

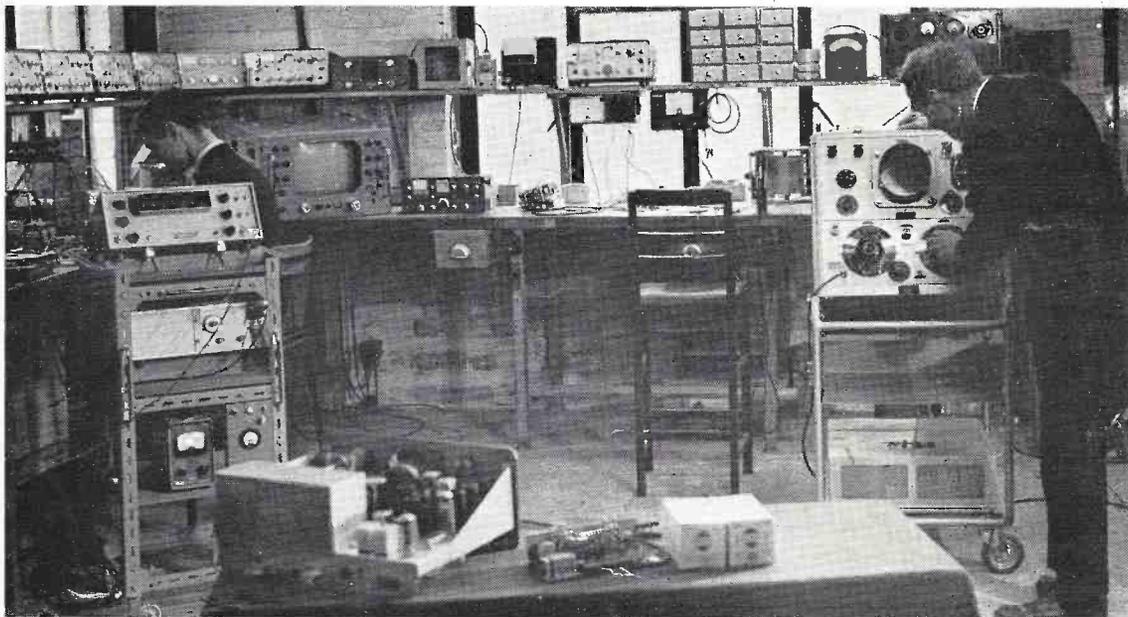
# The SHORT WAVE Magazine

VOL. XXIII

MARCH, 1965

NUMBER 1

## K. W. ELECTRONICS for all your Amateur Radio Requirements



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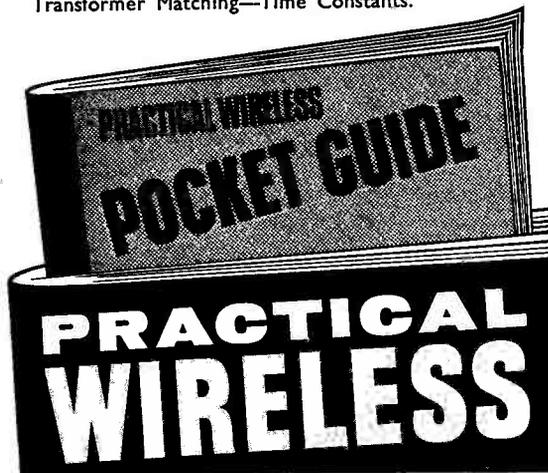
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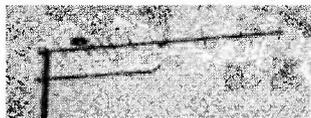
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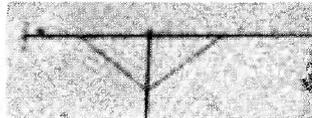
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PUBLICATIONS DEPARTMENT  
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## K.W. Corner No. 7

(A monthly review of news, views and advice)

### LABORATORY TEST EQUIPMENT

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IT5GT ... 5/6	6CD6GA ... 17/6	12BH7 ... 9/6	2050 ... 12/6	ECP83 ... 7/6	EZ80 ... 5/6	PEN46 ... 6/6	UBC81 ... 7/6
IU4 ... 5/6	6CD6 ... 6/6	12BTGT ... 5/6	5654 ... 8/6	ECL80 ... 6/6	EZ81 ... 4/6	PEN220A ... 7/6	UBF80 ... 6/6
IU5 ... 6/6	6CL6 ... 6/6	12Q7 ... 9/6	5763 ... 10/6	ECL82 ... 7/6	GZ32 ... 7/6	PEN384 ... 12/6	UBF89 ... 7/6
IX2A ... 7/6	6CW4 ... 12/6	20F2 ... 15/6	6080 ... 25/6	ECL83 ... 9/6	GZ34 ... 10/6	PEN453DD ... 11/6	UBL21 ... 11/6
IX2B ... 7/6	6DS4 ... 15/6	20L1 ... 14/6	6146 ... 27/6	ECL86 ... 8/6	HL2 ... 3/6	UCC84 ... 9/6	UBC11 ... 7/6
2CW4 ... 12/6	6FR6 ... 3/6	20P1 ... 14/6	CL33 ... 9/6	EF35 ... 4/6	HL2K ... 6/6	UCC85 ... 7/6	UBC12 ... 7/6
2D21 ... 6/6	6F13 ... 6/6	20P2 ... 12/6	CV31 ... 6/6	EF37A ... 8/6	HL23 ... 6/6	PL3B ... 16/6	UCF80 ... 9/6
3A4 ... 4/6	6F17 ... 6/6	20P4 ... 14/6	DAF91 ... 4/6	EF39 ... 5/6	HL23DD ... 6/6	PL81 ... 7/6	UCH21 ... 8/6
3A5 ... 7/6	6F23 ... 9/6	20P5 ... 12/6	DAF92 ... 6/6	EF40 ... 9/6	HR2 ... 15/6	PL82 ... 6/6	UCH42 ... 8/6
3D6 ... 4/6	6F24 ... 11/6	25A6G ... 5/6	DAF96 ... 6/6	EF41 ... 7/6	HR7 ... 15/6	PL83 ... 6/6	UCH81 ... 7/6
3Q4 ... 6/6	6F25 ... 11/6	25L6GT ... 8/6	DP96 ... 6/6	EF42 ... 6/6	KT41 ... 6/6	PL84 ... 6/6	UCL82 ... 8/6
3Q5GT ... 3/6	6F13 ... 6/6	25Z4G ... 11/6	DY86 ... 9/6	EF95 ... 5/6	KT44 ... 6/6	PL50 ... 15/6	UCL83 ... 10/6
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6AB4 ... 6/6	6X5GT ... 5/6	30P12 ... 10/6	EABC80 ... 7/6	EF184 ... 8/6	PABC80 ... 7/6	PY80 ... 8/6	UL84 ... 6/6
6AB7 ... 4/6	6Y6G ... 6/6	30P19 ... 14/6	EAC91 ... 4/6	EF180 ... 10/6	PC86 ... 12/6	QV03-10 ... 35/6	UY21 ... 8/6
6AF4 ... 11/6	7D3 ... 8/6	30PL1 ... 11/6	EAF42 ... 8/6	EH90 ... 7/6	PC88 ... 12/6	QV03-10 ... 35/6	UY41 ... 6/6
6AG7 ... 6/6	7D5 ... 8/6	30PL13 ... 11/6	EAB21 ... 5/6	EL34 ... 10/6	PC84 ... 6/6	R04 ... 10/6	UY41 ... 6/6
6AH6 ... 10/6	9BW6 ... 7/6	35A5 ... 11/6	EB33 ... 7/6	EL37 ... 17/6	PC85 ... 6/6	TH41 ... 10/6	UY85 ... 5/6
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6AL5 ... 3/6	10C2 ... 12/6	35W4 ... 5/6	EB81 ... 6/6	EL41 ... 8/6	PC89 ... 11/6	TH321 ... 7/6	X66 ... 8/6
6AM6 ... 4/6	110D1 ... 7/6	35Z4G ... 4/6	IEBF80 ... 6/6	EL42 ... 9/6	PCC19 ... 11/6	TP25 ... 5/6	X79 ... 20/6

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INDEX TO  
ADVERTISERS

	PAGE
B. J. Ayres & Co. ... ..	55
Ad. Auriema, Ltd. ... ..	<i>cover ii</i>
Bradford, Ltd. ... ..	58
British National Radio School ... ..	4
Busfield's Astro-Marine ...	60
Charles H. Young ... ..	8
Codar Radio Co. ... ..	3
Daystrom ... ..	<i>cover iv</i>
Finnigan Speciality Paints	64
G3HSC (Morse Records)	56
Green & Davis ... ..	<i>cover iii</i>
G.W.M. Radio ... ..	8
Henry's Radio ... ..	61
Home Radio ... ..	64
J-Beam Aerials, Ltd. ... ..	5
J.T. Supply ... ..	58
K.W. Electronics <i>front cover</i> ,	6
J. B. Lowe ... ..	4
Lustraphone, Ltd. ... ..	64
Minimitter ... ..	61
Mosley Electronics ... ..	1
Multicore ... ..	62
Partridge Electronics, Ltd.	62, 63
Peter Seymour ... ..	5
Practical Electronics ... ..	59
Practical Wireless ... ..	4
R.S.C. (Derby) Ltd. ... ..	58
Short Wave (Hull) ... ..	6
Small Advertisements ... ..	56-64
Smith & Co., Ltd. ... ..	57
Sona Electronic Co. ... ..	10
S.S.B. Products ... ..	8
S.W.M. Publications	2, 6, 54, 55
Martin R. Tetley ... ..	60
J. & A. Tweedy ... ..	60
J. Williams & Co. ... ..	56
Withers ... ..	7
Worthing Radio ... ..	58
Z. & I. Aero Services, Ltd.	7

# SHORT WAVE MAGAZINE

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## CONTENTS

	Page
Editorial ... ..	11
Generator for Accurate Noise Measurement, <i>by J. M. Cox (G8AFL)</i> ...	12
Do You Know That ... ..	16
Chimney for 4X150A, <i>Notes by G3KH</i> ... ..	17
Converter for Four Metres, <i>by B. J. P. Howlett (G3JAM)</i> ... ..	18
Transistor Transmitter for the LF Bands, <i>by R. V. Moore, B.Sc. (G3LWB)</i> ... ..	21
"SWL" — <i>Listener Feature</i> ... ..	23
Receiver Unit for AM/CW/SSB Using Semiconductors, <i>by A. S. Carpenter, A.M.I.P.R.E. (G8ABG)</i> ... ..	27
Two-Band Aerial System for Restricted Space, <i>by G. A. Swinnerton (G6AS)</i> ... ..	30
The Practical Application of Semiconductors, <i>Part VIII, Oscillators (II), by M. I. Davis, B.Sc.</i> ... ..	31
Simple Mast Clamp ... ..	32
Communication and DX News, <i>by L. H. Thomas, M.B.E. (G6QB)</i> ...	33
Some Notes on Receiver Design, <i>by S. E. Janes (G2FWA)</i> ... ..	40
Miscellany— <i>Comment on the Times</i> ... ..	41
Mobile Rally Arrangements ... ..	43
VHF Bands, <i>by A. J. Devon</i> ... ..	44
New QTH's ... ..	48
The Other Man's Station — G2XW ... ..	49
The Month with The Clubs — <i>From Reports</i> ... ..	50

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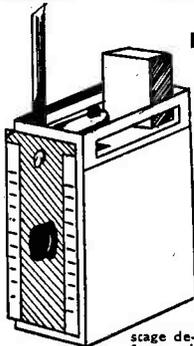
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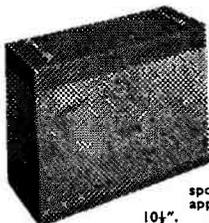
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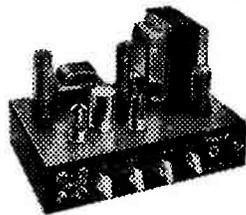
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# The SHORT WAVE Magazine

## EDITORIAL

**Transistory** *We hope that, in embarking on yet another Volume — the 23rd in the series, spanning so much of what has happened in Amateur Radio and to radio amateurs over all those years — there will be few readers who will expect us to apologise for the fact that the main technical articles in this issue discuss the practical use of transistors in receiving and transmitting applications.*

*Of course, there are those readers who have followed this piece since No. 1 (brought up on valves and therefore a bit long in the tooth) to whom transistors are still fiddly little things, with no obvious indication of how the wires sticking out at the bottom connect to anything.*

*While this is understandable, it is no longer excusable — because the transistors now generally available cover practically every Amateur Radio application and requirement, over all bands LF to VHF, transmitting and receiving, with the sole exception of RF power generation in terms of, say, 100 watts output on the HF bands.*

*This means that, in the Amateur Radio context, there is a vast new field for experiment and design in the application of transistors. And, oddly enough, a transistor is still the only RF generating device that, strictly speaking, can be “made at home on the kitchen table” — as was shown in the articles by John Osborne (G3HMO) in SHORT WAVE MAGAZINE more than ten years ago. Since then, more sophisticated circuit designs have appeared, taking advantage of the manufactured “semiconductor devices” so readily available to those with a few shillings to spend.*

*With nearly one hundred known manufacturers now producing semiconductors for the world market, it is only a matter of time before there is a ten-and-sixpenny transistor, freely available as “surplus,” having all the attributes of the 807 or the 6146.*

*Austin Ford, G6FO.*

WORLD-WIDE COMMUNICATION

## GENERATOR FOR ACCURATE NOISE MEASUREMENT

### DESIGN, CONSTRUCTION AND CALIBRATION

J. M. COX (G8AFL)

RECENTLY the writer embarked on a series of RVHF converter experiments, particularly with regard to low-noise front ends. Although the usual array of test equipment was available, including signal generators, grid dip oscillators and such, it soon became evident that before any *serious* evaluation of low noise RF amplifiers could be made a noise generator was an essential. This item of test equipment was not available, and it was impossible to borrow one for the possible long period of time that the experiment might take. It was decided, therefore, to suspend operations on the converters until a noise generator had been built. Perusal of the available literature on the subject of noise generators brought forth a number of ideas, but all unfortunately using different noise diodes. Finally it was decided to obtain a noise diode and design an instrument around it. The surplus valve lists showed that the A2087/CV2171 diode was available at a reasonable price. Such a diode was duly obtained along with the manufacturer's data sheets.

#### The Circuit

The manufacturer's data sheet on the A2087 showed that the valve required an anode voltage of between 100 and 200v. and up to a maximum of 20 mA. The filament requirements for the valve are 0 to 4.3 volts at up to 0.6 amps.

From the foregoing information the circuit of Fig. 1 was evolved and hastily put together in order to prove its worth. Immediately certain difficulties were encountered. First, it was found that the 10-ohm variable resistor used to control the diode filament

current was extremely "lumpy" to use; secondly, the resistor heated up after quite short periods of operation. (The second fault could of course be easily overcome by using a heavier rated component but this would not cure the first problem.)

After some thought the control circuit of Fig. 2 was evolved. This consists essentially of a DC power supply and a power transistor used in the emitter-follower mode. The components C1 and R1 are included to suppress any transients that might otherwise damage the rectifiers. The value of R2 was determined by experiment based on the curves of Figs. 3 and 4—see p.14.

It was decided that it was unlikely that a noise factor of greater than 10 dB would be encountered at the frequencies at which the noise generator was to be used, in particular up to 144 mc.

The graph in Fig. 3 shows the variation of noise factor with variation of diode anode current and is based on the expression:

$$F \text{ (dB)} = \log_{10} (20 I_d R_s) \dots \dots (1)$$

where F (dB) is the noise factor in decibels,  $I_d$  is the noise diode anode current in amps, and  $R_s$  is the noise source resistance, in this case 75 ohms.

From Fig. 3 it will be seen that for a noise figure of 10 dB the diode current will be 6.667 mA. From the curve of Fig. 4 it is found that for an anode current of 6.667 mA the diode filament voltage will be of the order of 3.6 volts. From this information the value of R2 may be readily determined when power is applied.

Fig. 5 shows the final circuit diagram and the various component values. (The switch S2 was incorporated in order that the power unit may be used separately)—see p.14.

#### Calibrating the Meter

The meter used by the author has a full-scale deflection of 5 mA, an internal resistance of 30 ohms and its scale is divided into 50 units. The first task was to calculate the value of shunt resistance necessary to extend the meter range to incorporate the 6.667 mA necessary for a noise factor reading of 10 dB. A value of 7 mA was considered to be a convenient new value of full-scale deflection. From

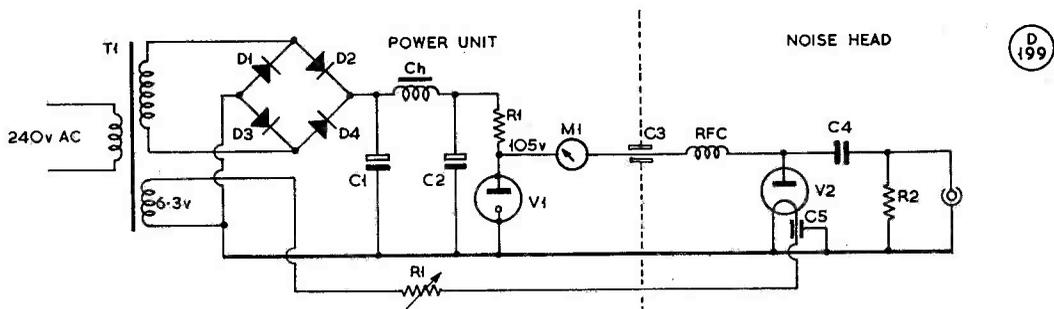
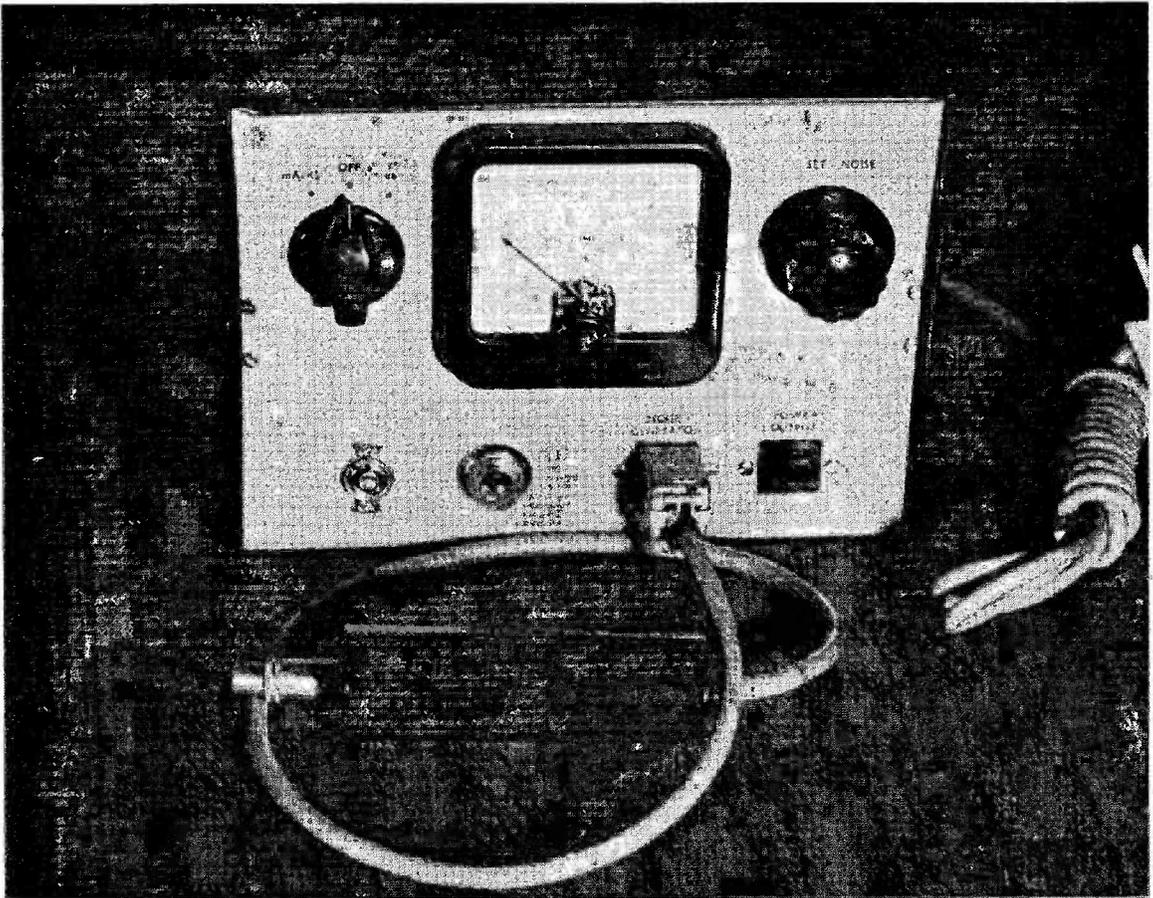


Fig. 1. The basic noise generator circuit, on which the development was carried out by G8AFL. This was refined to the arrangement shown in Fig. 5. The A.2087 (which is CV2171 in the services' nomenclature) makes a very suitable valve for the purpose, control being on its filament. As explained in the text, this does involve the use of good variable resistor for R1 var.



Front panel view of the Noise Generator built by G8AFL, with the noise head in the foreground. As he explains in his article, an instrument of this kind is almost essential for serious work on VHF — and, like a GDO, it soon becomes essential when you have it! The noise-range is up to 10 dB, and the methods of calibration and use are covered in the text. Another photograph shows the internal arrangements.

the usual equations for calculating meter shunts, the value of resistor necessary was found to be 75 ohms. Table I was prepared, using the graph of Fig. 3 and the new value of full-scale meter deflection, 7 mA. A second value of shunt resistance was calculated to extend the meter full-scale deflection to 25 mA in order that the meter could be used when the unit functions as a normal power unit. The value of this resistor was found to be 22.38 ohms and was wound from a length of Eureka wire (30g. in the writer's case) on a large, high value, resistor body.

**Table of Values**

Fig. 1. Circuit of Basic Noise Generator

- |  |  |
|--|--|
| C1, C2 = 16 $\mu$ F, elect.              | R1 = 10-ohm, var. (see text)           |
| C3, C5 = .001 $\mu$ F, feed-thru ceramic | Ch = 20 Hy 60 mA                       |
| C4 = .005 $\mu$ F, disc                  | D1, D4 = 400 p.i.v. 100 mA sil. diodes |
| R1 = 4,500-ohm, 5w., w/wound             | M1 = 0.20 mA m/c                       |
| R2 = 75-ohm, non-induct                  | V1 = OB2                               |
|  | V2 = A.2087 (CV2171)                   |

RFC can be 25 turns 36g. enamelled on  $\frac{1}{4}$ -in. ferrite slug.

**Construction**

The noise generator consists of two parts—a power unit and a noise head. The PSU is housed in an 8in. x 6in. x 6in. aluminium cabinet. The accompanying photograph shows the component layout. The filament control unit was built as a separate sub-assembly on a small paxolin panel, measuring 2 $\frac{1}{4}$  by

*continued p.16*

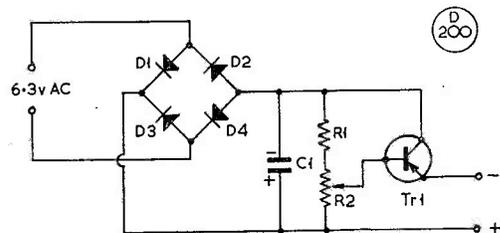


Fig. 2. Filament control circuit for a noise diode. C1 is .001  $\mu$ F, 12v.; R1, 27 ohms; R2, 250-ohm variable; D1-D4, 400 p.i.v. 750mA silicon diodes; and Tr1 an OC35 or similar.

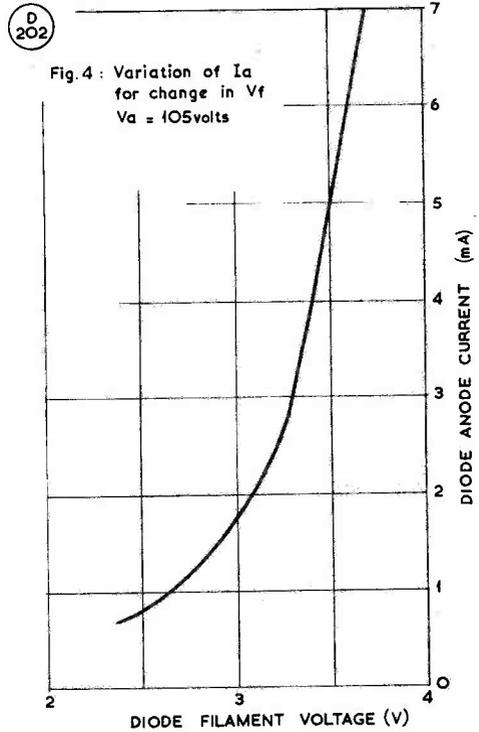
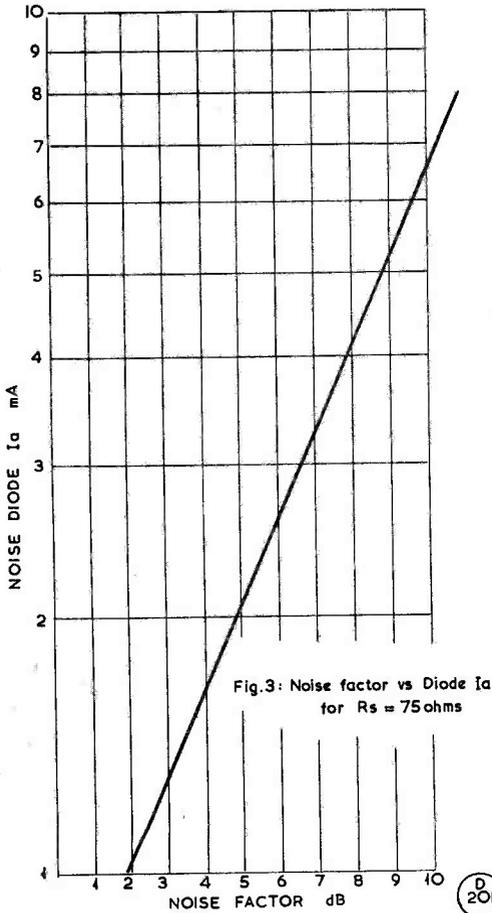


Fig. 3. (left) Graph to show noise factor against diode current.

Fig. 4. (above) Curve to show variation of diode current for change in filament voltage, with the anode at 105v.

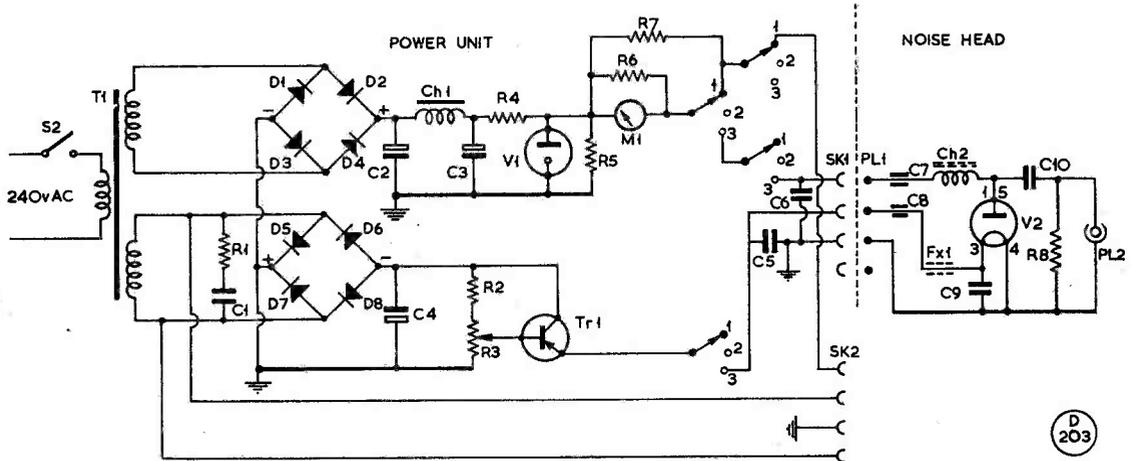


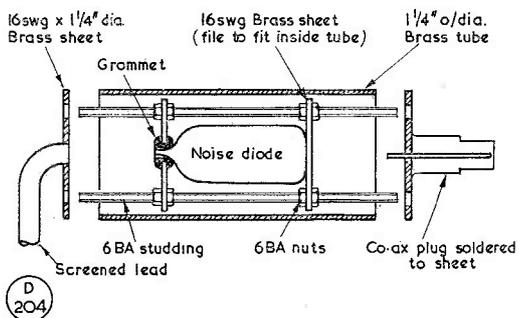
Fig. 5. The noise generator and its power supply as finalised by G8AFL. The noise head is constructed as a probe — see photograph — and is pluggable with the PSU as a separate unit, the latter then being available for other purposes as well, hence the meter switching. The circuit is fully discussed in the article, and all values are given in the table.

**Table of Values**

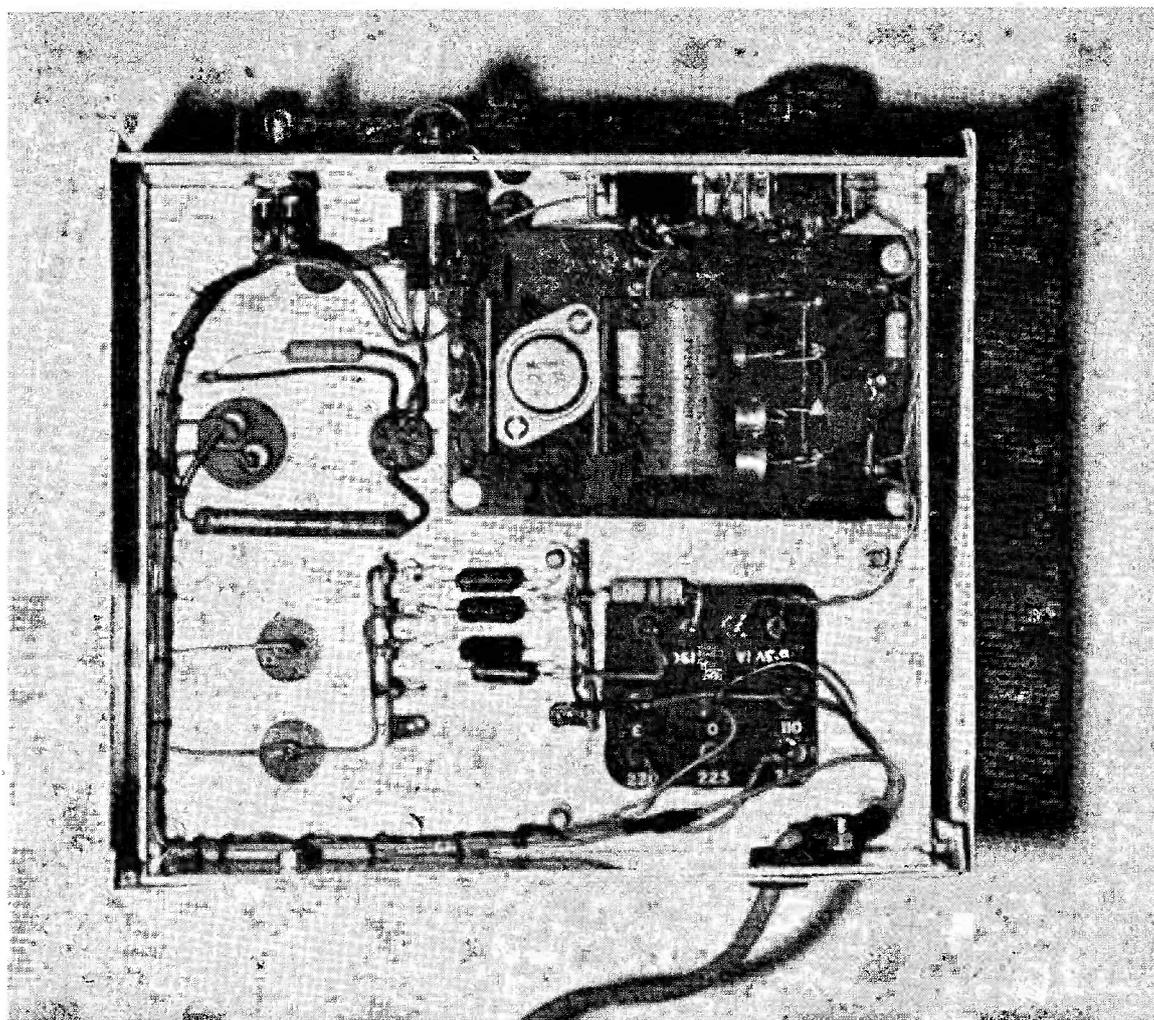
**Fig. 5. Finalised circuit of Noise Generator with PSU**

C1 = .01 $\mu$ F, disc cer.	R6 = 75 ohms, 1-w. (see text)
C2, C3 = 16 $\mu$ F, 350v. elect.	R7 = 22.38 ohms (see text)
C4 = .001 $\mu$ F, 12v. elect.	R8 = 75 ohms, non-inductive
C5, C6, C9 = .001 $\mu$ F, disc cer.	Ch1 = 20 Hy 40 mA
C7, C8 = .001 $\mu$ F cer. feed-thru	M = 0.5 mA (see text)
C10 = .005 $\mu$ F disc cer.	S1 = 4-pole, 3-way
R1 = 4,700 ohms, 1-w.	S2 = SPST
R2 = 27 ohms, see text	T1 = 150v., 40 mA., 6.3v., 1 amp.
R3 = 250 ohms, var.	V1 = 105v. stab.
R4 = 5,000 ohms, 3-w., w/wound	V2 = A.2087/CV2171
R5 = 3,300 ohms, 1-w.	Tri = 0C35, or similar

Note: Ch2 can be 25 turns 36g. enam. on  $\frac{1}{4}$ -in. ferrite slug, as RFC in Fig. 1. PL1 is 4-way miniature Jones plug; PL2 a brass coax plug. Sk1 and Sk2 are 4-way miniature Jones sockets. R8 can be made up of two 150-ohm carbon resistors. Switch positions: 1, PSU on with meter/5; 2, off; 3, Noise Generator.



**Fig. 6. Assembly of the noise head in the G8AFL noise generator. Materials required are: Four  $\frac{1}{4}$ -in. 16g. brass blanks; two  $\frac{1}{4}$ -in. 6 BA stud rods; one brass tube dms. by  $\frac{1}{4}$ -in. in 20g.; and one brass coax plug.**



Under-chassis view of the Noise Generator described in the article. The filament-control circuitry is in the top right-hand corner of the chassis, mounted on the small paxolin panel. An 0C35 is used in the author's case, although any power transistor of similar rating will satisfy the control requirement.

4½ inches. The components are carried on small turret tags, available from *Radiospares*, inserted in the panel. The control unit should be fitted on small stand-off spacers to prevent short circuiting the end of the turret tags to the chassis.

The noise head is built into a piece of 1½ in. diameter, 20g. wall, brass tube, approximately 4 in. long. The drawing of Fig. 6 shows the method of assembly and also gives values.

The noise head is painted inside and out with a matt black paint to help dissipate the heat generated by the noise diode. The expression (1) only holds good at a temperature of 290°K (17°C); it is therefore advisable, in the interests of accuracy, that power only be applied to the noise head when measurements are being made. The noise head is connected to the power unit by a length of two-core screened cable.

### Noise Factor Measurement

In use the noise head should be plugged into the converter or amplifier under test with the power to the noise head turned off. The AF control on the main receiver should be turned right up and the RF gain set to give a convenient reading on an output meter. The receiver AGC should be switched out. The noise head should now be energised and the diode anode current increased until the output power from the receiver doubles. The noise factor may now be read directly from the meter scale or from the graph of Fig. 3.

It is important to ensure that the power output of the receiver doubles. If the output of the receiver is being measured by a voltmeter this means that the reading on the meter must be increased by a factor of 1.414. The device shown in Fig. 7 has been found useful by the author in this respect. The output

TABLE I

NOISE FACTOR (dB)	DIODE CURRENT (mA)	SCALE DIVISIONS
1	0.8377	6
2	1.06	7.54
3	1.33	9.5
4	1.67	11.96
5	2.11	15.1
6	2.65	19.0
7	3.34	23.86
8	4.21	30.05
9	5.29	37.82
10	6.67	47.62

Using A.2087(CV2171) diode—and see graphs

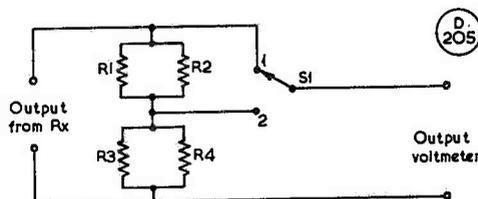


Fig. 7. A divide-by-two resistor network for a voltmeter when used as an output indicator. Values are: R1, 330 ohms; R2, 2,700 ohms; R3, 820 ohms; R4, 5,100 ohms; and the switch is SPDT.

from the receiver is set with the switch in posn. 1; the switch is then moved to posn. 2 and the noise diode current increased to obtain the original reading.

## Do You Know That —

— It is not always necessary to dismantle or even remove a meter to stick a loose front glass back into place. Cut some sticky tape, bent to a right angle, to hold on to the centre of the glass. Clean carefully round the edge of the glass and flange of the meter case on which it rests. Then apply a thin coating of *Durafix* or any suitable fixative you can paint on with a small brush. Hold the meter glass firmly against the painted flange, keeping a steady pressure till the fixer is dry. Then gently peel off the sticky tape. If you have a steady hand, you will be left with a neat, firm job. (G8QM.)

— Small plastic pill boxes with dispensers make ideal containers for items like nuts, washers, solder tags and so forth, and will dispense easily one at a time without fumbling. A good example of a suitable item is the *Saxin* 500-tablet container. (G2TA.)

— A silicon diode incorporated in the power input connection to transistor circuits will prevent excessive current flowing should there be an accident. The diode should be made an integral part of the transistor circuit for the duration of any experiments that are being carried out, and should be generously

rated to ensure that the supply impedance does not rise unduly. (G8AFL.)

— An 803 transmitting valve socket can be used to mount a 4X125A by turning it upside down and plugging the 4X125A into the underside. (ZLIPL.)

— The glass type of cartridge fuse can easily be repaired when blown. If the solder on the end-caps is melted, two small holes will be visible, one at each end. A length of fuse-wire is then threaded through the body of the fuse, soldered to the end-caps, and nipped off. Even if the fuse rating is not on the body, most electrical diaries and pocket-books will give data on fuse-wire for the current-carrying capacity required. (G8AEK.)

— When learning Morse it is quite an idea to record some high-speed commercial station sending press matter—which is “broadcast” and may be listened to by anybody—on a multi-speed tape recorder, and then slow the play-back right down for practice purposes. (G3LLL.)

— If you have a crystal that refuses to oscillate it may just be “lazy,” in which case a sharp tap on the holder may get it going, since the piezo-electric effect is mechanical, and the tap could “start off the vibra-

tions." The crystal should, of course, be in a live circuit, with HT on. (G3TVI.)

— A felt marker pen with a fine tip, of the type now available at most stationers, is ideal for writing on glossy QSL cards and for marking glass, chassis and panels, or any hard shiny surface. (G3IEW.)

— Cathode poisoning in the unused half of a double triode can be avoided by earthing the unused cathode, strapping its grid to anode, and taking the anode to the HT line through a 470K resistor. The result is that the unused cathode is kept active without affecting the rest of the circuit. (J. P. Garrard, Scarborough.)

— A BFO effect can be obtained on a receiver without one by tuning round on a second Rx, e.g.

an old BC set, or whatever, till a beat from *its* local oscillator is heard on the signal on tune; if the beat is rather weak, a little coupling can be introduced between the two receivers (such as a piece of wire from the BC set's aerial socket, laid near the aerial connection to the other receiver). Since the tuning of this external BFO will be relatively slow, careful adjustment will enable either sideband of an SSB signal to be resolved quite easily, and CW copied too, of course. (B. Dale, Congleton, Ches.)

Any more ideas, wheezes, suggestions or nifty notions? If you have one, send it to D-Y-K-T, with name, call sign and QTH, and if we can use it for this feature, you will receive 10s. 6d.—*Editor.*

## CHIMNEY FOR 4X150A

MAKE IT YOURSELF!

From Notes by G3KH

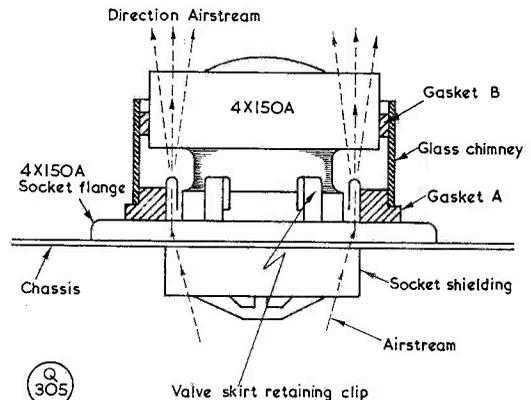
**H**ERE is a method of making an airflow chimney for use with the 4X150A type of valve under forced-air cooling—the chimneys being far more difficult to come by than the valves!

Basically, the home-made chimney is a slice cut from the straight top-section of the onion-shaped glasses used as flues on the oil-lamps of a bygone day. This glass is heat-proof and a likely source of supply would be almost any (old-fashioned) ironmonger's, especially in country districts.

These glasses vary in top-section circumference, and what is wanted for a 4X150A is one having an inside diameter of  $1\frac{1}{4}$  inches. The straight part is then cut into slices, or sections, each  $11/16$ th in. long — this being a job for a glass-cutter, who would do it for a few shillings. You now have half-a-dozen or so chimney glasses for your 4X150A's.

Next, a rubber grommet is needed for the top of the 4X150A air-system socket flange — gasket "A" in the diagram — and on this rests the glass chimney-section. "A" type gaskets can easily be fabricated from the large rubber grommets, or washers, found as CRT mountings, and can be selected to be the right diameter for the job.

It will now be found that there is a small clearance between the inside of the glass chimney and the anode radiator fins of the valve. In order to close this gap and at the same time to form a cushion between the glass flue and the anode radiator, a rubber band (gasket "B") is stretched round the fins. Suitable bands can be bought at a stationer's (as supplied for office use) or can be cut from an old cycle inner tube. In some cases, two bands may be required to get a close fit — the object being, of course, to ensure that the cooling air-stream passes over the radiator fins and not just out past the glass.



Cross-sectional view of the 4X150A chimney suggested by G3KH and described in the accompanying notes.

From experience, it has been found that the order of assembly — once all these items have been made to fit — should be: Gasket "B" on to valve; chimney over "B" and valve; then valve carefully into socket, while adjusting lower part of chimney to settle over the flange of gasket "A."

The cross-section sketch should explain the whole process. And even if there is a smell of hot rubber, it is surprising how long the gaskets will stand the heat before a replacement becomes necessary. Having once done it successfully, re-fitting is a matter of only a few minutes when all the materials are to hand, and the cost is negligible.

Remember that all valves of the blown type must have the air switched on and moving at full volume *before* even the heater voltage is applied. A 4X150A and the fittings associated with it will be destroyed in a few seconds if this precaution is neglected.

*More than one hundred Small Advertisements—radio amateur equipment for sale, wanted or in exchange—appear on pp.56-64 of this issue.*

## CONVERTER FOR FOUR METRES

### PRACTICAL TRANSISTORISED DESIGN FOR LOW-ORDER INTERMEDIATE FREQUENCIES

B. J. P. HOWLETT (G3JAM)

THE converter illustrated here may look suspiciously as if it might have been built in a tobacco tin; however, any resemblance between it and previous designs by the author (published in *SHORT WAVE MAGAZINE* December 1961, 3-transistor for two metres, and February 1962, 5-transistor, also two metres), is purely coincidental, a radical change of thinking having taken place in the interim.

As expected, the *Mullard* AF-series have become bread-and-butter types, reasonably priced, and available off-the-shelf, and are quite adequate for 70 mc work—and they serve as a guide if other types are preferred.

#### Description

The unit is of the RF/Mixer/IF type, with Butler overtone oscillator *cum* harmonic amplifier, and to test the arrangement, the lowest possible intermediate frequency is used in the prototype, 800-1400 kc. However, another station has already successfully reproduced the converter for a 2.1-2.7 mc IF, entirely from notes provided by correspondence, despite confusion arising from the fact that the author failed to state which side of the chassis was represented in the layout drawing (actually the underside, looking at the components); consequently there now exist both left-handed and right-handed versions of it!

The RF TR1 stage is the familiar grounded base RF amplifier using an AF102. It will be observed that although no aerial tuning has been installed, space has been left for it should it ever be needed. The collector tuned circuit is self-supporting and horizontal.

At this point, attention should be drawn to the fact that it is the battery *negative* supply line, the *collector* line, which is connected to chassis. One end of L1 and its trimmer capacitor is directly grounded. Also,  $\frac{1}{4}$ ths of an inch away and concentric with it is L3, to inject local oscillator energy at 69.3 mc (or 68 mc, with the alternative IF range already mentioned). C4, .01  $\mu$ F, carries the combined signal to the emitter of TR2, the grounded base mixer stage, AF115.

C4 has been made large (in value, that is) so that, having produced the IF in TR2 we do not lose it all again in degeneration (negative feedback) across R2, the emitter resistor. The advantages of grounding the collector coil L1 now become obvious; besides feeding in signal and oscillator to TR2, C4 adequately decouples TR2 emitter to IF through the last  $\frac{1}{4}$ ths of a turn of L1.

TR2, rather unexpectedly, is R/C coupled to the IF amplifier, AF117, TR3 (also AF117), though there is enough space to introduce a tuned circuit in place of R5 if yet higher IF's are contemplated. This point is raised again later.

It might be expected that TR3 would be transformer coupled out to the main station receiver, but this has not been found necessary—indeed, it is not even R/C coupled. It is *direct* coupled, using the aerial coupling coil of the main receiver as the tuned output transformer; one more advantage of a grounded collector line. R10, 2700 ohms, has been inserted to complete the circuit should the main receiver be unplugged, and to give a modicum of damping.

Stripped of its capacitors, coils, and crystal, the local oscillator pair, TR4 and TR5, constitute what have come to be known as a "DC coupled pair," each transistor providing the base bias for the other, and is known to have very high stability against temperature changes and battery supply variations. On the basic arrangement has been superimposed the normal AC arrangement of the well-known Butler Oscillator, which goes just as well in its transistor version as it always has done with valves. It is possibly a little unfortunate that R14 has to be introduced, but heavy squegging will be experienced

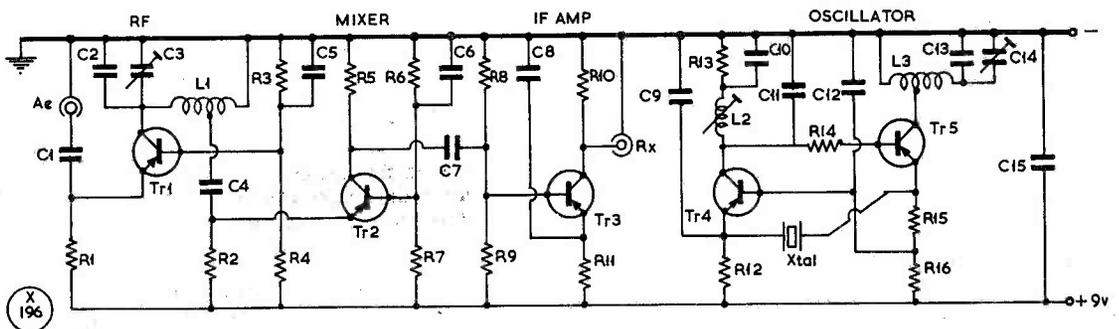


Fig. 1. Circuit of the four-metre converter designed by G3JAM and described in the article. It is intended for a low-order IF, though there is the possibility of using higher IF's if desired, as discussed in the text. This circuit can be built up in a miniaturised form—see Fig. 2—and is suitable for portable, mobile or fixed-station working. The measured noise-factor on the model is 6.5 dB.

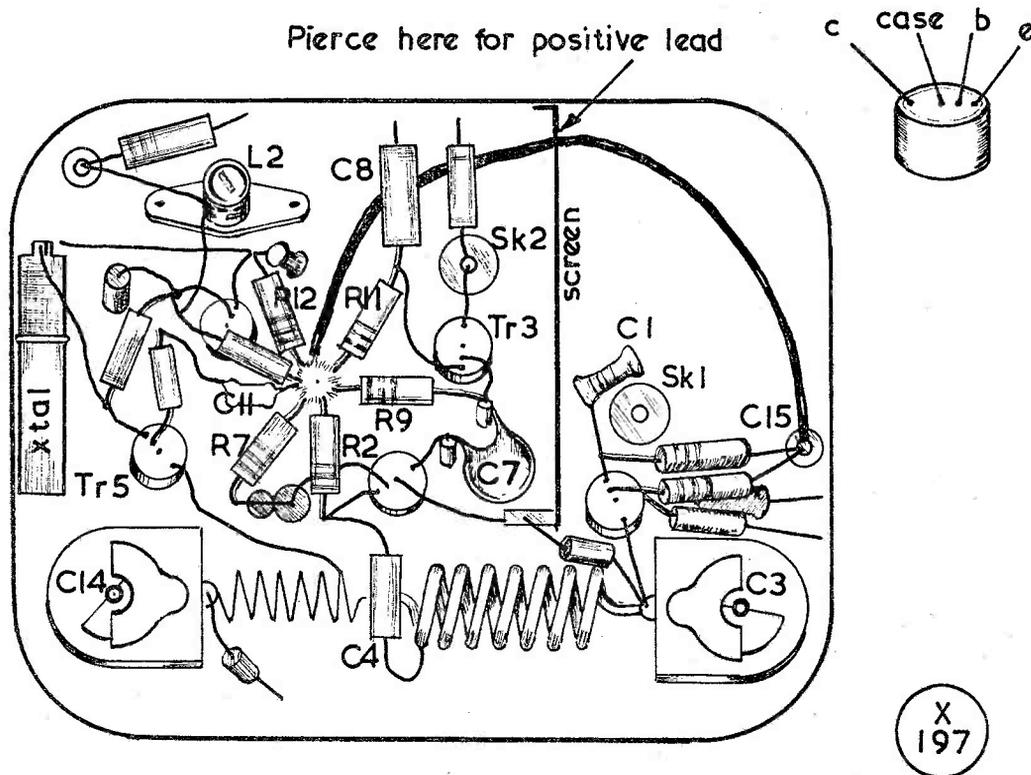


Fig. 2. A physical expression, almost actual size, of the 70 mc converter circuit shown in Fig. 2. The author is rather fond of tobacco tins for the construction of items of transistorised equipment — but there is no reason why something a bit grander should not be used!

**Table of Values**

Circuit of the G3JAM Transistorised 4-Metre Converter

C1 = 40 $\mu\mu\text{F}$ , 50%	R3 = 8,200 ohms, 10%
C2, C14 = 2-10 $\mu\mu\text{F}$	R5 = 470 ohms, 20%
C3 = 20 $\mu\mu\text{F}$	R6 = 10,000 ohms, 20%
C4, C6, C8, C12 = .01 $\mu\text{F}$	R7 = 4,700 ohms, 20%
C5 = 220 $\mu\mu\text{F}$ , 20%	R8 = 12,000 ohms, 20%
C7 = .003 $\mu\text{F}$ , 50%	R9 = 3,300 ohms, 20%
C9 = 18 $\mu\mu\text{F}$ , 20%	R10 = 2,700 ohms, 20%
C10, C15 = .001 $\mu\text{F}$ , cer. feed-thru	R11 = 1,200 ohms, 20%
C11 = 5 $\mu\mu\text{F}$ , see text	R12 = 3,300 ohms, 10%
C13 = 25 $\mu\mu\text{F}$ , see text	R13 = 4,700 ohms, 10%
R1 = 1,000 ohms, 10%	R14 = 470 ohms, see text
R2, R4 = 2,200 ohms, 10%	R15 = 470 ohms, 10%
	R16 = 1,500 ohms, 10%

Notes: Tolerances are plus/minus and are quoted to show how wide they can be; all resistors are Type 16. Transistors are: TR1, AF102; TR2, AF115; TR3, AF117; TR4, AF116; and TR5, AF115 or AF116. These are in the Mullard range, and similar types could be substituted

**TABLE OF COIL VALUES**

- L1 — 7 turns 18g. spaced to occupy  $\frac{3}{8}$ -in. and formed on  $\frac{1}{16}$ -in. rod. Tapped at one turn.
- L2 — 10 turns 22g. enam., close wound on  $\frac{1}{8}$ -in. former with dust slug.
- L3 — 8 turns 22g. enam., using 0 BA threaded rod as guide, spaced out to  $\frac{1}{16}$ -in. and tapped at one turn.

without it when an active crystal is used.

A worthwhile refinement to the Butler Oscillator is to neutralise the crystal self-capacity by connecting across it an inductor (in series with about 200  $\mu\mu\text{F}$ ). The value is approximately as many turns of 26g. enamelled wire as can be wound in the grooves of an O BA,  $\frac{3}{8}$ -inch dust-iron slug. When this is done, R14 can be omitted and a direct connection made between TR4 collector and TR5 base. Strength of oscillation is improved and frequency stability is almost as good as a fundamental oscillation. No squegging will be experienced.

Suitable crystals are available from *Henry's Radio*, London, marked with their correct overtone frequency—for instance, 34 mc for a 2.1-2.7 mc IF. For biasing reasons, R13 must be of the value shown, and must never be short-circuited even by accident for any appreciable time, since its value governs the behaviour of TR5. In the TR4 tuned circuit, L2, C11 is adjusted to the overtone frequency, enabling TR4 to develop gain at this frequency for passing into the base of TR5, whence it goes by emitter-follower action through the crystal itself to TR4 acting as a grounded base amplifier.

Having strongly modulated the current in both transistors at the crystal overtone frequency, it only remains to tune L3, C13/14 to the 2nd harmonic of

this, for inductive injection into L1. The collector of TR5 is tapped only one or two turns up L3. (*Note*: If C4 is physically large, compared with the layout drawing, it might interfere with the field of both L1 and L3: it might then be wise to reposition it.)

### Performance

The author has never had a valve converter operating on the 4-metre band, so comparisons are not possible; but with only a dipole from a site 38ft. a.s.l. most stations seem to be workable over a 30-mile radius, with a few more heard out to 75 miles, and this with a known standing wave on the feeder of about 2:1.

### Components

Most of the components are of the kind obtainable everywhere with the exception of the crystal already mentioned, and the L2 coil former which is a *Radiospares* item (listed under "Core Formers"), and sufficiently short physically to stand upright within the confines of an ordinary tobacco tin.

Reference to the table of values will show that an attempt has been made to place a realistic tolerance on the values of the components used, rather than the one stamped on them, as an indication of how far one can change them while still retaining normal performance.

### Discussion of Individual Requirements

It is unlikely that anyone would want a lower tunable IF than the author is already using, so we must turn our attention to the possibility of higher IF's, up to 10 mc or so. Apart from lowering the crystal frequency and adding a turn or two to L2 and L3, or, alternatively increasing the value of C11 and C13, there is the possibility of having to introduce a coil in place of R5, and the *Radiospares* item would suit this very well. Thin wire and plenty of turns will give a good flat response and there is enough space in the layout for this.

The fun starts when yet higher IF's are contemplated, and a very real limit occurs at 23.1 to 23.7 mc as a tuning range, requiring a crystal frequency with the present arrangement of 23.5 mc. For such cases it really would be better to work on the basis of extracting a fifth overtone from the crystal in the 48 mc region (turns off L2), eliminate L3 C13/14, taking the collector of TR5 to a low tapping on L1. Naturally all these proposals have not actually been tried but they do not seem to present any difficulty.

### General Points

Current consumption of individual transistors is often entirely superfluous, for the simple reason that if anything has gone seriously wrong it is already far too late to save the transistor! It is probably sufficient to know that, as it stands, the converter draws about 1 mA for every volt applied, and the recommended battery voltage is 9 volts.

No accidents have happened (yet) at G3JAM resulting in excessive RF into the receiver. Probably this is due to using a coaxial switch with really good

isolation between adjacent positions. Certainly, caution must be exercised when transmitting for the first time with a transistor converter for reception, and if there is any change in current consumption when the carrier is put on, the probability is that there is a near lethal dose of RF reaching the converter transistors. Diodes are of no avail, since the input is low impedance, and switching off will not affect the condition either; in fact, the only approximation to a dead short circuit at the converter would be to arrange for the coaxial lead from the aerial c/o to be an exact quarter-wave (electrical) at the frequency. With this open-circuited at the change-over on "transmit" it should show a very low impedance at the converter input terminal. Even this could be dangerous if the quarter-wave section itself picks up RF from the c/o switch.

The only really satisfactory alternative is a double change-over switch which, on "transmit," shorts the line leading to the converter: if this is then made an electrical half-wave, the short circuit will be faithfully reproduced at the converter input terminal, and all will be well.

To avoid cluttering up the layout drawing only a selection of components is identified, but there should be no difficulty in recognising the others.

The author hopes that all possible queries have been answered in advance and that the design can be bent to suit all requirements—and, one final point, the noise factor of the converter as shown has been measured as 6.5 dB.

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W. L. S-C, KG, OM, CH, RA

1875-1965

When at 1.39 p.m. on Saturday, January 30, the BBC cut all sound and vision carriers after one of the most moving occasions ever recorded by TV or heard on radio, it was another fitting tribute to a tremendous man to whom the world owes so much—not only by the nations, but also as individuals.

At about the time this appears, a great collection will have been started for a fitting national memorial to Sir Winston Churchill. This will not be just another statue, but in a cause to be of lasting value to our country. When you are asked, locally, to make *your* contribution, remember what you owe—and give generously.

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# TRANSISTOR TRANSMITTER FOR THE LF BANDS

UP TO HALF-A-WATT  
ON 80/160 METRES

R. V. MOORE, B.Sc. (G3LWB)

TRANSISTOR transmitting circuits have not often appeared in the Amateur Radio literature. One such was first published in *CQ* for October, 1958, and has been used by the writer on both 160 and 80 metres. This circuit originally required transistors of American type which were not easily obtainable in this country at that time. However, it proved to be a fairly simple matter to adjust circuit valves to suit transistors of British manufacture. The amended circuit is shown in Fig. 1. Old timers will note the similarity between this circuit and the "one-two" valve arrangement of the 1930's. Using Ediswan XA104 transistors, it was found to be very satisfactory on 160 metres, although other equivalent types such as OC44, OC45 and XA101 are equally suitable.

### Circuit Details

It is important to match the transistors for current consumption with fair accuracy. (The transistor tester circuit shown in Fig. 3 is suitable for this purpose.) Power can be supplied most conveniently by means of two 9-volt bias batteries connected in series. This provides an easy means of varying the voltage in steps of 1½ volts. The voltage should be adjusted so that an input of about 200-220 milliwatts is obtained, with the circuit oscillating readily. This voltage will be found to be between 12 and 15 volts. (Caution—check battery connections for correct polarity.) If any difficulty is experienced in getting the circuit to oscillate resistors R1 and R2 should be varied—values between 22K and 68K may be tried, but the two resistors should be kept of equal value throughout such changes. Capacitors C1, C2, C3, C4 should be silver mica, 1 per cent tolerance type.

Wiring up can be "bread-board" fashion, but a meter, 25 or 50 mA, is required for reading collector current and tuning for dip, so it is preferable to have a paxolin panel on which this may be mounted. Terminals can be used for the resistor connections and this will enable R1 and R2 to be quickly changed if necessary. Similarly, the transistors can be mounted in sockets. It is desirable to adopt a symmetrical layout all through—as suggested by the diagram—so that capacities in the two halves of the circuit are approximately equal.

Coil L1 for 160 metres consists of 58 turns of 20g. enamelled wire on a 1½in. diameter paxolin former with a link coil, centrally placed, of 8 turns of p.v.c. wire of the same gauge. For 80 metres the same former with 34 turns and a link coil of 6 turns

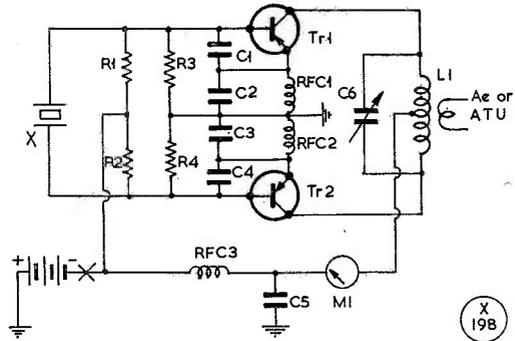


Fig. 1. The push-pull crystal-controlled oscillator arrangement used by G3LWB for QRP operation with transistors. Keying is at point "X"—where modulation can also be applied (see text)—and power is from a 12-14 volt battery. All values are given in the accompanying table.

### Table of Values

Circuit of the 80/160m. Transistor Tx

C1, C4 = 120 μF, s/m, 1%	RFC1, RFC2 = 1 mH RF chokes,
C2, C3 = 175 μF, s/m, 1%	low DC res.
C5 = 0.1 μF, tub.	RFC3 = 2.5 mH RF choke
C6 = 500 μF, var. tuning	L1 = see text
R1, R2 = 39,000 ohms, ½w. (see text)	M = 0-25/50 mA m/c
R3, R4 = 2,000 ohms, ½w.	TR1, TR2 = XA104 (see text)
	X = Top Band xtal

should be used.

A dipole aerial can be connected directly to the link from the PA coil—but if a length of wire less than a quarter-wavelength is used as antenna an aerial tuning unit such as shown in Fig. 2 will be necessary.

### Setting Up

When adjusting low-power transmitters it is very necessary to have some means of checking the loading. Low reading RF meters are not readily available so one of the following methods can be adopted: (a) By a diode in series with a sensitive meter (say, 50 μA) coupled to the output with a link, or (b) A 25-50 mA meter with a full-wave bridge rectifier circuit across the terminals (Fig. 2) connected in the aerial lead. Germanium diodes can be used for the bridge circuit or better still silicon power diodes (70v. p.i.v.) which have a much lower forward resistance. At first glance it may be thought that a considerable amount of RF will be lost when using this device but in practice the loss is negligible. There should be no difficulty in getting the circuit to oscillate readily when keyed but if oscillation is at all sluggish the values of R1 and R2 should be varied as indicated previously. Occasionally, it will be found advisable to try another pair of transistors.

### Modulation

If modulation is required the standard Mullard 250 mW push-pull amplifier may be used with success. It is unlikely that the amateur will have a suitable modulation transformer available in which case a

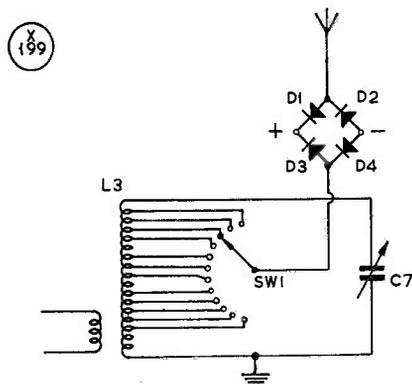


Fig. 2. An ATU suitable for use with the Transistor Transmitter on 160 metres, where the aerial is less than a quarter-wave long. C7 is 500  $\mu\mu\text{F}$  and L3 60 turns of 20g. enamelled on a 1 $\frac{1}{4}$ -in. former, tapped every three or four turns; the link is 8 turns of p.v.c. at the earth end. The switch is a single-pole rotary, with positions for as many taps as possible; the meter is 0-50 mA, and D1-D4 are silicon diodes, 70 p.i.v. half-amp., the function of which is explained in the text. Note: In this circuit the 0-50 mA meter is connected between the + — in the aerial lead, across the diode bridge.

push-pull output transformer (as Mullard circuit) can be used and connected in reverse. Alternatively, a multi-ratio output transformer would be satisfactory. Whichever is used it can be regarded as satisfactory if upward modulation results as shown by an upward movement of the RF meter. Full modulation of transistor transmitters is not usually attainable by modulation of the collector only so it is customary to modulate the driver as well as the PA stage and for this purpose an extra winding is required on the modulating transformer. However, with this transmitter modulation at point "X" in the circuit results in a certain amount of base modulation in addition to collector control and reports will usually indicate fairly full modulation—though, from first principles, direct modulation of a crystal oscillator can never be entirely satisfactory. After all, it is the function of the crystal to keep the amplitude constant!

**Results**

Using an 80-metre trap dipole with feeders strapped and loading Marconi fashion (ATU as Fig. 2) reports on 160 metres within a radius of 8-10 miles have been very satisfactory, particularly in the daytime, although quite naturally with an input of approximately 200 mW the signal would not stand up to heavy interference. The farthest contact on phone has been 24 miles, with a report of "5 and 6." On CW, and particularly in better locations than the writer's, and with a better aerial than the G3LWB system, much greater distances have been worked by amateurs who have tried this circuit.

The same transmitter operating on 80 metres (coil change as previously given) and link coupled directly to a trap dipole has been used successfully several times in low-power contests by the writer's XYL (G3ORU). The output on such occasions has

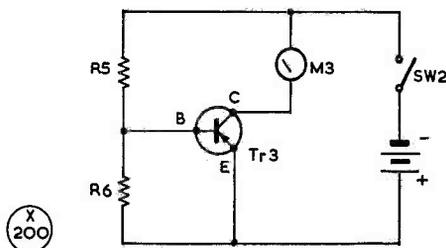


Fig. 3. A simple transistor tester — see text. R5 is 220K and R6 47K, both  $\frac{1}{2}$ -watt; the meter is 5 or 10 mA and TR3 is the transistor under test, three sockets or terminals being used to connect transistors. The battery supply is 4 $\frac{1}{2}$  volts.

been increased to about  $\frac{1}{2}$ -watt by using N600 transistors (manufactured by *Semi-Conductors Ltd.*).

Now that much higher power RF transistors are more generally available there seems no reason why this circuit should not be used for considerably increased inputs.

**INDEX — VOLUME XXII**

Every copy of this issue of SHORT WAVE MAGAZINE has had inserted—as a free loose supplement—a complete Index to our last volume, March '64 to February '65. This is the most extensive index we have yet had to compile, and shows the vast range of Amateur Radio interest and activity covered in twelve issues of the MAGAZINE. If for some reason you did not find this index loose in your copy, you can get one free simply by asking for it, with a large s.a.e.

**INTERESTING BOARD APPOINTMENTS**

*Painton & Co., Ltd.*

It is announced that with effect from January 26 Mr. C. M. Benham relinquished office as managing director, remaining as executive chairman of the board. Mr. J. B. Kaye and Mr. R. W. Addie are appointed joint managing directors.

The particular interest attaching to this announcement is that Cedric Benham is G4TZ, "J.B." Kaye is G5BG and Robin Addie is G8LT—between them running a firm doing a world-wide business in specialised radio and electronic apparatus and components, with subsidiary factories in several countries overseas. And it also happens that, between them, they are active on all amateur bands, VHF to 160m., on CW/AM/SSB/RTTY.

**THE LONDON SIDEBAND DINNER**

This is to be held on May 29, at the Waldorf, London, organised by G3FPK and G3KZI in a purely personal capacity—"no connection with any other organisation or personalities," we are told—and they are planning to put on a really worth-while show for those who would like to be in on an interesting Sideband occasion (there will be an equipment exhibition) and also have a good night out in the West End. Tickets are three guineas each (including dinner, dancing and cabaret), obtainable from either G3FPK or G3KZI, both *QTHR*.

# SWL • • • • •

## SOME NEW SUGGESTIONS—IN WHICH MODE?—QUICK QUOTES—READERS' NEWS AND VIEWS

THIS month's postbag is very heavy, and full of interest. All sorts of subjects are briefly touched on—but some letters are so long that it is pretty difficult to reduce them to a coherent brevity. Perhaps a little plea for more concise offerings would not be out of place here . . .

Always, one of your scribe's chief preoccupations is finding out what our correspondents want. There are no preconceived notions about how this feature should be run, except that it should be of interest to the greatest possible number of readers.

It is rather disconcerting (though maybe a little flattering), then, to find that for every reader who says "I would like to see so-and-so in 'SWL'," there are ten who, if they make any comment at all, say "Please leave 'SWL' just as it is—that's how we like it." It seems to have settled down into a kind of all-embracing gossip column for Short Wave listeners, and they do seem to like it that way.

However, it is certainly not the idea that this piece should become static, so we will try to introduce a few new ideas from time to time, without upsetting those for whom the format has become almost traditional!

### Suggestions

From *Andy Parker (Chesham)* comes a useful letter, suggesting that the feature has become rather like a session on 80-metre phone . . . "Each article, except the preamble, which is very good, seems to be a carbon-copy of the previous." (We don't go all the way with him there.) But at least he is constructive, and puts up the following ideas:

A "Logs Section"—not just lists of calls, but full details of really worthwhile transmissions heard, with date, time, mode, band, strength and readability, together with details of equipment used.

A *purely technical item*, which might only appeal to the minority, but might be of real interest to them—perhaps reviews of aerial systems, receivers, gadgets on main interest to SWL's, and so on.

*More Ladders*—countries, various bands, various modes, heard or confirmed. Zones, prefixes, counties, and what-have-you—the choice (as he says) is limitless.

*Readers' news, views and queries*—which take up most of the space at present, cutting out the "potted histories," which mean very little. In other words, longer quotes from those letters that say something worthwhile, instead of short extracts from all and sundry.

A *Listeners' Competition*—at a "favourable time" (what's that?).

All these ideas come from the same SWL—the said *Andy Parker*—and we are grateful to him for taking the trouble to write such a reasoned letter. Now we pass them on . . . which of these ideas would *you* like to see incorporated in "SWL"? It's up to *you*—if you want it, you shall have it!

### Contrariwise

In all fairness, we must quote the other point of view: *J. P. Fitzgerald (Great Missenden)* says he firmly disagrees with "readers who may think 'SWL' is devoted to meaningless chit-chat. I find your pages most interesting and the correspondents' comments most rewarding. As far as I can see, the alternatives are long and valueless lists of Calls Heard, or more technical articles, which would alienate the newcomer, while being too simple for the old hands. As it is, it is an excellent feature which has struck the 'happy medium'."

Others make rather similar comments, and there are quite a crop of letters agreeing with recent remarks on the dying-out of home construction, mostly putting forward the suggestion that "It's SSB that has killed it." Meaning, we suppose, that it is more difficult to build a receiver that is really up to the standards which Sideband reception demands. And another grouse is that the tendency towards miniaturisation makes home-construction almost impossible for the average tinkerer . . . but *why* miniaturise? Most SWL's have plenty of room for a receiver of the former conventional size, even AR88's and CR-100's.

So here are some *pros* and *cons* to mull over, and please let us have your own thoughts (but better in two pages than eight, if you don't mind!). [over



C. J. Whaley, 6 Milton Road, Impington, Cambridge has a CR-300 with a K.W./Geloso amateur-band converter and a Codar PR-30 pre-selector; the aerial is connected through an ATU. SWL Whaley hopes soon to join the SWL's who can listen on two metres.

### Points of View

Some unusual ideas have been flung forth this month. *M. J. Summers (Market Harborough)* is horrified at the suggestion that only *confirmed* loggings should qualify for the ladders. "Non-QSL collectors like myself would have to drop out altogether or else collect the dreadful things, starting from scratch."

*D. E. Fitzgerald (Dublin)* comes up in defence of SWL's who follow the broadcast as well as the amateur bands. "I'm getting tired of SWL's who give the impression that they have *lowered* themselves to BC listening, as if it's an inferior type of thing. In fact it can be quite the opposite."

*W. H. Gundill (Dewsbury)* asks "If it had been available, how much 1918 gear should we have been using in 1938? Yet nearly all the ex-Govt. surplus now in use or on sale is 20 years old." The only justification for this is that there was somewhat more difference in the techniques of 1918 and 1938 than between 1944 and 1964! (And, oddly enough, some very good Kaiser's War wireless apparatus is *still* on the surplus market!)

*J. E. Hart (Leeds)* mentions a new annoyance—the people "mostly W's," who say "Go," or "Go Ahead," or "Take it away, Fred," instead of giving their call signs. Yes, it's not only annoying—it's illegal.

*C. Dillon (Bath)* thinks the HPX Ladder should be kept going, just as it is, to give the newcomers (more of them each month) a chance to compare their prowess with the old hands, and perhaps even to catch them up.

*M. Woollin (Leeds)* steps on the toes of our Dublin friend, a few paragraphs back, by asking "Why don't these SWL's who take up broadcast listening, when the bands are dead, build themselves an *oscillator* and learn Morse? I did this during the winter, learning three letters a night, and can now copy 12 w.p.m., but call signs very much faster." Certainly, if you do this, you'll seldom find the bands dead.

*R. I. Buckby (Corby)* says *he*, too, started on CW by "just listening"—as we have so often suggested—and after listening to about five minutes of a CQ he heard a "UA9" on Top Band. (Afraid it was a pirate, though, because we're told that they simply are not there.)

Wow! Hold back those CW fans, or there will be mayhem! Quote from *P. A. Cayless (Exeter)*: "Perhaps before SSB came along, CW was the better mode, but now it is a useless pursuit . . . It is now a case of 'I can read CW, so you're just a lazy good-for-nothing and I'm hearing all the DX'." (No comment from here, but doubtless plenty from other sources next time.)

### General Comment

So much for the controversial part—and it is worth remembering that a certain famous writer once sent a postcard to the B.B.C. to the effect that "Nothing that is *not* controversial is of interest to anyone but a congenial idiot" . . . so by all means let us have the controversy.

We have a new name at the head of the HPX Ladder—*Terry Popham (Exeter)* now occupies the hot seat, and we congratulate him. (He added 69 prefixes to his previous 614 in one fell swoop.) Recently, he won the Exeter club's multi-band single-operator SWL contest and carried off their silver cup. He finds the best band is *Fifteen*, although it is not open for long periods like *Twenty*, and says that for him the HPX bug has bitten so hard that he no longer listens to QSO's! In front of him is a list of the prefixes that he hasn't heard, and he hunts for new ones all the time.

*M. Woollin (Leeds)* keeps listening on ten metres of a Sunday morning, but all he ever hears is his bunch of locals. But Forty CW is also a strong interest, as he hopes to be licensed within the year.

*Chris Freeman (Nuthall)* is also on the CW chase, but finds progress slow. During early January he was surprised at the number of W's on Eighty. While at school he has a 7-transistor set with him, covering that band and One-Sixty, but also has access to the school's 19 Set and R.107.

*R. Hunter (Harrow)* also has "academic QRM," but is awaiting the R.A.E. results. He has an AR88D, but doesn't appreciate its lack of bandspread on Forty. (Try a magnifying glass, as recently suggested in D-Y-K-T!)

*M. G. Allen (Heston)* says he has been forced to resort to the unbearable background of Eighty and Forty to fill the gaps in his European log. And he asks whether 5H9 is the long-awaited prefix for Zanzibar, and who on earth 8U1 might be? (We don't know the answers.)

*R. Finley (Kenton)* took the R.A.E. in December and awaits the result. Meanwhile, he has got his Morse up to scratch and is all ready for that hurdle. He has heard W1BB on Top Band, and has also listened with interest to one of his locals (G3HBW) trying to contact UA1BW on Two, by meteor-scatter—this is a wide range of interest!

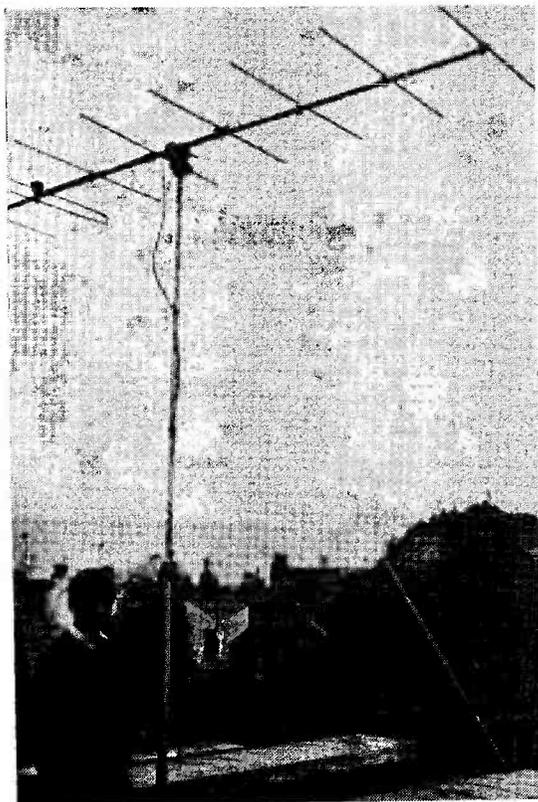
Another high scorer in the HPX department is *L. Margolis (Ilford)*, and he says his recent *plus* of 30 is mostly due to CW on Forty, which is good for those queer prefixes like YO 5-9, HAØ and the like (with plenty of DX available between 1900 and 2300, too). Twenty he found "extraordinary for mid-Winter" but 15 metres a little quieter.

### Working Tools

*L. J. Russell (Birmingham)* tells us he is a "SWL Oddity." He never logs anything—hears DX but doesn't bother to record it. On the other hand he builds, and always has built, all his own gear. He asks what should be considered the minimum amount of test gear for a well-equipped SWL to possess? But when he adds that he already has a GDO, a Valve Voltmeter, a 3in. oscilloscope and an R/C Bridge (all from the Heathkit range), we hardly feel like suggesting any more! Not many SWL's in the whole country can be as well equipped as he is.

In passing, hats off to the kitchen-table brigade who turn out creditable pieces of equipment with the help of a multi-meter (probably home-built) and a





M. Vincent, 7 Pittville Crescent Lane, Cheltenham, Glos. has a two-metre converter working well and though that fair town is notoriously a very poor place for VHF (except perhaps in the westerly directions) he is getting good results when the band does open for DX, six countries having been heard. This beam is an 8-ele at 35ft., rotated by hand, and his Rx is the G. & D. Mk. III converter, into an R.107 tuning 4-6 mc.

interesting than simply the capture of a call sign—and there are many of them—really reap a double benefit. P. J. Lennard (*Wartling*) points out how interesting it is to pick up a G station and listen for the man at the other end—sometimes one would not have heard him, otherwise.

Sometimes, though, on the HF bands, it is much easier to find the DX station first, and quite a test of skill to find the “local” that he is working! Yet another point of interest—compare the signal reports in a contact (especially if the “local” end of it is fairly near you) and if you find that someone is giving the DX station about three S-points more than you would, then you might perhaps start getting dissatisfied with the receiver. Or, alternatively, you might wonder whether strictly honest reports were being passed.

J. R. Daws (*Leeds*), who has recently started learning Morse, finds Top Band an excellent practice-ground. With a 41ft. base-leaded vertical, he has already logged W's on the band. He drops a sensible word on the competitive spirit: “HPX is *not* my first and foremost interest; I am anxious not to sacrifice the other pleasures of SWL'ing in an all-out

search for DX, which after all is not *everything* in Amateur Radio.”

Not many listeners seem to be interested in *Ten* these days, but Pete Cayless (*Exeter*) reports that he has heard 32 countries and 16 U.K. counties since last June—which is pretty good going.

#### “Ghastly” Prefixes

H. M. Graham, back to SWL'ing after many years' absence, asks “who started these ghastly prefixes like 9G1, 5X5 and so on? When I packed up in 1956 I only remember 4X4 and 3V8, but now they pop up like the measles. Is there real difficulty in allocating sensible lettered prefixes?” Well, yes, there is. All our former colonies who have achieved independence have to find a combination no longer allocated to the U.K. and Colonies (for instance, all the VS's, VQ's, ZD's and so on); and the allocation of sequences beginning with a *figure* was made to all the countries of the world many years ago. So the new prefix has to be taken from that sequence, as the old lettered prefixes no longer make sense. It's rather like a change of address!

Derek Poulter (*Morden*) thinks it unfair that W2, K2, WA2, WB2 all count as different prefixes, though the stations may be in the same road; whereas you may hear three VK9's and find them in Norfolk Is., Papua Territory and Christmas Is. Well, there's an anomaly there, but it's not unfair, because that's the way WPX and HPX work . . . You're not looking for new countries, only for new *prefixes*. To modify the rules at all would be to get the two systems hopelessly mixed up. SWL Poulter also wants to see a Ten-metre table included in this feature . . . we are hoping to do this later (certainly when *Ten* is a DX band once more), but we feel that at present there's not enough interest. Only about four readers mention the band each month.

And now once more we have run out of space. Thanks to those SWL's who have contributed some variety to this instalment, and best wishes to them in the coming “DX season”—which should be good. Next deadline will be **Friday, March 26**. Until then—Good Listening.

#### NEW PRESIDENT, R.S.G.B.

This year's President of the Radio Society of Great Britain is Eric Yeomanson, G3IIR, in succession to Geoffrey Stone, G3FZL. At a pleasant little ceremony on January 15, the former was inducted into the chair and invested with his chain of office by G3FZL.

#### AMATEUR LICENCE TOTALS

The latest G.P.O. return shows that, by January 31, the total of U.K. “A” licences in issue was 11,015 with another 164 in the “B” category (UHF only). Amateur mobile licences have gone up to 1,752—showing an increase of 23 /M's during the winter months. Amateur TV transmitting licences remain at 168, unchanged since our last check four months ago. The sharpest percentage increase is in the “B” category, showing that this facility is attracting increasing interest.

# RECEIVER UNIT FOR AM/CW/SSB USING SEMICONDUCTORS

## SIMPLIFIED SUPERHET CIRCUITRY

A. S. CARPENTER, A.M.I.P.R.E. (G8ABG)

At the present time the trend is towards transistorised circuit configurations; this will, doubtless, continue. The benefits afforded by transistors—low current and voltage demands—are already well known, whilst the fact that equipment can be made surprisingly small physically is also appreciated, particularly by /P and /M operators.

The SSB trend is also noted and while it is clear that a transistorised communications-type superhet suitable for amateur work can be constructed fairly easily, making it capable of receiving SSB can present a minor problem. In a version built by the writer recently the CW requirement was met conventionally by using a simple BFO. The circuit of this is shown in Fig. 1, where TR1 functions as a normal feedback oscillator, due to T1, which is tuned around the final intermediate frequency—in this case, 470 kc—with coupling into the detector circuit via stray capacity. Utilising the device to receive SSB transmissions proved unsatisfactory; SSB could be made intelligible but only when the RF gain control was backed well off. This was, obviously, not always desirable.

Since then a great deal of time has been devoted to this section of the Rx. Attempts at increasing the output afforded by the BFO have been tried and a transistorised product detector experimented with. These experiments have not proved completely satisfactory. However, the problem has been resolved, as described here.

### Practical Points

The normal AM demodulator circuit employed is depicted in Fig. 2(a). Here, D1 deals with detection, C1-C2-R1 being included as filtering elements. The DC content of the demodulated signal, positive in sign, is returned as simple AVC to earlier stages whilst audio is picked off from VR1 and fed via the usual blocking capacitor to the following audio amplifier.

It is found, however, that by substituting the section shown in Fig. 2(b) for that of (a), both SSB and CW are easily received if a beat is introduced across VR2, at  $f_{CIO}$ , from a carrier insertion oscillator. Withdrawing the CIO emission silences signals, provided VR2 is correctly adjusted.

### A Suitable CIO

The simple feedback circuit shown in Fig. 1 cannot be used in this connection for as both windings associated with T1 are in use none exists for external connection purposes. If, however, we change the

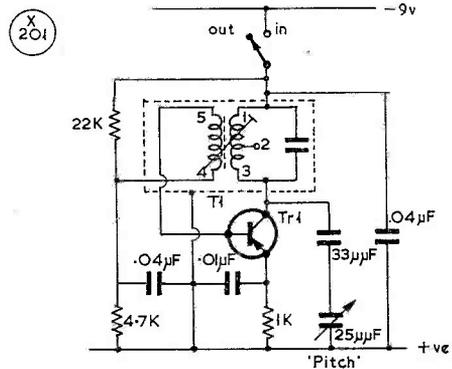


Fig. 1. The transistor BFO circuit discussed in the text, which was first tried by G8ABG.

circuit and make it into a modified Clapp, as shown in the June, 1963, issue (p.200) of SHORT WAVE MAGAZINE, one winding of T1 can be freed. This can be the secondary, or untuned, winding associated with the particular type of transformer used and since this is low impedance in form it will suit the case admirably.

### A Suitable Arrangement

Incorporating the AM/CW/SSB demodulators in a practical circuit is perhaps best illustrated by showing the complete IF amplifier stages with which they work.

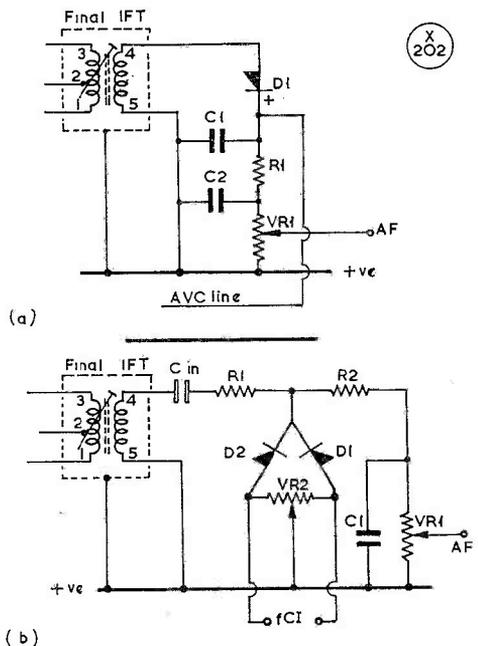


Fig. 2A shows a normal demodulator circuit, much improved by the arrangement in (B), enabling CW and SSB to be easily receivable if the CIO output is applied across VR2 — see text.

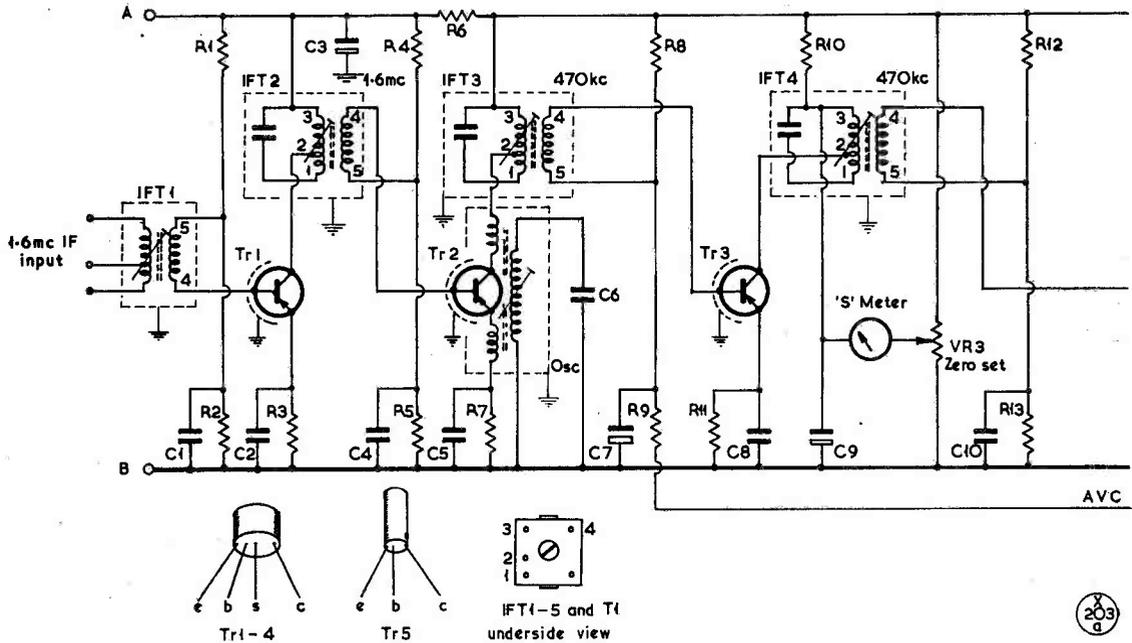


Fig. 3 does this and, as may be seen, five transistors and three diodes are utilised. It is not claimed that this is the "ultimate"—if there is such a thing, constructor-wise!—but it is certainly very useful. What goes before and after the circuitry of Fig. 3 is a matter of choice—a valved or transistorised converter (the latter type is in use here) with an IF output at 1.6 mc, and an audio amplifier, fore and aft, are all that will be needed—say, six more transistors in all to provide a double-conversion, all-transistor superhet!

In Fig. 3, TR1 functions as a 1.6 mc head amplifier feeding TR2, which operates as a fixed-tuned mixer/oscillator to produce the 2nd IF at 470 kc. Transistors TR3 and TR4 amplify further at 470 kc. IFT5 then feeds the demodulators. Selectivity in the IF stages is reasonably good despite the fact that the transformers are only single-tuned items. Use of double-tuned types would doubtless prove beneficial but these were not initially available. Care is needed at the alignment stage to make the cores peak as sharply as possible, for defects introduced by excessive bandwidth will be clearly evident when SSB signals are sought! It may be noted too that no neutralising components are fitted to the IF stages; these are not considered necessary due to the particular types of transistor used.

**Function One—CW/SSB**

When the function switch, S1, is set as shown signals pass via C12-R16 to the CW/SSB demodulator whilst TR5 is also made operative. Oscillations are fed to VR2 from T1 and if a SSB transmission is tuned this is quickly made intelligible—without normally having to reduce the RF gain—by adjusting

panel-fitted VC1. Signals at intermediate frequency are also fed to D1 from IFT5 and an AVC bias proportional to the strength of the received signal appears at the top end of R15 and may be fed back via R9 to control the gain of TR3. The base feed fixed potentiometer associated with TR3 then consists of resistors R9-R15-R18 as the lower half and R8 as the top section. By suitably connecting a meter in the collector circuit of the controlled transistor signal strength may be recorded. Here, a bridge connection (due to R10-VR3-TR3) enables the meter to read in a forward direction. Normally, the meter pointer is adjusted to read zero scale by means of pre-set VR3 under no-signal conditions. Any signal of reasonable strength received thereafter upsets the bridge balance and the meter pointer is deflected in the direction of full scale. In practice the meter sensitivity required is about 250  $\mu$ A f.s.d. but if one of this sort is not available another, of higher sensitivity (say 100  $\mu$ A) could be used provided it is shunted appropriately, i.e., by a pre-set variable resistor, marked "sensitivity." Condenser C22 is included in an attempt at lengthening the AVC time-constant in this connection; the AVC can, however, be made inoperative if preferred simply by moving panel-fitted S2 to "Out," whereupon R24 is placed in series with R9 to the +ve line. The blocking capacitor, C16, is an electrolytic item here and supposes use of a transistorised audio amplifier.

**Adjustment of the C10**

For good results TR5 should, presumably, be capable of providing a reasonably high output at the operating frequency but use of a OC81 has been found satisfactory when operated with a collector

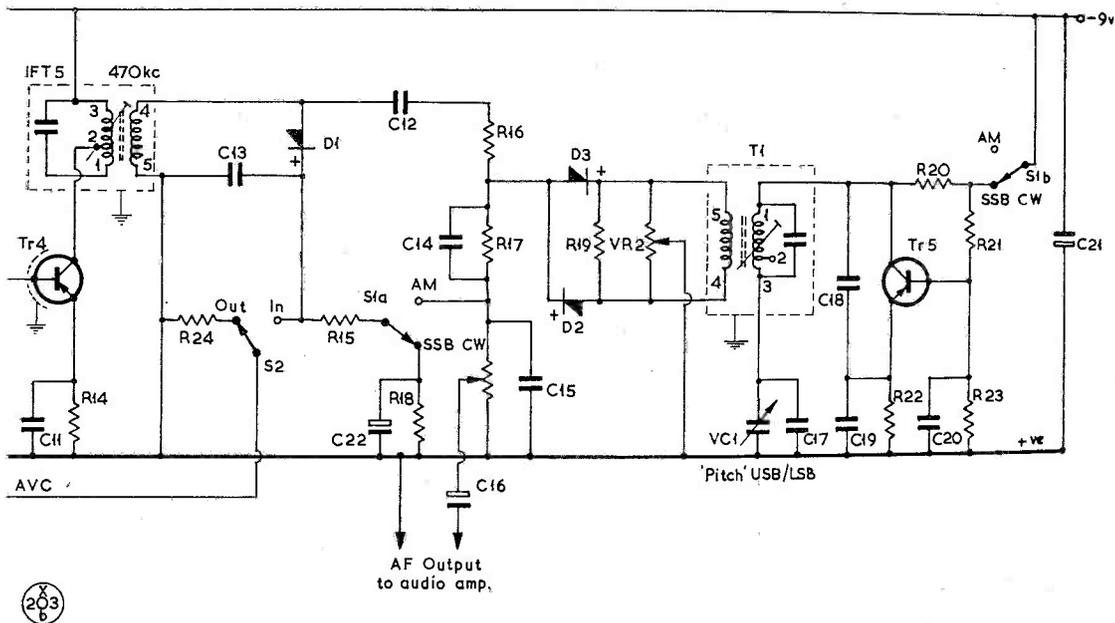


Fig. 3. Circuit complete of the AM/CW/SSB unit discussed in the text, showing the IF arrangement. This diagram should be read from the left of the page opposite. TR1 is a head amplifier and TR2 is the mixer-oscillator, with TR3, TR4 as further IF amplifiers (at 470 kc in this case). TR5 is the carrier-insertion oscillator, in effect a pre-set BFO. In this circuit, the condensers unmarked are as would be already incorporated in the "Denco" IF transformers used.

Table of Values

Fig. 3. Transistor Unit for AM/CW/SSB Reception

C1, C4, C10 = 0.04 $\mu$ F paper	R11 = 720 ohms
C2, C5, C8, C11, C15, C20 = 0.01 $\mu$ F paper	R12 = 22,000 ohms
C3, C22 = 100 $\mu$ F elect. 9v.	R13, R18, R23 = 4,700 ohms
C6 = 180 pF s. mica	R15 = 1,200 ohms
C7 = 8 $\mu$ F elect. 6v.	R19 = 2,700 ohms
C9 = 5 $\mu$ F elect. 9v.	R21 = 47,000 ohms
C12 = 50 pF s. mica	VR1 = 5,000 ohms (log.)
C13 = 5000 pF cer.	VR2 = 5,000 ohms (lin.)
C14, C18, C19 = 470 pF s. mica	VR3 = 10,000 ohms (lin.)
C16 = 2 $\mu$ F elect. 6v.	IFT1 = Denco type IFT16
C17 = 100 pF s. mica	IFT2 = Denco type IFT16
C21 = 100 $\mu$ F elect. 15v.	IFT3 = Denco type IFT13
VC1 = 25 pF variable	IFT4 = Denco type IFT14
R1 = 56,000 ohms	IFT5 = Denco type IFT14
R2 = 10,000 ohms	Tosc. = Denco type Range
R3, R14, R16, R22 = 1,000 ohms	Meter — see text
R4 = 15,000 ohms	S1 = 2-pole, 2-way rotary
R5, R17 = 3,300 ohms	S2 = SPDT
R6 = 470 ohms	TR1 = OC170 (AF117)
R6 = 470 ohms	TR2 = OC170 (AF117)
R7 = 2,200 ohms	TR3 = OC170 (AF117)
R8 = 33,000 ohms	TR4 = OC170 (AF117)
R9, R20, R24 = 5,600 ohms	TR5 = OC81
R10 = 680 ohms	D1 = OA70
	D2 = 2/OA79

current of 750  $\mu$ A. The circuitry around TR5 seems pretty "sure fire" but the functioning may easily be checked by inserting a meter set to read 0-10 mA on the switch side of R20 leaving R21 *in situ*. At switch-on the meter can usually be set to 0-1 mA. If pins 1-3 of T1 are then momentarily short-circuited the current reading should change and a fall—to say

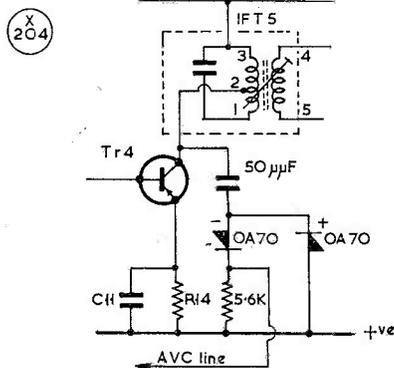


Fig. 4. An alternative AVC connection for TR4 in Fig. 3. G8ABG suggests this as likely to be an improvement.

600  $\mu$ A—will show the device to be working. Despite this, no signals may be heard in a newly constructed Rx because T1 may be incorrectly tuned. Rotation of the core of T1, with VC1 set at half-mesh, results in a sudden onrush of noise. Thereafter it is merely necessary to adjust the core in conjunction with VC1 to the correct operating point.

Function Two—AM

By adjusting S1 to the AM position the CIO is made inoperative. Diode D1 then functions as a normal AM demodulator/AVC generator. Condensers

C13-C15 are merely filtering items and audio is fed to VR1 via R15. In the test Rx output on AM does tend to be slightly greater than on the other functions, the differences being taken up manually, on the volume control. If this is objectional some in-built AM attenuation could probably be introduced.

**Conclusion**

Those who, like the writer, enjoy constructional work will, it is hoped, have found this offering of interest. Improvements, additions and changes could doubtless be made—the alternative type of AVC arrangement shown in Fig. 4, for example, plus a noise limiter, Q-multiplier, and so on. There is, fortunately, no end to it all!

**TWO-BAND AERIAL SYSTEM FOR RESTRICTED SPACE**

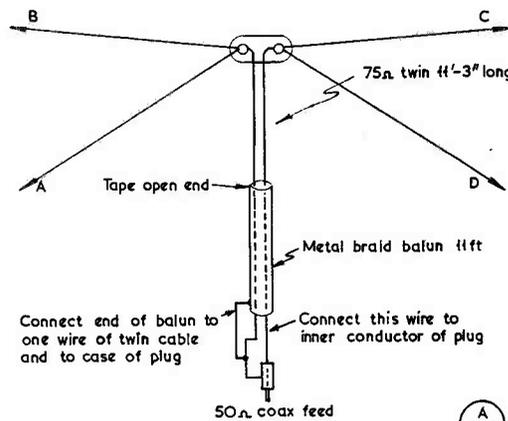
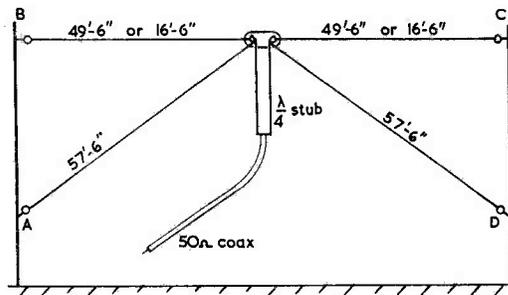
A TWENTY/EIGHTY METRE LAYOUT USING COMMON FEEDER

G. A. SWINNERTON (G6AS)

**I**N this period of low sun-spot activity, the writer's interest is confined to the Sideband portions of the 20-metre and 80-metre bands. A simple aerial fed with 50-ohm coax for both these bands, without switching, was required as a check against a vertical antenna for 14/3.5 mc. Convenient supports, just over 30ft. high, and spaced a little more than 100ft. apart, were available.

The most convenient solution to satisfy the physical requirements resulted in 3-half waves centred for 20 metres, with an inverted vee-dipole for 80 metres, centre-fed at the same point. As the impedance at the centre of the 3-half wave layout for 20 metres is possibly over 100 ohms and the impedance of the low droopy dipole for Eighty is in the region of 50 ohms, it was considered necessary to insert a ¼-wave matching stub and balun for the 20-metre band. The horizontal centre-fed wire is 99ft. long and the inverted-vee portion for 80m. is 115ft., the lower ends being about 6ft. above ground—see sketch.

For the matching section, 11ft. 3in. of 75-ohm twin feeder is used. The balun is constructed by stripping the outer conductor of heavy coaxial cable to provide about 11ft. length of metal braiding. The 75-ohm matching stub is inserted into the braiding, which is left unconnected at the end nearest the centre of the antenna but at the other end is connected to one wire of the matching stub and the outer conductor of the 50-ohm coax, which forms the feed-line. This arrangement appears to have no adverse effect on the performance of the 80-metre section.



Layout for the two-band (20/80m.) arrangement suggested by G6AS. Using a single 50-ohm coax feed line, through a matching section, a very good SWR characteristic is obtained, with reasonable performance on both bands.

The system exhibits a standing wave ratio of less than 1:1.5 on both bands—but it may be necessary to trim or add to the ends of the 115ft. dipole to show the best SWR under different circumstances.

In practice, this layout has proved quite satisfactory and appears to give virtually all-round coverage on both bands. There is slight gain on 20 metres over a dipole but possibly not enough to warrant the use of 3-half waves if this is inconvenient. Therefore, if only a 33ft. length is used for the horizontal portion, the quarter-wave matching stub could be omitted but a balun for 20 metres is recommended.

**SUBSCRIPTIONS FOR "QST"**

Readers who may be interested are reminded that we can continue to accept subscriptions—or subscription renewals—for QST, the monthly Amateur Radio journal published by the A.R.R.L. Subscription orders placed through us (the cost is 48s. for a year of 12 issues) will no longer include associate-membership of the A.R.R.L. and copies will be despatched from our office as received, instead of direct from America.

# THE PRACTICAL APPLICATIONS OF SEMICONDUCTORS

## Part VIII

### OSCILLATORS (II)

M. I. Davis, B.Sc.

The first part of the discussion on transistor oscillators appeared in our February issue. A full reference to previous articles in this series on Transistors will be found in the Index, the loose supplement in this issue.—Editor.

#### DESIGN PROCEDURE FOR A COMPLETE TRANSISTOR TRANSMITTER

The following represents a typical set of considerations involved in the design, from scratch, of a multi-stage solid-state transmitter. Unfortunately, mathematics cannot be entirely excluded, but the equations given are fairly simple and straightforward, and will, it is hoped, enable the reader to design and subsequently get on the air a transmitter which suits his particular requirements. The whole process is quite standard, and begins at the PA stage.

We first assume that all the transistors in the equipment are to be operated in the common-emitter mode; maximum power gain is achieved in this way. Possible exceptions to this rule might be: (1) Common base for higher operating frequency; (2) Earthed collector so that the output transistors may be connected directly to the heat-sinking without stray capacitance worries or fear of mica washers breaking down.

The second assumption is that the output stage consists of a push-pull pair in Class-B. Although with a given pair of transistors, Class-C operation does offer us more theoretically available output power, there are several disadvantages to operation in this mode. Any modulation must be applied to the output stage itself; low-level modulating systems may not be used, because of the inherent non-linearities in the Class-C mode.

Further, base charge storage effects increase transistor dissipation and reduce the high theoretical stage efficiency available in Class-C.

Having chosen a band in which we wish to work, we select an output power to aim at (P watts).

Then, from basic considerations of the principles of the Class-B output pair:

$$P = \frac{V^2}{R_L}$$

where V is the r.m.s. value of the output voltage

swing, and  $R_L$  is the effective collector resistance applied to each transistor when it is conducting. The "V" is found simply by subtracting from the supply voltage the few hundred millivolts which appear across the transistor when it is fully turned on. This gives the peak value of the output voltage swing. The r.m.s. value is simply obtained by dividing by 1.41. Note that we can allow the output transistors to bottom and turn off completely, since, with the collector circuit tuned, no cross-over distortion will occur; hence no standing current is required to prevent distortion of this kind.

At this point, we know the effective collector-emitter load resistance  $R_L$ . A resistor  $R_E$  will have been included in the emitter lead for reasons of stability, and the true value of  $R_L$  is obtained by subtracting the value of this emitter resistor from  $R_L$ , the result becoming the new value of  $R_L$ , to be used in subsequent calculations.

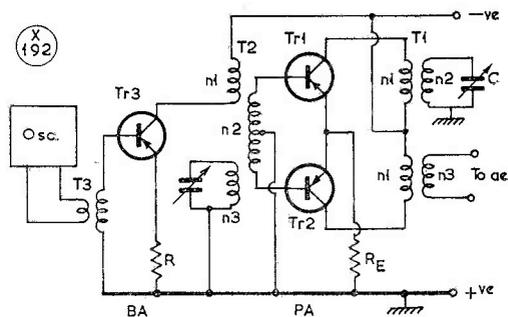
In all circuits of this type it has been found that the best working (loaded) Q for the output transformer is between ten and twenty, to achieve a reasonable compromise between harmonic rejection and power transfer. The unloaded Q will, of course, be much higher; something of the order of 200 is quite reasonable. This factor enables us to make the useful approximation:

$$L = \frac{QR_L}{6.3 f}$$

where the Q considered here is the working Q. By now putting our value of  $R_L$  into the expression, we arrive at a value for L, the inductance of the tuned circuit. It is frequently found, however, that the value of tuning condenser required to bring this inductance to the desired operating frequency is much too high. In this case, a third winding, labelled n2 on T1 in Fig. 5, is used. If C1 is the high value of capacitance required to tune L, and C2 is the largest capacitor available, then:

$$n_2 = n_1 \sqrt{\frac{C_1}{C_2}}$$

Note that L is the inductance of one half of the primary winding and that each half has n1 turns,



Basic circuit referred to in the discussion.

and also that it is advantageous to make the tuning capacitor as large as possible to keep down the tuned circuit voltages. The winding  $n_3$  is used to match the aerial, and it may be either arranged so that the ratio of  $R_L$  to the aerial impedance is the same as the ratio of the squares of  $n_1$  and  $n_3$ , or readers may make any ratio they choose, and match by means of our old friend, the *pi*-network. This is the more efficient method, and up to about 95 per cent efficiency can be achieved.

The author has already made some comments on the safety precautions necessary when dealing with high-power Class-B output stages when discussing audio amplifiers—SHORT WAVE MAGAZINE, October, 1964. These remarks carry over to RF amplifiers, and readers are referred to them.

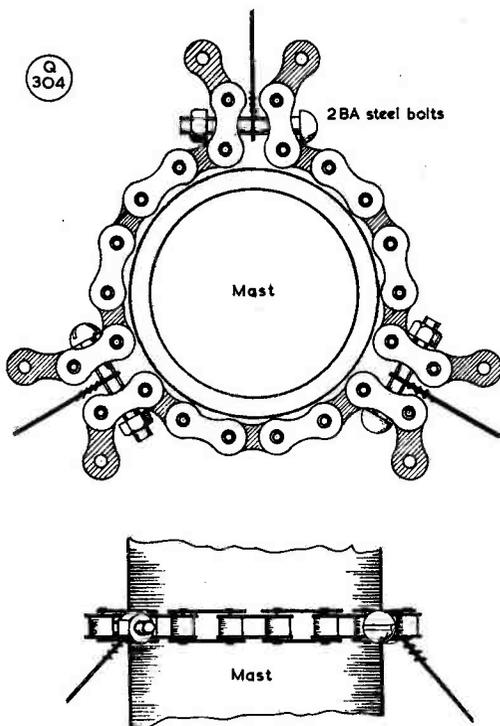
### Buffer Design

We now consider the design of the buffer stage, and commence with T3. Again, the working Q should be between ten and twenty, and we can say that, at high currents, the input impedance of the output stage  $Z_{in}$  is equal to the value of  $r_{bb}$  for the transistors concerned. This information is given in the manufacturers' data, but is usually of the order of 70 ohms. Then the inductance for the output stage base winding is given by:

$$L = \frac{70}{6.3 \times Q \times fH}$$

hence the number of turns for any particular former can be ascertained. The inductance of  $n_3$  and its associated tuning capacitor can be calculated as for the output stage. The only other parameter of T2 left to determine is  $n_1$ , and this may be found as follows: Assume we get a power gain of about ten from the output stage. We know its input impedance, and so can easily calculate the r.m.s. voltage swing at the bases. We also know the maximum peak voltage excursion obtainable at the buffer collector, this being governed by the supply voltage and the voltage left across Tr3 when it is fully conducting. If this value is turned to r.m.s., we then have a simple transformer problem, in which we know the primary and secondary voltages, and also the number of turns on the secondary. Thus we can find  $n_1$ . The transformer is put in at T3 purely to match the output of the oscillator to the buffer input. Of course, if really high power output is envisaged, more stages of buffer amplification will be necessary. In any case, the choice of transformer or resistance-capacity coupling is up to the reader. No further information will be given on the oscillator; so many circuits are available, and if the buffering between it and the output stage is adequate, almost any circuit which satisfies the user's requirements for frequency stability and is prepared to run off the supply voltage provided, should prove satisfactory.

(To be continued)



### SIMPLE MAST CLAMP

The clamping device shown here, suggested by G3KIP (Tunbridge Wells), does away with any need to drill a mast for the attachment of guys. Short lengths of bicycle-chain are placed at the guying points and pulled up tight by means of steel bolts in the manner shown in the sketch, which will be self-explanatory. The guy-wire (or nylon cord) ends can either be attached at the bolts, or the chain can be used as a collar, with the guy-ends looped over it; with a suitable washer resting on the chain-collar, the mast would then be rotatable.

Any old chain will do and can usually be had for the asking at most cycle shops. It can easily be split into the correct lengths for the mast circumference by knocking out the link pins with a centre-punch.

The result is a neat, strong job, only needing a liberal dollop of *Bostik* or some such protective treatment for weather-proofing. This type of chain-clamp can, in fact, be pulled up tighter than would be necessary for most radio masts.

### SLIGHT SLIP

The D-Y-K-T item on p.722 of the February issue—"cheap feed-through insulators"—should have been attributed to G8AEK, and not as stated. (We have hardly got accustomed to these G8--- three-letter calls yet.)

# COMMUNICATION and DX NEWS

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

**I**F your station were to be photographed tomorrow, exactly as it is, and without any tidying-up, which would be visible—a key, a microphone, or both? No, we're not stirring up that dreary old phone-versus-CW business again—just making a polite enquiry.

Some like nattering; some like brass-pounding; some are equally at home with both modes. But there is a clear division, and one wonders whether we are all making the best of this.

Many years ago a *QST* Editorial suggested, fancifully, that if someone would design a receiver on which, at the turn of a switch, one could either hear CW only, or phone only, then that would be the equivalent of doubling the extent of our bands. Both modes could then work happily all over every band.

In this age, the suggestion doesn't appear quite so fanciful as it did thirty years ago. Many CW operators use their receivers in a state of such high selectivity that phone would be quite unintelligible on them—but it can still cause interference. Many phone operators with modern receivers can put in a notch filter which will practically remove *one* interfering CW signal. Further developments may well bring us to the stage where a receiver can be used for one or the other, but not both.

And then we come up against this business of carrier waves! The day will come when the amateur fraternity will have to ask themselves, quite seriously, whether carrier waves can any longer be tolerated. Phone, whether SSB or AM, is expensive in terms of frequency-spread. CW is not only more economical, but the stations can be packed many times closer. But as phone must be used, every opportunity must be taken of reducing the space it requires.

Any competent CW operator can copy a reasonable signal even if there are four or five others within one or two kilocycles. The

only complete disaster, in fact, is an interfering signal accurately tuned to zero-beat. Some people can copy the wanted signal if the unwanted is only a matter of *cycles* away. But consider the case of two phone stations. If both are using faultless SSB, one of them is reduced to monkey-chatter at a very small separation; but who would seriously argue that you can make anything out of two AM signals 500 cycles apart?

Though some of the diehards for AM insist that the "splash boys" cause more interference than another AM station, this is simply *not true* unless their transmitters are badly adjusted or poorly designed. A perfect SSB signal simply consists of the components of an AM signal minus the carrier and one sideband—that being so, how can it fail to cause far less interference?

Incidentally, those who frankly acknowledge the advantages of SSB but stay on AM because they build their own rigs and feel that SSB is beyond their abilities might at least try DSB—the real Cinderella. Is DSB ignored because

of the old fable that it is difficult to receive properly? This is nonsense, because all modern receivers are selective enough to tune in one sideband only, and need never know what the other one is doing.

True, the real SSB enthusiast will probably decry DSB, but it has at least gone part of the way, by removing the carrier. And nothing could be much simpler than a DSB transmitter; no complicated filter circuitry is necessary—just a balanced modulator instead of a BA or PA. You can build a DSB rig for Top Band (an effective one, too) with nothing bigger than a 12AU7 PA, connected as a balanced modulator; and its output will have penetrating powers comparable with 10 watts of AM phone.

Back to the original point . . . every means of reducing mutual QRM *must* be tried out. Nobody is going to hand us more frequencies; new stations are coming on the air in thousands; the present level of QRM is nothing compared to what we shall have in a few years' time.

[over

FIVE-BAND DX TABLE

Station	28 mc	21 mc	14 mc	7 mc	3.5 mc	Countries Worked
G3DO	183	223	312	86	83	318
G2DC	169	279	305	65	110	319
GW3AHN	151	294	322	71	21	330
G6QB	143	183	277	116	56	302
G3NOF	132	190	251	32	39	275
G3IGW	123	128	150	112	64	188
G3IDG	55	66	53	27	17	94
G3MDW	43	41	46	7	6	81
G3KMQ	3	83	201	83	50	225
G3RJB	0	19	105	46	1	112
G3TJD	0	36	44	47	18	94

Therefore it is up to the technical ingenuity of amateurs themselves to make the best of what space they *have* got. Cleaner signals, whether CW or phone; high stability which allows maximum receiver selectivity to be exploited; aerials which put the signal in the right place instead of just splashing it around; and (as has been said before!) less long-windedness on the crowded bands. And don't overlook the advantages of DSB, if only as a transition stage from AM to SSB. It became quite popular for a short period, some years back—whatever happened to it? (And don't worry about what the pundits may say.)

Last plaintive thought! This very afternoon we tuned round the CW end of Twenty and logged *thirty-four* stations calling CQ DX. Many of them would have been quite pleased to work each other, but they were so busy bashing away that they didn't hear each other. If just seventeen of those had been listening instead of screaming their heads off, there would have been less QRM and more QSO's. Think that one over.

#### Around the Bands

For a quick summary of band activity over the last month, a quote from G2DC's letter: He doesn't mention 28 mc this month (and most of those who do confirm that it is in a sorry state). On 21 mc, lack of activity, but the band opens up nicely from about 1030, mostly for Africa and the Near East, and on most days the signals from the West arrive at some time during the afternoon.

14 mc, as usual, still produces all round DX, but the Pacific path has fallen off a little. But VK, ZL, FK8, FU8 and the like (all long-path) make the 0730-0930 period worth while. European QRM is as bad as ever, and with the beam eastwards there's no escape from it.

7 mc, says G2DC, has fallen from grace more than the other bands; real DX is now scarce, and the nice periods for VK (0630-0730) have deteriorated.

3.5 mc has "turned up trumps," with W5 QSO's as early as 2230 and all sorts of DX at 0700-0800.

(Three new countries for Jack were VP1PV, VP7BG and XE1NNN.) And the W6 gang say they are hearing Europe between 0500 and 0730, and ask us to look for them through the screen of East Coast stations.

Top Band is dealt with elsewhere—at some length—but G2DC explains that he hasn't got a super-efficient aerial for the band (44-ft, vertical, base-loaded) and says it's probably just as well that we haven't *all* got them—or the commercials would have a rough time, judging by some of the G and even GM signals.

Rather similar comments from G3NOF, who thinks the best news of the month concerns the much longer openings and good DX on 14 mc. A quick round-the-clock summary from him looks like this: 0730, Africa; 0800, VK, ZL and sometimes the South Pacific (KX6, FK8, KG6 and so on); 1030, VK-ZL over the short path; 1100, South-East Asia, with XW8, 9M2, VK9 sometimes as late as 1330. Early afternoons, West Coast U.S.A. (and, of course, the rest of the States too). 1700, sometimes the Africans, and ZL3UY and VKØDS have also been heard then. 1930, band sometimes dead, but it often opens up again around 2100 (mostly East Coast W's) and later to South America.

On February 9, 14 mc was open to South America (S9 signals) at 0030. Good QSO's during the month—all on 14 mc—were with FK8AU, KG6IB and 6SB, KP6AZ/EA9, KX6DQ and 6DR, TJ1AD, VU2NRA (Andamans), ZD8JC and 8WR, and 4W1G—all on SSB.

Another excellent list of 14 mc DX comes from GW3AHN, who raised VQ8AMR (Rodriguez), OEØAG, HZ3TYQ/8Z4, VK9's, FK8AU, KG6IG, ZL4JF (Campbell) and several other goodies.

While we are with GW3AHN, and in the atmosphere of DX, it's interesting to note that he has deduced the following figures: There are 314 *current* countries workable (by DXCC criterion), and 26 countries have been deleted from the lists. So a grand total of 340 is possible (well, per-

haps *possible* is not quite the word—shall we say "available" if you have been on long enough to have worked all the deleted ones in the past). The time has come, we should say, for these deleted countries to be permanently shelved and forgotten—so many of them are in the category of Gold Coast (ex-ZD4), Singapore (ex-VS1), British Somaliland (ex-VQ6) and so on that they are best relegated to the archives. No newcomer, obviously, can ever make a score comparable with those Old-Timers who were able to work these now non-existent prefixes. (GW3AHN's total score, including many of the deleted ones, comes out at 333!)

#### Top Band Doings

Most of the Top-Band space must be devoted to DX, which is still the main topic of conversation up there. General opinion is that it hasn't been as good as last season, but probably just about as interesting.

G3IGW, with G3JML as co-operator, once more worked the CQ Contest from Lochnaw Castle, signing GM3IGW/A, and seems to have made a wonderful job of it. Last year's score (when they were the second highest in the world) was 269 contacts in 12 countries; this year they wisely went out for the multiplier and scored 266 contacts in 17 countries. But, as the W/VE QSO's (at ten points a time) were far less numerous the overall score is 35,451 as against 39,015.

#### TOP BAND LADDER

(G3S-- and G3T-- stations only)

(Starting Date: January 1st 1965)

Station	Countries	Countries
G3SED	45	14
G3SWH	39	8
G3SJJ	39	7
G3SHY	33	6
G3SVL	25	8
G3SQX	24	6
G3TSS	20	6
G3SVW	6	3

Best DX during the contest was 9M4LP and VP3CZ, and they suggest that the possible winner this year will be VO1FB.

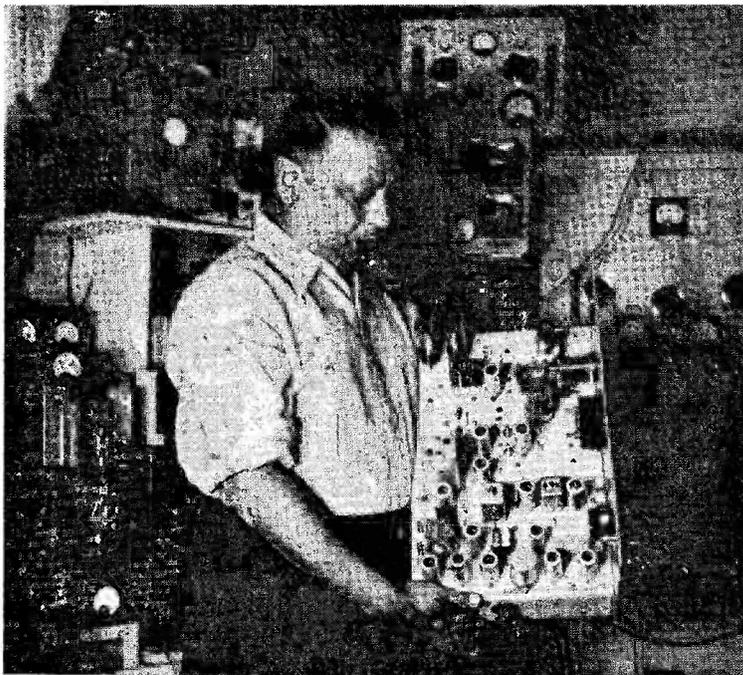
Next comes a letter from VO1FB himself (he is G3LMD, but operating from St. John's, Newfoundland), who first came on Top Band only on November 29, 1964. The station is on high ground (450ft. a.s.l.) overlooking the North Atlantic to the East, and Joe uses 150 watts to a 700ft. wire, running East-West at a height of about 32ft.

The band opens to the U.K. as early as 1910 GMT, which is 1540 local time, but the earliest contact, as yet, has been with G3PU at 1950. Sometimes the skip is one-way, and the G's are heard for 1½ hours before contact can be made. During the contest, 64 Europeans were worked, out of a total of 106 stations.

To quote him at some length, because this is really interesting: The band from VO to G can be open for *more than twelve hours*—1915 to 0845 GMT! No fish-fone, and a much quieter band than in the U.K. And far easier to work into Europe than into the mid-West of U.S.A. So, in two months, VO1FB managed to raise 106 different G's and 42 counties. Would anyone have said this was possible, ten or fifteen years ago?

G3SJJ says he has heard rumours that ON4 and 4X4 stations are getting permission to work the 1.8 mc band; and with G3SVF he is arranging skeds with ZC4BG and 4KW . . . G3SQX (who also operates from Cardiff as GW3SQX) heard OX3FP working W1BHQ, and wonders if this is another phoney . . . G3SED thought conditions during the CQ Contest were fantastic, and in the evening, after it was all over, he heard 9M4LP with 559 signals at 2115 and again at 2145.

GW3PMR suggests that the Counties Ladder ought to be turned into an annual affair—then we would see how many got themselves into the 98/98 bracket! He "had a bash" in the Contest—the first single-operator event he had ever entered—and made 176 contacts, with only one across the Pond.



Mickie Mozoomder, VU2CQ, Shanti-Baug, Chembur, Bombay 71, has built himself a Sideband generator using the Collins mechanical filter with a 7360 as balanced modulator. Bands worked at VU2CQ are 10-15-20m. and, says Mickie, "results so far are wonderful."

### The Tables

Nice to see so many new entries for the tabular stuff this month, including several G3S-- stations for their special Top Band ladder . . . but where are the G3T--'s? Only one has shown up, and there are always dozens of them around the band. G3SED, who had already worked 91 counties, gallantly made a fresh start on January 1st and says he is actually enjoying the job of finding them all over again.

The Five-Band affair has nearly doubled in size, and the Ten-Metre Activity table has attracted a few more. Roll up!—the more the merrier.

### Coming Events

During the coming spring and summer (if any) it is proposed to lay on a few events for which there is a continual demand. First, one or more "MDT" (Magazine Daylight Test) affrays on Top

Band; and secondly, a short series of *Ten-Metre Activity Sundays*. The latter tend to be disappointing unless they come in the period of sporadic-E propagation, so they will have to wait for some time. The former are not truly daylight tests until a little later in the year; but we are aiming at the first MDT during the spring and the first ten-metre affair by June or thereabouts.

### Into the Arena

We quote, strictly without comment, from a letter from G3SIL (London, N.W.7). "Why on earth *should* the 'phone boys' be expected to get off 1880 kc, JA or no JA? There are few enough frequencies on Top Band on which it is possible to hold a decent phone QSO over any distance . . . What are these CW boys trying to prove, anyway? Let them try the far more, difficult task of working DX on phone, then we'll be able to separate the good ops.

from the poor, the good and properly modulated signals from the indescribable.

"Brass-pounding is primitive; cockroaches, woodpeckers and death-watch beetles all communicate in a similar manner. I would be the first to admit its excellence as an emergency means of communication, but we also light candles when the electric light fails.

"CW has shown no advancement (other than the wholesale butchery of the English language) since the spark Tx gave way to the RF carrier. For goodness' sake, it is time things were put in correct perspective. I suppose we should be thankful that the *Magazine* is

not printed in dits and dahs."

Over to you, chaps . . . he's all yours!

**Single-Bander**

G3SDE (Leeds) writes "I am unashamedly a one-band natterer, and if I fail to show up on Top Band at least twice a week, SWL's in the district write to ask what's happened!" And he wants to know whether a list of the various channel allocations throughout the band is available. Not just from the point of view of dodging them, but as an indication of conditions.

It would be a very space-consuming affair, and incomplete at that. Sufficient to say, here, that from Ostend Radio on 1820, there is a coast station at every 7 kc down to Scheveningen on 1890. The European Loran (the one we all know and love!) is between 1920 and 1960; but when the band is wide open, the American Loran can be heard between 1830 and 1870. The various beacons seem to crop up all over the place.

**How to Get Out**

How's your little aerial farm? Does it work, or does it fall down occasionally? And how would you like this little lot? 28 mc: 10-el. beam; 21 mc: 8-el. beam; 14 mc: two 6-el. beams stacked and fed in phase; 7 mc: wide-spaced 3-el. beam; 3.5 mc: full-size 2-el. beam. All at heights between 100 and 140ft. Oh, yes, we nearly forgot . . . and a full-sized ground-plane for Top Band, with 50 radials. No, we're not just day-dreaming; you can see that little lot if you care to visit K2GL in New York.

Thanks, by the way, to K2UYG for this information. He suffers from "cramped conditions" and can only manage beams for 21, 14 and 7 mc, so has to visit K2GL for the real thrills of Top-Band operation. (And then we looked out of the window at the two Pieces of Wire and wondered what to do next.)

**DX Gen. over the Air**

The Memorial Station of the Northern California DX Club signs W6TI, or W6TI/6, and transmits DX news most Sundays at 1600 and 2130 GMT. You will

find him on 14002 kc with a potent signal, and K6VVA on the key. The broadcasts include up-to-the-minute news of DX-peditions and rare stations active on the bands, but will not take place during major contests or times of intense DX activity. W6TI welcomes any news items and also any published DX bulletins. Please QSP to K6VVA, 1634 Creek Drive, San Jose, Calif. 95125. (By the way, a similar service on SSB is projected soon.)

**I.O.T.A.**

The Directory of Islands, which will be the yardstick for the Islands On The Air Award, contains some 500 entries, and orders are now being taken for delivery early in March. Six continental sections list all the main groups, most of the known minor groups, most of the remote islands and all those which at present count for DXCC. The Directory may be obtained from: G. P. Watts, 62 Belmore Road, Norwich, Norfolk NOR.72.T . . . for the U.K., 2s. or four IRC's; Europe, 6 IRC's; U.S.A., 8 IRC's; Pacific Area, 9 IRC's. Full rules for the award will be announced after the delivery of directories has begun.

**"CQ" Worldwide SSB Contest**

This popular event will be held on April 10 (1200) continuing until April 11 (midnight). Single-operator stations may use only 24 hours out of the 36, and the twelve hours' gap can be taken in two periods which must be clearly indicated in the log.

Three categories: Single-Operator, all-band or single-band, and Multi-Operator, all-band. No multi-transmitter operation. All bands, 3.5 to 28 mc. Usual incremental serial numbers.

Contacts between different continents, 3 points; on the same continent, but different countries, 1 point; in the same country, no points but may count for multiplier.

The overall multiplier will be the different number of prefixes worked, each prefix only counting once during the contest for this purpose. Logs are to indicate the first time each prefix is contacted; all times in GMT; scores to be

**TOP BAND COUNTIES LADDER**

Station	Confirmed	Worked
<i>Phone and CW</i>		
G2NJ	98	98
G3NPB	98	98
G3REA	98	98
GM3KLA	98	98
GM3IKD	97	98
G2CUZ	96	98
G3SED	79	91
G3NOW	76	82
G3OJE	58	68
G3SWH	52	72
G3IDG	51	56
G3SVL	47	55
G3SJJ	41	79
G3SHY	41	60
GW3TLW	41	55
G3TMZ	37	43
GW3PMR	34	66
G3RJB	34	37
G3SVW	33	61
G3SXW	32	45
G3TJD	29	37
G3SQX	23	58
<i>Phone only</i>		
G3NPB	88	88
G3REA	56	67
G2NJ	54	54
G3MDW	43	62

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

computed; and a pledge that all rules and regulations have been adhered to must be signed. Logs to be posted before April 30, 1965, to *CQ*, 14 Vanderventer Avenue, Port Washington, New York 11050.

### DX News from Readers

*From G2DC:* ZB2A is having a rebuild and was recently testing; and he is now on Top Band, having made the first ZB2/U.K. contact with GM3DYY . . . The VQ8AMR sortie (from Rodriguez Is.) was a bit of a shambles because he worked SSB on 14119 kc and said "listening 14200-14300"; so W's calling him were spread all over, and it just turned into a game of Russian roulette . . . VR6TC runs a sked with W5OLG (not W5IGJ, as stated before), Mondays, 21060 kc at 1830; but he doesn't hear Europe at present, has little time, and is powered by a diesel for which the fuel has to be humped up the hill in barrels.

VS9SJF went QRT on February 4, having worked 111 countries on his DX-40U . . . FB8WW is active again, most days from 1500-1630 on 14 mc CW . . . VS9OC (Masirah Is.) is on 14 and 7 mc with strong signals but not always T9; he has a pair of 813's and a Racal RA-17.

*From G3NOF:* The Portuguese Guinea prefix will shortly be changed from CR5 to CR3. (This reminds us that Malta has now dropped the time-honoured ZB1 and become 9H1 . . . and that Gambia (ZD3) is bound to be coming up with a new one almost immediately.)

*From GW3AHN:* VQ8AMR operated from February 6 until 0600 on February 10. Pile-ups were terrible (see earlier note) and there is some indignation (chiefly among the AM boys) at the mess they made of the band, with SSB stations spread all over 100 kc and calling him. KP6AZ came up from Rio de Oro signing /EA9, but as he had no permit for the operation, contacts will not count DXCC-wise.

*From 9J2DT (Box 72, Kasama, Zambia):* Very interested in 28 mc, and worked 94 countries on that band last year—but not at

the expense of all the other bands, right up to 1.8 mc. All the equipment is more than fifteen years old, and has been moved all over the place during that time. Aerials, rhombic and two Vees, all about 412ft. per leg, suspended from a 45ft. mast on the corrugated asbestos roof of the house . . . Dave says he always expects to get home one day and find its base in the lounge! Nearest "local" is 300 miles away, so QSO's of any kind are really appreciated.

### General Chat

G3EHL (Manchester) writes "just to say that one station up North uses ten metres. Can work G6BY and G2CDI consistently on ground wave . . . it's a pity more stations won't come on the band." G3EHL uses 100 watts and a 3-el. beam.

G3SZC (Canterbury) says that

he was VS9MA 'way back in 1951 and still occasionally gets enquiries about QSL cards. His QTH was R.A.F. Ryan, in the Quaiti State of Shirk and Mukalla, whence, he thinks, there has never been any other amateur activity.

G3KMQ (Shaftesbury) put up a long wire for Top Band and found that it worked amazingly well on 7 mc, where he picked up 17 new ones in a very short time. He reaps one of the benefits of shift work, since his operating hours on 7 mc were 0001-0500 GMT. DX included VU2AJ and 2LE (0230), VP2's (0400), 9J2WR (0100), ZS5UR (0430), FG7XC, CP5EZ and many other good ones. That's the way to enjoy 7 mc—pick a time when 90 per cent of Europeans are in bed!

G3SQX, apologising for his low count on 28 mc, writes "I would agree that the band is useful, but it's not worth looking round for hours on Ten when I know I can



Neat station of W7MEV, Keith Beck, 3455 Woodland Park Road, Grants Pass, Oregon, who can be heard in the U.K. using various transmitting modes—and, obviously, one of his interests is RTTY.

# Reporting the HF Bands

get a contact on Top Band almost immediately."

## Club Contest

We are asked by Grafton Radio Society to mention that their annual Top-Band Contest will be held on April 3 (CW) and April 10 (Phone) between the hours of 2130 and midnight GMT. The G2AAN Cup goes to the leading member of the club, but there is also an Open Section for all U.K. stations. Exchange RST, or RS and usual serial number. Final score, the sum of the points in both CW and Phone sections—but certificates for winners of each section. Logs to G2CJN (*QTHR*) not later than April 20.

## Sunspot Progress

From various sources, including W3ASK's "Cycle 19—The Declining Years" we have tried to build up a coherent account of the present state of affairs. The important points seem to be these: In addition to the 11-year cycle, the existence of a much longer cycle (roughly 169 years) is now established. Over this kind of period, the 11-year cycle varies between an average maximum (smoothed sunspot number) of 140 and an average minimum of 10.

The highest maximum ever recorded was 201, in the currently declining cycle (March 1958). The lowest minimum ever recorded was 3.3, in April 1954, and the minimum through which we are passing now is expected to come out at some figure between 5 and 9. It is possible that the maximum of the next cycle will not exceed 75 . . . and if this does happen, it is unlikely that this figure will be exceeded during the 20th century! This next cycle is the crucial one . . . its maximum could be even higher than the record 201 of the last (though this is now considered highly unlikely) or it could be a phenomenally low "high" which could set the pattern for a series

of decreasing maxima.

Should the latter prove to be the true position, then the accent is going to be on the LF bands for many, many years, with no likelihood of MUF's in the region of 28 mc until further notice. But we shall not be really well informed on this matter until the current (20th) cycle has developed. Perhaps in two years from now we shall know whether we are heading for a new record maximum, or an unusually low one.

## DX Gossip

K2LAF is visiting 15 African countries—he took off on February 15 for roughly six weeks, and will operate wherever he can get permission. 14005 CW and 14275 kc SSB.

Raju of VU2NR is still operating VU2NRA from the Andaman Is., mostly SSB on 14130 kc . . . PY7BALØ is said to be on 7012 kc in the small hours (Fernando de Noronha) . . . AC5H (none other than "our Gus") has been active on his old frequency of 14035 kc.

A new one from Chatham Island—ZL3AWJ/3—is reported to be around . . . CR4AJ on SSB and CR4BB on CW are keeping the Cape Verde Islands on the map . . . ZD3C is a new licensee in Gambia; he started on February 4 on 14280 kc SSB.

Comoro Is.—still pretty elusive—represented by FH8CD on 14 and 21 mc SSB—Cayman Is. are said to be changing their prefix from VP5 to ZF1, as from April 1st.

A group of EA's are reported to be interested in reactivating Rio de Oro and Ifni (both EA9) . . . A less probable rumour (or so it seems) is that Indonesian amateurs will shortly be licensed.

9M4LX has been very active from the Maldives, signing VS9MG; by now he may be on from Sabah, as 9M6LX . . . Laos—XW8AX and 8AZ both on 14 mc SSB . . . Lebanon amateurs

may be re-licensed by now, presumably still with OD5 calls.

Hammarlund DX-pedition-of-the-month announce that Bob Lane, WA6ZIQ, who will be in Europe for the next two years, will operate from various "interesting places," to be announced as they materialise . . . British Honduras, always elusive, is now represented by VP1HB (14 mc SSB), VP1AB (7 mc AM) and for a short time by VP1GFQ (WØGFQ).

George Barrett, so well known as ZC4IP and then as 5B4IP, is bound for St. Helena and hopes to come up as ZD7IP in due course; he will be a busy man . . . 5V8AB is a new prefix for Togo, but seems genuine (14105 kc SSB).

## Late Flashes

From W1BB: January 10 seems to have been the day for Top Band DX—better than any of the scheduled test days. Stew himself worked 25 U.K. stations that morning, and five other Europeans! On January 31, G3PU was hearing W1BB at 0920 (449), 0922 (339) and 0930 (329). Seeing that sunrise was at 0748, this was pretty remarkable.

During the 160-metre Contest, daylight QSO's of 800-1000 miles were being made within the U.S.A. . . . GM2BUD heard W6RW . . . VK5KO heard not a trace of a single 1.8 mc signal.

GM3LXI leaving for ZD7-land, April 1 . . . ZD8CI is a new one on 7025 kc CW and 14300 kc SSB . . . 4W1A is on 14110 and 14118 kc SSB with a KWM-2 . . . YA3TNC also on 14 mc SSB, but

## TEN-METRE ACTIVITY TABLE

(Starting Date: June 1st 1964)

Station	U.K. Counties Worked	Countries Worked
9J2DT	18	78
G3OAD	17	27
G3HCU	13	19
G3EHL	8	9
G3IDG	4	12
G2DC	2	14
G3SQX	2	2

reported too on 21450 and 28500 kc, same mode.

The CEØAG party is now home-bound, after a highly successful operation from those parts.

#### Sign-Off

That's all for another month, with thanks and acknowledgments

to the *WGDXC Bulletins*, to W1BB for his Top Band news, and to all our correspondents, including, we note, many new ones. With activity building up on all bands, and a good season ahead of us, we hope for even more next time.

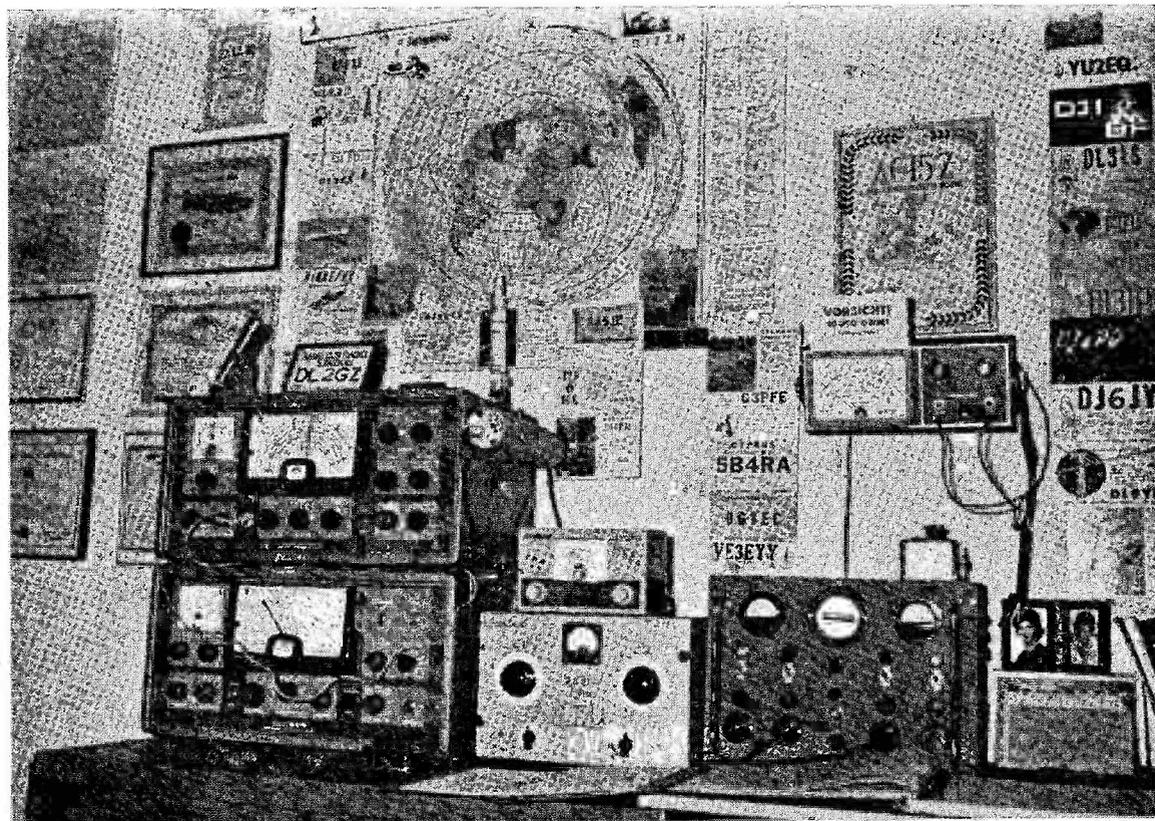
Deadline for the April issue is

**first post on Monday, March 15.** Don't miss this date, and address everything, as always, to "Communication and DX News," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. Don't forget the Tables—there's room for plenty more in all of them. Good Hunting, 73 and—BCNU.

### REAL DX ON QRP

It will be remembered that G3AM had an article in the August 1964 issue of *SHORT WAVE MAGAZINE* describing his one-watt TTx. Up to the end of January, he had made about 150 contacts, on 80m. CW, in many European countries, and had been heard by W1ZY and W8NBK. On February 3, G3AM

worked VE1ZZ for what is undoubtedly the first G/VE QSO on a low-power transistor Tx, his input at the time being 700 milliwatts. On February 18, they had another contact, G3AM getting 339! Work is now proceeding on a transistor-transmitter for CW operation on the 20 and 40 metre bands.



F/Sgt. W. J. Wallace (G3KGJ), is a radio instructor in the R.A.F. and is at present signing DL2GZ from Flat 8, Bachstrasse 1, Wickrath, West Germany. Main items of equipment are a Gelo 4/214G receiver and 222-TR transmitter, running 65 watts, his aerials being indoor dipoles, used in various ways on the HF bands. As well as having been hon. secretary and licensee for a number of R.A.F. station Amateur Radio clubs in the U.K., DL2GZ is a member of the local München-Gladbach Club, signing DJØRY, and is in charge of DL2ZN, the Club station maintained by the Hq., R.A.F. Germany, radio amateur group. On his return to the U.K. G3KGJ will be getting himself organised on to SSB.

## SOME NOTES ON RECEIVER DESIGN

### WITH REFERENCE TO THE MIXER STAGE

S. E. JANES (G2FWA)

**F**URTHER to the article, by the present writer, in the February, 1963, issue of *SHORT WAVE MAGAZINE*, on the Mixer Stage, in Rx design, some additional notes may help those who are contemplating the construction of a new receiver or updating old equipment such as the HRO.

Referring to the article already mentioned, some readers may wonder why the oscillator cathode tap needs such careful adjustment when variations of HT and coupling condenser values would in effect achieve the same result. Practical experience has shown that a stabilised 105 volts on the 6C4 oscillator and a 10  $\mu\mu\text{F}$  coupling capacity are about optimum values for the range of amateur bands from 1.8 to 30 mc. The cathode tap remains the only other variable and it should be remembered that the ratio of turns above and below this tap will vary with each coil. If the interest is in amateur bands only then it is a simple matter to adjust the bandspread ranges covering only a few hundred kc. On general coverage, HRO coils have a frequency range of 1:2 and a compromise is required because the mixer injection grid current will probably change as one goes through the tuning scale.

The foregoing has a direct relationship to the availability of modern mixer valves. In the original HRO, for example, considerable oscillator voltage was required for pentode screen-grid injection. (With consequent local TVI from such a powerful oscillator!)

Modern pentagrid mixers require much less injection on the oscillator grid, thus enabling use of less power in the oscillator stage, reduced coupling to the mixer, and with the RF pick-up from the oscillator made from a point of adequate, but not excessive, voltage. With the values given in the preceding paragraph it is fortunate that the grid end of the oscillator coil provides this preferred degree of coupling. There is, in addition, a "consolation prize" with this method, as explained in the following paragraph. (At this point it is of interest to note that the 6BA7, requiring only 0.35 mA of oscillator grid current, is now available on the surplus market. This pentagrid is an improvement on the 6BE6.)

The author considers it to be bad practice to extract any oscillator output from an untuned anode; in this condition it is inherently unselective and therefore rich in harmonics. (This may be more of a problem, too, with tetrode or pentode oscillators compared with a triode.) Hence, it is desirable that any coupling should be from a *tuned* circuit, in which harmonics are at a minimum. This important factor appears to be overlooked in many expensive receivers and in

popular, published designs.

Any method of BFO or CIO injection is subject to the same considerations. Receiver noise rises on switching in the BFO, so it is of prime importance not to allow this to be more than necessary. Furthermore, incorrect operation of any mixer stage can cause inexplicable beats and whistles—particularly if operation of the oscillator is unchecked, so that it may be working in a squegging condition through being over-coupled far beyond the point of initial oscillation. The output of any mixer valve, in addition to the sum and difference and the fundamental frequencies of the two injected signals, contains all harmonics of these two input signals and all combinations of the sum and difference frequencies of all the harmonics! Realisation of this fact, in terms of frequencies, is quite staggering and should make the receiver designer extra careful not to risk mixing any unnecessary frequencies.

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### THE "CALL BOOK" AND THE "NEW QTH" PAGE

As agents for the *Radio Amateur Call Book* (published from Chicago, U.S.A.) our "New QTH" page is available for the publication of all new U.K. callsign/addresses and changes of address. This facility is not confined to direct subscribers, but is open to all radio amateurs in the United Kingdom and Eire, even if they are not regular readers. To get your QTH into the *Call Book*—the only comprehensive directory to the amateur stations of the world, and appearing quarterly—send your callsign/address, or change, on a separate slip headed "New QTH," in to us as soon as you know it, as this ensures the earliest possible publication in the *Call Book*. As most readers will know, the *Call Book* is now so large (listing the callsign, name and address of every known licensed amateur in the world) that it is divided into two parts—"U.S. Only," and the rest of the world, called "DX Listings." See p.6 of this issue for details.

### NOTICE FOR RTTY OPERATORS

Just a reminder for those who would be interested in the B.A.R.T.G.'s Spring Contest for radio T/P operators that the rules and scoring system were set out on pp.725-726 of the February issue of *SHORT WAVE MAGAZINE*. The event takes place over the weekend of March 20-22, with all bands 10-80m. open for Contest purposes.

### WATCH IT!

Next issue of practically every periodical of Amateur Radio interest will be dated April—this will give a certain proportion of them the excuse to include a comic pseudo-technical article based on the commonly-held superstition that April 1st is *All Fools' Day*, when anything goes. It is not the intention of *SHORT WAVE MAGAZINE* to compose one of these fatuous offerings—though there *are* those (unfriendly critics) who hold that *every* issue of this *MAGAZINE* comes into the comic category! Ah, well, we can only go on trying to do better.

## Miscellany

At a recent club gathering, members were asked "What are the most significant changes that have taken place in Amateur Radio during the post-war years?" After a debate which took up most of the evening, the top of the list was shared by two: First, the tremendous decrease in size (and increase in neatness) of equipment; secondly, the dying-out and possibly eventual death of the old-fashioned two-way Simplex QSO. Most of us can doubtless think up changes that we feel are more significant than these—but that's what the members thought, and these two things had more impact on them than any others.

Regarding size of equipment—and to embark here on a small slice of sociology. From the rack-and-panel to the large and very heavy table-topper was the first step. But what a table it needed to accommodate, say, an AR88 and a Panda PR-120V! Then the table-toppers started shrinking, and the last refinement of this tendency has been the popular transceiver, or the transmitter-receiver combination with units as small as the Drake 2B, or the modern Heathkit range, and the fashionable rounded-edge cabinet. This (and here's your sociology) has induced many XYL's to allow the OM to come into the house at last. A transceiver in a corner of the lounge is an OK symbol—"of course, you know, we can talk to anywhere in the world with that"—but a fearsome collection of junk is strictly for the garden shed.

As for the two-way QSO—is there *room* for this any longer in our overcrowded bands? The CW DX-hunter can still indulge in it, because his contacts are short. But the chap who just wants to chat, whether on phone or CW, has to put up with a constant background of breakers and eventually a contact that began with two is likely to include any number up to seven or eight. (A cynic says "That's why I prefer CW—it's easier to pretend you don't hear them . . . or at least to ignore them without seeming so rude as you do on phone.")

"Transistors are growing into configurations more adaptable to radio amateur construction projects," according to *Electronic News* (U.S.A.). They already compete with valves—both in price and performance—in the transceivers used on commercial airlines, and by the end of this year they will be found in commercial FM transceivers giving *outputs* of 35 watts at 17 mc. And there is one type (Clevite 3TE240) which will give 8 watts of RF at 400 mc. Several companies offer transistors which permit direct operation from 117-volt mains—even with

### INFORMATION—OPINIONS— IRRELEVANCES

sufficient margin to allow for the "spikes" that plague such lines. A complete solid-state transmitter with no transformer or smoothing choke is not far off.

("Collector and Emitter," Oklahoma)

A pirate known as "Sam, of Modbury," who had been using the call of G3LPV, recently went the way of all (or most!) pirates, by handing over the equipment plus £10 fine and five guineas costs. In a "broadcast" (*vide* local press) he arranged to pick up a piece of radio equipment, and his car was seen outside the address mentioned. When the GPO engineer went to his home "the broadcasting stopped as though something had been switched off." Inside, "certain valves were still warm." Poor Sam, like so many others of his ilk, simply wasn't clever enough.

"I sleep out here as well; only go into the house when I'm hungry. Don't know what I'd do without Amateur Radio."

(Heard at 0400 GMT, 160-metre band, G3S--)

"A mechanical filter . . . is a component whereby IF signals are converted into mechanical vibrations by a magnetostrictive transducer, and then passed through a series of resonant metal discs, and reconverted into electrical impulses by another magnetostrictive transducer. Examine the resultant response with the aid of a wobulator, and it will be apparent that the device has a dual-purpose function: One, to filter out a sideband, and the other, as a source of vibro-massage!"

(N.A.R.C. "Challenge," Norwich)

Mullard Ltd. recently donated the sum of £10,000 in response to the University of Lancaster's appeal for funds to supplement their Government grants. Those who search for reasons behind everything may be interested in Mullard's own words: "This company is very much aware of its dependence on the output of trained scientists and engineers, and has previously made considerable capital grants to Universities as well as establishing a number of fellowships." Well, at least *some* firms still have an enlightened attitude, even if cynics might say "It's only good business" (but what's wrong with that—business is what we live by!).

"This popular use of the word *Gunk* to describe Government junk—it is also the proprietary name of a cleansing agent which dissolves away all signs of heavy oil consumption from worn engines, and is

thus a hallowed commodity in the motor trade. Consider the feelings of all respectable manufacturers of ex-Govt. equipment!" (Letter from G3NWT)

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The published results of last May's Radio Amateurs' Examination show that in both the Home and the Overseas categories there was a higher percentage of failures than in the previous year. At home, 33.5 per cent failed, as compared with 30 per cent; overseas, 39 per cent failed, compared with 23 per cent. With the entries already in for the May, 1965, examination, one naturally wonders whether this trend will continue, and, if so, what is the reason for it.

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Readers who own 1961 Cadillacs (a countless number, no doubt!) will be interested to learn that if they tune up their mobiles on 28 mc, they will

probably find both amber direction-indicators glowing at almost full brilliance. There's a built-in resonant circuit somewhere. ("CQ," January 1965)

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One XYL's opinion of our wonderful pastime: "Not so much a Hobby—More a Way of Strife!" Oh, all right! (Cannock Chase "Newsletter")

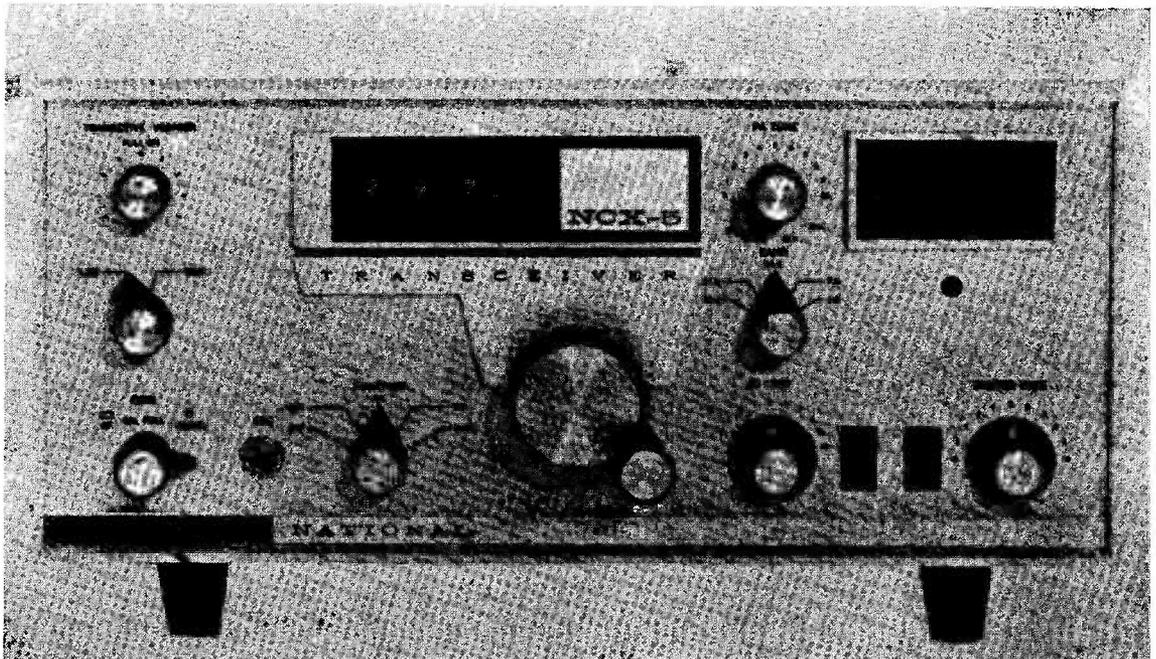
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An interesting news item in connection with the U.S.A. 5c. stamp commemorating Amateur Radio: Though it was on sale all over the U.S.A. on December 16, 1964, it appeared in the Post Office at Anchorage, Alaska, on the previous day. "First Day Covers" from Alaska are dated December 15. It seems that Anchorage was chosen as the first-day city to honour its amateurs for their emergency communications work carried out after the earthquakes on Good Friday, 1964.

Up at Skegness, the local group will be holding a large Junk Sale, starting 7 p.m. on Friday, April 9, at the Bull Hotel, Spilsby, near Skegness. Details from G2ABK or G3OTD, QTHR. And from what we know of these events from previous years, it is well worth making a date.

#### ARTHUR ROBERTS, G4OF

We very much regret to have to record the passing of G4OF (Gainsborough, Lincs.) who had been licensed since pre-war days and was active on 160-80-2m. He was particularly keen on VHF and built most of his own gear.



The new National NCX-5 is designed as "total station equipment" for the 10-80m. amateur bands and is essentially a transceiver with a 10 kc tuning swing on the Rx side by means of a separate vernier control. Exceptional frequency stability is claimed, with negligible warm-up drift, and the dial calibration is directly to 100 cycles on each band. USB/LSB are selectable, power input is 200w. on Sideband or CW, and the transmit/receive selectivity is by an 8-pole crystal lattice filter, said to be the most advanced ever offered in amateur-band equipment. An interesting point about the VFO is that it is made solid state, unaffected by temperature or voltage input variations. The set incorporates in all 20 valves and 15 semi-conductors, with parallel 6GJ5's in the PA. The U.K. agents for National are Ad. Auriema, Ltd., 125 Gunnersbury Lane, London, W.3.

## MOBILE RALLY ARRANGEMENTS

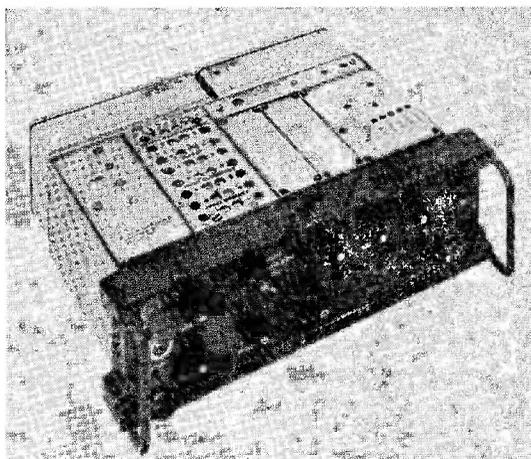
With more than 1,750 U.K. amateurs licensed mobile—representing about 15 per cent of the total of G transmitting permits in issue—and some 15 major rally events now scheduled, it is clear that this year's Mobile Rally season will be the busiest and most interesting yet.

The well established events—such as at Trentham, Wethersfield, Derby and Woburn Abbey—have set a pattern of their own. But it is in every way desirable that organisers try different schemes (or none at all) to make their events attractive. While there is plenty of scope for the highly-organised affair—with every category of visitor taken care of, and all contingencies guarded against—there is much to be said just for getting people together and letting things take their course.

Though it is probable that for some Rallies a big effort will be made to attract commercial support in the way of trade stands, it is questionable whether a half-day exhibition is worth it in terms of work, staffing and travelling for business done. On the other hand, where the firm concerned is operating in the Amateur Radio field, has a range of products of direct interest to radio amateurs (whether mobile or otherwise) and staff members who are themselves licensed and look upon the whole affair as a day out at the firm's expense, it is perhaps worth doing.

Dates on the slate are now as follows :

- April 4 :** RSGB National Rally, Texas Instruments Ltd., Bedford (*as last year*).
- April 11 :** Midland Amateur Societies annual event at Trentham Gardens, Stoke-on-Trent, Staffs.
- May 9 :** Thanet Mobile Rally, Pegwell Bay, Ramsgate, Kent (*as last year*).
- May 23 :** A.R.M.S. Rally, R.A.F. (U.S.A.F.) Station, Croughton, Northants.
- May 30 :** Royal Naval A.R.S., Petersfield, Hants.
- May 30 :** Northern Ireland Mobile Rally, Butts Corner Airfield, Belfast.
- June 6 :** RSGB Rally, R.A.F. (U.S.A.F.) Station, Wethersfield, Essex.
- June 20 :** Hunstanton Rally, Norfolk (*as last year*).
- July 11 :** Tenth Anniversary Mobile Rally, Oxford, at the College of Technology.
- July 11 :** South Shields & District R.S., at Shields.
- July 25 :** Cornish A.R.C. Rally, Newquay, Cornwall (*as last year*).
- August 15 :** Derby & District A.R.S., at Derby (*as last year*).
- August 30 :** (*Bank Holiday*), Peterborough Rally.
- September 12 :** RSGB Rally, Woburn Abbey, Beds. (*as last year*).
- September 26 :** Harlow A.R.S., at Magdalen Laver, Essex.



The new Redifon GR.345 Tx/Rx is unique in a number of respects and has many interesting features. It is a trans-portable AM/CW/SSB rig covering 2-12 mc and allowing any frequency in that range to be selected in 1 kc steps. On the Tx side the RF output is 15w. p.e.p. on Sideband, nearly 4w. on AM phone and 15w. on MCW (keyed-tone SSB). As a complete station the basic weight is only 22 lbs., with the PSU run from a 12v. nickel-cadmium battery. The GR.345 can be used either man-portable or vehicle mounted and, in addition to the military application, it has considerable potential for civilian work.

*"Short Wave Magazine" covers the whole field of Amateur Radio, has been established for more than 25 years, is independent and unsubsidised, and circulates in 75 countries outside the U.K.*

# VHF BANDS

A. J. DEVON

THE general impression is that conditions have been poor and activity low since last we met—but in fact they were quite good during the early part of the period, and there have been some flashes of brilliance all through the month. However, it is only too true that there has been nothing in the way of one of those long, sustained openings that really get things moving on the VHF bands.

A contributory factor to the low activity during what could perhaps have been one or two interesting sessions was probably the absence of the beacon — GB3VHF has been off the air with an aerial fault, so it is quite likely that many people, at GDX distances, tuned the two-metre band, could not find the beacon signal, and so concluded that conditions were right off. Whether or not this was so is almost impossible to say with certainty—but that is the impression of your A.J.D.

Reverting to last month's piece about *Oscar III*, G2AOX has

circulated a note to the effect that there has been another postponement, until about mid-March. One can only hope that all these delays—which must be extremely frustrating to the group of hard-working W6's actually responsible for the project—will in the end make success more certain.

On the subject of working *Oscar III*, an interesting comment from G2HCG, who suggests that the best possible aerial system to use—and he should know—will be crossed dipoles in conjunction with a crossed Yagi beam having switchable polarisation. The crossed-dipole array confers the tremendous advantage of receiving through the whole hemisphere while the polarisation varies from horizontal at the horizon to circular at the zenith. G2HCG thinks that it should be possible to work *Oscar III* with crossed dipoles only, using the beam to back up for gain during the important last few minutes when the satellite is at maximum range and dropping below the horizon. We quote Bill *verbatim* because what he says will probably encourage people to try even if they are unable to install a relatively complicated beam system, involving rapid rotation and variation in elevation for accurate following.

## London VHF Convention

This always well-attended event, the eleventh in the series, will this year be held on Saturday, April 10, at the Kingsley Hotel, Bloomsbury Way, London, W.C.1. The convention opens at 11.0 a.m. with a trade exhibition, and for the afternoon a lecture programme is arranged, on a variety of topics of general VHF interest. If you can possibly be there, you ought to make it, even if you are intending to be at the Trentham Mobile Rally the next day (who fixed these dates!), because there will be VHF types present from all parts. The convention ends with a dinner (an event in itself) and the total cost is 30s., or 4s. 6d. if you are not staying for the evening. Bookings with F. E. Green, G3GMY, 48 Borough Way, Potters Bar, Middlesex.

## Notes and News

We are informed by David Evans, G3OUF, that "he and the group," eight ops. in all, will be making a three-week stay in Alderney this summer, and intend to work all four VHF bands, 23 cm. to 4m. We are assured that the gear they are taking will be better than last year, and that a determined effort will be made on the 23/70 cm. bands, in particular. Dates are August 17 to September 7, the callsign will be GB2GC, skeds are invited (especially with Continental

## TWO METRES

COUNTIES WORKED SINCE  
SEPTEMBER 1, 1964

Starting Figure, 14

From Home QTH only

Worked	Station
52	G3EDD, G3SAR
45	G3HRH
38	G3CO
37	G3AHB
36	G3FNM
35	G2AXI
34	G3GWL, G3TNO
32	G2BJY, G3LAS, G3PSL
30	G3KWH
29	G2CDX, G3PTM, G4LU
28	G3JHM/A
27	G3FIJ, G3TLB
26	G5UM
21	G3TKQ
20	G3KQF
19	G3IOE, G3THC, G8VN
17	G3CKQ
14	G5FK, G13SLI, GW3CBY

This annual Counties Worked Table will run till August 31, 1965. 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 frequent intervals. Operators new to VHF are particularly invited to join Annual Counties.

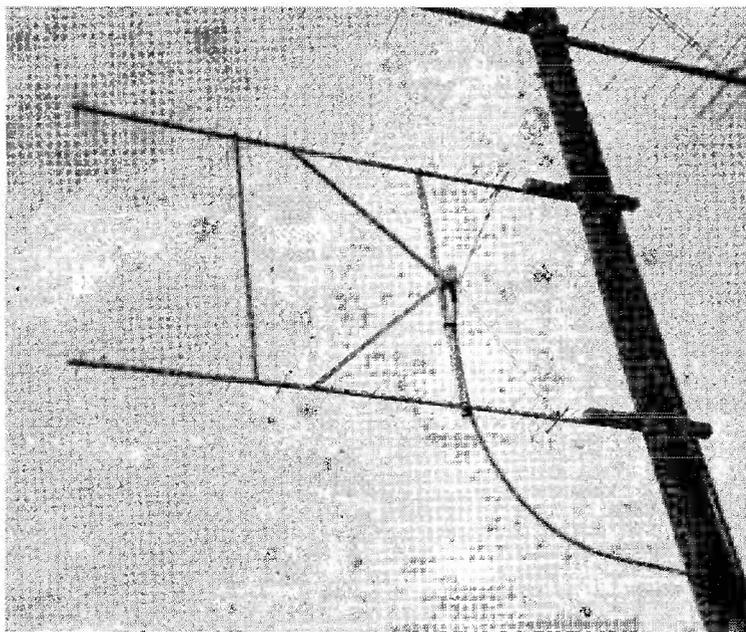
stations) and the sked QTH is: GB2GC, c/o G3SHZ, 19 Dorset Road, Harrow, Middlesex.

A paper circulated by the VHF Committee of the RSGB suggests, for a trial period of 6-12 months, a plan for the 4-metre band. Taking the band as 70.1-70.7 mc, the proposals are: 70.1-70.275 mc, free-for-all, with a calling channel for *southern* mobiles at 70.26 mc. The CW area is 70.275-70.35 mc; emergency working, 70.35-70.4; from 70.4 to 70.6 for AM phone, with a *northern* mobile calling frequency at 70.45 mc; 70.6-70.62, exclusive RTTY; and 70.62-70.7 mc reserved for SSB. This seems to be an eminently fair and reasonable division of the 600 kc of the band—quite a nice slice of frequency area, when you come to think of it.

Talking of band-planning, there is nowadays a narrow frequency-area at 145 mc which is being used almost exclusively by the two-metre Sideband boys—and very good signals many of them are putting out, too, with remarkably accurate netting. Some of the stations recently heard using that mode on this channel include G3EIX, G3KMP, G3KMT, G3LBA, G3LFF, G4MN and G5BJ, running mainly transverters into pretty potent linears.

With two metres fairly well open during the first week of February, PAØFB was hearing and working EI/GI; G2AUD worked GM3FYB, and G3KEQ also raised GM; another to make it with GM3FYB was G3LBA (who has a most penetrating Sideband signal and is a good operator, on CW and phone).

Having been listening round during most of this session, with the two-metre band in an open condition, your A.J.D. had the question of good operating procedure very much in mind, both phone and CW. An example of really *bad* CW operating was when a station, answering a CQ, called and called and called—and then signed *once*. Now, we all know that when listening to any GDx station under QSB conditions (which were prevailing at the time) it is a fair bet that the calling station will always fall into the



View of the 15/15 long-Yagi for 23 cm, used by F8MX/A from St. Valery, as seen by G3HRH when he was over there on holiday. It was with this beam that F8MX/A made his 1296 mc contacts with G3MPS (Bridgwater, Som.) and G3OBD/P (Swanage) last year, as reported in the August 1964 issue.

noise just as he signs. It took these two stations about three overs to establish contact—it could have been done the first time if the calling station had used the correct “three by three” procedure, repeated perhaps four or five times. Then there is the always-tiresome phenomenon of gabbled callsigns, or the ineffective enunciation of callsigns—only the experienced operator realises that, over the air, S/F, also V/D/B, to say nothing of P/T or J/K, can sound the same unless enunciated with absolute clarity, preferably with a mnemonic—who can mistake “GeeTwoJayEff John Fox.” Then there is the chap who enunciates with absolute clarity, but fails to mention (a) Where he is, or (b) Which way his beam is headed while he is calling.

On the other hand, we have an operator like G3LFF, making it clear who he is, where he is, which way his beam is headed, what he is listening for, and in what mode—CW/AM/SSB. He will get a contact straight away, while others are floundering about trying to

copy unintelligible callsigns down in the noise.

It is so easy, so much slicker and more efficient, to do it the right way. All you have to do is to assume that the chap at the other end is having the greatest difficulty in establishing who you are and where you are—it could be this that decides him whether or not to answer your call.

Well, enough about that—A.J.D. could go on for a long time on this theme, but there are a lot of reports on the hook. First of all, a welcome to new VHF men G3TOT (Knebworth), into the 4m. All-Time with 9C, and G3TLB (Tunbridge Wells), who is in the Two-Metre Annual at 27C; he runs a 25w. PA with a 4/4 at 42ft., at a QTH 350ft. a.s.l., and his Rx is a G. & D. converter into an HE-30 tuning 28-30 mc on the IF. G3TLB started on two metres in September last, and after some trouble with TVI “and several visits by the Post Office,” is now settled on the band; apparently, the TVI was due to an SCR-522, used straight but now discarded.

Yet another new one is G8AGL (Solihull), who has an 8/8 outside and a 70 cm. converter, with a two-metre exciter in hand, to drive a tripler-amplifier on 430 mc.

Your A.J.D. would very much like to have a lot more news about what the G8's are doing, and how

they are using their licences. It had been thought that a separate table for them might be of practical interest, but since they are confined to phone-only on 70 centimetres and above, it would obviously be more realistic to hold any such idea in abeyance.

On p.47 you will find the first entries for the new Three-Band VHF Annual—and let it be said that there was nobody more surprised than Old Man Editor (*all right, let it pass—Ed.*) when sufficient claims came in, at such short notice, to justify the table being started. Your A.J.D. thought that it might be a month or two before we could show it, with perhaps a half-dozen of entries. The considerable mail for this issue makes it evident that the Three-Band Annual will be well supported—and at least ten correspondents (not with scores included) remark that they wish they had kept up activity on the couple or three bands in which they are interested in order to stake a claim. Never mind—there is still plenty of time. Even if you work one band only, you can still show a creditable score—but obviously those who use all three

must keep in the lead positions.

Having worked out the Table shown on p.47, it immediately became clear to your A.J.D. that it is susceptible of infinite variation. One month, we could show (as this time), positions in terms of total points scored; later, the order could be arranged in terms of, let's say, countries accounted for, with a heavy loading in favour of those who have worked their countries on the more difficult bands—which, in this context, means 70 cm. and 70 mc. Then, there is the possibility of giving, say, a 2/1/3 multiplier for counties worked on 4m., 2m. and 70 cm., in that order, to see who comes out top in terms of GDX difficulty. Then again, if as the Table develops it looks as if the two-metre boys are doing the heavy scoring, we could load against them with a one-third penalty (or something like that).

For the moment, however, in the interests of all concerned and because the Three-Band VHF Annual has only just started and exactly meets the proposition made here last time, it is not intended to apply any of these possible variations without at

## FOUR METRES

### ALL-TIME COUNTIES WORKED LIST

Starting Figure, 8

From Home QTH Only

Worked	Station
50	EI2W, G3IUD, G3OHH (217)
43	G3EHY
38	G3SKR (221)
37	G2OI, G3PJK
35	G3JHM/A (210), G3MOT (261)
33	G3OWA (213), G5JU
32	G3NUE, G5FK
30	G2BJY, GM3EGW
29	G3PMJ
26	G3LQR, G3LZN
25	G3AYT
23	G3BOC
22	G2AXI
21	G1BHXV
20	G3HWR
19	G3BNL
17	G5CP
16	G3BJR, G3FDW, G3OJE, G5UM
14	G3OKJ
13	G3FIJ
12	G5DS
11	G3LHA, G3SNA
10	G2BDX, G3ICO, GC3OBM
9	G3EKP, G3TOT
8	G3NNO, G3PRQ, G8VN

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. Totals in excess of 100 different stations worked can be claimed and will be shown in brackets after the call.



DX on two metres — EI2A (right) with EI2W. Enthused largely by Harry, EI2A has become very active on VHF and does well from a location further north-west than EI2W's station, shown on p.745, February. Picture by G3HRH

least one month's notice.

What it comes to is that, in the meantime, you should work all the VHF bands you can, and keep a careful note of your scoring—by bands, counties and countries. And even if your call sign is near the bottom of the list—never mind, it's all good fun, and remember that there are many U.K. amateurs not able to put a good signal out on one VHF band, let alone three. (*This is the sort of comment that gets us into all kinds of trouble.—Editor.*)

Looking now at some more individual reports, a note from G3OHH (Macclesfield, Ches.) to say that he has "crawled up to 50C and 217S worked" on the 4-metre band, with at least three more good ones heard. G3HWR (London, N.W.3) signs in for himself and G5FK for the Three-Band Annual, and asks if 23 cm. had been considered for scoring in the multi-band context. The answer is, of course, Yes—but it seemed to A.J.D., and those advising him, that for the time being at least, we should keep the new Table to the bands being worked by the majority of VHF operators.

A good multi-band score comes from G3FIJ (Colchester), who has been with us for many years and knows most of the answers

on VHF; he collaborated with G4AC on the Mini-Halo project, covered in the January issue of *SHORT WAVE MAGAZINE*.

Another old timer, G2BJY of Walsall, Staffs., says that conditions have been poor on both his bands, but nevertheless moves upwards in the tables—he also is in the new one. G2AXI (Basingstoke) is going to start on 70 centimetres before long and remarks that "the lowest frequency used at this station is 70.108 mc"—well, he's out of the turmoil of Top Band and the CW end of 20 metres!

Leading the new Table is G3BNL (Keyworth, Notts.) who will find, as time goes on, a lot of keen types nudging up on him! But he has the great advantage of being able to work all three bands, and it only needs a couple of new ones on one or the other to keep up the aggregate.

G3LAS (Berkhamsted) says he is going ahead right away to get operational on four metres in order to build up his totals for the Three-Band Annual. It will be noted that he has put in a counties/countries claim for one band only, two metres; this is, of course, quite acceptable, and we would be glad to see any one-band score for inclusion in the table.

Other readers of this piece

sending in notes of VHF interest and making claims for the tables include: G3SAR (Sevenoaks); G3KWH (Welwyn Garden City); G8VN (Leicester); G3KQF (Borrowash, Derbys.); G3HRH (Welwyn); G3LZN (Rowington, Warks.); and G3BA (Sutton Coldfield, Warks.).

G2CIW (Northfield, Birmingham), who has worked 40 counties and 9 countries on an all-time basis on the 70-centimetre band, says "I cannot enter the three-band Annual because I do very little on two metres nowadays and nothing at all on four metres." But he agrees that the new Table is a good thing, in that it will eliminate a lot of people no longer on the VHF bands. (This is not quite the idea, but we see what Jack means!)

An interesting claim from G5UM (Knebworth) shows that since September 1 (the start of our VHF year) he has worked no less than 115 different stations on 70 centimetres; he is one of our three-band VHF men, with much larger totals of stations worked than most.

G3IUG (Poole, Dorset) fills us in on what is happening down there on the 4-metre band. He and G2FKY started up last August, and have kept a daily schedule; G3IUG is on 70.26 mc using a B.44 Mk. II, and G2FKY is running the same sort of gear.

From Ash Green, Aldershot, G3KMO writes that the Guildford Club group have transferred the local net from Top Band to 70.65 mc in the 4-metre band, which they find "ideal for the purpose." Activity is high and, on the evening that G3KMO wrote (February 12), some thirteen stations were dodging about—and he says that more are coming on.

### Sign-Off and Close

It will be by **Wednesday, March 17** that A.J.D. would hope to have your next report, addressed: A. J. Devon, "VHF Bands," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1—so keep the fire in and let's hope the band opens wide before then. *Urs as ever, A.J.D.*

THREE-BAND ANNUAL VHF TABLE

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		TOTAL pts.
	Counties	Countries	Counties	Countries	Counties	Countries	
G3BNL	17	2	32	9	16	2	78
G3HRH	12	1	45	8	5	1	72
G2AXI	19	3	35	7	—	—	64
G2BJY	25	2	31	5	—	—	63
G5UM	16	1	26	1	12	1	57
G3FIJ	12	2	27	3	6	1	51
G3LAS	—	—	32	8	—	—	40
G3HWR	14	3	6	1	7	1	32
G5FK	12	1	14	1	3	1	32
G3EKP	11	4	9	3	3	1	31

Scores are since September 1st, 1964, and will accrue until August 31st this year. Position is shown by last-column total, as aggregate of all scores. Own county and country score as one each. Entries may be made for a single band, any two, or all three. Claims should be sent in as often as possible to keep the table up-to-date. New entries can be made at any time.

# NEW QTH's

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

**DL2CB**, E. D. Melville (*ex-G3FCB*), R.E.M.E. Inspectorate, B.F.P.O.34, B.A.O.R.

**G3AFP**, L. W. Carlin, 3 Bank Street, Somercotes, Derby. (*Re-issue.*)

**G3ILB**, D. S. Kendall, 40 Aberdale Gardens, Potters Bar, Middlesex. (*Re-issue.*)

**G13LOB**, Amateur Radio Club, R.A.F. Station, Bishops Court, Downpatrick, Co. Down.

**G3OST/A**, D. E. J. Wilson, 59 South Primrose Hill, Chelmsford, Essex.

**G3PHR/A**, J. Carter, 59 South Primrose Hill, Chelmsford, Essex.

**G3SSO**, Government Communications Amateur Radio Club, Benhall, Gloucester Road, Cheltenham, Glos.

**G3TKK**, P. R. Doughty, 36 Spinney Hill Drive, Loughborough, Leics.

**GW3TMS**, D. C. Smith, 2 Glanynrafon Gardens, Sketty, Swansea, Glam. (*Tel. Swansea 22584.*)

**GM3TNT**, D. R. McArthur, 24 Smith Drive, Campbeltown, Argyllshire.

**G3TOM**, F. Fook, 109 Matlock Crescent, North Cheam, Surrey. (*Tel. FA1rlands 5630.*)

**G3TRK**, D. Kitson, 65 Penine Way, Brierfield, Lancs.

**G3TRV**, M. Smith, 65 Pledwick Lane, Sandal, Wakefield, Yorkshire.

**G3TRY**, W. J. North, 3 High Street, Lane End, High Wycombe, Bucks.

**G3TTY**, B. J. Field, 5 Jameson Lodge, 58 Shepherds Hill, Highgate, London, N.6.

**GW3TUL**, J. M. Copson (*ex-GW84CS*), 26 Pendwvallt Road, Whitchurch, Cardiff, Glam.

**G3TUV**, J. Philip-Nichols, R.N. (*retd.*), The Old Ship, Halford Road, Ickenham, Middlesex.

**G3TVX**, D. G. Ashwood, 27 Hillcroft Road, Chesham, Bucks.

**GW3TWA**, E. W. Humphreys, Deva, Vaynol Road, Caernarvon.

**G3TWF**, D. Cowgill, The Hall, Cononley, Keighley, Yorkshire. (*Tel. Crosshills 2349.*)

**G3TWG**, P. J. Patrick, R.N., 100 Upwood Road, Lee Green, London, S.E.12.

**G3TWZ**, D. J. Farman, 6 Ash Grove, Bush Hill Park, Enfield, Middlesex. (*Tel. LABurnum 2705.*)

**G3TXF**, N. S. Cawthorne, Holt Cottage, Kingston Hill, Surrey. (*Tel. KIN 0841.*)

**G3TXF/A**, N. S. Cawthorne, Beaumont College, Old Windsor, Berks.

## CHANGE OF ADDRESS

**E16AS**, A. E. Latham (G3JLA), 92 Glenageary Estate, Dun Laoghaire, Co. Dublin.

**G2BSR**, T. S. Tatton, 18 Latymer Croft, Churchdown, Glos. (*Tel. Churchdown 3300.*)

**G2FOZ**, L. J. Orange, 14-A Colls Road, Peckham, London, S.E.15.

**G2FUX**, F. W. Fletcher, 53 St. Ives Park, Ringwood, Hants. (*Tel. Ringwood 3561.*)

**G2SC**, J. M. Scott, The Coppice, Tickenham Hill, Clevedon, Somerset.

**GM3BGB**, S. B. Jagger, 65 Forsyth Street, Greenock, Renfrewshire.

**G3BPD**, A. A. Lamb, Old Bakery, The Green, Finningley, Doncaster, Yorkshire.

**G3DHB**, D. H. Baynham (*ex-XZ2DB / VS1GC / ZB1DB / DL2DB*), Cobbles, Dartnell Avenue, West Byfleet, Surrey. (*Tel. Byfleet 46086.*)

**G3GHB**, A. T. Eley, 14 Warming-ton Road, Hollywood, Birmingham, Worcs.

**G3HBR**, B. Hummerstone, 26 Pomeroy Close, Amersham, Bucks.

**G3IEF**, K. E. Felton, 24 Oxford Street, Watford, Herts.

**G3IGZ**, D. W. Bruce, 22 Brown-spring Drive, New Eltham, London, S.E.9.

**G3JAF**, A. H. Trigell, 77 High Street, Lymington, Hants.

**G3JHC**, B. Jenkinson, 19 Blair Close, Sale, Cheshire.

**G3JPO**, M. G. Hutchins (*ex-VS1LU/9M4LU*), Edgcumbe Cottage, Edgcumbe, Penryn, Cornwall.

**G3JUT**, T. J. Jones, 26 Greenland Road, Weston-super-Mare, Somerset.

**G3JVM**, R. H. Medcraft, 134 Dulverton Road, Ruislip Manor, Middlesex.

**G3KDY**, R. Folgate (*ex-5B4RF*), 32 Orchard's Caravan Park, Ruskington, Sleaford, Lincs.

**G3LQI**, S. G. Williams, 79 South Street, Lancing, Sussex.

**G3LTY**, East Kent Radio Society, St. Mary Bredins Vicarage, Old Dover Road, Canterbury, Kent.

**G3MCY**, G. C. Moore, c/o Officers' Mess, R.A.F. Station, Benson, Oxford.

**G3NDJ**, C. R. Delhaye, 7 Roslyn Close, Broxbourne, Herts.

**G3NWT**, E. G. Harrison, M.Sc., 31 Derby Road, Risley, Derbyshire. (*Tel. Sandiacre 2339.*)

**G3ODI**, G. N. Partington, B.Eng., 145 Mackets Lane, Woolton, Liverpool, 25.

**G3PFE**, G. W. Spriggs, Police House, Heckington, Sleaford, Lincs.

**GM3RKO**, N. J. McIntosh (*ex-9M4LJ*), c/o Sgts' Mess, R.A.F. Station, Kinloss, Forres, Morayshire.

**GW3RXD**, G. Llewelyn, 90 Maesllwyn, Amlwch, Anglesey.

**G3SMR**, R. Tinkler, 11 Westhill Drive, Kettering, Northants. (*Tel. Kettering 3500.*)

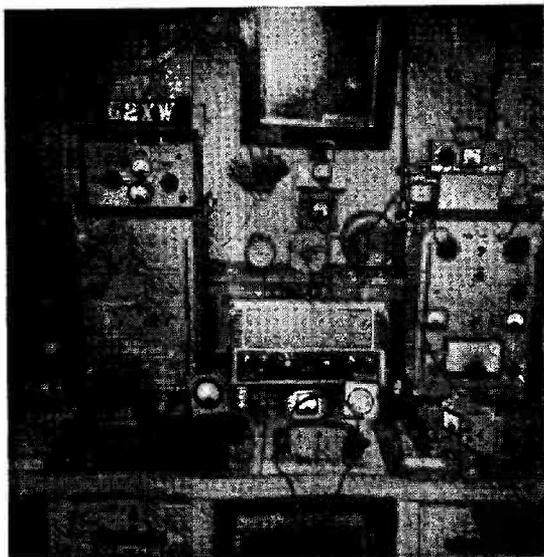
**G3SNI**, V. W. G. Caves, 1 Rousebury Manor Cottages, School Lane, Stewartby, Bedford.

**G3SUX**, D. J. Bradshaw, 6 Houghton Road, Penwortham, Preston, Lancs.

**G3TBB**, J. B. Marsden, Springhead, The Square, Bramham, Boston Spa, Yorkshire. (*Tel. Boston Spa 2637.*)

**G3THA**, D. W. H. Ashton, 49 Sedgefield Drive, Thurnby, Leicester. (*Tel. Thurnby 3988.*)

**G8RB**, T. A. Fachtor, 53 Osborne Road, Jesmond, Newcastle-on-Tyne, Northumberland.



## THE OTHER MAN'S STATION

# G2XW

**T**HIS time it is G2XW, owned and operated by A. W. Wells, at 9B Grand Parade, Green Lanes, Harringay, London, N.4 — who started as an SWL in 1919 and, coming on the air in 1929, has been consistently active ever since, mainly on CW.

Having spent all his working life in the electrical industry, and now nearing the age of retirement, he contemplates that "little place in the country" on which so many set their hearts for later years. It would certainly be a blessing for G2XW. The present QTH is in a block of flats, involving him in difficulties with aerials and bother because of TVI. Nevertheless, he runs the rig on all bands 10-160m., depending on conditions, and admits to the occasional use of phone nowadays.

Though until about three years ago all his gear was home-built, it is now mainly commercial, as these pictures show. The main transmitter is a Labgear LG.300 with the matching PSU/Modulator (at left), and covers the 10-80m. bands very effectively. The station receiver is an Eddystone 888A, at centre at the operating position. Above the PSU/Mod. unit is an all-band ATU and dummy-load for transmitter testing and adjustment. The auxiliary equipment includes a BC-221, an all-band absorption wavemeter (Chas. Young, Ltd.) a harmonic checker, an SWR indicator and a mains voltage monitoring meter.

For Top Band, the transmitter is a KW-160, which is, of course, a phone/CW Tx in the 10-watt category for 160m. only.

Aerials at G2XW consist of a system of dipoles which, in various ways, can be made to go on all bands. He hopes that, come retirement to that place in the country, he will be able to expand a bit on the aerial side and go in for beam arrays of the kind

impossible at the present location.

On the wall to the right of the operating table (constructed by G2XW to accommodate the gear and fit the space) is our *DX Zone Map*. The station is single-switch relay-controlled and the SWR indicator and harmonic checker are in constant use; all inter-connection is by coax. It is of interest to add that, after all these years, G2XW still uses a straight key.

### FOR THOSE WHO MAY LIKE TO KNOW

In any issue of *SHORT WAVE MAGAZINE*, we use a great many photographs, either with articles or by way of general illustration. If you have a good, clear print of Amateur Radio interest — whether of equipment, your own station, some radio occasion, or personalities — send it in, with notes on a separate sheet.

Please *do not* write the details on the back of a photograph, or even stick on a slip — simply identify the picture, on the plain side, lightly in pencil, e.g. "A, from G3XYZ," or whatever, and then, under "A, from G3XYZ" on the separate sheet, give all the details — and do make sure that they are accurate, particularly where call signs are involved. (The reason for this requirement is simply that the chum who makes the block sits about 100 miles from the chap who writes the caption!)

Your photograph can be of any size — except that we prefer them not to be of the area of this page, nor down to prints taken off 16 mm. film, for viewing through a magnifying glass! — and, in any event, what we want are prints, not negatives. We can only use "the picture as you see it." And, of course, payment is made for all that we can publish.

# THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for Next Issue: March 12)

(Address all reports for this feature to "Club Secretary")

ONE of the major headaches for any Club Secretary, and for the other officials and committee members, is the production of an attractive programme of events. Not, be it said, because of shortage of ideas, or even of lecturers, but because of the impossibility of finding out what members really want.

More than one club, to our knowledge, has faded away completely because members simply didn't turn up at meetings. The hard core of officers took this to mean that their efforts in providing a programme were not good enough, and resigned . . . and *no one* offered to take their place.

Perhaps the next best thing to finding out what the members want is simply to find out something about the members themselves. For this reason we were interested to see that **Southgate** recently issued a short questionnaire with their *Newsletter*.

From this the club officials could deduce everyone's main interests, such as the bands used, the most favoured transmission mode, the bands most listened on by SWL's, any special radio interests, non-radio hobbies, professional occupation, and that most invaluable item "Further Remarks."

We commend this idea to club secretaries; and it would not come amiss to add another question: "What type of meeting do you favour most — lectures, discussions, ragchews, junk sales, outside events, visits, mobile outings?"

But let no one think his troubles will then be at an end—for one of the clubs that closed down a few years ago ran an even more detailed questionnaire, and went to some pains to put on exactly the meetings that members requested . . . and *still* they didn't turn up. Once apathy gets a hold, you're done for!

And so to this month's club news . . .

## ACTIVITY REPORTS

**Bury and Rossendale** (note new title) spent their January meeting discussing club affairs and policies, as a result of which their March 9 meeting will be the annual supper, at the Old Boar's Head. They wish to make it clear to younger members and their parents that meetings are *not* held in a "pub tap-room" but in a private room upstairs; the 1965 programme is now available from the secretary.

**Chester** hope to organise more visits to places of interest this year. They meet every Tuesday except the first, in the YMCA at 8 p.m. March 9, Radio Panel Game; 16th, film on Worldwide Communica-

tion; 23rd, second talk for beginners, by G3ATZ.

**Torbay** recently heard a talk on DX Communication by one of Plymouth's SWL members, Barry Curnow; their meetings are still held monthly, on the last Saturday, at their Hq. in Bath Lane, Torquay.

**Northern Heights** have decided to start a fund to acquire a transmitter for use at their many demonstration events; coming meetings include a talk on Wide-Diffusion Hi-Fi (March 17), a Junk Sale on the 31st and the AGM on April 14.

**Peterborough** get together at the Technical College on the first Friday, and on other Fridays at their new "Mill Shack" behind the Peacock Inn, London Road. On March 5 there is a film show; on April 2 a new SSB Rx and Tx will be shown to members; and the May talk will be on Radio Astronomy.

**Slade** will be hearing G5PP on Mobile Operation, on March 5; G3MVT will be talking on SSB on March 19; and on April 5 they will visit Wolverhampton for a Quiz. Informal meetings continue, every Wednesday at the Church House Hq.

**Mid-Warwickshire** report some successful gatherings during January and February; on March 5 they have a night on the air with the Club Tx, and on the 22nd will be discussing Frequency Meters and Crystal Calibrators.

**Harrow** elected new officers at their AGM, and the 1964 president, G3SM, reviewed a very successful year. The new president is Old Timer G2UV. Meetings will continue, 8 p.m. every Friday in the Science Lab. of Roxeth Manor School, and membership exceeds the 100 mark. March subjects: 12th, an HF-Band Converter; 19th, Practical, 26th, Junk Sale.

**Loughborough** fill the month with a lecture by G3ESB on the 5th; a Components Sale on the 12th; NFD Discussion on the 19th; and a Tape Lecture on an FP8 DX-pedition on the 26th. Morse classes are held every Monday at 7.30 p.m.

**Cray Valley** (*QUA*, February) will have a talk on "My Shack" (Part II) by G3GJW on March 5; April 1 is the date for the "Annual," when there will also be a talk on Vocal Synthesis by G3JJC. All at Eltham Congregational Church Hall, Court Road, S.E.9, at 7.30 p.m.

**Derby** conclude their first quarter's programme with an Open Evening and committee meeting on March 10; G3FGY on Servicing, March 17; G2CVV on Making a Simple Voltmeter, March 24; and

G3JFD on The Morse Code, March 31. All meetings at Room No. 4, 119 Green Lane, Derby, 7.30 p.m.

**Cambridge** have a visit from G2MI on March 5; the title of the March 12 meeting is "Converters—Bring Yours!"; and March 19 is their AGM. All at the Hq., Victoria Road, Cambridge.

**Cannock Chase** (CCARS Newsletter, Vol. 1, No. 1) meet on the first and third Thursdays at the George Inn, Walsall Road, Cannock. Their March 18 event is described as "Morse, Construction and Committee"; and on April 1 G5PP will be talking on Mobile Working.

**Acton, Brentford and Chiswick**, at their recent AGM, elected G3IGM chairman, G6RC vice-chairman, G3GEH secretary-treasurer. At the next meeting, on March 16, there will be a demonstration of SSB (7.30 p.m. at 66 High Road, W.4.).

**Cornish** (*The Cornish Link*) heard a talk on SSB just recently, but by a show of hands decided that AM was the best means of communication (tell them, somebody!). On January 24 they visited Lands End Radio, GLD, for a complete tour of the station; the aerials were the envy of all.

**Durham City** are now well into their second year and can report an average attendance of over 30 at their meetings in 1964. They continue on alternate Thursdays at the Bridge Hotel, North Road, and new members are welcome. Next meeting is on March 11, and forthcoming events are a Constructional Competition (June 3) and the AGM (June 17).

**Halifax** (Newsletter No. 2) seem justly proud of their win in "MCC," and they were also strongly represented (by GM3IGW/A) in the CQ 160-metre Contest. On February 23 they had a lecture from G3LSA on Two Metres, and March 30 is booked for the Annual Dinner.

**Harlow** are looking forward to a big event next August, when they will be staging an exhibition in a big marquee on "Harlow Day" (August 28-29). A large-scale exhibition of all aspects of Amateur Radio is their aim, with stations operating on all bands, fixed and mobile. This will be quite an undertaking.

**Maldstone YMCA** are running Morse Practice and R.A.E. tuition on March 10 and 17 (G3ORH and G3ORP respectively); on the 24th G3REM will talk about Car Radio Installation, and the 31st is the date of the AGM.

**Surrey, Croydon** (SRCC Monthly News, February) had a talk by a member of the Mullard staff, on Modern Electronic Components, at their February meeting. On March 10 they have a Junk Sale, and on April 14 their AGM.

**South Birmingham** (QSP, February) report a very pleasing increase in the number of keen youngsters turning up at meetings, and are considering the formation of a Junior Group. For their March occasion (on the 18th) they hope to have several well-known local amateurs (not necessarily members) form a panel and answer questions. They report that firm links have been established with other clubs in the Birmingham area, and the exchange of ideas and lecturers is benefiting all concerned.



At the recent Camping & Outdoor Life Exhibition at Olympia, London, the Boy Scout and Girl Guide Association had an official exhibit. Part of this was provided by the Baden-Powell House Scout Amateur Radio Group, with G3TGS/A on the 80m. air. Here G2CAJ is helping the group's youngest member with a constructional problem using one of the Philips electronic kits, supplied for the purpose.

**Crawley** enjoyed the recent lecture on Amateur TV, from members of the B.A.T.C. On March 19 they will have G2UJ as guest-of-honour at their annual dinner, together with many visitors from other clubs. And on March 24 Messrs. Green & Davis will be demonstrating items from their wide range of equipment.

**Barnsley** held a very successful Annual Dinner and Social, but the photos turned out to be flops! Better luck at their Open Night, they hope. On March 12 G3GNK will describe his hybrid mobile receiver, and on March 26 there will be a Junk Sale.

**Manchester** will be hearing W1BB's tape-and-slide lecture on Top-Band DX at their first March meeting; on the 24th more films will be shown; and on the 31st G3RTU will be talking about the Heathkit RA-1.

**Bedford**, only established last October, meet fortnightly (second Tuesday and fourth Thursday) in Room 14 at the Harpur School, Horne Lane. No ambitious enterprises have yet been tackled, but the club is running smoothly and would now welcome new members who wish to prepare for R.A.E. and Morse. "If they have the ambition," writes the secretary, "we will help them fulfil it."

**Reading** heard a report, at their recent AGM, of

a year of increased activity and prosperity. For 1965 they elected G3GHE chairman, G5HZ vice-chairman and G3TOQ secretary. Next meeting is on March 27, when there will be a lecture on Principles and Applications of Microwave Distance Measurement.

**Malvern College A.R.S.** has been re-started, and a Junior Constructors' Group is in full swing. The College celebrates its Centenary in July, and the club hope to put on a good show. They would appreciate some advice about organising regular lectures (meaning, probably, where to find the lecturers—any volunteers?).

The **R.A.I.B.C.** include with the January issue of their journal *Radial* a list of their invalid members, and a separate list of blind members. Licensed amateurs and SWL's are listed separately. This organisation continues to do splendid work for the bedfast and disabled, and although it seldom makes appeals for help, there are many ways in which more fortunate amateurs could assist them. Periodicals, text

books, call books—or even a few cheering letters . . . nothing need be overlooked.

**R.N.A.R.S.** entertained amateurs at the R.N. Signal School (H.M.S. *Mercury*) on January 28 to a Social and Ragchew evening. Despite bad weather, over 60 visitors turned up, many being talked in on 70 mc from G3BZU. Now they are looking forward to their Mobile Rally on May 30.

**University of Keele** held their AGM and elected their officers. Prof. D. M. Mackay, B.Sc., Ph.D., F.Inst.P., is their President; G3COY is continuing as secretary. On February 27 they were due to help in the running of the Students' Rag (public address systems and mobile work), which raises large sums of money each year for the North Staffs. Hospital Charities.

**Spen Valley** break away from radio at their March 18 meeting, with a talk on Electronic Equipment in Marshalling Yards, by an expert from British Rail. On April 1 they will visit the R.N.R. Communications

#### 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): V. J. Galpin, Building 347.3, A.E.R.E., Harwell, Didcot.  
 BARNSELY: J. A. Ward, G4JJ, 44 Northgate, Barnsley.  
 BEDFORD: J. R. Clarke, G3OWQ, 12 Robin Hill, Brickhill, Bedford.  
 BURY & ROSSENDALE: K. Drinkwater, G3RHR, 16 Linddale Avenue, Accrington.  
 CAMBRIDGE: F. A. Porter, G2CDX, 37 Metcalfe Road, Cambridge.  
 CANNOCK CHASE: C. J. Morris, G3ABG, 24 Walhouse Street, Cannock.  
 CHESTER: R. Trickey, G3DRB, 31 Penzby Avenue, Chester.  
 CLIFTON: J. Rose, G3OGE, 63 Broomfield Road, Beckenham, Kent.  
 CORNISH: W. J. Gilbert, 7 Poltair Road, Penryn.  
 CRAWLEY: R. G. B. Vaughan, G3FRV, 9 Hawkins Road, Tilgate, Crawley.  
 CRAY VALLEY: S. W. H. Harrison, G3KYV, 30 Plaistow Grove, Bromley.  
 CRYSTAL PALACE: G. M. C. Stone, G3FZL, 10 Liphook Crescent, London, S.E.23.  
 DERBY: F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby.  
 DUDLEY: R. W. Fisher, G3PWJ, 63 Swan Crescent, Langley, Oldbury, Worcs.  
 DURHAM CITY: M. Allenson, G3TGD, Physics Dept., Durham University South Road, Durham.  
 FAREHAM: N. Carless, G3EER, 16 Waterloo Road, Alverstoke, Gosport.  
 GREENFORD: J. A. Hedges, G3MMQ, 35 Ferrymead Avenue, Greenford.  
 HALIFAX: J. Ingham, G3RBQ, Lambert House, Greetland, Halifax.  
 HARLOW: G. O'Donald, G3TLJ, Great East, Roydon Road, Harlow.  
 HARROW: C. J. Rees, G3TUX, 17 Colburn Avenue, Hatch End, Pinner.  
 HAVERING: P. J. Moore, G3TUW, 1 Bons Farm Cottages, Stapleford Tawney, Romford.  
 HULL: A. Sherer, G3TEU, 18 Malham Avenue, Anlaby Road, Hull.  
 LICHFIELD: H. E. Plant, G3TJG, 171 High Street, Chasetown, Walsall.  
 LOUGHBOROUGH: G. P. Bateman, G3LCG, 24 Farndale Drive, Loughborough.  
 LUTON: P. W. Thompson, G3TUI, 1 St. Michaels Crescent, Luton.  
 MAIDSTONE Y.M.C.A.: A. Wilson, 11 Elizabeth Close, King Street, Maidstone.  
 MALVERN COLLEGE: G. P. Shirville, G8ADU, No. 2 The College, Malvern.  
 MANCHESTER: K. Kahn, G3RTU, 12 Cliffdale Drive, Manchester 8.  
 MELTON MOWBRAY: D. W. Lilley, G3FDF, 23 Melton Road, Asfordby Hill, Melton Mowbray.  
 MIDLAND: C. J. Haycock, G3JDJ, 29A Wellington Road, Handsworth, Birmingham, 20.

MID-WARWICKSHIRE: H. C. Loxley, 51 Guy Street, Warwick  
 NORTHERN HEIGHTS: A. Robinson, G3MDW, Candy Cabin, Ogden, Halifax.  
 NORTH KENT: P. G. Wells, 25 St. Davids Road, Hextable, Swanley, Kent.  
 PETERBOROUGH: D. Byrne, G3KPO, Jersey House, Eye, Peterborough.  
 R.A.I.B.C.: Mrs. F. E. Woolley, G3LWY, 10 Sturton Road, Saxilby, Lincoln.  
 REIGATE: F. D. Thom, G3NKT, 12 Willow Road, Redhill.  
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 SALOP: Dr. K. E. Jones, G3RRN, Greystones, Shrewsbury Road, Church Stretton.  
 SALTASH: D. Bowers, 95 Grenfell Avenue, Saltash.  
 SLADE: D. Wilson, 177 Dower Road, Four Oaks, Sutton Coldfield.  
 SOUTH BIRMINGHAM: J. Rowley, G3TQO, 195 Castle Lane, Solihull.  
 SOUTHGATE: R. E. Wilkinson, 23 Ashridge Gardens, London, N.13.  
 SOUTH HANTS: G. J. Meikle, G3NIM, 34 Victoria Road, Netley Abbey.  
 SOUTH LONDON (Mobile): L. W. Wendon, 112 Leathwaite Road, London, S.W.11.  
 SPEN VALLEY: N. Pride, 100 Raikes Lane, Birstall, Leeds.  
 STOKE-ON-TRENT: K. H. Parkes, G3EHM, 28 Grove Road, Heron Cross, Stoke-on-Trent.  
 SURREY (CROYDON): S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon.  
 SWINDON: D. J. Goacher, G3LLZ, 51 Norman Road, Swindon.  
 TORBAY: Mrs. G. Western, G3NQD, 118 Salisbury Avenue, Barton, Torquay.  
 UNIVERSITY OF EAST ANGLIA: *No details.*  
 UNIVERSITY OF KEELE: V. J. Reynolds, G3COY, Dept. of Comms., University of Keele, Staffs.  
 UNIVERSITY OF SHEFFIELD: J. P. Billingham, c/o Dept. of Metallurgy, University of Sheffield, St. Georges Square, Sheffield 1.  
 UXBRIDGE: F. J. P. Offord, 43 Grays Road, R.A.F. Uxbridge.  
 VERULAM: G. Slaughter, G3PAO, 5 Leggatts Wood Avenue, Watford.  
 WIMBLEDON: E. N. Hurle, G3RZN, 156 Monkleigh Road, Morden, Surrey.  
 WORCESTER: G. W. Tibbets, G3NUE, 25 Greenford Gardens, Martley Road, Worcester.  
 YEOVIL: D. L. McLean, G3NOF, 9 Cedar Grove, Yeovil.  
 YORK: W. H. Hodgson, 69 Sherwood Grove, Acomb, York.

#### Overseas

CEYLON: I. Woller, 457IW, R. S. of Ceylon, Box 907, Colombo.  
 EX-G CLUB: N. F. Thompson, W8YHO, 1368 Roslyn Avenue, Akron 20, Ohio.  
 NIGERIA: Nigerian A.R.S., Box 2873, Lagos.

Centre in Leeds. On March 20 they have a Saturday meeting, 2.30 p.m. at Heckmondwike Grammar School for a lecture by G2YS.

The **University of East Anglia** (Radio and Electronics Group) are running a series of lectures on Thursday evenings, with the co-operation of the Norfolk Club. On March 11, G3PTB will be talking on Frequency and Power Measurement, and on March 25 they will hear G3IOR on Interference. All lectures start at 7.30 p.m.

The **University of Sheffield** A.R.S. report that six of their members were successful candidates for the R.A.E. on December 10, 1964.

**Melton Mowbray** will be seeing a Mullard film strip on March 25, dealing with Basic Valve Circuits. Their April meeting will take the form of an 8-mm. Ciné evening and ragchew.

**Wimbledon** gained several new members in January; at the February meeting the subject was Ultrasonics, and on March 12 it will be Oscillators. Plans are afoot for a station at the Wimbledon Exhibition (May 21-22). Normal meetings are on the second Friday at the Community Centre, 28 St. George's Road, S.W.19.

**A.E.R.E., Harwell (QAV, February)** announce a "star attraction" on March 16, when Mr. H. V. Sims of the B.B.C. will talk on Transmitting Aerials. They gather in their own Social Club on the third Tuesday of each month.

**Dudley** recently paid a visit to the B.B.C.'s sound studios in Birmingham. Their February evening began with the hearing of members' tape recordings, and the next meetings scheduled are March 12 and 26; all on Friday evenings, 8 p.m. in the Art Gallery, Dudley.

**Stoke-on-Trent** will once more be helping M.A.R.S. with the Mobile Rally at Trentham Gardens (April 11). Meanwhile they meet every Thursday at the rear of the Cottage Inn, Oakhill, and on March 11 will hold a Junk Sale. March 18 is the date for a Top-Band discussion, and on the 25th they will be trying out the Top-Band aerial and Tx in readiness for the rally.

**Swindon** have acquired a CR-100 and are now at work on an ATU and a transmitter. Meetings are at the Deer's Leap clubroom (the landlord is also their chairman). Having found attendances dwindling, they have re-shaped their policy and are now aiming at the younger members, with R.A.E. classes properly organised.

**Uxbridge** also seem to be suffering from poor attendances—seven at their AGM and not enough to run a meeting on January 18. On March 15 there is a film on Electron Microscopy, and on March 29 an Extraordinary General Meeting. Lack of support is not improving the morale of the committee, but they still hope that things will change for the better.

**Verulam (News Sheet, February)** will be hearing a report by their TVI Group on March 17, followed by a talk by G3RPA on his transistorised GDO. General discussion will follow. On April 21 an aerial demonstration by Mr. Vic Hartop of J-Beams Ltd. should prove a big attraction.

**South Hants.** celebrate the tenth year of publication of *QUA*, the 200th meeting of the Southamp-

ton group, and the imminent opening of their club room and permanent home. The next Southampton get-together is on March 13; dates for the Dinner and the special Anniversary meeting are not yet announced.

**Luton**, who are at the A.T.C. Hq. every Tuesday, have secured the loan of a Viceroy Tx, and are on the air with their call G3SVJ. On March 6 they have a Bring-and-Buy Sale; on the 23rd a "Circuits Evening," and on the 30th a debate on that now popular subject "AM vs. SSB."

**Haveing and District** is the title of a newly-formed club which will be meeting at the Sea Scouts' Barracks, Wood Road, Hornchurch. SWL's in the district, and anyone else who is interested, please contact the secretary (see panel for GTH).

**Greenford** have two meetings during March—a Film Show on the 12th and a talk on a Mobile Tx, by G3OZY, on the 26th. **North Kent**, likewise, but their dates are the 11th (Early Days of Commercial Radio) and 25th (SSB Transmitters, with special reference to Heathkit designs, by VS4RS).

**Reigate** report a good attendance at the AGM, and they now have 27 call signs within the club (out of 38 members). Their next meeting is on March 20, 7.30 p.m. at the George and Dragon, Redhill.

**Saltash (The Tamar Pegasus, February)** now have a membership of 25, who gather fortnightly at the Toc H Hall, Burraton, and a recent event was a talk on Hi-Fi by Mr. P. Spencer. They are arranging a Mobile Rally for Whit Monday. Meanwhile, on March 12 there is a Junk Sale (no TV chassis, by request!) and on the 26th a talk-demonstration on Test Equipment.

**Clifton** report that plans are in hand for adding an HF-band transmitter to their existing 160- and 2-metre equipment at the club station G3GHN. Meetings continue, every Friday 8 p.m. at 225 New Cross Road, London, S.E.14.

**Hull** held their Annual Dinner in January and followed up with the AGM, at which the following were elected: Chairman G3AGX, secretary G3TEU and treasurer G3TTW. They hope to acquire new premises soon, and meanwhile new members are always welcome at the meetings, which are on the second and last Tuesdays. Full details from the secretary (see panel).

**Yeovil** likewise held their AGM and put in G3BEC as president, Mr. R. A. Woodward, chairman, and G3NOF secretary. Meetings every Wednesday, 7.30 p.m. at Park Lodge, The Park, Yeovil—and new members always welcome.

**Roding Boys' Society** visited the offices of *The Times*, but say there has been little else to "interfere with lectures and building projects." There will be a special meeting at Wanstead House on March 24, when anyone interested in Science or Amateur Radio is invited to attend at 7 p.m.

**Salop** are now in their second year, but unfortunately have lost their clubroom and are using a temporary location. The March and April meetings will therefore be at the Morris Hall, Bellstone, Shrewsbury, and the informal meetings will be at the Old Post Office Hotel, Milk Street. On April 8 they

will hold their construction competition.

On January 19, the **Midland Amateur Radio Society** had a most interesting discussion on "To Build or Not to Build," with the opposing cases put by G3BA and G5PP—the outcome seems to have been that there is ample scope for both, and it is all a matter of individual interest, ability, resources and requirements. For the period February 12-27, the **M.A.R.S.** group was heavily involved with the **Birmingham Boat Show**, where they put on a stand. This was followed by an inter-Club contest (with **Bristol** and **Coventry**) on the 28th. Their next meeting is **March 16**, **Birmingham & Midland Institute**, 7.30 p.m.

**Worcester** report steady progress with their new Hq. at 35 **Perdiswell Park**, **Droitwich Road**, and they are on the air most week-ends "on almost any band Top to two metres" under call sign G3GJL. Six different aerial systems have already been tried, and VO1FB has been worked on 160m.

The **Fareham Amateur Radio Club** is now a going concern, with Hq. at the **Clubroom of The Bugle**, **West Street**, and meetings scheduled for the first *Sunday* in each month, at 7.30 p.m. Morse and technical classes have been organised, and membership already stands at 20—and there is room for plenty more, SWL and transmitting.

Meeting every *Thursday* at 8 p.m. at the **British Legion Clubroom**, 61 **Micklegate**, **York** Amateur Radio Society held their **AGM** on **February 4** and elected officials, who include G3JFO as chairman and G3FTS as a committee member.

Signing G3SLM, the **South London Mobile Club** has meetings fixed for **March 13** (G.P.O. Amateur Radio Section) and for **March 27**, which will be the **AGM**.

When **Lichfield Amateur Radio Society** held their annual dinner in **January**, no less than 100 members and their guests attended. The gathering was addressed by their president, G3BPK, and the guests of honour were the mayor and mayoress; like the president, **Clr. Garman** took as his theme the contribution organisations like **L.A.R.S.**—and local Amateur Radio societies generally—can make to the interests and needs of the young.

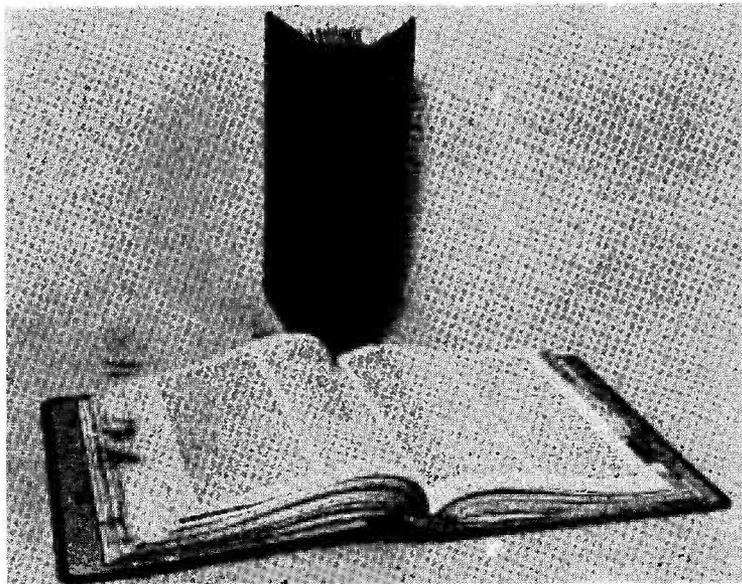
Now approaching their tenth anniversary as the **Crystal Palace & District Radio Club**, the *February Newsletter* records that the group's history actually goes back to 1951. The present secretary, G3FZL, took on the job in 1954, and at the first committee meeting the idea of a monthly newsletter was born—and it has appeared regularly ever since. From it, we can say that **C.P.D.R.C.'s** next meetings are on **March 20** and **April 2**, when once again they join battle with the **Clifton boys** in another inter-Club Quiz.

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We have received the *NARS News*, which is now issued every three weeks for **Nigerian** amateurs. This is full of personal and society news and must be, for the members, the next best thing to a regular meeting.

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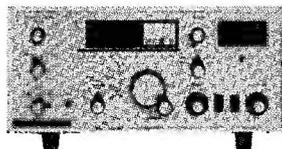
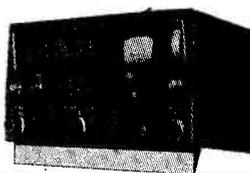
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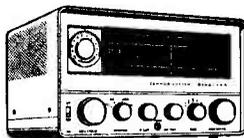
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Illuminated "S" Meter. 1.5 microvolt sensitivity. Electrical bandspread. Aerial trimmer. Noise limiter. B.F.O. R.F. stage. Big slide rule dial. Output for headphones or 4/8" speaker. Modern steel cabinet size: 13" x 7 4/5" x 10". Operation 220/240 volt A.C. Supplied Brand New and Guaranteed with Instruction Manual. Matching speaker in Cabinet, 55/-. S.A.E. for full details.

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Each receiver supplied brand new and fully guaranteed complete with manual. Carriage 10/-. All models for operation on 220/240 volt A.C. S.A.E. for illustrated leaflet—generous part exchange allowances.

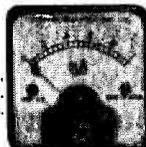
**LAFAYETTE "PRECON" AMATEUR PRESELECTION CONVERTER**



● Crystal Controlled ● For 80-40-20-15-10 Metre Bands ● As a Converter — Converts Receiver to Dual Conversion Operation ● Improves Selectivity ● Widens Band Spread. 3 crystals are included for 20, 15 and 10 metre bands. Operates on 230v, 50/60 cycles A.C., 2 stages of RF assures a high signal to noise ratio. S.A.E. for full details. 19 gns. P.P. 3/6.

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First grade quality. Moving Coil panel meters. available ex-stock. S.A.E. for illustrated leaflet. Discounts for quantity. Available as follows. Type MR. 38P. 1 21/32" square fronts.



50µA	32/8	1-0-1mA	22/6	150mA	22/6	3v	DC 22/6	500v	DC 22/6
100µA	29/6	1mA	22/6	200mA	22/6	10v	DC 22/6	750v	DC 22/6
200µA	27/6	2mA	22/6	300mA	22/6	20v	DC 22/6	15v	AC 22/6
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50-0-50µA	29/6	10mA	22/6	750mA	22/6	100v	DC 22/6	150v	AC 22/6
100-0-100µA	27/6	50mA	22/6	1A	DC 22/6	150v	DC 22/6	300v	AC 22/6
500-0-500µA	22/6	100mA	22/6	5A	DC 22/6	300v	DC 22/6	500v	AC 22/6

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**ILLUMINATED "S" METER, 1 21/32" sq. front. Cal. in 5 units, 6v. lamp, 29/6, P.P. 1/-; 2 5/16" square, 39/6, P.P. 1/-.**

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250v. P.I.V. 750mA	3/-	400v. P.I.V. 500mA	3/6
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"LF" excellent condition ... .. £35  
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**TRANSISTORISED FIELD STRENGTH METER**



3 bands 2.5 to 57 mc/s., permits easy tune up for max. transmitter output. Earphone jack to monitor audio. 200µA meter cal. 0-10. Supplied complete with battery, telescopic aerial, £7/7/- each. P.P. 2/6.  
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Mullard inductance/capacitance bridge. Good condition, £7.10.0	Marconi TF 1449 signal generator, 85 kc/s.-25 mc/s., £16, carr. paid.
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Four metre mains wavemeter, Marconi/Ekco GL/T No. 3. Perfect condition, £6.15.0.	TS62/AP "L" band wavemeter, £3, carriage 7/6. As new.

PLEASE SEND S.A.E. FOR FULL LISTS OF TEST EQUIPMENT, Etc.  
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## WORTHING RADIO

7 Coronation Buildings, Brougham Road, Worthing, Sussex

## R. S. C. (DERBY) LTD.

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**LAFAYETTE HE.40. SHORT WAVE BROADCAST RECEIVER (3 Band and B.F.O.).** Bandsread Tuning and "S" Meter. Only £19/19/- (carr. 7/6). HE.30 £35 (carr. 10/-).

**2 METRE.** 5 element Yagi and Super Mast bracket, 39/6; 8 Element, 59/-; add on 3 elements, makes 5 into 8, 19/6, all plus 5/6 carr. each.

**S.S.B. COMPONENTS.** 500 ohm, 1K and 2K lab carbon linear controls, 6/- each. P. and P. 6d.

**S.F.6. RINGS** temporarily out of stock.

**MATCHED PAIR OA79 DIODES,** 6/- . P. and P. 6d.

**EDDYSTONE RECEIVERS** and spares.

**2" CAST MAST COUPLERS,** 9/- each. P. and P. 2/6.

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1.2-10 mc/s. In 4 switched ranges.

Ideal for Harmonic suppression of TX or as a station rejector for RX's. Just plug aerial into one socket and connect to other socket; large tuning knob and dial; in small grey case. BRAND NEW. ONLY 35/-. Post 5/-.

We have been informed by many well satisfied customers that these units have been used for Grid-Dip Osc., Signal Generators, Receivers, R.F. Preselector, etc., with very little modification. FEW ONLY LEFT.

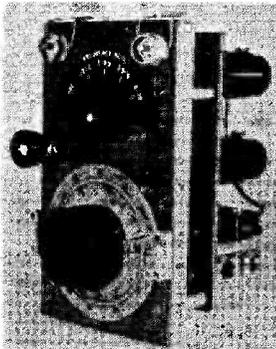
### Aerial Matching Tuning Units

Latest American release bulk purchase of 3000

These well made tuning units, made for the American 19 Tx-Rx, are housed in a metal case, colour green or brown, using a large precision calibrated scale, are an essential piece of equipment for the serious Tx or Rx operator. This unit will match an untuned wire or Whip Aerial to almost any Short Wave Receiver or Transmitter, exceptionally good for Mobile Top Band use. This American version being well noted as far superior to any other. GUARANTEED BRAND NEW, only 20/-, Post 7/6. Instructions supplied.

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### Vertical Aerial or Light Mast Kits

10 x 3' sections x 2" dia. tubular steel, with 14' Whip Aerial, total height approximately 45'. Insulated base, adjustable rope guys, pegs, hammer and reamer. All complete in canvas carrying bag. New surplus.

Price: £3 15s. per KIT, Carriage paid

H. H. BRADFORD LTD.  
RAMSEY, NEAR HARWICH, ESSEX

### SMALL ADVERTISEMENTS, READERS—continued

**FOR SALE:** Lafayette HE-40 Receiver, little used, complete with instruction manual, £16 o.n.o.?—Offers to, 1 Rose Cottage, Summers Lane, Freshwater, Lo.W.

**MANUALS, circuits of all British ex-W.D. 1939-45** Wireless equipment and instruments, from original R.E.M.E. instructions. S.a.e. for list: over 70 types.—W. H. Bailey, 167a Moffat Road, Thornton Heath, Surrey.

**WANTED:** 2-metre Nuvistor converter, good condition and reasonable price.—G3OPI, 11 Falmouth Street, Walney Island, Barrow-in-Furness, Lancs.

**MINIMITTER** Mercury Tx, 150 watts, CW and phone, 80-10 metres, FB condition, £45 o.n.o.?—Allcoat, 74 Villiers Street, Nuneaton, Warwickshire.

**SWL** started Motor Racing, therefore has for sale several hundredweight of radio junk, including 19 Set, German Tx/Rx, BTBS8 less valves, usual parts, etc. Any offers? the lot. Buyer collects. Also: *Short Wave Magazines* February '53-October '64, *Practical Wireless* October '58-November '62, *Radio Constructor* February '60-August '62. Any offers?—J. R. Hardcastle, Rigton Grange, East Keswick, nr. Leeds. (Phone Collingham Bridge 3205.)

**WANTED:** T.C.S. Tx. Must be in perfect working condition and with modulator.—Write, B. Wedzicha, 91 Clyde Road, Croydon, Surrey.

**A** R88D, perfect condition, new slow-motion drive. Front panel resprayed black. Re-aligned and electrically overhauled. Complete with manual, £35. BC-221 with mains p/pack (needs new xformer) and calibration chart and manual, £10.—D. Mounter, 141 Chislehurst Road, Orpington, Kent. (Phone Orpington 27351.)

**SALE:** MOSLEY TA-33Jr. Beam, £10; painted with zinc chromate, then aluminium paint; also 20/15 metre Quad, new bamboos, polythene varnished, complete with boom, baffle plate and spiders, £6 plus carriage.—S. J. Taylor, G3OFN, Chy-yn-Gwel, Woodbine Lane, Illogan, Redruth, Cornwall.

**A** R88D meticulously re-aligned and re-calibrated to RCA spec., no twenty-year-old resistors and capacitors—all replaced with good quality modern close-tolerance HSV components; new set of valves, S-meter and tape monitor fitted; appearance, inside and out, excellent; RCA telephones and manual, £65; buyer inspects and collects. **WOULD ANYONE LIKE:** Back numbers of the *Short Wave Magazine*: January '56; November '58; April, May, June, August, September 1961; January, May to September 1962; please send s.a.e. **WANTED:** February, March, April, July, August, September '59; December '61; January, March, April '63 *Short Wave Magazine*.—B. Falcon, 12 Hillfield Avenue, Morden, Surrey. (Tel. Mitcham 2366 after 7.30 p.m.)

**GOING MOBILE?** Record those callsigns. German Minifon miniature wire recorder 6 $\frac{1}{2}$  in. x 4 $\frac{1}{2}$  in. x 1 $\frac{1}{2}$  in., 12-volt drive motor, 2 $\frac{1}{2}$  hours non-stop recording; carrying cases for recorder and accessories, playback into stethoscope headphones, £35. Original DST-100 Rx handbook, £2.—Keen, 2 Braithwaite Cottages, Greenend, Goathland, York.

**NEW** SSB linear band-switched pair of 4-250A's, fine job with solid-state power unit, all in Imhof cabinet; will deliver reasonable distance, £55 o.n.o.?—G3NMH, 6 Haven Close, Stratton, Swindon, Wilts.

**LOOK:** QRO for QRP. Swop mint Minimitter Mercury for smaller Tx. Factory built Vanguard preferably, 160-10m. or similar.—G3LK, QTHR.

SMALL ADVERTISEMENTS, READERS—*continued*

**CR-100** with handbook (cabinet and front panel replaced). Rx 639A (RAF R.5032A), 155-100 mc with PSU, all in working condition, £10 the lot. Buyer collects.—Scott, Dudley, Anstey Lane, Alton, Hants.

**NCX-3**, mint condition, surplus to requirements, £110; H.P. arranged. Also NCX-D power unit, £25. Personally delivered 150 miles.—G3FKO, 109 The Holloway, Droitwich, Worcs.

**FOR SALE:** T.1131 power packs and 125-watt modulator, complete with valves; power packs give (1) 1000v. at 300 mA, 300v. 200 mA and fils; (2) 1000v. 500 mA and fils. Buyer collects. What offers?—G3GIQ, 271 Popes Lane, Ealing, London, W.5. (Phone Ealing 6389, evenings.)

**WANTED:** Eddystone 640 or 740, not in working condition (740 preferred), or slightly damaged. State condition and price. Will pay carriage.—G. Rowley, 61 South End Villas, Crook, Durham.

**FOR SALE: AR88, alignment spot on. Offers?—185 Brandy House Brow, Blackburn, Lancs. (Tel. 58594 evenings—not Sundays please.)**

**SALE:** Eddystone 680X, mint, £70. Tiger 70 cm. converter and 70 cm. 8/8 J-Beam, £8.—G3PUV/T, 51 Lyndale Drive, Wednesfield, Staffs.

**EXCHANGE:** Q-Max B4/40 Transmitter, manual, unmodified, for unmodified Rx, or sell, £20. Carriage extra.—Nunn, 62 Orford Street, Ipswich, Suffolk.

**FOR SALE:** Eddystone 888A, excellent condition. Offers? Will deliver London/Essex area.—Box No. 4083, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**SB-10U**, unused, valves never been in sockets, £33 10s. o.n.o.? Collect or carriage extra.—Wright, 77 Aigburth Road, Liverpool, 17.

**EDDYSTONE 840C** Communications Receiver for sale, brand new, £40.—Callers to: C. Weston, 20 Grange Park, Ealing, London, W.5, after 6 p.m.

**TWO-METRE and Four-metre cascode**, crystal-controlled converters, both with built-in mains supplies, £7 10s. each, or £14 the pair. 240/110 volt multi-tapped transformer, 2½ kW, isolated, £5. Transformers for transistor DC-to-DC supplies, 12 volts to 300 volts, 30 watts, 25s.; 60 watts, 35s.—complete with circuits. W6DPP de luxe electronic keyer, complete and perfect, £10. All items carriage extra.—B. M. Sandall, 21 Dale View, Ilkeston, Derbyshire.

**WANTED:** U.S. Navy version rectifier power unit Type COL.20242 (PSU for TCS Tx/Rx). Must be 100% electrically perfect. Condition of casing not so important.—Full details, price, including carriage, to: GW3TUD, Cole's Cafe, Saundersfoot, Pems.

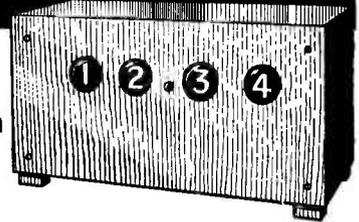
**FOR SALE: Hallicrafters SX-100, AM/CW/SSB**, upper and lower sidebands, T-notch filter, 100 kc cal., double conversion, perfect working order, complete with 240/110 AC trans., instruction book; cost £140, sacrifice, £70, carriage paid.—Box No. 4084, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**SALE:** 160-metre Tx/Rx/PSU, £5. 13-valve Tri-Band Rx (U.S.A.), £4. Collector's piece Marconi Marine Rx Type 394F, offers? Expensive transformers, valves, xtals, books, large box, lot £5. Oscilloscope, £5. S.a.e. details, carriage extra. **WANTED:** Marine R/T equipment and xtals.—Cain, 18 Oaky Balks, Alnwick, Northumberland.

**OLYMPIC T.100X**, 100w. Phone/CW Tx, 160-10 metres, TT21 PA, little used, as new, £55. Heathkit V-7AU Valve Voltmeter, new, £10.—Thompson, 134 Royal Oak Road, Manchester, 23. (Tel. Wythenshawe 2897.)

# 4 HOW-TO-MAKE FEATURES FOR ELECTRONICS CONSTRUCTORS

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An unusual faceless clock with four Digitron tubes showing the time in hours and minutes. Operates on 12-hour principle, can be read in the dark.

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SEND 4½d. STAMPS

## RADIO, ETC.

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G3RIX proudly presents a new base loaded antenna system designed specifically for mobile use on each of the six lower frequency bands available to hams.

The interchangeable coil units combine elegance with high efficiency, employing space wound construction on low loss formers. A mirror finished aluminium cone in each end of the former ensures waterproof joints and good connections to the whip aerial and mounting pillar. Any ham would be proud to own one.

PRICES:	each
Coil units for 160, 80, 40, 20 or 15 metres	£3
Adaptor for 10 metres operation	9/6
Two-piece 8ft. whip aerial	17/6
Insulated mounting pillar complete	15/-
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Coil of your choice with antenna and base £4/15 carr. paid  
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#### J. & A. TWEEDY (Electronic Supplies) Ltd.

Eddystone Receivers, Components and Accessories

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#### New:

Eddystone EA12	£185	Eddystone EC10	£48
Eddystone 870A	£30. 17. 6	G. & D. CTX 2	£10
G. & D. linear amp.	£87. 10. 0	G. & D. CTR70	£20
G. & D. 3N70 conv.	£16. 16. 0	G. & D. Mk3 conv.	£8. 19. 6

Codar preamplifiers and Q multipliers

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BC 348Q with external psu	£15
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HRO MX with GC and BS coils	£27. 10. 0
Class D wavemeter Mk. 2 (large type)	£10
BC 221AH with original charts	£13

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GREEN & DAVIS  
500W. SSB LINEAR

operates on 80-40-25-15 and 10m. With high efficiency on ALL Bands. Completely self-contained including P.S.U.  
R.C.A. 7094 Beam Tetrode. Light in weight—only 38 lbs.  
Absolutely reliable—12 months guarantee. Internal Ant. Change-over relay matches into ALL SSB TX or transceivers.

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H.P. TERMS AVAILABLE. TRADE-INS ACCEPTED

21 Birkin Lane, Grassmoor, Chesterfield, Derbyshire  
Tel.: Holmewood 506

### SMALL ADVERTISEMENTS, READERS—continued

TX, bandswitched 10-80m. CW/AM 120w. input, professionally constructed in crackle cabinet. Delivered London, £6.—Aitken, 19 The Headway, Ewell, Surrey. (Tel. 7804.)

WANTED: K.W. Viceroy Mark III or IV.—Hayes, 31 Beverley Crescent, Northampton.

2-INCH diameter x ⅜ in. thick alloy tube in 10ft. lengths plus one end-to-end coupler, total weight 5lbs. The Antenna Mast £5 per section. End-to-end couplers, 14s. 6d. each, carriage paid.—Write to: J. Davies, 34 Highfield Avenue, Romiley, nr. Stockport.

URGENTLY WANTED: H1231Z valves, also 250 mmF 6in. condenser. SALE: Mobile power supply and 12v. battery.—5 Farrant House, Winstanley Road, London, S.W.11.

SALE: Complete Station as used by VP8HF on South Sandwich Islands, comprising DX-40U and VF-1U, £28 pair. RA-1 (recently re-aligned by Daystrom) with crystal calibrator and Q-Multiplier, £39.—or £62 lot. Entirely unmodified. Free delivery 100 miles.—G3RFH, 5 Blakes Crescent, Highbridge, Somerset.

WANTED: Admiralty B34 or Eddystone 358X Receiver. Please state price and condition.—Box No. 4085, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

EDDYSTONE 770R VHF Radio and speaker, manual, etc., mint.—Offers to: Sutcliffe, 103 City Road, Bradford, 8, Yorkshire.

SALE: Mosley El-Toro Aerial, Model TW3X, as pictured on page 630 December, 1964, *Short Wave Magazine*. Six weeks old, cost £9 plus coax. Too many trees in garden! Sell £5 complete with 10 yards coax and earth rod.—G3RDG, QTHR. (Tel. Speedwell 8831.)

FOR SALE: 2-metre Transmitter, type WD 1540 in new condition. Valve line-up 2/CV788, 2/12AT6, 1/6X5G, 1/5U4G, mains PSU, price £6.—Call, 16 Slade Drive, Stratton St. Margarets, Swindon, Wilts. (Phone 3414.)

PANDA PR-120V 150w. Tx, £42, excellent condition. CR-100, S-meter, muting, spare valves, £16. New CR-100 handbook, £1. K.W. Converter, £12. Large American vibrator unit, as new, 6/12v. input, 115v. AC or 500v. DC output, £3. Inspect and collect, please.—G3NLY, 20 Bridge Cross Road, Chase Terrace, Walsall, Staffs.

REQUIRED by genuine collector: Any unusual miniature or suitcase type Receiver or Transmitter, or both combined, as were used by the Polish, French, Dutch, etc., S.O.E.—Resistance Movements; also handbooks or publications relating to this type of equipment. Good price paid.—Gee, 11 Whitehorse Lane, Stepney, London, E.1.

SHACK CLEARANCE: 10-metre Converter, 7.5 mc IF, £1. Output transformers, heater transformers, chokes, dozens of valves: 807, 6L6, 5R4GY, 6V6, etc. Offers to—G3PXJ, 43 Appian Close, Kings Heath, Birmingham, 14.

WANTED: Amateur-Band Converter, Geloso or Minimitter. Must be in good condition. Price to—Box No. 4081, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

HRO Senior, spotless condition, power pack and speaker, no mods., nine coils, £22.—G8KU, Roseacre, Irton, nr. Scarborough.

SALE: TCS-12 Tx, G2VV mods. PSU in matching cabinet, circuits and gen., exceptional condition, £18.—G3RTW, Little Meadow, Brickhouse Lane, Stoke Prior, Bromsgrove, Worcs. (Tel. 3313.)

SMALL ADVERTISEMENTS, READERS—continued

**SALE:** R.208 10-60 mc in three bands, works well, £5. Ex-R.A.F. Box Kite in container, can carry aerial, £1. *Practical Wireless*, 1960-64, 1s. each, postage extra.—Clark, Hillside, Butchers Hill, Shorne, nr. Gravesend, Kent.

**GONE Bonkers: Selling Creed 3X T/P for only £14 o.n.o.? Includes carriage U.K. FB condition.**—D. A. Hogg, Royston, Warwick Drive, Hale, Cheshire. (Phone 061 ALT 4083 after 18.30 hrs.)

**FOR SALE:** 40-watt homebuilt AM/CW transmitter, 160-10 metres, Geloso VFO, 807 PA, £14. Offers and enquiries to—E. F. Taylor, G3SQX, 5 Bernard Road, Birmingham, 17.

**WANTED:** RTTY AP.66862 TU, with AP.66863 PSU, in working order. **SALE:** FS.10 TU, £6.—G3MEW, 17 Testcombe Road, Gosport, Hants.

**NEW CR-100/8, offers?** Pye portable transistor, LW, MW and Trawler Band, £7 10s.—Sutcliffe, 103 City Road, Bradford, 8.

**FOR SALE:** One tubular steel mast of nine 8ft. 6in. sections, 2½in. diameter, complete with accessories and erecting handbook. Requires repainting before erection. Was erected and lowered again by one man to a convenient height of 54ft., £20 or offers?—G3NIV, 8b Duwich Road, Herne Hill, London, S.E.24.

**52** Set, as new, with mains/battery, PSU, spare valves and official Canadian Army manual, £12 o.n.o.?—Fenwick, 115 Church Hill Road, East Barnet, Herts.

**EDDYSTONE 680X, matching speaker, Brown's Type "A" phones, completely as new and unmarked, £60. No offers. Buyer collects (South Bucks).**—Box No. 4086, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**FOR SALE:** 4/UEW572B valves which are direct interchangeable replacements for any RF amplifier using 811A's. Also 4/6146B's; 30ft. metal tower, including TA-33Jr. Beam, rotator and indicator.—Box No. 4087, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**FOR SALE:** R.107 fitted with S-meter, £10. Eddy-stone 840C receiver, mint condition, £35. Heathkit 10-12U 5in. Oscilloscope, 2 months' old, £30.—Donovan, 25 Ringwood Avenue, Newport, Mon.

**WANTED:** Copies of *QST* and *Radio* prior to 1941. Also March 1946 issue of *Short Wave Magazine*.—G5LY, 33 Downs Road, Langley, Bucks.

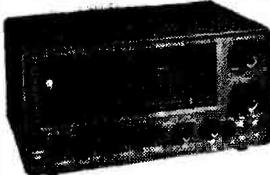
**FOR SALE:** AR88D with genuine S-meter, immaculate condition, £38 o.n.o. considered. TA.12G Tx unused, £3. Prefer buyer collects. **WANTED:** Copies of *CQ* for September 1956, February 1959 and March 1959, to buy or borrow.—G3JJM, 39 Tonge Park Avenue, Bolton, Lancs.

**FOR SALE:** Complete SSB/CW/AM Station. Hallicrafters 32A exciter, Hallicrafters HT-41 linear amplifier; Hammarlund HQ-170 Rx (with Telechron clock timer fitted). Spare valves for all three pieces of equipment also for sale. Heathkit HO-10 Oscilloscope. No reasonable offer refused.—Box No. 4059, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**WANTED:** SX-28 or AR88D receiver. Condition, price and details to—G3TJK, 86 School Lane, Broomfield, Chelmsford, Essex.

**FOR SALE:** Eddy-stone 840C, new November 1964, and Codar RF Preselector PR-30X, new December 1964. Both virtually unused, £50 and £4 or £52 together.—Box No. 4088, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**WORLD WIDE COVERAGE COMMUNICATION RECEIVERS**



**9 valves 4-waveband**

MODEL 4E-30 **£35.0.0** BRAND NEW

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AC107	12/6	OC75*	6/-
AF114	9/-	OC76*	6/-
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ADT140	15/-	GET116*	15/-
OC44	6/-	OC83*	7/6
OC45	5/-	OC84*	7/6
OC71*	4/-	OC170	7/6
OC72*	6/6	OC171	8/6
2N711A	15/-	AF139	19/6

**POWER TRANSISTORS**

OC25*	12/6	OC35*	15/-
OC28*	17/6	OC36*	15/-
OC29*	17/6	AD140*	19/6

\*Matched Pairs available. Send for New List.

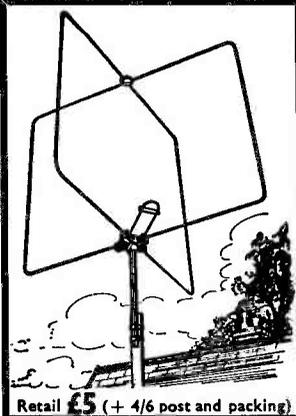
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 Albion Mews, Kilburn High Road, London, N.W.6  
 (MAIda Vale 5588)

# 'JOY' NEWS No. 7

## W.A.C.\*

### in under 12 hours!!!

(in very poor conditions)

**\*(Yes—worked all continents, transmit and receive)**

A photostat copy of ZL4GA's full report is available on request by return of post. Here are a few extracts:—

"I will, firstly, take this opportunity of congratulating Partridge Electronics Ltd. of producing a small sized transmitting and receiving antenna which will give the user excellent results, far beyond expectations, PROVIDING THE ANTENNA IS USED AS INSTRUCTED... It must be noted that I removed two permanent antennae before using the "JOYSTICK" to make sure that no other antenna could possibly assist, or interfere, with the "JOYSTICK" operation and the following report is therefore made with only the 'JOYSTICK' in use. Also, the nearest antenna is a TV mast, on Channel 1, AND THERE HAS NOT BEEN A SINGLE INSTANCE OF TVI. The TV mast is 100ft. from the 'JOYSTICK' and slightly higher... The enclosed Log copy will show that I have contacted 32 countries, to the 4th of January and on the 4th January I MADE WAC IN LESS THAN 12 HOURS and the EL2 contact is my FIRST WITH EL2, tho' I have tried for years to make contact with this country.

"No one could ask for a better result and I have no hesitation in praising this AMAZING PRODUCT which has done even more than the testimonials I have read from others."

(signed) Alan F. Frame, ZL4GA.

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*Multicore*  
**SOLDER**

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**2/6 each**

**SAVBIT ALLOY**  
*saves wear on*  
*soldering iron bits*

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Gives a professional touch—A handy precision tool allows quick and accurate editing—no wastage or post-editing clicks. Can be mounted direct on the tape deck. It uses all your odd lengths of tape.  
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Strips insulation without nicking wire, cuts wire cleanly, adjustable to most thicknesses. Splits extruded plastic twin flex.  
**3/6 each**



SMALL ADVERTISEMENTS, READERS—continued

**10W.** 160-80 metre Tx, plate and screen mod., 10 mains PSU, self contained 17 x 8 x 8in., £8.—Collins, 32 Albany Road, Skegness, Lincs.

**R.** 107, 1951 model, immaculate, p.v.c. wired, external S-meter, £14. Delivered 10 miles. Callers after 7 p.m. or weekends.—Parker, 8 Hill Grove, Romford, Essex.

**K.W.** Viceroy, Mk. III, £100. 4-125 (8), offers?  
**WANTED:** 500 kc mech. filters, 4X250B's.—Pilkington, 23 Southport Road, Ormskirk, Lincs. (Tel. 3209.)

**SELLING STATION:** Sphinx SSB/AM/CW Tx 160-80-20 metres, perfect, hardly used, microphone relay, £68. AR88D sprayed grey, working perfectly, v.g.c, £38. **WANTED:** Amateur Band Rx, could exchange.—David Power, Chapel Green, Fillingley, Coventry, Works.

**WANTED:** QSO on tape with SWL's, three speed recorder, any spool size, interested in all aspects of Amateur Radio.—Moseley, 80 Gordon Street, Northampton.

**FOR SALE:** SCR-522 official manual, £1. Signal Generator TF.390G, 10-150 mc, with manual, £3. 320 Service Sheets TV and Radio manuals, 1953-1963, offers? TR-1986 circuit, 5s. 5CP-1 plus screen and base, 10s. 3BP1 screen and base, 7s. 6d. 2AP-1, 5s. VCR-138A, 5s. 2.5 volt CT by Woden, 5s. 315-0-315v. 80 mA plus 2/6-3v. with matching choke by Haynes Radio, 30s. Large AM Morse key, 7s. 6d. 24-volt 16mm. recording camera, F1.9 to F16, 3 shutter speeds, magazine loading, with some film, working, 30s. All plus carriage.—Heeley, 27 Old Bank Road, Dewsbury, Yorks.

**GOING SSB.**—Sell 100 watt CW/AM table-top Tx, 80-10m., Geloso VFO, fully metered, screened, all TVI precautions, built-in K.W. low-pass filter, £9. Matching power unit, including speech amp/50 watt modulator, pair 5B/254M's, UM-2, all HT's, LT's, fully metered, relay controlled, £9—or pair £16 10s., with screened connector. VHF Signal Generator Type 101, £3. Audio Oscillator, switched 300-1000-3000 c.p.s., £2 5s. All collect or carriage extra. Crystals, 6s. each: 500, 1570, 1670, 7040, 14022-5 kc. FT241's, 24.3 (2), 24.4 (2), 24.5 (5), 24.6 (5), 25.1, 25.2, 29.2, 37.8 mc.—G3KGN, 126 Danescroft Drive, Leigh-on-Sea, Essex.

**SELLING Gear for space and Going Mobile.** Home-brew amateur band Rx 10-80 metres, needs slight attention, but fully working, £8. 19 Set with 12v. Rotary, working, but started modifying, VHF stripped out and new modulation in, £4. Cossor CC.15 VHF Tx/Rx, good condition, but never tested, suitable for 2-metre mod., £8. CW 80-metre Tx, rough looking, but working, VFO good, £5. 50-watt modulator, pair 807, needs attention, but working, £3. Mains xformers, 500-0-500v. 4v. 4A, 170 mA, 30s. 350-0-350v. 120 mA, 6.3v. 5A, 5v. 2A, 20s. These two and one other mounted on board forming power supply 500v., 340v., 250v. and 150v., DC, stabilised, the lot, £4. CRT 3BP7, 15s. EF184, 7s. 6d. each and most of gear must go; s.a.e., stating requirements, all items or near offer? and W.H.Y.? Postage please.—G3NEG, 22 Woodhurst Road, Canvey Island, Essex.

**FOR SALE:** RTTY, 7B printer and motor PSU, manual and paper; Creed Perforator; 80 + 80v. PSU. Rack, containing AP.66862 T.U. and AP.66863 PSU, tuning scope, AFSK oscillator, two switch panels and stabilised PSU. Demonstrated, sold complete, £50.—D. Butler, 17 Carlton Road, Woodside Estate, Grays, Essex.

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CMMS 24c

SMALL ADVERTISEMENTS, READERS—continued

**FOR SALE:** Geloso VFO 4/102, £4 10s. Modulation transformer, 50w., brand new, as used in K.W. Valiant, £3. Geloso pi-output, coil and switch assembly, 18s. Transformer 550-0-550v. Parmeko with all heater outputs, £1 10s.—Kellow, St. Dominic, Callington, Cornwall.

**RX 216,** 19-157 mc AM/CW/FM, PSU, manual, new, £40. Class-D Wavemeter, 240 volt. manual, new, £3 10s.—Barry, 15 Fairlawn Court, London, W.4.

**1964** Eddystone EC10 transistor receiver, £35, also 840C, £38, or exchange camera same value. *Wireless World* 1934 to 1952, complete. Offers? Will separate volumes.—Habesch, 19 High Street, Rhyl, Flintshire.

**HEATHKIT** Mohican, as new. factory assembled, £27 10s. Also Collins TCS-12 receiver H/D power pack, ready to work, £12. Buyers collect.—Sims, 47 Castle Street, Cirencester, Glos.

**FOR SALE:** Hallicrafters SX-28, no S-meter, £15. Also National 57M, £10. Both in good working order. Buyer collects.—72 Elmstone Road, Rainham, Kent.

**WANTED:** Two 1-to-1 right-angle bevel-gear drives, or four separate equal diameter bevel gears to fit 1/4 in. shafts.—Sandys, G3BGJ, 31 Churchill Road, Boscombe, Hants.

**FOR SALE:** New, due sudden death owner, the New Televet Type 259 Airmec Television tester, £45. Apply—Evenings only, Dobson, 18 Lavenham Drive, Woodley, Reading, Berks.

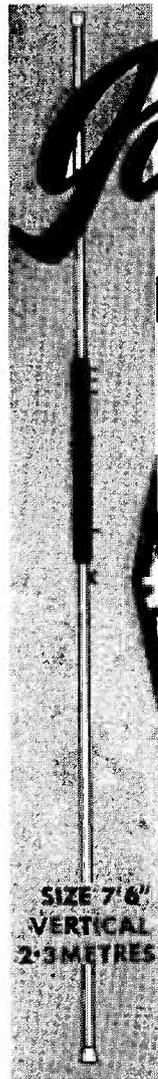
**EDDYSTONE** 358X, good order, ten coils, one needs mod. with PSU, £7 10s. BC-453's 190-550 kc, 3-6 mc, 6-9-1 mc. good order, cases dirty, £4 10s. each. Radio Compass receiver BC-433, good order, £7 10s. BC-456 Modulator, no valves, no generator, £1. Vibrator PSU N202937, £1. 80 watt petrol/electric generator, 12-volt battery charger, £7 10s. Aircraft generator 15 amp. 15 or 30 volt 2200-4500 r.p.m., £5. Two Flowmeter transmitters, contain autosynns. £2 10s. BC-375 Tx, dirty and shop-soiled, but full of super gear (no TU's), £2 10s. Radio-altimeter dipoles with coax socket, pair, 10s. Lots hydraulic gear, state requirements.—Hillier, 23 Queen Street, Bottesford, Nottingham. (Tel. Bottesford 446.) Will deliver 50 miles, otherwise radiotele.

**FOR SALE:** Two mobile Radiotelephones, 80 mc. licensable, good condition, complete with all accessories, handbooks, £45 each; set up on specified channels, £5 extra. Other sets also available. Two Marconi walkie-talkies, 86 mc, suitable amateur use, £12. Pye 15-watt base station, suitable 70 mc, £10. Pair all-transistor walkie-talkies, 27-28 mc, as new, in original packing, £20. Two Marconi signal generators covering 18-300 mc, with handbooks, £7 10s. the pair. American Pierce wire recorder, complete with Electro-Voice 630 mic., auto-transformer, three cassettes, leather framed headset and fibreglass carrying case, £15.—Storey, 49 Avon Road, Sunbury-on-Thames, Middlesex. (Tel. 4422.)

**WANTED:** Diagram and information on BC-624A.—Philpott, Russell House, Rye, Sussex.

**K.W.** Valiant and KW-76 Rx for sale, or exchange for RTTY equipment or Ciné equipment. All offers to—G3OFH, QTHR. (Tel. Watford 23015.)

**K.W.** Valiant wanted by Hull and District Radio Society. Details to—Secretary, G3TEU, 18 Malham Avenue, Anlaby Road, Hull, Yorks.



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## VARIABLE FREQUENCY ANTENNA

The DX aerial for any QTH!

Hear and work that spicy DX with the Joystick—lift yourself out of the frustration of "lump of wire" local contacts—pump out a real beefy signal—yes even from inside a flat or bungalow.

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COMPLETE

A life time of experience and aerial "know-how" has gone into the development of this revolutionary principle of a Variable Frequency Antenna on which World Patents are now pending. Possessing the unique property of an even performance over all frequencies between 1.5:30 mcs. the Joystick's special matching facilities and associated A.T.U. ensures efficiency on any frequency. Peak performance for transmission and maximum voltage for reception—the Joystick is a major break-through for ardent SWLs and all licensed stations. Over 1,500 stations all over the world are already equipped with the Joystick.

**W.A.C.**

in under 12 hours!!!

(In very poor conditions)

(See "Joy" News No. 7 on page 62)

A poor QTH is now no excuse for a weak signal — act . . .

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Full "money-back" **GUARANTEE** if you're not completely satisfied. Not convinced? Still complete the coupon below for a detailed brochure and showers of testimonials!

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Standard Model, £3 10s.  
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### SMALL ADVERTISEMENTS, READERS—continued

**WANTED:** Eddystone 888A. SALE: Lafayette HE-80, few hours use, £40. Hallicrafters SX-16, rebuilt, £20. S.38 and Codar pre-amp and S-meter, £17 10s. Heathkit RA-1, £27 10s. Minimitter Five-Band converter, £9. Hambander and pre-amp, £11. Canadian C.52, working, £5. R.1224, 1-9 mc, 2 plus 120v., £3 10s. Two R.107 Tuning Units, £1 10s. each. 6-volt PU for CR-100, £1 10s. "Joystick" and tuner, £2 10s. Offers invited. Carriage extra or callers 75388 (daytime).—Duke, 18 Hawkins Road, Folkestone, Kent.

**EXCHANGE:** AR88D, fitted S-meter, diversity IF gain, manual, for small comparable general coverage receiver or sell reasonable. Inspection preferred.—Box No. 4089, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**50**mm. Astronomical Telescope, X53, with clamp, perfect, cost £12 15s., offers around £8 or telescope and £5 for CR-100 in good electrical order.—Box No. 4090, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**SALE:** NCX-3 Transceiver, mint, 6 weeks' old, a real DX'er! Cost (£168), complete with NCX-A mains PSU/speaker (cost £54), XCU-27 crystal calibrator (cost £11), Shure 404C Dynamic mic. (recommended by National) (cost £11) and all handbooks. No real reasonable offer rejected! Genuine reason for sale! Can be viewed and tested, London area.—Box No. 4091, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**WANTED:** Old pair Brown's "A" Type headphones, burnt out acceptable, also CRT tube type 5API/1805/PI/CV 832.—G6RF, Talltrees, Lower Cookham Road, Maidenhead, Berks.

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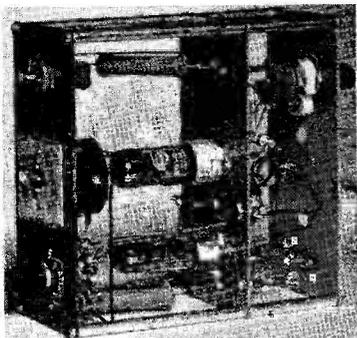
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CTR-70 CASE REMOVED



The illustration shows a CTX-4. The CTR-70 (its case removed) matches the new CTX-2 and CTX-4 in size only, 6 ins. x 2½ ins. x 6 ins.

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**THE NEW 2M15-20A IS THE HEART OF A COMPLETE VHF/UHF TRANSMITTING SYSTEM**

★2M15-20A Complete 2m. TX (20 watts) with PSU's (A.C. mains and 12 volt D.C.) with facilities for extending coverage to 4m and 70cm when connected to CTX-4 and CTR-70.

4m & 70cm The CTX-4 and CTR-70 plug straight into the sockets provided on the 2M15-20A. Thus utilising by standard interface, the PSU and modulator of the 2M15-20A.

★CTX-2 This 20 watt 2m CW/TX can be used with your own PSU and modulator. Your PSU, providing between 150 and 300 volts, as available.

★CTR-70 8-10 watt Tripler Amplifier for 70cms. This can be used with your own 2m TX, or a CTX-2, or 2M15-20A. When the CTR-70 is used with a CTX-2, then your existing modulator plus PSU is needed. NO PSU OR MODULATOR IS NEEDED if CTR-70 is used with a 2M15-20A.

★CTX-4 This 20 watt 4m CW/TX can be used with your own PSU and modulator. It will also PLUG STRAIGHT INTO A 2M15-20A, to extend the coverage of a 2M15-20A to the 70 Mc/s. band. NO PSU OR MODULATOR IS NEEDED if CTX-4 is used with a 2M15-20A.

2 metres	4 metres
2M15-20A or CTX-2	2M15-20A + CTX-4 or CTX-4
48 gns. or 14 gns.	48 gns. + 14 gns. or 14 gns.
70 centimetres	
2M15-20A + CTR-70	
CTX-2 + CTR-70	
14 gns. + £20	

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2 metres, Mk. III or Mk. IV Converters, £8.19.6 or 14 gns.  
4 metres, Mk. III or Mk. IV Converters, £8.19.6 or 14 gns.  
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GC-1U



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RG-1



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**"MOHICAN" GENERAL COVERAGE RECEIVER, Model GC-1U.** In the forefront of design with 4 piezo-electric transistors, 10 transistors, variable tuned B.F.O. and Zener diode stabiliser. £37. 17. 6 Kit £45. 17. 6 Assembled Suitable Battery Eliminator. Model UBE-1. £2. 17. 6 Kit

**AMATEUR TRANSMITTER, Model DX-100U.** Covers all the amateur bands from 160-10 metres, 150 watts D.C. Input. Own power supply. £79. 10. 0 Kit £104. 15. 0 Assembled

**SINGLE SIDEBAND ADAPTOR, Model SB-10U.** For use with most A.M. transmitters. Less than 3 W. R.F. input power required for 10 W. output. Operation on 80, 40, 20, 15 and 10m. on U.S.B., L.B.S. or D.S.B. £39. 5. 0 Kit £54. 18. 0 Assembled

**VARIABLE FREQ. OSCILLATOR, Model VF-1U.** Calibrated 160-10m. fund. outputs on 160 and 40m. Ideal for our DX-40U and similar TX. £10. 17. 6 Kit £15. 19. 6 Assembled

**GRID-DIP METER, Model GD-1U.** Continuous coverage 1.8 to 250 Mc/s. Self-contained. £10. 19. 6 Kit £13. 19. 6 Assembled

**HIGH SENSITIVITY GENERAL COVERAGE RECEIVER, Model RG-1.** A high performance, low-cost receiver for the discriminating Short-wave listener. Frequency coverage from 600 Kc/s. to 1.5 Mc/s. and 1.7 Mc/s. to 32 Mc/s. Send for details. £39. 16. 0 Kit £53. 0. 0 Assembled

**AMATEUR BANDS RECEIVER, Model RA-1.** Covers all amateur bands 10-160 metres. Half-lattice crystal filter at 1.6 Mc/s. I.F. Provision for fixed, portable or mobile uses. Switched USB and LSB for SSB. £39. 6. 6 Kit £52. 10. 0 Assembled

**Q MULTIPLIER, Model QPM-1.** May be used with receivers having 450-470 Kc/s. I.F. Provides either additional selectivity or signal rejection. Self powered. Model QPM-16 for 1.6 Mc/s. I.F. Either model £8. 10. 0 Kit £12. 14. 0 Assembled

**AMATEUR TRANSMITTER, Model DX-40U.** From 80-10m Power input 75 W. CW., 60 W. peak, C.C. phone. Output 40 W to aerial. £33. 19. 0 Kit £45. 8. 0 Assembled

**REFLECTED POWER METER, Model HM-11.** Indicates Antenna/Transmitter match. £8. 5. 0 Kit £10. 10. 0 Assembled

## AMERICAN HEATHKIT SINGLE SIDE BAND EQUIPMENT

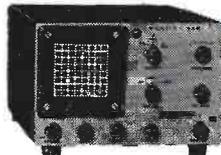
(At time of going to press, all American models are subject to an additional import levy of approximately 15% on prices quoted below. Full details sent on request.)



SB-300E



SB-400E



HO-10E



HW-12

**SB-300E AMATEUR 80-10m. BANDS RECEIVER.** This de-luxe receiver offers unsurpassed value to the Radio Amateur. Of advanced concept, employing up-to-date design and construction techniques its ultimate specification ensures unparalleled performance. Full specification and details on request. Weight 22lb. Power Req.: 115/230v. A.C. 50-60 c/s. 50 watt. Size: 14 7/8" x 6 3/8" x 13 3/8". £133. 14. 0 Kit (Less speaker)

A fitting companion for this receiver is the SB-400E Transmitter which is designed for "lock-in" facility with the SB-300E. A self-powered filter type Tx covering the "Amateur" bands, 80 to 10m. with a P.E.P. of 180 watts. Weight 33lb. Power Req.: 115/230v. A.C. 50-60 c/s. Size: 14 7/8" x 6 3/8" x 13 3/8". £165. 4. 0 Kit

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Model HW-12. 80m. } £60. 1. 0 each. Kit  
HW-22. 40m.  
HW-32. 20m.  
GH-12. Push-Talk Microphone £3. 13. 0 Assembled

**3" MONITOR SCOPE, Model HO-10E.** A must for the SSB station. Gives at-a-glance, visual indication of your transmitted signal and the incoming signal, displaying envelope patterns. Built-in two-tone generator ensures a clean output signal. Power Req.: 115/230v. A.C. 50/60 c/s. £34. 10. 0 Kit

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