE, our contributor on "RTTY Topics," nor ourselves have had any control, his feature has not appeared since the September issue of SHORT WAVE MAGAZINE. However, those interested in radio teleprinter transmission and reception on the amateur bands may be glad to know that "RTTY Topics" will resume in the January issue of the *Magazine*, and will continue as a regular alternate-month feature thereafter.



You would hardly believe that there could be a village called Prosperous Ham but G3IAG found it, as this picture shows.

Miscellany

INCIDENTAL INFORMATION, AND ITEMS OF TOPICAL INTEREST

From time to time readers suggest that too little interest is taken (by us) in QSL cards. On the other hand, we have pondered on several mysteries concerning these invaluable proofs of contacts, local, DX, or super-exotic. What do people do with them these days? Thirty years ago they all went up on the wall, without question; but nowadays, when so many are needed for claiming various awards and certificates, the better ones are absent for half the time. In any case, papering the shack walls with them is an untidy business—they collect dust and they fade in a strong light. Photograph albums? Filing cabinets? Shoe boxes? One would like to know more. With some very active stations claiming 15,000 QSO's per annum (and presumably receiving at least 5,000 cards for them), one feels that someone must have found the answer to clean, tidy and methodical storage. A filing system for QSO's is used by lots of people . . . it wouldn't be surprising to hear, now, of a filing system to show which QSL's are wanted for new awards, in transit for awards already claimed, or simply available as DX status symbols.

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Worth knowing—that PAØAA transmits a programme of news, code practice and code proficiency runs every Friday evening, 3600 kc.

(*"Lothians Radio Amateur"*)

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G3KPO/A, exhibition station at Peterborough Town Hall, received an urgent message from G3HXR/M in a nearby car park—"Try to find the owner of a blue Victor, registration number so-and-so; it's blocking the way." The show was crowded, but the first person approached by G3KPO said "Why that's mine—I'll move it at once."

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And another strange motoring story: G3NLD returned home one night to be told by his wife that a C.I.D. man had called to ask if he owned a car with a certain registration number. They had received a report from the Devon police that the said car had been seen parked with "a man talking into a microphone." No doubt it's all cleared up by now.

(*Southgate "Newsletter"*)

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For those who think they are too old to try it—Mr. George Peachey, aged 71, of Ealing, recently passed in Subject No. 55—the Radio Amateurs' Examination of the City and Guilds.

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Some recent illegal operation in Uganda (in one case a licensed amateur allowed his station to be used by an unauthorised person) has produced a sequel . . . a special law has been passed under which anyone convicted of illegally operating an Amateur Radio station will be liable to six months' imprisonment and a fine of £200, the equipment also being confiscated.

(*"QTC Journal"*)

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How lethal is the interior of your shack? G2WK underlines the oft-repeated warning about using nests of two-pin plugs for connection to the mains (even into a three-way socket), whereby the mains earth is left disconnected. Seldom is any distinction made between live and neutral, so that in certain cases a dangerous or lethal voltage can appear between the metal-work of equipment and earth. A simple warning device should be used . . . for instance, a small neon wired between the cabinet, or chassis, of the equipment and earth. If, when the mains are switched on, the neon glows, the gear is plugged in incorrectly, and the plug should be reversed and clearly marked. If it is a three-pin plug, its connections should be changed over internally.

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"Despite the hand-wringing, ominous, pessimistic foreboding of several writers two or three years ago, when the sunspot count was sinking fast, we're enjoying the best sunspot minimum in Amateur Radio history." (*W4KVX, in "DX Magazine"*)

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A simple but interesting Pre-IF Noise Silencer is described by W2PUL in the October issue of *QST*. Actual oscilloscope pictures "before and after" tell their own story and show the unit to be very efficient. The Beginners' Section carries the first part of a new series on Antennas and Feeders, and a short article, of interest to many, deals with a product-detector adaptor for SSB reception.

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A recognition signal for mobiles . . . apart, that is, from the whip. How *can* one identify them, when on the move? Plaques on the roof, stickers in the windows—all are ineffective. It is infuriating to be out on foot and to see a car with a nice-looking loaded whip pass quite slowly by, possibly in one's own town (especially if it is a holiday resort). On the other hand, the writer was recently 250 miles from home, on foot, and saw a mobile draw slowly out of a filling station and move away—just about 25 yards out of reach. Only some gadget like a supersonic whistle would work in these circumstances. And, when one is driving and sees a mobile pass in the opposite direction, a "CQ" on the horn (quite illegal, by the way) is usually lost because it starts too late. Ideas?

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"Have you ever found that after corresponding with someone, and then meeting them, the pre- and

post-meeting mental images of the person continue afterwards, as of two visually separate, if closely related, people? " So writes G3NWT, opening up an interesting line of thought. How often have you found that someone you have frequently worked on the air bears the slightest resemblance to your first mental image? No photographs allowed, of course—that is cheating.

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G3OOJ, who was interested in the amateur bands in 1919, but was not licensed until five years ago, suggests a " 59 " Club. Not " five and nine "—but 59 years of age and over. No meetings, no rules, but " CQ 59 " on the air. Possibly even a special contest occasionally? We feel that " 59 " might be a little confusing—why not start at 60?

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" G3HUA spent four days of his holiday with yours truly, and if he tells you he earned his keep, he's right. He foolishly mentioned that my signal should go up a couple of S-units if I removed some trees from in front of the beam . . . and I have pictures to show him doing just that! "

(*W3HQO, in the Ex-G Radio Club " Monthly Bulletin "*)

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" Project Interference " is the intriguing title of an article by K4TUA in the October *CQ*. It opens a series which will deal with the causes of interference and an analysis of the usable portions of the amateur spectrum, and which will go on to discuss the quality of signals and describe a campaign to improve conditions on the bands. Other interesting articles cover a Cascode Pre-amp for 14 and 21 mc, and a review of Extra Wide-Band Antennas (Discone, Log-Periodic and so on).

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There is nearly always someone listening, and no QSO can ever be assumed to be private. This was made very clear recently, when two CW stations on 14 mc were heard, but not identified, and appeared to be running a real slanging-match about each other's key-clicks. After some ten minutes of vituperation (but no callsigns) they turned out to be a couple of VK's. The offending clicks from one of them were clearly audible in England! Presumably the same thing often happens in reverse, and some of these quick cross-town contacts, between rival DX'ers within a few miles of each other, probably cause lifted eyebrows in some remote part of the world.

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A recent survey of the bandwidths of SSB stations, taken in the U.S.A., showed some 30 per cent to be 5 kc wide, 20 per cent 6 kc, and 16 per cent 7 kc. The ideal 3 kc bandwidth was achieved by . . . *two per cent only!* And this same figure applied to transmissions 9 kc wide. On the other hand, 63 per cent of AM transmissions were more than 10 kc wide.

Is there an affinity between radio amateurs and the self-destroying lemmings? In certain quarters (even in the U.S.A.) it is being suggested that there is; and that the apparently in-built desire to encourage more and more amateurs on the air is dangerous. " Make it reasonably hard for them," runs the argument, " and only the right types will make the grade." Now that a slight clamour for " novice licences " is making itself heard in this country, we have to consider the matter carefully. One side of the argument is forcefully put by G3IDG, who writes thus: " Those with sufficient enthusiasm and grey matter will make it, anyway, without being pushed by the local club, learning theory parrot-fashion at the local Tech., or worrying some long-suffering local amateur into teaching them Morse. Those characters who incessantly worry for a Novice Licence wouldn't be worth tuppence if they got it. We want *higher* standards to keep the clots out, not lower ones to let even more in."

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Heard on the Air: " I have almost given up CW for a year, but this screaming-match has sent me back to it and now I find I *like* it! " (The " screaming-match " was the phone section of the *CQ* Worldwide Contest, October 26-27 . . . and not a bad description, at that.)

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" In 1938 a record was set up by Fred Miles, G5ML, when he worked all continents on 14 mc in 110 seconds (W4DLH, VU2CQ, HK5AR, VK4JU, SU1WM and a G8). This record has yet to be beaten, even with modern methods and equipment."

(*G3NBQ, writing in " CQ CARS," Coventry*)

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Radio Mathematics for Beginners: 12 WPM + RAE = G3; G3 + YL = − LSD; G3 + XYL + TVI + HP = QRT. (" *Mercury," Royal Signals A.R.S.*)

ANOTHER SUCCESSFUL RESULT

Finding a back-number copy of the *Magazine*, P. V. Bamfield of Hove, Sussex, was inspired to resume SWL activity, with an R.1155, after a lapse of many years. Going a bit deeper, he obtained a quantity of back issues of SHORT WAVE MAGAZINE, and has now emerged with a receiver incorporating an *Electroniques* amateur-band coil pack; the IF amplifier and detector section of the G3BDQ Rx (June, '62); the product detector design by G3GKF (December, '62); the S-meter and Q-multiplier from the G5NH receiver (February, '63); and the silicon rectifier power pack as described in our April '63 issue, from which he is also taking the transistorised broad-band RF amplifier. SWL Bamfield has got this hybrid-Rx working well, and is beginning to chase the DX for the HPX Ladder in our " SWL " feature. His approach and its successful result is a very good example of how technical and constructional information can be used—and is exactly how we hope much of the material appearing in SHORT WAVE MAGAZINE *is* being used.

TRANSISTOR VOLTAGE REGULATOR

FOR MOBILE POWER UNITS

B. E. GEE (G3LDG)

WHEN the writer embarked on mobile activities it was thought advisable to have some means of monitoring the car battery voltage to avoid running it flat when operating for long periods at standstill. This was achieved by incorporating a suppressed-zero voltmeter into the control panel.

Besides indicating small changes of voltage around 12 volts when at standstill, the meter also served to emphasise the large increase in system voltage when charging, particularly from cold. The maximum voltage of about 16 volts is in fact a 33% increase over normal.

As most LT-to-HT converters have an output voltage directly proportional to input voltage, this can represent an increase from 300 to 400 volts on a typical HT line supply.

The results of this are enormous. Over-running of components, increases in anode currents of valves in receivers and transmitters due to increased screen volts, mismatching, and even exceeding power input on Top Band; all at the expense of increased LT current consumption.

It seemed obvious that consideration should be given to some form of voltage stabilisation. Although it is usual to think in terms of stabilising the HT supply, there are several disadvantages in doing so in this case.

The currents involved are rather more than the normal gas stabilisers can handle and valve-type regulators use heater current, which is to be avoided. It is possible to make transistor circuits perform as HT stabilisers but care is needed not to exceed the voltage rating of the transistors. All of these methods are in any case wasteful of power and a major drawback is that the voltage delivered by the transformer to the HT rectifiers of a transistor converter is not reduced by any of these arrangements. If these are silicon units of 400 p.i.v. the increase in HT could prove disastrous!

It was therefore decided to stabilise the LT to the converter. The writer's transistor converter consumes about 3 amps. at 12 volts, which is probably typical of Top Band installations. A transistor regulator was designed to handle up to 4 amps. Fig. 1 shows the block diagram of such an arrangement.

Circuit Design

The output of the unit can be set to deliver 12 volts from a 16 volt supply. With the car at standstill, however, we know that the supply voltage can fall to 12 or rather less, and as the input voltage

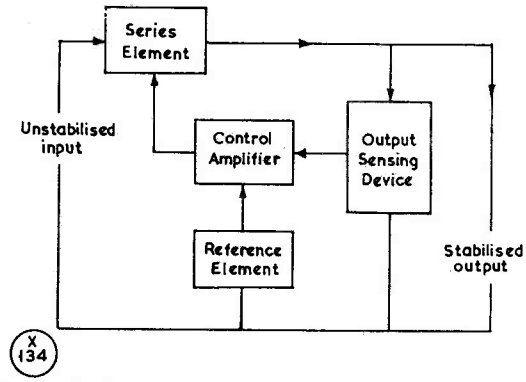


Fig. 1. Block diagram of the control system described in the article by G3LDG.

approaches the stabilising voltage the circuit ceases to operate and the output voltage decreases rapidly.

It would be possible to deal with this problem by stabilising the output at, say, 10 volts—however, not only must the converter be designed for this input but the input current and the maximum dissipation are increased.

So to overcome this, it is necessary to supply the control transistor from a source more negative than the input. As there is none normally available, a small dry battery is pressed into service. This should last almost indefinitely as the drain is very small.

When the input voltage drops to within half a volt of the output, the control transistor will be turned off and the full drive will be applied to the series element. The output voltage will then only decrease at the same rate as the input, *i.e.* it will follow the input down. We can compare the two characteristics in Fig. 2.

The presence of the dry battery presents its own problems. If the input to the regulator is switched off the dry battery continues to discharge *via* the two

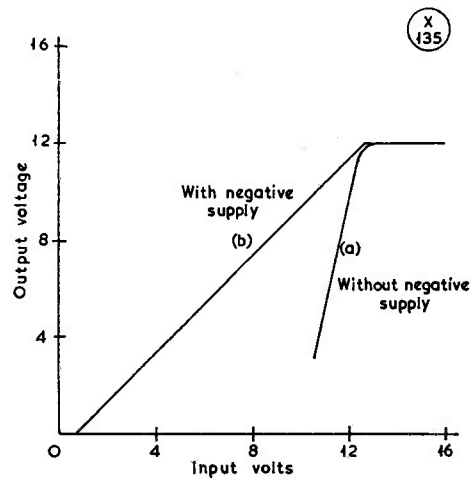
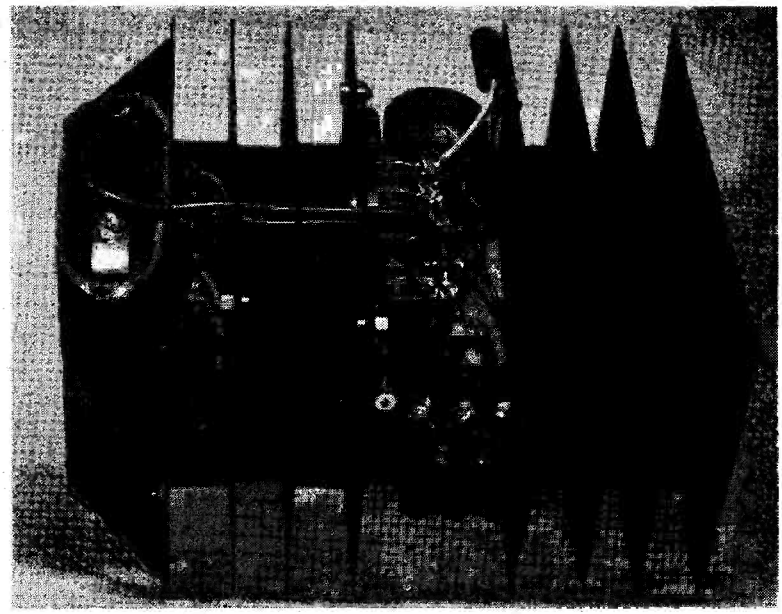


Fig. 2. These curves show the advantage of using the regulator unit, which can be constructed as shown in the photograph.

series transistors. On a permanent installation it would be possible to break the dry battery lead with another pole on the main switch. For use in other situations it is an advantage if the system is entirely automatic.

The dry battery is therefore connected through a further transistor which is only biased-on when the main supply is on. This reduces the dry battery current to a few microamps in the " off " state.

Although this feature is optional it has another very useful purpose. If the output is accidentally short circuited, the drive to this transistor is lost and it turns off, removing the drive to the series transistor. Thus the output current on short circuit will be very nearly zero. A useful feature!



General appearance of the transistorised voltage regulator, as built by G3LDG. Assembly is on a heat sink having cooling fins — see text.

Operation

Fig. 3 below shows the complete circuit. Tr1 is the series transistor driven by Tr2 to form a compound pair. This gives a high current gain enabling the control transistor Tr3 to operate at a low current level. The emitter of Tr3 is maintained at a constant potential by the zener diode and the base is supplied from the output potential divider R1, RV1, R2. Adjustment of RV1 enables the output voltage to be set to take account of circuit tolerances.

When the output voltage tends to increase the base of Tr3 becomes more negative, thereby increasing its collector current and producing a less negative voltage at the collector. This reduces the input to the compound pair which serves to reduce the output voltage, thus counteracting the original increase.

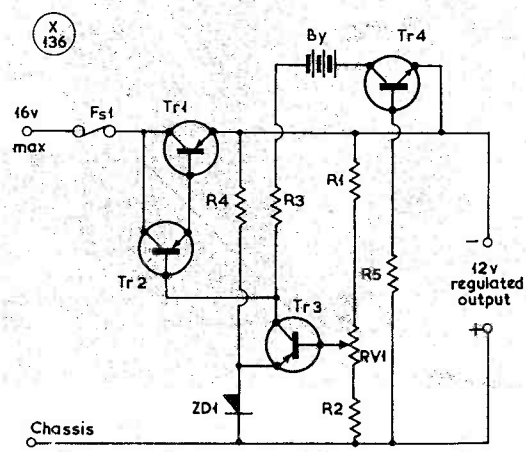


Fig. 3. Circuit complete of the transistorised 12v. voltage regulator, as described by G3LDG. It keeps the HT rail stable, irrespective of how the car generator may voltage-hunt during charging or when under load. All values are given in the table.

Construction

The photograph shows a view of the underside of the writer's unit. Tr1 is fixed to a finned heat sink on which all the other components are mounted. However, the layout is not critical so long as Tr1 is mounted near the centre of a heat sink of not less than 50 square inches, which may be bent to form a box.

The transistor can be bolted direct to the heat sink, if having this " live " is not an embarrassment. Insulating bushes and mica washers are, however, available for these transistors, and may be used with little increase in transistor junction temperature.

Tr2 should also be fixed to this heat sink by a metal clip such as those sold for the purpose, although it should be physically remote from the heat producing series transistor, Tr1.

Protection

The fuse shown is not strictly necessary in some respects, as the unit, being self-limiting, has inherent

Table of Values

Fig. 3. Circuit of the Voltage Regulator

R1	= 2,200 ohms	F	= 5 amp. fuse (*see text*)
R2	= 2,700 ohms	ZD1	= OAZ202
R3	= 1,500 ohms	Tr1	= OC35
R4	= 1,000 ohms	Tr2	= OC84
R5	= 56,000 ohms	Tr3	= OC71 (or OC76)
RV1	= 500-ohm, w/wound	Tr4	= OC139
B	= 4½v. dry batt.		

All fixed resistors rated ½-watt

short-circuit protection. It is, however, of use for moderate overloads. The circuit values given in Fig. 3 will cater for any combination of transistors, and if Tr1 and Tr2 both happen to be high-gain devices, R3 will supply enough base current to support a large fault current.

If desired, therefore, R3 may be adjusted on test to a value which only allows rated output current before the output voltage falls. This value may be as high as 20K. If we also make R5 only sufficient to turn Tr4 on with minimum output volts, then as soon as the voltage begins to fall on overload, due to the limiting action of R3, Tr4 will begin to turn off. This will further reduce the drive to the series transistors and enhance the current limit feature.

The combination of fuse, short circuit protection and this current limit action gives the unit a high degree of protection.

When used with a dynamotor the rating of the fuse may have to be increased to cater for the high starting current.

READERS' SMALL ADVERTISEMENTS

This issue of SHORT WAVE MAGAZINE carries the largest spread of small advertising by readers that even we have ever printed—see pp.574-584. This also means, of course, that it is, by far, the greatest number of " smalls," of strictly radio amateur interest, yet published in the U.K. Since the average number, issue to issue, is a direct measure of the pulling power of SHORT WAVE MAGAZINE for general display advertising in comparison with its contemporaries, we feel it is a fair claim that *Magazine* advertising gives the largest and most consistent coverage of the U.K. radio amateur market. This is not just a boast, but is demonstrable from the facts, and is important for those whose business involves advertising.

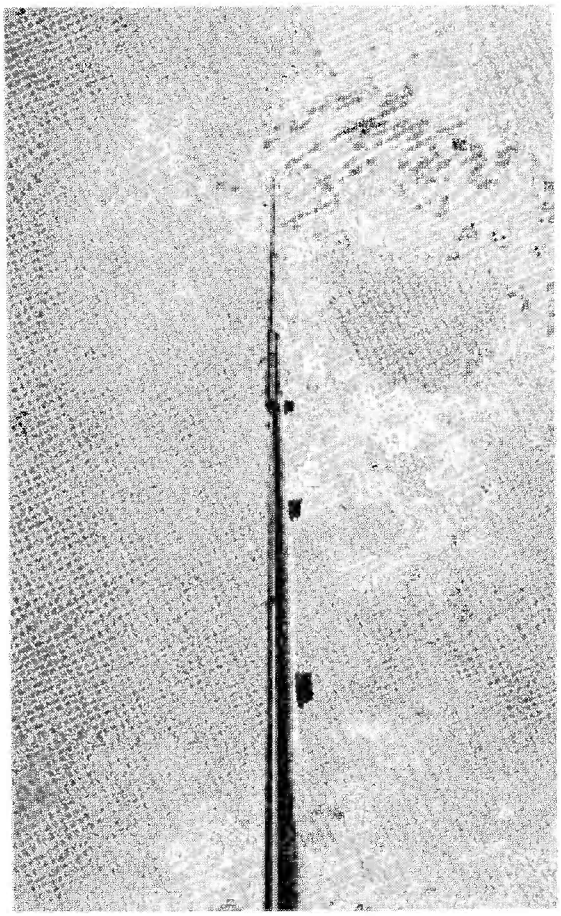
The radio installation for the new ocean-going tug " Britonia " was designed and fitted by Redifon, Ltd. At centre are the two communication receivers, Type G.146, each covering 250-530 kc and 625 kc-24 mc. To the left is the main receiver, Type R.50M, giving coverage of 13.5-26 kc in the VLF range, and 95 kc-32 mc for general communication purposes. To the right is the 75w. emergency general-coverage transmitter and out of view are the main transmitters for HF and MF operation, on both CW and telephony. Additional equipment includes receivers for D/F and auto-watch on MF, and VHF R/T for local working on the marine bands. The " Britonia " is a fine little ship of 568 gross tons, with tremendous towing power, and she can stay at sea for 75 days. Her callsign is MFWH and she also responds to the collective c/s GWZW, allotted for all vessels of the Overseas Towing & Salvage Co., Ltd., her owners. Her master is Capt. R. Prior, seen here trying out the R/T facility.

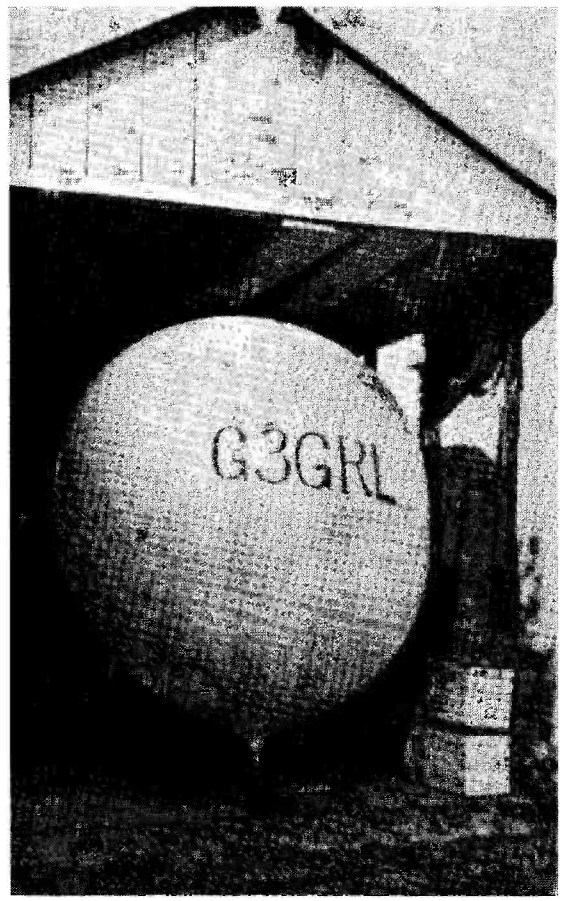
CORRECTION—"VHF TRANSVERTER AND POWER AMPLIFIER"

It is pointed out by G3OCB, author of this interesting practical article in our October issue, that in the Table of Values on p.416, resistors R3, R5, R16, R18 should have been given as 2·2K, and not as printed. He explains that the error could result in a loss of drive, but that otherwise there should be no deterioration in performance.

NEW ZEALAND AT-STATION LICENSING

A recent issue of *Break-In*, the journal of the N.Z.A.R.T. (New Zealand Association of Radio Transmitters) is by way of being the ZL call book, from which much interesting data can be derived. We have mentioned on a previous occasion that, in relation to its total population, New Zealand has the highest ratio of licensed radio amateurs of any country in the world. In a population of less than 2½ million, the N.Z.A.R.T. can list 3,000 transmitters and about 500 SWL's and overseas supporters. (With more than 20 times the population, the U.K. has barely four times as many AT stations.) For radio amateur purposes, New Zealand is divided into four licensing districts, ZL1-ZL4, and the regulations for the issue of an amateur licence differ somewhat from the U.K.—for instance, operation on the 10-40m. bands is subject to a special permit, only issued after one year's CW experience on 80m., with not less than 50 QSO's in the log. Indeed, the accent is on CW throughout in the ZL licence system; an HF-band operator can be called upon at any time to take a Morse test at 15's, and for phone working certain additional requirements must be met. The ZL's have the use of two bands not open to us, *viz.*, 5m. and 11m., but otherwise the frequency limits, band to band, are much the same as for the U.K., except that on Top Band they have 1875-1900 kc only. In this context, it is an interesting, if not sobering, reflection that if the enthusiasm for Amateur Radio in Britain was the same as it is in New Zealand, we would now have about 65,000 amateurs licensed under the G prefixes !





G3GRL, 38 Maple Drive, Nuthall, Notts. has a 75-ft. loaded vertical aerial for Top Band, with which he has been getting some splendid DX results, including W, 5B4, VQ4, VE and 5N2 — quite something on 160m. ! By using the balloon, G3GRL can also run up a true ground-plane for Top Band, but tests with W1BB have shown that in fact there is little to choose between the two systems, even with the balloon at the correct height of 130 ft.

IMPROVING A TWO-METRE CONVERTER DESIGN

MODIFICATION FOR DOUBLE-CONVERSION AND LOWERED IF TUNING RANGE

F. W. HATTEMORE

DESPITE the introduction of Nuvistors for the front end of VHF converters, it has been the writer's experience that the design originally described in the January 1961 SHORT WAVE MAGAZINE is still pretty good.

However, the one shortcoming of this converter has always been the rather inadequate bandspread obtained when using the 24 to 26 megacycle IF. In addition, one has to take into account the relatively poor frequency stability of many of the older receivers in this range, *e.g.*, the old HRO's and CR-100's. The problem was, therefore, how to alter the IF to the more favourable 4-6 mc without a major rebuild, and thus risk spoiling the appearance of the converter.

The answer is, of course, double conversion, using the original 20-megacycle oscillator frequency also as second conversion oscillator frequency, so that 24-26 mc -20 = 4-6 mc. This lower IF ideally satisfies the bandspread requirement and also that of frequency stability. In fact, using the modified converter working into the writer's CR-300 as the tunable IF, any reasonably stable CW signal can be held without difficulty within the 100-cycle passband of the audio filter.

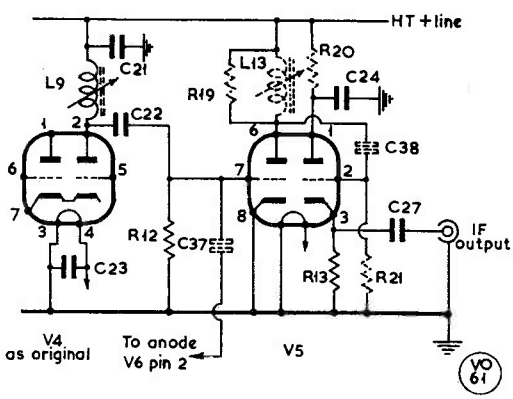


Fig. 1. The modification to give double-conversion in the two-metre converter originally described in our January, 1961, issue, to which reference should be made. The new circuit elements are shown dotted, and values are: C37, 2 $\mu\mu$F; C38, 330 $\mu\mu$F; R19, 10K; R20, 1.5K; R21, 330 ohms; L13, pile wound to resonate at 5 mc, using slug-tuned former for adjustment; and V5, ECC81 or 12AT7. For the original circuit and all other values, refer to p.579, January, 1961.

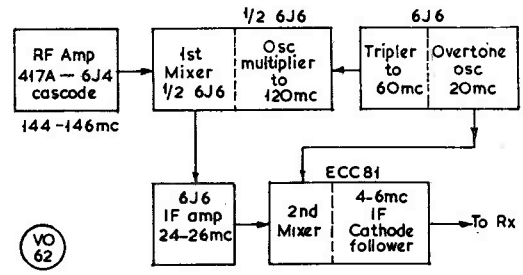


Fig. 2. Schematic representation of the finalised design, to modify it for double conversion — see text.

Details of Modification

Looking at the original, V1 to V4 and V6 remain unchanged—*see* p.579, January 1961. V5, originally the output cathode follower, now functions both as second mixer and output cathode follower.

The original 25 mc IF amplifier stage is retained, and the 6C4 is replaced by an ECC81 or 12AT7; this will involve changing the base and rewiring.

One triode of the ECC81 is wired as mixer stage, as shown here in Fig. 1. The 2nd oscillator frequency of 20 mc is taken from pin 2 of the original overtone crystal oscillator (V6) to pin 7 of the ECC81 *via* a 2 $\mu\mu$F condenser C37, together with the output of V4 through the existing C22. In the anode circuit (pin 6) is a coil L13 wound to resonate at the mid-band frequency of 5 mc, and damped by a 10K resistor R19 to give reasonably level output over the entire 2-megacycle bandwidth.

The IF output is capacity coupled (C27) to the second half of the ECC81, which is employed as an IF cathode follower to match the input impedance of the main receiver.

Alignment

The only adjustment necessary is carried out by tuning in a fairly strong local signal, and setting L9, and the new IF coil L13, for maximum output and even bandwidth—sometimes a compromise. The overtone oscillator coil L11 in the original circuit may also require minor readjustment, due to the additional capacity loading imposed by C37 and the different input capacity of V5.

None of these adjustments will have the slightest effect on the noise figure of the converter which remains as originally.

This conversion has proved satisfactory in all respects after nearly 12 months' use. It has also been compared side-by-side with a single-conversion 6CW4 converter using an oscillator on 140 mc which, of course, gives the same 5 mc IF. Without belittling the performance of the latter in any way, the double-conversion unit has the edge on the Nuvistor converter.

If the modified converter is used with a really good HRO an amazing degree of bandspread is available, averaging about 9 kc per HRO dial division. You can't, however, have it all ways and this does make searching the entire two-metre band an awfully laborious process !

VHF BANDS

A. J. DEVON

IT is not often on the VHF bands that we encounter the DX conditions experienced on the night of October 29-30. A good tropospheric opening, related to the weather, is something we do expect from time to time. We also know that if an auroral manifestation develops it can be dense enough, electrically speaking, to give very interesting results right up to 150 mc. But what is unusual, to say the least, is to have both these VHF propagating mechanisms in action at the same time, giving coverage over almost all Northern Europe.

Those who have been with this piece for many years will know that a combined tropo-aurora situation is not unknown, even if it is pretty rare—indeed, the last such occurrence reported seems to have been in September, 1958. As to the Aurora itself during October 29-30, it was unusually steady and sustained—lasting from about 2200 on the 29th till around 0230 on the 30th—while the tropospheric condition had been there earlier in the evening and was giving good European coverage from the U.K., with strong signals from stations right down into the central and south-western areas of France. Had an EA or a CT1 been on, he might have been workable . . .

Conditions for GDX generally and the nearer EU's had been good for several days until October 29, and the barograph trace shows this very well. Tropo. conditions were just beginning to change for the worse when the Aurora came on. After the 30th, conditions reverted to the mediocre and, broadly speaking, there hasn't been much doing since in the way of VHF/DX. The barometer trace for the period till the time of writing looks rather like a contour of the Himalayas (with which, as it happens, your A.J.D. is not unfamiliar).

It also happens that A.J.D. was *not* among those looking for the DX on the evening of October 29/30—our stand at the Seymour Hall was being prepared for the Exhibition opening; A.J.D. was 60 miles from his gear when someone came up and said "Do you know the two-metre band is wide open?" (This situation is, of course, strictly in accordance with Murphy's Law.)

DX Worked and Heard

However, we have numerous interesting reports, and the first one to take is that from GM3JFG (Invergordon, Ross-shire) whose callsign from one of the rarest GM counties became, in about twelve hours, very well known indeed. The Rev. Iain McHardy has been on two metres since May of last year, and we can all imagine and understand that it must have been rather a lonely experience for him—though he does report a regular nightly schedule with GM3GUI, nearly 100 miles away over the Cairn Gorms, and a total of four local countries and 19 counties worked prior to October 29/30—in themselves good figures from a location like Invergordon, even though it had taken GM3JFG about 18 months to get them. On the evening of October 29/30, he worked 17 G's, one GW, one OZ, two DL's, and two SM's, putting him up to 30 counties in the All-Time and 8C in the Countries Worked table—from Invergordon, on two metres! GM3JFG mentions that the only G's he could ever hear during the summer were G3BA (worked) and G5YV, and that many of the openings he read about in this piece just never affected Ross-shire. He thinks that perhaps his frequency, at 145·98 mc, is too near the HF end of the band to attract attention. That could well be—but we hope that henceforth all who are looking for a rare county when the band is open will remember that the Rev. Iain McHardy, GM3JFG, is on every evening, and gives the county of Ross & Cromarty.

Coming right down south, to Woldingham in Surrey, G3BLP reports that he started by working many F's from interesting locations; he then turned to the North, to knock off EI2A, GM2DRD (Forfar, Angus), GM2FHH (Aberdeen), GM3JFG for Ross, and GM3LDU in Clarkston for Renfrewshire; GM3OFY in Ayrshire and GM6XW for Stirling were also heard, but could not be raised. Johnny, who has been on two metres—with a few temporary

TWO METRES

COUNTIES WORKED SINCE SEPTEMBER 1, 1963

Starting Figure, 14

From Home QTH only

Worked	Station
57	G3BA
52	G3LRP
50	G3GWL
43	G3CO
42	G4LU
40	G3HRH
34	GM3LDU
32	G2CDX
31	G2BJY, G3PSL, G3SAR
30	G3CKQ
27	G3LAS
26	GW3PWH
24	G3PKT
20	G5JU
19	G2BDX, G3KPT
18	G3EKP, G3ONB
17	G3DVQ
16	G3HWR, G3OJY
14	G3CCA, G3OZF, G5UM, G5ZT

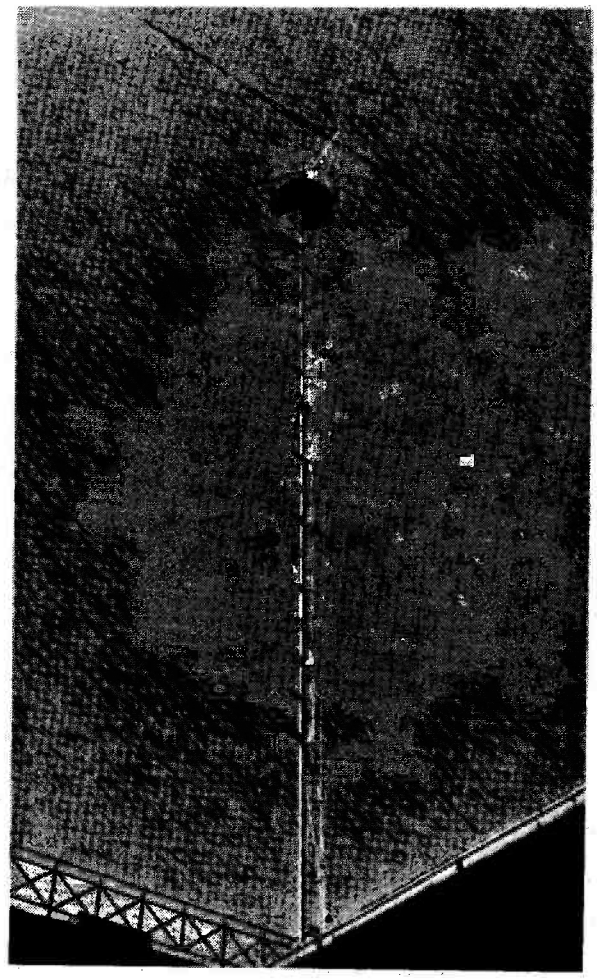
This annual Counties Worked Table will run till August 31, 1964. All two-metre operators who work 14 or more Counties on the band are eligible for entry. QSL cards or other proofs are not required. After the first 14 worked, simply claim from time to time with counties as they accrue, giving callsign and date for the county worked. To keep the Table up-to-date, claims should be made at intervals of not more than two months.

lapses—since the band opened, has now worked the remarkable total of 1,226 different VHF stations, in 16 countries and more than 70 U.K. counties. (We must run the All-Time again as soon as may be possible to get this, and other interesting placings, right up to date.)

When G3CO (Dartford, Kent) switched on, as he says, "by pure chance" on October 29, he found that it was the boys up North who were having most of the fun. He heard in all eight GM's in seven counties, as well as EI and GI, and had the interesting experience of getting a strong T9 signal from F8VN (Chartres) while the latter was working the GM's *via* Aurora, with the typical rusty note. Out of all this, Jack got four GM's for two new All-Time counties, and is modestly satisfied thereby.

In about three hours on the band during the "critical period" (the late evening of October 29) GM2DRD worked eighteen G's and one GW, four SM's, two PAØ's, one OZ and one ON, and heard EI, GI, LA and F—nice going for an evening session (and remember, the band is still two metres).

Looking north-west, we have a report from GW2HIY, of Holyhead in Anglesey, and one of the outpost-stations when interesting things are happening in the way of EDX. He started at 2100 on October 29 (having been alerted by fuzzy pictures on the BBC's Ch.2), and found a number of two-metre stations, including GB3CTC and GB3VHF, giving a rusty beat—the sure sign of Aurora reflection. During the following four hours he heard strong signals from about 30 stations in eight countries; he spent two hours trailing SM5BSZ, finally QSO'd for a new country both ways. And GC2FZC may be interested to know that GW2HIY spent most of one October evening calling him for a QSO—signals from GC2FZC were S4-S2, but readable all the time. Finally, GW2HIY recommends that the best way to appraise Auroral conditions is to watch for wobbly TV signals. To which we might add that other ways are to keep the highest receivable frequency up to 145 mc on tune and watch for roughening of the beat, *e.g.*, GB3CTC or GB3VHF going "peculiar," and for a rusty tone on signals outside the normal local range. For the right results under Aurora conditions, the beam should be "felt" over a sector from north-west to north-east—it often happens that the best auroral signals come in from a direction other than due North. There have been occasions when the strongest *Ar* reflections were from the north-east.



The VHF aerial array at SP3GZ, Warsaw. The mast is nearly 80 ft. high, and carries beams for two metres and 70 centimetres. His beam for two metres is the 10-ele long Yagi, evidently giving full gain!

For the evening of October 29, GM3LDU (Clarkston) kept at it from 2240 until 0200, working in that session 13 G's, two GW's and SM5BSZ in Stockholm, with another twelve G's heard, also GW2HIY, seven GM's, and DL3YBA, F8VN, LA6CG, ON4BZ (we have been wondering about Guy recently, not having heard from him for some time), ON4TQ, PAØFB, and the beacons. GM3LDU thought that GB3VHF was not as strong as during the September 22/23 *Ar* opening when, as it happened, activity was much lower.

Down at Banwell, Somerset, Louis of G3EHY was on throughout the auroral period; as well as having several interesting QSO's, he heard signals from 10 different countries—he also draws attention to the theory that this particular *Ar* manifestation of October 29

FOUR METRES

ALL-TIME COUNTIES WORKED LIST

Starting Figure, 8

From Home QTH Only

Worked	Station
40	G3EHY
34	EI2W, G3PJK
32	G3IUD
31	G3OHH, G5JU
30	G3JHM/A
29	G2OI
26	G5FK
23	G3NUE, G3PMJ
20	G3LZN
19	G3AYT, G3BNL
16	G3BJR, G3FDW, G3OWA
14	G3OKJ, GI3HXV
12	G3LQR, G5DS
11	G3HWR
8	G3PRQ

This Table records Counties Worked on Four Metres, on an all-time basis. Claims can be made as for the other Tables, e.g. a list of counties with the stations worked for them, added to from time to time as more counties accrue. QSL cards or other confirmations are not required.

may have been caused by some remarkable radio disturbances noticed from Jupiter about 48 hours earlier. This can only be surmise until the pundits have published their opinions and findings, but it is an interesting thought.

G3GWL (Bletchley) made the best of the opening. Having started the early evening of October 29 by working F8VN, HB9LN and ON4ZN by tropo., he turned the beam north and ran into about ten GM's, as well as EI2A and GI5AJ; though the latter were 59A, he couldn't get either of them back; the GM's heard or worked were varying between 54A and 59A. A particularly interesting phenomenon noticed by G3GWL was the effect on the CW signal from G3ILD (Darlington, Co. Durham): At one period his upper sideband was auroral in tone characteristic, while simultaneously the lower sideband was pure DC, as for a CW signal received by good tropospheric propagation. The mechanisms of Nature are surely marvellous.

Naturally enough, Bob of G5MA (Great Bookham, Sy.) had a good time during the opening—he worked four GM counties and comments on the remarkably stable signal from GM3JFG (Invergordon, Ross), who was still coming through long after the other GM's had faded down. G5MA's heard-list includes six GM's, GI5AJ and SM5BSZ—the latter seems to have been a very consistent signal all over this country.

As usual, Jack, G2CIW (Birmingham) spent a good deal of time on 70 cm.; having worked PAØCOB on the 28th, and three G's on the 29th, he was soon drawn on to two metres, finding the band "full of GM's" at about 2230; he worked GM3JFG and GM6XW and then listened to others of them knocking off the EU's.

Items of General Interest

G3LAS (Berkhamstead remarks "as usual, I missed the opening," and G4LU (Oswestry) says that he also missed it, due to what he calls "careless listening"—he tried the Rx early in the evening, found nothing much doing, so left it at that. Had he been more diligent, he might have raised some much-wanted GM's. However, having been in on most the Continental openings this year, Stan is doing quite nicely in the tables and, having worked HB1ADT and LX1SC, he is now at 13C in Countries.

G3EKP (Belthorn, Lancs.) is making steady progress on both 70 cm. and two metres, and runs a regular sked with G3LJO/T (Poulton-le-Fylde, Lancs.) on Wednesday and Saturday evenings; he also made some very useful contacts during the 70 cm. contest in October.

Writing in for the first time, G3AQX (Somercotes, Derbys.) says he has been on the two-metre band for four years. He runs 15w. to a QQV03-10 in the PA, modulated by a pair of 6BW6's, and has worked more than 500 stations on phone only; his beam is a slot-fed 8/8 at 60 ft., and a very good QSO for him recently was with HB9LN; actually, G3AQX is being taken into Countries Worked at 14C, which is nice going with low power.

Ingenious Beam Installation

In contrast, G3ONB (Kirkby-in-Ashfield, Notts.) only started on two metres about three months ago, and in that time has penetrated into 18 counties; the present Tx takes 20w. input to a QQV03-20A, modulated by 2/6L6; the Rx is an A.2521 cascode, with 22·2-24·2 mc tuned on an AR88D.

His beam is a 5-ele flat-top, at a height of 40 ft., on a rotary mast built up of TV-type mast sections and is motor-driven by remote control, with Desyn indication;

TWO METRES

COUNTRIES WORKED

Starting Figure, 8

22	G3LTF (DL, EI, F, G, GC, GD, GI, GM, GW, HB, HG, LA, LX, OE, OH, OK, ON, OZ, PA, SM, SP, UR)
21	G3HBW (DL, EI, F, G, GC, GD, GI, GM, GW, HB, HG, LA, LX, OE, OH, OK, ON, OZ, PA, SM, SP)
20	G5YV (DL, EI, F, G, GC, GD, GI, GM, GW, HB, HG, LA, LX, OE, OK, ON, OZ, PA, SM, SP)
19	G3CCH
18	G6NB, ON4BZ
17	OK2WCG
16	G3BA, G3BLP, G3CO, G3GHO, G3KEQ, G5MA, G6RH, G6XM, PAØFB
15	G2CIW, G2XV, G3AYC, G3DKF, G3FZL, G4MW, GM3EGW
14	G2FJR, G2HDZ, G3AQX, G3FAN, G3HAZ, G3HRH, G3IOO, G3JWQ, G3KPT, G3WS, *G5BD*, G6LI, G8OU
13	G2HIF, G2HOP, G3DMU, G3DVK, G3EHY, *G3GPT*, G3IIT, G3NNG, G3PBV, G4LU, G5DS, G6XX, G8VZ
12	EI2A, EI2W, F8MX, G3AQS, G3GFD, G3GHI, G3GWL, G3JAM, G3JXN, G3NUE, G3OBD, G3WW, G5CP, G5JU, G5ML, G8DR, GW2HIY
11	G2AJ, G2BJY, G2CDX, G2CZS, G3ABA, G3BDQ, G3BNC, G3BOC, G3GSO, G3IUD, G3JYP, G3JZN, *G3KUH*, G3LAS, G3LHA, G3OHD, G4RO, G4SA, G5UD, G6XA, GC2FZC, OK1VR
10	G2AHP, G2AXI, G2FQP, G3BK, G3DLU, G3GSE, G3JHM/A, G3KQF, G3LAR, G3LTN, G3MED, G3OSA, G3OXD/A, G3RMB, G5MR, G5TN, G8IC, GW3ATM, GW3MFY, GW5MQ
9	G2BHN, G2DHV, G2DVF, G2FCL, G3BOC, G3BYY, G3FIJ, G3FUR, G3JLA, G3LRP, G3OJY, G3PSL, G4LX, G5UM, G8GP, GC3EBK, GI3ONF, GM3DIQ
8	G2DDD, G2XC, G3AEP, G3AGS, G3CCA, G3EKX, *G3GBO*, G3HCU, G3HWJ, G3KHA, G3PKT, G3MPS, G3VM, G5BM, G5BY, G8SB, GM3JFG, GM3LDU

an interesting point about this installation is that the mast drive is contrived from an old washer-motor and gear-box picked up very cheaply at a junk sale, and the final drive to the mast is by cycle-chain, to give the required reduction. One of the advantages of a mast layout on these lines is not only is it cheap to build up, but also that the motor can be run from a normal AC supply. Plans are in hand to increase PA size and modulating capability and, as G3ONB remarks that he is 520ft. a.s.l., he should be making himself well heard before very long—and he mentions also the help and encouragement he has had from G3LGK in getting going.

G3PSL (Loughborough) moves to 31C in the Annual, and wonders if a change of QTH locally will necessitate a new start in the Tables—in his case the answer is No. (This is the sort of situation that often arises, and in general the ruling is that it is only a move to another postal district which means starting all over again ; but even this may not be the right answer in some instances.)

G3MBL (London, N.12) reports that he has just got going on two metres, with a 5-ele Yagi at 30 ft.; a 6CW4 converter into a modified HRO ; and a QRP Tx on the lines of that described in the March, 1963, issue of SHORT WAVE MAGAZINE—this has proved to be a very successful design for those making a start on VHF.

Every now and again, we get a piece of paper, bringing him up to date in the Tables, from G5UM (Knebworth, Herts.). Jack is, of course, an old hand at this VHF business, with experience going right back to five metres in pre-war days. He is regularly on both bands, and for two metres now has no less than 1,026 different stations worked. For 70 cm., his score is 98S worked in 18C, all-time.

The Four-Metre Clip

It is the experience of G3EHY (Banwell, Som.) that stations in all parts of the country—with the possible exception of the south-west—are now regularly workable on four metres any Sunday morning. With him, it is always possible to hear or work the northern counties, irrespective of conditions ; and Louis says that there are now four active 4m. stations in Somerset alone. Well, as we all know, G3EHY has been strongly for the 70 mc band ever since it was opened, and there is no doubt that he has done much to increase activity by being on regularly himself.

The station of SP3GZ, Warsaw, who worked many U.K. stations on two metres during the early-October opening. It is evident from this photograph that he has good gear and we know he is always on the look-out for EDX.

Another who is there every Sunday morning is G3IUD (Wilmslow, Ches.), looking for stations in the London area, and in GI/GM. He is now at 32C in the 4m. all-time.

The appearance of G3BA (Sutton Coldfield) and G3MYI (Leicester) on four metres has given the northern boys much encouragement, as they represent new contacts and counties for most. G3AYT (Hyde, Ches.) is on 4m. SSB, and G3PMJ (Gorton, M'cr.) is trying NBFM. The latter has now QSO'd 61 different stations on 70 mc.

From Oldham, Lancs., G3SNA reports himself as in action on four metres—he is running 20w. to a 6146 (which is, incidentally, an ideal PA type for this band) ; with a 3-ele beam, he is in touch with the locals, and has G3MYI in Leicester as best-DX to date.

G3PJK (Middleton Junc., M'cr.) is plagued by main-road QRN trouble, the noise often submerging S7-8 signals. However, he has worked G3MYI for a new county, and says that there is an increasing number of stations to be heard on the band.

In Conclusion, Greetings—

That winds us up for this time, and it only remains for your A.J.D. to offer his good wishes for the Christmas season to all who follow this piece—with an expression of his sincere thanks for their support and interest, and all the kind comments and appreciative notes they (quite often) add to their report-letters (which opinions and remarks the Editor will not allow to be published, on the grounds that " we are not a mutual-admiration society "). As it will be hard going to get the next issue out by January 3, everything for " VHF Bands " must be in A.J.D's hands by **Friday, December 20, latest,** addressed : A. J. Devon, " V.H.F. Bands," *Short Wave Magazine,* 55 Victoria Street, London, S.W.1.—and do please allow for the three days' postal delays which will prevail about that time. As it is, the feature will have to be written over the Christmas period, not for the first time, and there will be barely two days to do the whole job, as Christmas falls right in the middle of our production period. Anyway, good luck to us all, and keep a drop in the bottle for the New Year—*73 de A.J.D.*

NEW QTH's

This space is available for the publication of the addresses of all holders of new U.K. callsigns, as issued, or changes of address of transmitters already licensed. All addresses published here are reprinted in the 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.

G3CZA, W. B. S. Marsters, 21 Glebe Close, Manea, March, Cambs. (*Re-issue*).

G3GJL, Worcester and District Amateur Radio Club, c/o T. W. Byrne, 19 Prestwich Avenue, Worcester. (*Re-issue*).

G3RQN, F. B. Gowen, 61 Westerleigh Road, Yate, Bristol.

G3RSX, G. M. Preece, 139 Owen Road, Wolverhampton, Staffs. (*Tel.: Wolverhampton 26609*).

G3SAA, J. N. Helsby, 68 Second Avenue, Chelmsford, Essex.

G3SBN, R. M. Hartop, 22 Stockhill Road, Greengates, Bradford, Yorkshire.

G3SCG, R. F. Partridge, 42 Maxstoke Road, Sutton Coldfield, Warks. (*Tel.: SUT 5921*).

G3SDK, M. R. Kidman, 11 Crown Road, Muswell Hill, London, N.10.

G3SDN, Dr. E. Savundra, Ph.D., D.C.L., 80 Hendon Lane, Finchley, London, N.3.

G3SFF, H. G. Johnson, Dowrich House, Crediton, Devon. (*Tel.: Crediton 2734*).

G3SFV, E. E. Meachen. Wyngarth, Meriton Road, Lutterworth, Rugby, Warks.

G3SGI, R. North, 28 Greenland Avenue, Deanstones Lane, Queensbury, Bradford, Yorkshire.

G3SGN, Miss Ceri Taylor, 12 Hafton Road, Catford, London, S.E.6.

G3SHJ, D. H. Heald, 21 Montreal Road, Blackburn, Lancs. (*Tel.: Blackburn 5625*).

G3SKC, R. W. Harvey, 4 Rowan Road, West Drayton, Middlesex.

G3SKL, J. A. K. Leger, 9 Parkfield, Topsham, Exeter, Devon.

GW3SLA, J. Sugden, 21 Borough Avenue, Colcot, Barry, Glam.

G3SLG, R. E. Simpson, 14 Davenport Road, Earlsdon, Coventry, Warks.

G3SLS, A. V. Hancock, 9 Belvoir Road, Widnes, Lancs.

G3SLX, J. Q. Smith, 258 Stone Road, Hanford, Stoke-on-Trent, Staffs.

G3SMK, G. E. Eaton, 54 Yoxall Road, Shirley, Solihull, Warks. (*Tel.: SHI 6381*).

G3SML, R. C. Melling, 10 Edinburgh Road, Earl Shilton, Leics.

G3SMM, W. M. Furness, 171 Woodhouse Lane East, Timperley, Altrincham, Cheshire. (*Tel.: Pyramid 2922*).

G3SMS, J. Blagbrough, 10 Upper Brockholes, Ogden, Halifax, Yorkshire.

G3SMY, R. Livsey, 39 Welford Road, Shirley, Solihull, Warks.

G3SNI, V. W. G. Caves, 31 Halsey Road, Kempston, Bedford.

GM3SNO, G. M. Smith, 5 Tarvit Avenue, Cupar, Fife.

G3SNQ, R. Catton, 81 Arnesby Avenue, Sale, Cheshire.

G3SNY, J. V. Pearson, 43 Belle Vue, Wordsley, Stourbridge, Worcs. (*Tel.: Kingswinford 4506*).

G3SOF, F. G. Milsted, c/o Randall Hut, Orchard Drive, Holywell Hill, St. Albans, Herts.

G3SOH, Radio Club, Ryde County Secondary School, Pell Lane, Ryde, Isle of Wight.

G3SOI, R. S. Pace, 22 The Drive, Shotley Bridge, Co. Durham.

GW3SOQ, J. A. Bowgen, 16 Stanway Road, Ely, Cardiff, Glam. (*Tel.: Cardiff 74529*).

G3SOV, D. L. Wightman, 81 Middletons Lane, Norwich, Norfolk. NOR.34.M. (*Tel.: Norwich 46943*).

G3SPJ, C. Wooff, 31 Holme Lacey Road, Lee, London, S.E.12.

G3SPL, P. Lee, 204 Parkdale Road, Sheldon, Birmingham, 26.

G3SPR, T. E. Clark, 68 Abbey Row, Malmesbury, Wilts.

G3SPS/MM, D. J. O'Connor. QSL to EI6AL. (*QTHR*).

CHANGE OF ADDRESS

G2HMK, T. G. Brown, 99 Brinkburn Drive, Darlington, Co. Durham.

G2OF, W. G. D'Arcy, 19 Fairey Avenue, Hayes, Middlesex.

G3EEQ, K. C. Gill, 27 Seaview Gardens, Roker, Sunderland, Co. Durham.

G3FDW, M. Gibbings, 77 Meadowfield, Gosforth, Seascale, Cumberland.

G3GXD, J. E. Burnitt, 24 Gardenwood Road, East Grinstead, Sussex.

G3HKQ, L. V. Westmoreland, 41 Riddell Avenue, Langold, Worksop, Notts.

G3IFT, F. H. Tobin, 7 Holly Drive, Basing, Basingstoke, Hants.

G3KAD, T. N. Ayscough, 59 Malvern Road, Gorse Hill, Swindon, Wilts.

G3KXT, R. I. Richardson, Post House, Puttenham, Guildford, Surrey.

G3MFO, P. J. Elliott, 91 Green Lane, Edgware, Middlesex.

G3NJK, J. V. de Bono (*ex-ZB1VJ/GD3NJK*), 33 Oak Tree Close, R.A.F. Station, Middleton St. George, Darlington, Co. Durham.

G3NLL, Amateur Radio Club, 2243 Laindon and Basildon Squadron A.T.C., Cherrydown, Basildon, Essex.

G3NOH, G. D. Eddowes, 24 Arps Road, Codsall, Wolverhampton, Staffs.

GI3OAU, D. B. McCutcheon, 8 Bengore Gardens, Larne, Co. Antrim.

G3OKF, J. S. Fitz-Patrick, 79 Sparks Lane, Thingwall, Wirral, Cheshire.

G3OPE, C. Urwin, 7 Hillford Terrace, Chopwell, Newcastle-upon-Tyne.

GM3PAE, N. V. Clarke, 35 Grange Loan, Edinburgh, 9.

G3PRK, A. H. Yilmaz, 42 Park Avenue, Palmers Green, London, N.13. (*Tel.: FOX 1750*).

G3RDC, A. Wood, No. 9 Flat, 62 High Street, Hastings, Sussex.

THE MONTH WITH THE CLUBS

By "Club Secretary"

(Special Note: No Club reports for next month — MCC results only)

THESE notes are written before the arrival of the logs for the Eighteenth "MCC," but there is no doubt that all records were broken once more, and that well over a hundred Club stations took part. The lengthened periods of four hours were necessary, to give most clubs a chance of working even three-quarters of the others who were on. Single-point QSO's with non-Club stations were (if we may use the word) pointless! They will obviously have to be ruled out in future, if activity continues to run so high.

The usual full report on the Contest will appear next month, and all secretaries and scribes are reminded that **no routine club activity reports** are wanted for the **January issue.** (We say this every year, but they still come in!)

Once more it is our pleasant task to wish all Club Secretaries, Officers and members a Merry Christmas and a Prosperous New Year. The Radio Club movement is thriving as never before—may yours be successful throughout 1964.

ACTIVITY REPORTS

These are very numerous this month, and very interesting, too. In the following columns you may read of dowsing (or divining) in the electrical sense; of a Winter Hamfest with sleeping-in facilities, Christmas Dinner, Dance and Party and Mobile Contest; of a Boys' club based entirely on science and Amateur Radio; of another for handicapped boys; and of a club that was just about to peter out, but has resurrected itself. And, of course, the normal reports of past, present and future activities from nearly 60 clubs.

Blackpool & Fylde will get together at their Squires Gate clubroom at 7.30 p.m. on December 9 for an Open Night, and on the 16th for a Tape Lecture with slides—Introduction to Electronics. Scheduled for December 23 is a meeting called "Getting Ready for Christmas."

Wolverhampton meets on the same dates, with a committee session, Morse and R.A.E. on the 9th, a "History of the Big Switch" on the 16th and a Christmas Rag Chew on the 23rd. Their November *News Letter* includes the report on the AGM, some technical gen, and a short DX report. Note secretary's change of address—in panel.

East Worcs. will be holding a Constructors' Evening on December 12, at the Old People's Centre, Park Road, Redditch; and on January 9 G5SS will be giving a talk on TVI. **Scarborough** are running a Review of the Year, with slides, on December 12, and a Christmas Party on the 19th. No meeting on Boxing Day, but the local net will be in action.

Civil Service, meeting at the Science Museum on December 16, will have an informal evening in the form of a Christmas Gathering, with a tape-recorded lecture on Receivers (G2IG). On January 6 the subject will be Worldwide Communications using VHF Radio Links, with films, by colleagues from G.P.O. Headquarters.

Dorking have an informal meeting on December 10 at The Wheatsheaf, when visitors will be welcome. On the 17th they hold their Christmas Dinner, at the Parrot Inn, Forest Green, as in previous years. Bookings to G3AEZ, the secretary, please. **Spen Valley** have a Film Show on December 12, and no further meetings until January 9, when there will be a display of members' gear. **Derby** will see 1963 in Retrospect—from members' slides—on December 11, and on the 18th the annual Christmas Party will be held. January 1 starts the New Year well with a surplus sale—"bring along the presents you didn't

Station G3MVH of the Northern Heights Amateur Radio Society took part in the October Scout Jamboree-on-the-Air. They made 150 contacts in many countries, and 75% of their QSO's were with stations either operated by Scouts or in the Scout interest. In this photograph, G8CB is at the controls, and the lady is G3OMM.

like!"

Stoke-on-Trent look forward to a talk and demonstration on a Transistorised Electronic Organ, by their secretary G3EHM, on December 12. The Christmas Party is fixed for the 19th. Meanwhile, they have been working hard on the clubroom, now completely re-decorated, and they meet at 8 p.m. every Thursday at the rear of the Cottage Inn, Stoke.

Stratford-upon-Avon produce a concise but lively *News-Sheet*, from which we gather that their meeting on December 6 will be a lecture on Tape Recorders by a member of the BBC staff; December 13, a talk on Operating Techniques and the Club station, by G3AUF; and December 20, a feature called "Boasters' Evening" with a small prize for the best entertainer.

West Kent (*QLF*, October) hope to pay a visit to one of the big electronics firms on December 13; on the 20th they will make merry with their Christmas Party, and on January 10 they will have an "Audio Night." All meetings are at Culverden House, Tunbridge Wells, at 7.30 p.m., with refreshments available at half-time.

Wirral recently held their AGM and elected G3CSG chairman, G3FOO secretary and G3KXR treasurer. G2FOS produces their *News Letter*. They report that the R.A.E. course at Birkenhead Technical College will not run this year, owing to lack of candidates—pity. Next meeting is on December 18, with a film show on Metals. **Acton, Brentford & Chiswick** will be discussing ATU's for Top Band at their next meeting—December 10 at the AEU Club, 66 High Road, Chiswick at 7.30 p.m.

Grafton report steadily increasing attendances at their Friday meetings (Montem School, Hornsey Road, London, N.7). Groups are working on a new Heathkit RA-1, the installation of a two-metre rig, and a series of "Morse Confidence" sessions to encourage interest in CW. On December 6, G2MI will be talking on International Aspects of Amateur Radio; and on the 13th, the final meeting of the season will be a Junk Sale. The clubroom will re-open on January 10.

Sutton and Cheam have planned some Morse practice for their December 17 meeting, and will also feature it on their Committee nights, held every first Tuesday. Requirements are stated as "high-impedance headphones, pencil and paper, and a clear head." 7.30 p.m. at The Harrow, High Street, Cheam.

Names and Addresses of Club Secretaries reporting in this issue:

ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, London, W.3.
A.E.R.E. (HARWELL): C. Sharpe, G2HIF, Building 347B, A.E.R.E., Harwell, Berks.
BARNET: F. Green, G3GMY, 48 Borough Way, Potters Bar.
BLACKPOOL & FYLDE: J. Boulter, G3OCX, 175 West Drive, Cleveleys, Blackpool.
BLACKWOOD: P. M. Fulton, GW3MMU, 36 Sunnybank, Blackwood, Mon.
BRISTOL: E. J. Davis, 72 North View, Westbury Park, Bristol 6.
BURNHAM-ON-SEA: D. W. Birt, G3GIW, 99 Stoddens Road, Burnham-on-Sea.
BURSLEM: W. Luscott, 36 Rothsay Avenue, Sneyd Green, Hanley, Stoke-on-Trent.
CAMBRIDGE: H. Lowe, G3PEI, 47 Hurst Park Avenue, Cambridge.
CANNOCK CHASE: G. M. Preece, G3RSX, 139 Owen Road, Wolverhampton.
CHESHAM: M. A. Woof, G3SGO/T, Copperkins, Copperkins Lane, Amersham.
CIVIL SERVICE: G. Lloyd-Dalton, 2 Honister Heights, Purley.
CLIFTON: J. Rose, G3OGE, 63 Broomfield Road, Beckenham, Kent.
CORNISH: W. J. Gilbert, 7 Poltair Road, Penryn, Cornwall.
COVENTRY: A. J. Wilkes, G3PQQ, 141 Overslade Crescent, Coundon, Coventry.
CRAWLEY: R. G. B. Vaughan, G3FRV, 9 Hawkins Road, Tilgate, Crawley.
CRYSTAL PALACE: G. M. C. Stone, G3FZL, 10 Liphook Crescent, London, S.E.23.
DERBY: F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby.
DORKING: J. Greenwell, G3AEZ, Eastfold, Henfold Hill, Beare Green, Dorking.
DUDLEY: R. W. Fisher, G3PWJ, 63 Swan Crescent, Langley, Oldbury, Worcs.
EAST WORCS.: M. J. Nicholas, 12 Crabtree Close, Lodge Park Estate, Redditch.
FARNBOROUGH TECHNICAL COLLEGE: D. Strike, Farnborough Technical College, Farnborough, Hants.
GRAFTON: A. E. Bristow, 37 Tyndale Mansions, Upper Street, London, N.1.
HALIFAX: J. Ingham, G3RMQ, Lambert House, Greetland, Halifax.
LIVERPOOL: H. James, G3MCN, 448 East Prescot Road, Liverpool 14.
LOTHIANS: L. R. Richardson, GM3AKM, 64 Easter Drylaw Place, Edinburgh 4.
MEDWAY: P. J. Pickering, G3ORP, 101 Chatham Road, Maidstone.
MIDLAND: C. J. Haycock, G3JDJ, 360 Portland Road, Birmingham 17.
M.R.C.C.: J. Lockyer, G3OVA, 23 Beechwood Road, Birmingham 14.
MITCHAM: A. Thurley, 50 Bruce Road, Mitcham.
NORTHERN HEIGHTS: A. Robinson, G3MDW, Candy Cabin, Ogden, Halifax.
NORTH KENT: B. J. Reynolds, G3ONR, 49 Station Road, Crayford.
OXFORD: B. Green, G3PMI, 3 Barnet Street, Iffley Road, Oxford.
PLYMOUTH: R. Hooper, G3SCW, 2 Chestnut Road, Peverill, Plymouth.
PORT TALBOT: H. G. Hughes, GW4CG, 20 Austin Avenue, Porthcawl, Glam.
R.A.I.B.C.: Mrs. F. E. Woolley, G3LWY, 10 Sturton Road, Saxilby, Lincoln.
READING: R. G. Nash, G3EJA, 9 Holybrook Road, Reading.
REIGATE: F. D. Thom, G3NKT, 12 Willow Road, Redhill.
RODING BOYS: R. J. Phipps, 51 James Lane, London, E.11.
SALOP: K. Jones, G3RRN, Greystones, Shrewsbury Road, Church Stretton.
SCARBOROUGH: P. Briscombe, G8KU, Roseacre Irton, Scarborough.
SCOTLAND: A. Barnes, GM3LTB, 7 Southpark Terrace, Glasgow, W.2.
SILVERTHORN: B. A. Lea, G3ICY, 9 Balgonie Road, Chingford, London, E.4.
SOUTHGATE: K. Spicer, G3RPB, 22 Clifton Road, London, N.3.
SPEN VALLEY: K. H. Parkes, G3EHM, 28 Grove Road, Heron Cross, Stoke-on-Trent.
STOURBRIDGE: A. G. Macintosh, 50 Field Lane, Oldswinford, Stourbridge.
STRATFORD-UPON-AVON: N. Smith, 54 Clopton Road, Stratford-upon-Avon.
STROUD: H. Jordan, G3GEW, Avenis, France Lynch, Stroud.
SURREY (CROYDON): S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon.
SUTTON & CHEAM: F. J. Harris, G2BOF, 143 Collingwood Road, Sutton.
VICKERS-ARMSTRONGS (HURN): J. F. Squires, M.B.E., G2DBF, 18 Wakefield Avenue, Northbourne, Bournemouth.
W.A.M.R.A.C.: Rev. A. Shepherd, G3NGF, 121 Main Street, Asfordby, Melton Mowbray.
WEST KENT: H. F. Richards, 17 Reynolds Lane, Tunbridge Wells.
WHITENESS: B. Page, Whiteness Manor Home, Kingsgate, Broadstairs, Kent.
WIRRAL: A. Seed, G3FOO, 31 Withert Avenue, Bebington, Wirral.
WOLVERHAMPTON: J. Rickwood, 852 Stafford Road, Fordhouses, Wolverhampton.
WORCESTER: G. W. Tibbetts, G3NUE, 108 Old Hills, Callow End, Worcester.

For the recent Jamboree-on-the-Air, when Scout stations all over the world were in contact on the amateur bands, GB3BPH was installed at Baden-Powell House, in South Kensington, London. A team of eight licensed Scout operators kept the station on the air throughout the 48-hour period of the event, and worked 40 foreign Scout stations in 18 different countries. It is estimated that this year more than 100 amateur stations were on the air on behalf of Scout groups in the U.K. alone. As an example, the Salisbury & District Short Wave Club provided a station signing GB3USA, at an American camp on the Fonthill Abbey Estate, Tisbury, Wilts. This was operated mainly on 80m., with some local contacts on Top Band and a few W's worked on 20m. The station aroused much interest and was always crowded with visitors, who themselves represented 10 different European countries, in addition to the American contingent.

Crystal Palace joined forces with **Clifton** to run a Hi-Fi evening on November 16; next meeting, on December 21, takes the form of a Junk Sale and Party. We have received their *Newsletters* for October and November.

Northern Heights made a big thing of their participation in the Jamboree-on-the-Air, which brought them much valuable publicity in the local press. A party of members left Halifax at 0430 on the Saturday of the Radio Communications Exhibition, and returned home by about the same time the following morning! December 11, Third Annual Dinner; December 18, Ragchew; and January 1, a Ten-to-Eighty transmitter using the new Geloso VFO, by G3FDC.

Stourbridge report membership steadily increasing, with a good proportion of young enthusiasts. Their "Christmas informal" is at the Bell Hotel, Market Street, Stourbridge, on December 20, at 8 p.m., and a large turn-out is hoped for. All are welcome.

Reading have planned a "Questions and Answers" session for their December meeting (on the 28th, 7.30 p.m. at the Palmer Hall). The competition for the best Club badge design will also be judged on that day. The AGM is booked for January 25, when the 1964 programme will be outlined.

Lothians report a successful Junk Sale—although it seems that the same "old faithful" bits-and-pieces turn up every time! Their December meeting will be on the 12th and 26th at the YMCA, South St. Andrew Street, Edinburgh, 7.30 p.m.

Burnham-on-Sea now meet every Tuesday evening and Sunday morning, and in addition to their Morse classes for beginners, they are running an advanced session so that licensed members can improve their speed—an excellent scheme which others might like to emulate. The main monthly meeting is on the second Tuesday, at the Crown Hotel.

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CLUB SECRETARIES—PLEASE NOTE

The entire "Clubs" space in the January issue will be given over to our detailed review of MCC —the recent Magazine Club Contest. Normal Club reports will be resumed in the February issue, for which the deadline will be January 17, 1964.

Cambridge will be hearing a talk from G3HRH on A Scandinavian Journey, on December 6. December 13 is described as an "Informal Evening for Survivors." (What is to happen in Cambridge on the 12th ?)

Coventry (*CARS News Letter*) now meet every Monday evening at Westfield House, Radford Road, Coventry. Once a month there is a "G2ASF Night on the Air." **Blackwood** (*Newsletter*, October) report a successful AGM, at which their new constitution was passed. Officers elected were—president, G6BK; chairman, GW3CJR; secretary, GW3MMU.

Southgate (*Newsletter*, November) hold their AGM at the December meeting (date not stated) and a Junk Sale at the January event. **Port Talbot**, gathering on the fourth Tuesday of the month, recently held their AGM, at which GW5VX was re-elected chairman and GW4CG secretary. On December 17 there will be a lecture; subsequent meetings on January 14 and February 11, all at 8-10 Jersey Street, Port Talbot.

Ambitious Event

MRCC (Midland Radio Contest Club) are running a Hamfest at their Hq. over the week-end of December 21-22, beginning at noon on the Saturday with full talk-in facilities on Top Band and Two. Activities on Saturday include a film show, amusements for the juniors, and the MRCC Christmas Dinner, Dance and "Ham-Hop." Mobile aerial performances may be checked, and mobiles tested out on the Club's very extensive LF-band arrays. On Sunday there is a Mobile Contest at 1030, and after lunch a lecture on the Eddystone EA12 and EC10 receivers, by G3GVA. Also a Christmas Party for the juniors, the Grand Draw, and presentation of prizes.

Overnight accommodation for about 50 visitors is available, and the inclusive entrance fee is 2 guineas per person. Children half-price, and a nursery is available, with a qualified "nanny." Ticket applications to J. A. Bratby, G3GVA, 4 Burford Park Road, Kings Norton, Birmingham, 30—not later than December 16. Full details available on request. We wish them well with this enterprising effort, and look forward to hearing that it was a great success.

Unique Venture

Those who saw the exhibit, in Seymour Hall, of the **Roding Boys' Society** cannot fail to have been impressed, and probably wondered exactly what is behind this most unusual club. It is not a radio club forming an offshoot of a larger Youth Organisation—it is, simply, a Boys' Club founded on a common interest in radio and science, rather than the more usual sports and athletics. The whole show is run by the boys themselves, with suitable guidance, but not interference, from more senior members. They recently put on a show at the Wanstead and Woodford Exhibition, and took part in the Jamboree-on-the-Air. A visit was also paid to the Marconi Co. at Chelmsford.

For the Handicapped

Whiteness Radio Club is based on the Whiteness Manor School for Handicapped Boys (at Broadstairs) and the history of its growth is a most interesting story. The Club organised a Hamfest and Mobile Rally, earlier in the year, and visited the Radio Communications Exhibition in some numbers. Three years ago the Club was formed, largely as the result of 80-metre listening on a broadcast receiver. Now, thanks to the generosity of Essex and Kent amateurs, there is a well-equipped clubroom and at least four worthwhile receivers; the boys have also built a "Junkbox Special" transmitter. Watch their progress!

The **RAIBC** (*Radial*, October and November) is, of course, an old-established club for invalids and shut-ins, and its good work is well known. They are quietly supported by numerous unnamed amateurs, and their own enterprise is considerable. The current *Radial* contains an article on "Possum" (Patient-operated selector mechanisms) which started at Stoke Mandeville in 1960 with a simple device consisting of a police whistle suspended above a patient's mouth. Where other physical movements are impossible, many operations can still be carried out by servo-mechanisms operated by a light puff into a mouthpiece. An admirable line of research for those amateurs blessed with normal health.

No Obituary Notice

Mitcham, for the last month or two, has given the impression of being in a bad way. Now, however, we gather that the tide has turned and that nothing less than progress and expansion will be considered. Meetings have been arranged for December 6 (Film Show) and 20 (Constructional Contest) and all former friends of the club have been circularised. Future activities will be discussed at the next few meetings and "will be entirely in the hands of those who attend." We certainly wish them every success.

Liverpool reports that members are getting going on Four Metres, using the R.220 receivers and home-brew transmitters. The meeting on December 17 is noted as "Bring Your Own Bottles" (and we do not imagine that the electronic type are implied). No meetings on the 24th or 31st.

AERE, Harwell ("*QAV*," November) meet on the third Tuesday, at 7.30 p.m. in the Social Club; outside visitors are always welcome. They also run two nets (nightly at 2100 on 21400 kc, and Mondays, 2000 on 144·12 mc, with G2HIF as control). They suggest that more local support on 21400 kc instead of "ploughing through the QRM of 3·5 mc" would be a good idea. December 17 is the date of the AGM.

Bristol have a full programme including Simple Test Gear (December 9), a Junk Sale (12th), Oscilloscopes (16th), Receivers (19th) and SSB (30th). No meetings on the 23rd or 26th. A Sunday visit to the G.P.O. station at Highbridge will be arranged, also an evening at the Central Telephone Exchange.

Crawley are delighted at winning the Exhibition

Organiser's plaque for their entirely home-built equipment at GB3RS and GB3VHF during the Radio Communications Exhibition. Their AGM will be held on December 18, and the Annual Dinner has been booked for March 6.

Medway (*MARTS Newsletter*, November), finding great difficulty in locating suitable accommodation, have launched a building fund and intend to aim at a Hq. of their own. They have lots of enthusiasm and ideas, and we wish them every success.

North Kent (*Newsletter*, November), recently acted as hosts to the Ilford Group from "across the water"; their next meeting, on December 12, will be a talk and demonstration on the TW range of VHF equipment, by G3HGE.

At their AGM, **Oxford** elected G2DU president, G3JLE chairman, and G8PX and G3PMI secretaries, the latter being in charge of club activities. They meet at the Cherwell Hotel, Water Eaton Road, on the second and fourth Wednesdays, 7.30 p.m., and on December 11 they will have a lecture on LF transformers by G3OFB. R.A.E. and Morse courses are projected, and new members welcome.

The Midland Radio Contest Club signs G3RSR, and here G3NXV is seen operating, on a recent Club occasion. Excellent equipment, loaned by G3GVA, includes a transmitter which incorporates a tracking arrangement to keep it on the Rx frequency at all times.
A G3GMN print

Salop are now well established with a membership of 35, including 12 call-signs. They recently held a display of home-built gear, and a Junk Sale. Next meeting, December 12, for a talk (unspecified).

Vickers Armstrongs (Hurn) plan to organise a Mobile Rally at the airport next year, and would welcome new members from the Bournemouth area, since one-third of the membership is available for non-employees of the firm.

WAMRAC (*Circular Letter* No. 36) continues to run regular nets and skeds, and reports a record number of new members during recent months. A headquarters station is the important project now under way.

Radio Club of Scotland (*GM Magazine*, October) meet every Friday night, 8 p.m., at the Partick Burgh Hall, until such time as they can make more permanent arrangements for their own premises.

Farnborough Technical College R.S. held their AGM recently, and report that power is now laid on to their shack—all they need is "permission to switch on"! Several members are taking the December R.A.E.

Plymouth report that they were well beaten by Torbay in a recent Quiz. They are working hard on their new clubroom, and the club Tx, G3PRC, is going strong. Many SWL members are working for their licences, and new callsigns are appearing.

Down in Cornwall, the **Cornish** Radio and TV Club have been given a demonstration, by G3OFN, of the art of locating buried metals by the use of copper rods, in the same way that a water-diviner, or dowser, uses hazel twigs. G3OCB, who is doing so well on Sideband, is giving a series of lectures on that subject. The Club's chairman is now G3NKE, and the group is in an organised and healthy condition.

From **Worcester,** we hear that they have now moved to a new Hq., at the Dolphin, in Broad Street, where the next meetings will be on December 7 and 21. At the recent AGM, G8JC was re-elected chairman, with G3NUE as secretary; there now being four callsigns and two SWL's on the committee.

CLUB NEWS IN BRIEF

Barnet: Christmas Party, December 7 (Oakmere House, Potters Bar). Tickets, 5s., from G3MWG.

Clifton: Annual Constructional Contest, December 13—225 New Cross Road, London, S.E.14.

Burslem: Third Wednesday each month, Town Hall, Burslem.

Dudley: December 6 and 20 at The Art Gallery, Dudley.

Midland: December 17, 7.45 p.m., Birmingham and Midland Institute, Paradise Street, Birmingham 1.

Silverthorn: Every Friday except the first, 8 p.m. at Friday Hill Community Centre.

Stroud: Every Wednesday, 8 p.m. at Arundel Mills, London Road, Stroud.

Chesham: Every Friday, 7.30 p.m.—note change of Secretary.

Surrey (Croydon): December 10, Hints and Kinks Evening, at the Blacksmiths Arms, 1 South End, Croydon. December 14, Dinner-Dance at Selsdon Park Hotel.

Halifax: Quiz versus Barnsley, December 3 at the Beehive and Crosskeys.

Reigate: Annual Constructional Contest, December 14 at The Tower, Redhill. January 18, AGM.

SMALL ADVERTISEMENTS

(" SITUATIONS " AND " TRADE ")

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

SITUATIONS VACANT

SEVERAL vacancies exist for enthusiastic, practical young men as Test Engineers, Technical Assistants, Experimental Prototype Constructors, etc. The positions offer opportunities for advancement. Academic qualifications not essential but applicants should be of good general education and have been interested in radio or electronics for some time.—Labgear, Ltd., Cromwell Road, Cambridge. *(Tel: Cambridge 47301.)*

TRADE

COMMUNICATION RECEIVERS VLF-UHF, any condition, working or faulty. Also test gear, transistor radio, tape recorders, record players, anything of radio interest, etc. Bought, sold and exchanged.—Frank Bazaar, 66 Moor Lane, Preston, Lancs. *(Tel. 85692.)*

CONSET Transceiver S.76, 6-band with mobile power supply, ideal for desk or mobile; cost £350, accept £175.—Eastell, 9 Prod Lane, Baildon, Yorks.

MODERN Communication Receivers Wanted.—Teleradio Co., 64 High Street, Waltham Cross. *(Tel.: WS.22973.)*

WEBB'S LOG BOOK for recording signals heard and worked; 112 pages 9¾ in. x 8 in. approved format, semi-stiff covers. Excellent value; 6s. 0d. post free, or callers, 5s. 4d.—Webb's Radio, 14 Soho Street, London, W.1.

QSL CARDS: Buff, blue, pink, green, 100, 15s.; 250, 25s.; 500, 40s.; 1,000, 75s.—Samples (s.a.e.): Reilly, Panxworth, Norwich, 56.Z.

CASES, chassis, panels. ANYTHING in metal; send your drawings for quote. Stove enamelled, hammertone, or plain, in any colour.—Moss Watson, 40 Mount Pleasant Street, Oldham, Lancs. *(Main 9400.)*

ALL TYPES of modern and obsolete valves at low prices, s.a.e. lists/enquiries. Radio/Television books, service sheets.—Hamilton Radio(s), Western Road, St. Leonards, Sussex.

NATIONAL NCX-3 SSB Transceiver, full coverage 80-40-20m., 200w. p.e.p., with NCXD mobile transistor power supply, £185; demonstration London. —Box No. 2837, Short Wave Magazine, Ltd., 55 Victoria Street. London, S.W.1.

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

CATALOGUE No. 15. Government Surplus Electrical and Radio equipment. Hundreds of items at bargain prices for the experimenter and research engineer, 2s. 6d. post free; catalogue cost refunded on purchase of 50s.—Arthur Sallis Radio Control Ltd., 93 North Road, Brighton.

SALE: Good clean Communications Equipment taken in exchange for our NQ products. 2-metre Nuvistor Converter Mk.III, less PSU, IF 28-30 mc, £5. Two- and four-metre Exciters, Mk.I, less Mod. and PSU, £7. 4m. 6BQ7A converter, less PSU, £6. (All realigned and tested.) AR88D, in very good condition, £45.—Green & Davis, 104 Hornsey Road, London, N.7.

READERS' ADVERTISEMENTS

3d. per word, min. charge 5/-, payable with order. Add 25% for Bold Face (Heavy Type). Please write clearly, using full punctuation and recognised abbreviations. No responsibility accepted for transcription errors. Box Numbers 1/6 Extra. Replies to Box Numbers should be addressed to The Short Wave Magazine, 55 Victoria Street, London, S.W.1

LAST FEW! Brand new AVO-tested American Valves: 6AQ5, 6AU6, 6AK5W, 12AT7, 12AU7, 12AX7, 2s. 6d.; 12AY7W, 5687, 6AL5W, 2C51W, 1s. 6d.; 5R4WGA, 6AS7G, 10s. SQ type, 1s. extra. Ceramic bases + cans, 6d. 12E1, 6L6, 2s. 6d. 14-way American small-type plugs and sockets, gold-plated pins, 1s. pair. Add postage, please.—Judkins, 20 Highbury Crescent, Bessacarr, Doncaster.

REDIFON R5OM table model, as new, 15 kc to 32 mc, manual, PSU, £65. HRO, PSU, manual, coils 3·5 mc to 30 mc GC, 7 mc BS, spare xtal filter, £12. Miniciter and Minipa assembly on chassis, with meters, needs completing, £14; buyer collects.—Hales, 4 Westbrook Road, Thornton Heath, Surrey.

MOBILE for sale, unwanted gift, brand new: Small Minimitter Mobile Tx and control box, matching transistor power supply and Top Band transistor Rx; all reasonable offers considered.—G3RBG, Anthony Gray, 13 Balmoral Avenue, Whitefield, Manchester, Lancashire.

MOBILE Multi-Elmac AF67 6-band Tx, 6146 in final, matching Rx, PMR7 6/12v. power supply for Rx; also unused Avel transistor combined power supply for Tx and Rx, plus mains power supply, manuals, etc., £75 the lot. Minimitter Mercury 200 (new type) 2 x TT21's in final, £40. All above unmodified; will deliver Midlands after inspection.—Box No. 2907, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: R.A.E. Question Papers, prior 1962.—Box No. 2908, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Manual and circuit diagram for CR-100 receiver, please state price.—R. M. Tatton, 1 Hillview Drive, Edinburgh, 12.

SALE: G.E.C. 60w. amplifier prl p/p KT66's, 3 inputs, with power supply, circuits metered, multimatch output transformer, as new, £5. Also B2 Tx/Rx, power supply, xtals and coils, in original attachè case, £5; buyer collects.—G3IRL, 166 Stradbroke Grove, Ilford, Essex. *(CRE 3365.)*

FOR SALE: Geloso Converter, 4·6 mc, £12. WANTED: Genuine AR88 S-meter, Panda ATU, or similar.—GM3NPR, Henrietta Street, Kilmarnock.

FOR SALE: HRO Senior receiver fitted with new modern valves, requires little attention, two coils, £10. Transformer 0-240v. pri., sec. 0-480v. 200 mA, sec. 275-0-275v. 500 mA, sec. 6·3v. 2 amps, sec. 6·3v. 1 amp. sec. 2·5v. 10 amps. Offers?—Box No. 2909, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

£25 offered for Heathkit Mohican with manual; would consider faulty or incomplete model, please state price; will collect reasonable distance.—Knowles, 57 Brougham Street, Preston, Lancs.

VICEROY Mk. II for sale, complete with PSU, £85. Transport 100 miles.—G3LCZ, 13 Almond Grove, Fairfield, Stockton-on-Tees, Co. Durham. *(66248.)*

SMALL ADVERTISEMENTS, READERS—*continued*

IMMACULATE Labgear LG.50 Tx, ready for operation, £28 (owner now QRO).—V. W. Stewart, 9 Belmont Avenue, Juniper Green, Midlothian.

RCA SIGNAL GENERATOR, 100-30,000 kc; Valve Tester (trade mark AVO); a quantity of new valves, going cheap, what offers?—S. J. Saunders, 4 Leach Lane, St. Annes-on-Sea, Lancs.

HRO SENIOR, Table Model, complete with S-meter, PSU and speaker; bandspread coils for 80, 40, 20 and 10 metres. Recently professionally re-aligned. What offers?—Carlisle, 43 Strand Road, Londonderry, Northern Ireland.

WANTED: For radio club starting, AR88D or similar. Offers to—Radio Club, R.A.F. Bawdsey, Nr. Woodbridge, Suffolk.

S-37 Hallicrafters receiver, 125 mc-225 mc, £75. AR88D Receiver, cost £75, p.v.c., £45. BC-221 frequency meter, £14. R.109T receiver, £5. All new condition; s.a.e.—L. Boushear, 17 Kent Road, Atherton, Manchester.

SALE: Collins KWM2 with AC and mobile transistorised power packs; excellent condition; no reasonable offer refused.—Box No. 2910, Short Wave Magazine, 55 Victoria Street, London, S.W.1.

WANTED: TCS receiver chassis for spares, also circuit or manual for same.—Please write: Doran, 37 Waverley Road, Exmouth, Devon.

SALE: LM14 plus calibration book and power pack, £12. Heathkit tunnel diode GDO, as new, £20. AVO-7, good condition, £9. 60-watt exciter, bandswitched 160-10 metres, built-in VFO and NBFM; also 813 PA bandswitched 80-10m.; both fully screened and filtered for harmonic reduction; offers? WANTED: AVO-8 and good VTVM with RF probe.—G3FPQ, Markham Oak Cottage, Bucks Horn Oak, Farnham, Surrey.

COMMAND Receiver 4-6 mc, £2. Telequipment S31 oscilloscope, twelve months old, immaculate, £40. BSR tape deck, brand new, £5. 4-metre PA units, new, for 829B, less valves, £1 each. TCS-12 receiver, brand new, with noise-limiter, speaker, 6v. version, and power plug, £8 10s. Labgear 2m. converter, £4 10s. G.E.C. electric cooker auto-timer, brand new, unused, £4 10s. Crystal oven 6·3v., twin HC6U, £1. Magslip transmitters and receivers with indicators, 5s. each. Manuals for BC-221 AF & T, 10s. each. QQV03-6's and 3-10's, 15s. each; QQV03-20A, 30s. 2C39A's, £2 each.—A. J. Hodgkinson, 30 Moorthorne Crescent, Newcastle, Staffs. *(Phone 51509.)*

SALE: HRO-MX, needs slight attention, 6 coils covering 175 kc-2 mc, matching speaker, PSU, offers? Delivery within 50 miles.—Duffy, 8 Forbes Road, Springvale, Winchester, Hants. *(Evenings.)*

EDDYSTONE S.640, highly modified, good performer on sideband, £12. Class-D Wavemeter, AC, needs attention 7 mc range, £2. Cossor double beam 'scope, excellent condition with spare tube, £10. All with instruction books; as one lot, £21.—G3LNO, 62 Stonebury Avenue, Broad Lane, Coventry. *(Tel: 66565.)*

FOR SALE: Eddystone S.750 with matching speaker, £40. BC-453 modified MW and AC mains, £3.—Mitchell, G2DHG, 62 Ely Road, Worthing, Sussex.

G3PAI wants a left-handed bug.—Rabson, Lavers Rectory, Ongar, Essex.

SMALL ADVERTISEMENTS, READERS—*continued*

GRAYSHAW Signal Generator, 100 kc-80 mc, £4 10s. *Practical Wireless*, April 1957-April 1963, £3. Command receivers 3-6 mc, £1; 6-9 mc, £2. Crystal Calibrator No. 10, £2 10s. R.1155B, rough, 10s. Please enclose postage.—L. Arnold, 24 Albert Road, Stechford, Birmingham, 33.

DESPERATELY wanted: Manual or circuit diagram for "88" Walkie-Talkie set Type A made by Ekco. Any information on conversion wanted. Also Top Band or 80-metre band crystal for CW.—R. Livesey, 39 Welford Road, Shirley, Solihull, Warks.

SALE: BC-348L, in excellent condition, complete with special power unit, speaker, £20. Buyer collects.—BRS 14996, 7 Boldmere Drive, Sutton Coldfield, Warks.

THE Season's greetings and good DX to all old shipmates and friends from G8IX.

SWOP complete TCS Tx/Rx unmodified, 12v., for complete HRO Senior or suitable offer. SALE: J-Beam 32-ele 70 cm. array, £9. U.S.A. 30 ft. plywood tripod base mast, £6. Mohican, £25. S-Band sig. gen., BC-1077, £20. Test Set 202, £5. UPX6, xtal controlled 1050 mc Tx/Rx (has 3/2C39A, VHF xtals in multiplier chains, etc.), beautiful job, best offer over £30. WANT: Circuit of LAE sig. gen. (520-1300 mc). Will help with transport.—D. Clift, 3 Balmoral Drive, High Lane, Stockport, Cheshire. *(Disley DS9 2273.)*

EXCHANGE: Evinrude "Fastwin" 18 h.p. outboard engine, as new, cost £180, for high grade receiver.—Box No. 2911, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Heavy Post Office type straight key, must be in good condition; state price.—R. Whittington, 18A Botwell Lane, Hayes, Middx.

G2DAF receiver, all new components incl. QCC xtals, working 20 metres only, uncalibrated. Bargain, £40.—Box No. 2912, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

EXCHANGE: TCS-13 Rx in good condition, including mains p/pack, loudspeaker, control unit, connector—for Rx covering 40 mc to 60-70 mc, good condition, for AC mains. Write—R. Bunney, Trelawne, Cupernham Lane, Romsey, Hants.

WANTED: 4-metre Tx, about 20/25 watts, TVI proof and reliable.—Details to G3ADZ, 3 Norris Gardens, Havant, Hants.

SALE: Moving QTH. 200/250v. mains xformers: 400-0-400v. or 500-0-500v. 250 mA, 4 or 5v. 3½A., 4 or 6v. 3A twice, 30s.; 250-0-250v. 50 mA, 6·3v. 2A, £1; 3kV 10mA, 4v. 1½A., £1; 6·4 or 5 or 2½v. 7A four times, £1; 250-0-250v. 80 mA, 5v. 2½A., 6·3v., £1. Chokes: 20H 80 mA., 15s.; 10H 350 mA., £1; 7½H 500 mA., £1. Condensers: 8 μF 800v. wkg., with mounting clips, 6s. each. UM-1, 15s. Labgear coax selector switch, 5-way with T/R relay, £2. K.W. LP filter, 75-ohm, £1. RF-26 and matching p/pack, £1. Some above new. All guaranteed; send s.a.e. meter list, mostly 2½ in. 1st grade m/c, 15s. each. Above prices do not include post/carriage.—Box No. 2914, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: *Short Wave Magazines*, Jan.-Oct., 1959, and Jan.-March, 1960. Also Creed Type 7B teleprinter; state condition and price.—E. A. Bonser, 442 Bradgate Road, Newton Linford, Leicester.

SMALL ADVERTISEMENTS, READERS—*continued*

SSB Kendon crystal filter Exciter, as new, comprising SB1 MX1 MX2 EL84 amplifier, 5 watts output, switched 3·5 to 28 mc, complete with VOX, power supply and meter, all built into Philpotts cabinet 18 ins. x 10 ins. x 14 ins.; circuit and details supplied; needs external 3 to 4 mc VFO, £20 (cost over £45). Also steel lattice tower, 4 ft. base, 35 ft. high, £15.—G5KM, 9A Woodstock Road, Barnsley, Yorks. *(Tel. 5972.)*

888A, with matching S-meter and blocks, excellent condition, recently overhauled and aligned by Webbs, and in tip-top shape, £75. Two-tone S-line G2DAF Rx or Tx cabinet by Philpotts, with Eddystone 898 dial, £5 10s., including carriage.—Box No. 2913, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: 522 2m. Tx, with PSU, crystal and mike, TVI-vetted, £10. Excellent R.109A Rx, £5. High capacity 6v. car battery, £3. HMV car radio, works fine but needs PSU, £4. Nuvistor 2m. pre-amp, £4. ECC88 2m. converter, £4. 6v. vibrator PSU, £1; another, 15s.; 12v. vibrator PSU, £1. 12v. rotary converter, 10s. 28v. rotary converter, 5s. Various 6v. and 12v. valves, 2s. 6d. each, state needs. Muirhead 4½ in. slow motion drive, 7s. 6d. R.1132 slow-motion drive, 7s. 6d. All carriage extra.—L. Belcher, Pine View, Savill Road, Lindfield, Sussex. *(Lindfield 2050.)*

FOR SALE: AR88 Receiver, mint condition, complete with phones, speaker, manual. Buyer inspects and collects, £35.—Ring *LIV 2374 after 7 p.m.*

WANTED: Mohican GC-1U receiver; please state condition, price, and whether factory or otherwise built.—D. Timperley, 104 Chestnut Drive, Sale, Cheshire.

FOR SALE: ET4336 Tx, good condition; reasonable offers, please? Would consider exchange table-top rig. Buyer collects.—Box No. 2915, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

MOBILE? 130w. Aveley transistor power pack, 250/100v. plus 425/250v. in manufacturers' sealed box, £14 10s. WANTED: S27/S36.—G3IES, *QTHR. (EDGware 0937.)*

PCR Receiver, complete with matching PSU, £6 10s. Radio Receiver and transmitter with matching PSU; 6v., 12v., 24v., working. Offers?—W. A. Clapham, 239 Cambridge Road, Ellesmere Port, Wirral, Cheshire.

SALE: Minimitter 160, 80, 40 metre mobile whips and mounting bracket. 130A, 100-156 mc sig. gen. and field strength meter. 40m. "Command" Tx; RF-26 Unit modified 4 metres. Offers?—G8DT, 18 New Court Park, Charlton Kings, Cheltenham, Glos.

WANTED: HRO Senior receiver with or without coils. All replies answered. Details, price, etc.—Box No. 2916, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

10 AMP 50v. R.C.A. silicon diodes, brand new, perfects, 4 for 25s. WM3, £35. Mint CT53, £15. Murphy TPG11, £15. TS87-AP, £3. TR.1520 complete, working, 144 mc, £4. Mint Leak TL12 plus 12w. amplifiers, £10. FT-243 Crystals, 4s. 6d. each, 7000, 7025, 7050, 7075, 7100, 7125, 7150 kc (£1 the set); 8025, 8050, 8075, 8100 kc (10s. the set). Brand new U18, VR150/30, EF37A, GEC ECC83, 4s. DG7-5, 25s. Post extra.—V. Cedar, 2A Convent Hill, London, S.E.19. *(LIV 8489 after 7.30 p.m.)*

SMALL ADVERTISEMENTS, READERS—*continued*

MOBILE station complete, all bands 160-10m., plus medium-wave on Rx, Multi-Elmac model PMR-7 Rx, with AVC/MVC, squelch, variable BFO injection, noise limiter and S-meter; Multi-Elmac model AF67 Tx, 50w. with 6146 final; complete with control box, and Dependapac 500v./250v. DC/DC Converter, £80. 100w. fixed-station Tx, all bands, TT-21 final, 2/KT88 ultra-linear modulator, in two packs complete with 300/600/900v. separately switched power supplies, in 3-tier rack with top tier unoccupied for ATU, etc., switching for final in linear; commercially built, £45.—G3NXV *QTHR. (MAYpole 3466.)*

BC-221 with charts and valves, less xtal, £8. New non-inductive carbon resistor 50 ohms, ideal dummy aerial load, 15s. 6d. Handbooks R.107, W/S 19, W/S 22, W/S 46, Wavemeter Class-D, 5s. 6d. each. —Akehurst, Stevens Cottage, Ipplepen, Devon.

FREE 100 valves first offer, £67 for £35 AR88D, manual, speaker, S-meter. BC-221 charts, p/p £15. Geloso Converter, p/p £6. Q-Fiver, £4 10s. CBY Tx, 2·1-3 mc, £5. UM2, £2. Q-Fiver IFT's, 7s. 6d. Buyer collects possible.—19 Kingswood Avenue, Swanley, Kent.

COMMAND Rx's, one only of each, 3-6 mc, 85s.; 0·5-1·5 mc, 75s., brand new and boxed. 1·5-3 mc latest model, with AVC and p.v.c. wiring, brand new, £8 15s. Type 234A p/pack, brand new, 35s. All plus carriage. WANTED: Hallicrafters S.40A, SX-42, SX-43, or RME-70.—Box No. 2917, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

HRO Senior table topper, five GC coils 900 kc-30 mc, power pack, manual, perfect condition, £20, carriage extra.—B. Watkins, New Jersey, Breach Lane, Enmore Green, Shaftesbury, Dorset.

CR-100, excellent condition, manual, £18 10s. Transmitter, professionally made, wonderful condition, 3·5 to 30 mc switched, ATU unit, power supply and modulator, all metered, 100w. AM, 120w. CW, VFO, £45 o.n.o.? Also R.1132A and power pack, new condition, £4 10s. Valves, meters, mast.—Winter, Hoathwood, Beckley *(315),* Rye, Sussex.

BRT-400 receiver. Hallicrafters VHF receiver. (Converter 300 mc-1,000 mc, 30 mc IF.) AR88 spares. HRO dial, 30s. SWR and Wattmeter, 35s. WANTED: Manual for Collins R-278B/GR Receiver.—Wright, 4A Nepal Avenue, Atherton, Manchester. *(Tel. 991 after 6.30 p.m.)*

TELETYPE 14 Teleprinter, excellent condition, £12. G.P.O. rectifier Type 43A, 30s.; rectifier Type 26B, 30s. Home-built TU, £5. AFSK osc., 30s. CR-100 Rx, £12. 20 mA 2½ in. meter, new, boxed, 15s. Prefer buyer collects.—Vears, 19 Waterloo Road, Epsom, Surrey.

WANTED: Top Band "Command" Rx. Must be in good working condx. Details to—Graham, 121 Bletchingley Road, Merstham, Surrey.

SALE: Dependapac transistorised power supply, as new, £15. No. 62 Transceiver, 1·6-10 mc, 6V6 plate-and-screen modulated by 6BW6, less power supply, £12. Heathkit Q-Multiplier, £5. Or offers to—GM3PER, 5 Rosselm Cottages, Rossie, Auchtermuchty, Fife.

K.W. "VANGUARD" 160-10 metres, with LP filter. No offers, £45.—G3RHM *QTHR* or phone *Byron 5810.*

SMALL ADVERTISEMENTS, READERS—*continued*

WANTED: BC-348 manual.—N. Eddy, 25 Lister Street, Falmouth, Cornwall.

FOR SALE: CR-100 receiver, good condition, £20 o.n.o.? Apply weekends.—Jones, 33 School Lane, Harpole. *(4 miles N/W Northampton.)*

WANTED: Manual or sheet on Triplett Signal Generator 1632, borrow or buy. Have £60 worth of new Radio and TV components to exchange for AR88D or S-36.—Box No. 2918, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

LG.50, excellent condition, very little used, must be sold due to impending matrimony, £35 o.n.o.? Will deliver 25 miles Birmingham.—Millman, 38 Fowlmere Road, Birmingham, 22a.

SALE: Tobe communications receiver, full band-spread, £8. G5NI Oscilloscope model RCO, £5. Coil turret 1·5-30 mc, £2. RF-24 unit, £1. Transformers: Thordarson modulation transformer, similar UM2, £2; 550-0-550v. Parmeko 250 mA, £2. 2-24H chokes, heavy duty, £2 pr. 600-0-600v. 200 mA, £2. New 813 valve, £1 5s. Meters: 0-100 mA, 0-50 mA, 0-150 mA, 0-120 mA, 0-75 mA, 10s. each. Condensers, heavy duty, paper: 2-8 μF, 1500v. DC; 2-6 μF, 1500v. DC; 2-4 μF, 1000v. DC, 10s. each. 19 Set ATU, 10s. Postage extra.—Kellow, St. Dominic, Callington, Cornwall.

GEAR of late G5GT. LG.300 Tx and companion modulator, aerial switching unit, LP filter, Ae. tuning, SWR, monitor band marker units, steel rack, microphone, £70. SX-28 with speaker, transistor pre-amp, £22 10s. BC-221, £7 10s. Dumont 'scope £10. Buyer collects. Various other units, aerials, etc. Details.—Napper, 15 Hall Green Close, Malvern. *(Malvern 2312)*, Worcs.

FOR SALE: K.W. "Valiant" Tx (no power supply), excellent condition, £28.—G3JRJ, Buckley, 37 Howson Road, Brockley, London, S.E.4.

GOING ABROAD. For Sale: K.W. "Vanguard" Tx, 10-160 metres, low pass filter, good condition, £30. HRO Senior, rack mounting, band-spread coils, PSU, £15. AR88D, needs slight attention, £25; handbooks available. Newnes *Radio Television Service* books, 13 volumes, 1950-63, good condition, £15.—H. Lassman, 268 Amhurst Road, London, N.16. *(Tel. Clissold 5518.)*

TWO BC-221's with charts, excellent condx, £12 10s. each. Ex-TBS transceiver cases 23 ins. wide 17 ins. deep 10½ ins. high, cleaned and re-sprayed, black or grey, 30s. each. Valves, boxed, new, VR150/30, 3s. 9d.; 5U4G, 12AX7, 807(U.S.), 3s. 6d.; 6AK5, 6AM6, 3s. 3d.; 12AT7, 4s.; 5763, 5s. 6d.; all plus carriage.—G3LSD, Netherton Cottage, The Elms, Stoke Damerel, Plymouth.

BRT-400 receiver, table model, with 50 kc calibrator, manual and some spare valves, condition FB, purchaser must collect South London, £70. —Box No. 2919, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

COSSOR double-beam 'scope, 339A, good condition, £10. BC-611 Handy-Talky, good condition, new crystals, £4. 19 Set with 12v. PSU, crystal calibrator, RF meter, spares, etc., excellent condition, £5. Set of spare valves for 19 Set, 30s. 19 Set, rough, £2. German Tx/Rx, 30s.—Hardcastle, Rigton Grange, East Keswick, Nr. Leeds. *(Phone Rigton Hill 205.)*

SMALL ADVERTISEMENTS, READERS—*continued*

FOR SALE: AR88D, matching speaker, built-in S-meter, £32 10s. Prefer buyer collects.—G3RDT. *(Bognor Regis 1357 after 7 p.m.)*

SALE: HRO with coils, PSU, speaker, £18 o.n.o.? Heathkit Q-multiplier, £5. 2m. cascode converter, £5. Eddystone 10-15m. converter, £2. All plus carriage.—G3RKH, 11 Rosyl Avenue, Dawlish, Devon.

WANTED: G3HSC Morse Record. FOR SALE: Two Mullard QY3-125A's, unused, and PSU 480v. 150 mA with LT; offers?—Bonnett, 28 Dale Park Road, London, S.E.19. *(LIV 6190 after 7 p.m.)*

TAYLOR signal generator, Mullard Bridge, multi-Q, Erskine 'scope, Kilovolter Labgear Multiplier, xtals. Sell, exchange.—J. Brown, Marlborough Farm, Falmouth, Cornwall.

VICEROY Ser. II, with xtal mike and Dow coax relay. Drake 2B with calibrator, Q-multiplier and speaker. Complete station, in mint condition, £200. Going QRT.—G4BL, 48 White Street, Derby.

EDDYSTONE 870A, needs new flywheel. Best offer before Thursday. WANTED: Grey 680X.—Box No. 2920, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

EDDYSTONE 888, speaker, S-meter, mint condition, £65. Eddystone 358 type Rx, some coils, requires attention, £6 10s. Minimitter 150w. Tx, mint condition, £50. Power packs, relay-rack mounting: 1500v. 500 mA, 1400v. 500mA, 800v. and 500v. 500mA, £6 each; two power packs, 350v. 250 mA, 90v. regulated bias, £5 each. TZ40 modulator, relay-rack mounted, £5. Minimitter 10/15/20 beam, 30 ft. telescopic mast, rotator, Selsyn indicator, power supply, £25. Buyer collects.—G2COP, Chesterfield Grange, Lichfield, Staffs. *(Tel. Shenstone 230.)*

NEW QQV06-40A, 45s.; 6146, 805, MW6-2, 20s.; 807, X79, 5s.; N78, EL37, 7s.; 12v. Vibrator Pack, 25s. Mod. transf. 30w., 25s.; 65w., 35s. Chokes: 5 Hy 250 mA, 7s. 6d. 10 Hy 70 mA, 4s. PA feed 300 mA, 5s. Meters: 2½ in. square, flush, 40v., 1 mA, 50, 100, 150 mA; 2A, 3A RF, 5s. each. Siemens Handset with press-to-talk switch, ideal mobile, 15s. 24v. rotary, 600v. at 350 mA, 25s. Many others. Insulators, all types, s.a.e. for full list. Postage extra.—Box No. 2921, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

AR88D, as new, recently aligned, £45 o.n.o.? REQUIRED: HRO Rx and K.W. "Valiant" Tx.—G3RXK, 63 Swan Crescent, Langley, Oldbury, Birmingham.

CREED 3W. TELEPRINTER, power supply and odd accessories, £12. HRO receiver, 7 coils, p/pack, £12. No. 36 Transmitter, 100w, CW/MCW/AM phone, converted 80-40-20, needs completing, £8. Buyer collects.—L. Deverish, 13 Riverside, Hendon, London, N.W.4.

MOHICAN GC-1U Receiver, excellent condition and performance, with manual, £28. Creed 3X T/P, £8. AVO valve tester, with manual, £6.—GW3SFC, 30 Well Place, Cwmbach, Aberdare, Wales.

SALE: LG.50 and G2MA Linear Amplifier, both perfect condition, and with spare PA's if required. Offers/inspection G3ADZ, also quantity of "junk" components for collection.—*QTHR.*

SMALL ADVERTISEMENTS, READERS—*continued*

SALE: HRO Miniaturised, 8 coils, BS, PSU; needs slight attention, £14. DX-40U, used 6 weeks, £17. WANTED: MP4DAH, returning U.K. approx. 20th Dec., requires good Rx, also interested in QRO Tx or QRP SSB rig. All types considered, all letters answered.—Full details with phone number if any, c/o G5GH, *QTHR.*

POWER SUPPLIES: Admiralty. 750v. 250 mA, tapped 850v., Bias 200 v., 6·3v. 7A, 300v. 100 mA; 19-in. rack mounting, two FW4/500, 1/5Z4, £5; less valves, £4 10s. Carriage extra. Weight 60 lbs.—B. L. Cedar, 2A Convent Hill, Upper Norwood, London, S.E.19. *(LIV 8489 after 7.30 p.m.)*

SWEDISH AMATEURS wish to pay good prices for second-hand Eddystone, Hammarlund and Collins receivers (all models), AR88D, CR-100, HRO, BC-221, LM-14, PCR3, etc. Immediate payment and collection from your shack within 200 miles of London.—Brian Ayres, 21 Grange Road, Chessington, Surrey.

MOBILE and SSB. Heathkit Cheyenne Tx, Comanche Rx, with 12v. transistor and mains supply units, all manuals, £50 lot. K.W. "Valiant" Tx 10-80m., new unused, no PSU, £20. New, pair 811A £2; TT21 £1; 6146 (4) 15s. each; B & W phase shift. 2Q4 (2) 30s. each. Geloso amateur band converter, 4·6 mc IF, £8. Japanese transistor intercom, master and two slaves, mint, £10 o.n.o.? Numerous components, valves.—Roberts, 14 Woodlands Close, Swanley, Kent. *(Swanley 3602 after 6 p.m.)*

WANTED: Mohican; exchange AR88LF, Top Band "Command" Rx, plus rotary PSU.—Knowles, 12 Fairview Road, Denton, Lancs. *(Denton 3018.)*

1/WODEN PCS-12 choke, £2. 1/Woden DTM-17 trans. 750-0-750v. 250 mA, £4 10s. 1/Power Unit 247, £4. 1/Freq. Meter BC-906D, £2 10s. 2/Vibrator power packs, 6v. MI-8319A, 15s. each. 1/Oscilloscope around ACR10 with spare tube, £4 10s. 1/Modified CR-100 with Geloso front-end, £10. 1/Woden trans. 350-0-350v. 120 mA, £1 15s. 1/Woden trans. 250-0-250v. 80 mA, £1 5s. 1/Elstone trans. 350-0-350v. 200 mA, £2. 1/Gardner 5H 250 mA Choke, £1. 2/GU50, 15s. each. 2/QQV06-40, £1 each. 1/832, 15s. Various Cabinets by Philpotts, £1 10s. each. Please add carriage.—P. C. Spence, c/o Hinmans, Mill Street, Oakham, Rutland.

COLLINS 32S-1 transmitter, complete patch cables, manual, carton, but less separate power supply; late model, unmarked, 180w. p.e.p., 80-10 metres. Cost £292, sell £110. Delivered free London, otherwise by B.R.S.—Box No. 2922, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: 4X150A 45s.; QQV03-20A 30s.; 5B/255M 10s.; 813 27s. 6d.; 6BW6 6s. 6d.; 6AM4 8s. 6d.; 2C39A 20s.; 2C43 20s.; TZ40 10s.; all new valves, post paid. BC-221M, charts, PSU, very clean, less case, £12. Eddystone 358X, all coils, 40 kc to 30 mc, PSU, data, £8.—Box No. 2923, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SHORT WAVE MAGAZINE back numbers: *1956*—Feb., March, April, July, Aug., Sept., Oct., Dec. *1957*—May, July, Sept. *1958*—April, Sept., Nov., Dec. *1959*—Nov., Dec. *1960*—Feb., June, July, Aug., Sept., Oct., Nov. Dec. *1961*—Jan., March, May, June, July, Aug., Oct., Nov., Dec. All at 1s. 6d. per copy, plus p/p.—Box No. 2924, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS, READERS—*continued*

888A with Eddystone S-meter, £65. All *QST's* for 1963, £1. Both carriage extra.—G3GVV, 65 Harlands Road, Haywards Heath, Sussex. *(Telephone : 2461.)*

WANTED: 160m. Mobile Rig. Anything considered. Have car, do travel, but no /M Rig—W.H.Y.?—Box No. 2925, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

C.C.TV camera ready for use with any TV set. Any channel in Band I, with 1-inch bloomed f/2·5 lens and 14 yds. monitor cable, £59. Radar Video and Sync generator, £18. Eddystone 680, £48. SX-28 for rack mounting, £22. AR88LF, S-meter, aligned to specification, £38. All-band 150w. Tx in 6 ft. enclosed rack; supplies, modulator, 5RV exciter, ZL linear PA, connections for SB-10U, £68.—G3CTR/T, 29 Aspinden Road, London, S.E.16.

MOHICAN all-transistor communication receiver, £24. Jason Wobbulator, £8. Testgear Signal Generator, £3. Buyer collects.—29 Hillcrest Road, Orpington, Kent. *(ORP 26802.)*

WANTED in mint condition: Triband beam, Mohican and Collins 75A4 and SSB transceiver. Other top-class equipment considered.—G3ODT, 2a Skipton Old Road, Foulridge, Colne, Lancs.

WANTED: HRO Coils, BS or general coverage; write particulars and price.—Gorman, 7 St. Anthony Road, Cardiff.

HRO 6 coils, 5 bandspread, speaker, PSU, £18. DX-40U, £20. Woden transformers and chokes 1250v.-1000v., 300 mA, £5. 1750-1100v., 350 mA, £5. 1000v., 250 mA, £3. UM4, £6. 5/25H S/Choke, 350 mA, £1. 5/25H, 500 mA, £2. 12H, 350 mA, £2. 20H, 60 mA, 10s. 10v., 10A, £1. Several 2 μF and 4 μF oil filled, 2500v. DC working, and various transformers, chokes, meters, valves and components for sale.—G3DO, 31 Ladywood Road, Sutton Coldfield, Warwickshire.

PCR2 fitted with BFO and internal power pack, AC mains, £5. Buyer collects but can deliver 30 miles.—G3BYO, 18 Kent Road, Mapperley, Nottingham.

MR-44/II and matched speaker, good condition, £40. K.W. Geloso converter plus HRO, with two coils and PSU, £20. BC-453, as new, unmodified, £5; another, v.g.c., £4. MW "Command" Rx with 12v. dynamotor, £7 o.n.o.? T20/ARC5 Tx, v.g.c., £2. Buyers collect.—*(Telephone Silverthorn 5635 (London) 7 p.m. onwards.)*

SALE: PCR2 Rx, excellent condition, internal mains PSU, headphones, circuit, £7.—Rooney, 11 Withert Avenue, Bebington, Cheshire.

SALE: Senior HRO, 4 coils covering all amateur bands, makers' PSU, speaker working but needs attention, £5 10s.—S. Foote, 112 Shinfield Road, Reading.

HRO-50T1, crystal calibrator, FM adaptor, with following coils: General coverage (A) 14-30 mc, (B) 7-14 mc, (C) 3·5-7·3 mc, (D) 1·7-4 mc, (E) 900-2050 kc, (F) 480-960 kc, (G) 180-430 kc; Bandspread (A) 7·0-7·3 mc, AC 21-21·5 mc, (B) 14·0-14·4 mc, (C) 7·0-7·3 mc, (D) 3·5-4·0 mc.—Offers to Box No. 2926, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS, READERS—*continued*

GENUINE BARGAINS, no offers, K.W. "Vanguard" Tx, 80 to 10 metres, £25. BC-342, £10. Buyers collect Croydon area.—Box No. 2927, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

KW76 double superhet receiver, excellent condition, best offer over £20. Woden UM3, 50s. 2/38 AFV Walky-Talkies with 12v. power supply, 30s. each; carriage extra.—Woods, 40 Coltness Road, Wishaw, Lanarks.

K.W. 6-BAND Geloso converter, as new, 8 hours' use only, £16 or offers?—Taylor, 156 Clarendon Road, Broadstone, Dorset.

LABGEAR LG.50 for sale, excellent condition, £22; will deliver in London or Middx. area.—G3RJH, 19 Killowen Avenue, Greenford, Middx.

BEST OFFER before Dec. 15 secures well built CC 14 mc converter or Q5'er.—Easteal, 136 Arkwrights, Harlow, Essex. *(HAR 24811.)*

HALLICRAFTERS SX-16, 550 kc to 61 mc in six bands, in good working condition with speaker, £12 10s.—J. Sharratt, 12 Clocks Close, Edlesborough, Dunstable, Beds. *(Tel: Eaton Bray 297.)*

FOR SALE: RTTY T.U. Type CFS39384, c/w circuit diagram, £5. Creed 3X T/P, c/w 240v. AC motor, silence cover and new keyboard, £5. Two 88 mH toroid coils, mounted on IO plugs, 15s. pair. —*(Phone: LAR 1544 (London) after 5 p.m.)*

R.107 FOR SALE, good, working, £10 o.n.o.? CR-300/2, works on AM only, £2.—QTH: A. Huggett, 17 Brewer's Street, Lamberhurst, Kent.

WANTED: Circuits and Manual for AR88LF receiver, and/or information on CNY-2 transceiver. For cash.—F. D. Nurse (G3RBI), 31 Woodfield Avenue, Colindale, London, N.W.9.

EXCHANGE R.1155L, min. valves, S-meter, internal p/pack, for scrap HRO, table model.—T. H. De Courcy, 27 Highbury Avenue, Salisbury, Wilts.

TR.1985, 100-125 mc, 21 valves, control unit, cables, circuit. Complete but non-operational, £5 10s. carriage paid. WANTED: AP.66862 FSR 1-1X or CFS ZA-39384 Teleprinter terminal unit.—Box No. 2928, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: Eddystone 840C, 10 months old, little used due to illness, £40 o.n.o.?—A. Neal, 2 Tarn Cottages, Bolton, Lesands, Carnforth, Lancs.

MOHICAN factory aligned. Latest mods., £28. WANTED: RSGB *Bulletin* Vol. 17 (1941/2).—Swinnerton, 28 Nightingale Road, Rickmansworth, Herts. *(Tel: 6864.)*

MANUALS for R.1155B, BC-348Q, Hallicrafters S.27 and Cossor television alignment and pattern generator Model 1320. Borrow or buy, please state price.—W. Harrison, 123 Dickson Road, Blackpool, Lancs.

COMMAND Rx medium wave, £3. Grundig TK20 Tape Recorder, hardly used, original packing, £22. Morse Record G3HSC, 15s. Old RSGB *Bulletins* wanted.—Fletcher, 7 Tintern Gardens, London, N.14 *(PAL 3647.)*

SMALL ADVERTISEMENTS, READERS—*continued*

WANTED: Linear amplifier, for use with Hallicrafters HT-32B Tx; new (or in perfect condition) with inbuilt power supply; American preferred but not essentially so. Cash waiting.—Box No. 2930, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: CR-100, good condition, £10. T.1131 modulator, modified front-end, £4. Prefer buyers collect. WANTED: UM3, 750v. 250 mA transformer. —Tibbert, 397 Uttoxeter Road, Derby.

CR-100, fair cond., £13 carriage paid. Electroniques Q-mult. coils, nominal 460 kc, 10s. the pair. WANTED: CDR Rotator or suitable rotary drive for 3-element beam.—R. M. Kent, Winterton, Carlton Avenue, Hornsea, E. Yorks.

G.E.C. BRT-400, 90-540 kc, 1·4-33 mc, excellent cond., £70 o.n.o.?—N. Green, 15 Birdhill Road, Woodhouse Eaves, Leics.

R.1155, excellent condition, modified with modern valves, int. PSU, ext. amplifier plus PSU, £10 o.n.o.?—Bessant, 5 Lauderdale Road, Hunton Bridge, King's Langley, Herts.

FOR SALE: Taylor valve tester Model 13A, £10. Signal generator by Testgear (Acton) Ltd., £4.—Hayes, Vines Cross, Horam, Sussex.

150-WATT CW Tx, 10-80 metres, in 5 ft. rack with PSU and spares including 813.—Details from G5RS, 20 Hedgeway, Guildford.

FOR SALE: HRO-5T with nine GC coils, mint condition, £23. HRO coils all frequencies 50-2050 kc, 20s. each. AR88 loudspeaker, 50s. AR88 6v. vibrator power pack, 30s. Spares available for AR88 D/LF and HRO; send s.a.e. for list.—A. J. Reynolds, 139 Waller Road, New Cross, London, S.E.14. *(Telephone New Cross 1443 after 7.30 p.m.)*

CR-100 Receiver, with manual, good condition, must be sold before December 21st, £12.—Morrissey, 46 Tollington Road, Holloway, London, N.7.

CLEARING UP: Gram-deck complete, £4 10s. Eddystone R.101, £3. Philips 12v. car radio, £2. Pye ITV converter, £1. 4-transistor amp., £1. Pair headphones, 10s.; s.a.e. for particulars.—Box No. 2931, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: O/P trans. ex-SCR522, or "Command" receiver. State price, incl. postage.—G3JUX, 14 Tyler Grove, Walton, Stone, Staffs.

AR88LF, p.v.c. wiring, new case, works well, but panel needs re-lettering, £25. Buyer collects.—Cox, 8A Parker Street, Chorley, Lancs.

SALE: BC-1147A 1·5-30 mc, good Rx, unmodified, £20. Woden DTM-18, brand new, £8 o.n.o.?—GW5BI, 25 Partridge Road, Cardiff.

HAMMARLUND HQ180, Sept. '61, little used, excellent condition, offers over £120? Seen by appointment, buyer collects.—R. W. Pennells, Apps Farm, Hook Green, Lamberhurst, Nr. Tunbridge Wells, Kent.

WANTED: AR88D, must be in good condition.—G2CVY, Ebberley Dairy Farm, Newport, Barnstaple, Devon.

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