

# The SHORT WAVE Magazine

VOL. XXII

AUGUST, 1964

NUMBER 6

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

Consult us at K.W. for all your equipment—we may have it in stock

**NEW!** CDR Rotor and Control Unit TR11A £13. Also in stock models AR22, TR44 and "HAM-M."

### WE STOCK:

KEYS—Vibroplex Semi-automatic and G.P.O. type. HK1B keyer.

VFO'S—Geloso, Miniphase. TOWERS—G3BX1 and S.V.S. PHASE-SHIFT NETWORKS—B and W.

ROTATORS—CDR TR11A, AR22, "HAM-M," & TR44. BEAMS—Mosley, Hy-Gain. IH2 2 metre curtain.

AERIALS—K.W. & Mosley, G3FIF & Webster Band-spanner (mobile).

MIC'S—Geloso, Shure, Acos. FILTERS SSB—McCoy Crystal and Kokusai Mechanical.

FILTERS—High Pass and Low Pass.

"WALKIE-TALKIE"—Tokai Transceiver on 28.5 mc/s. New 200 mW. model.

AIRDUX COILS. Complete range  $\frac{1}{2}$ " to 2" dia.

RELAYS—Dow Key Co-axial type.

SIG. GENERATOR—Nombrex Transistorized.

CABLE—Co-ax 75 and 52 ohm, 15 s.w.g. enamelled copper.

POLYTHENE CORD—280 lb. and 350 lb. strain.

SWR INDICATOR—KW Match 75 or 52 ohm.

CONVERTER—Front-end KW, Geloso.

PLUGS, SOCKETS, Pi COILS. R.F. CHOKES, etc.

COLLINS 'S' LINE 32S3 & 75S3



The KW77 Receiver

### K.W. TRANSMITTERS

KW "Viceroy" S.S.B. Transmitter MK. IV with built-in Power Supply £156 (Additional  $\frac{1}{2}$  lattice filter, £9 extra)

KW500 Linear Amp. 500 watts p.e.p., £78 10s.

KW "Vanguard" A.M. and C.W. 10-80m. 63 gns. 10-160m. 67 gns. Kits also available. KW160. Top band transmitter with a punch, £29

Send for details.

Carriage extra

Awarded Silver Plaque, Radio Communications Exhibition, Seymour Hall, London, 1963



KW2000 SSB TRANSCIVER AND A.D.C. POWER SUPPLY 10-160 metres, Mobile and Fixed Station

Easy Terms Available

NEW! 50/- each  
6146B tubes 2/6 postage & packing

Importers of U.S.A. Equipment

- ★ Mechanical filter provides pass-band for SSB
- ★ No external antenna switching required
- ★ Independent transmit and receiver frequencies or true transceiver operation
- ★ 90 watt p.e.p. provides effective mobile power whilst not over taxing the car battery
- ★ 12 volt d.c. transistor power supply
- ★ Easy to install in a vehicle for mobile operation
- ★ Lightweight, attractive, robust, efficient
- ★ 100 kc Calibrator built-in

# KW

## ELECTRONICS LTD Vanguard Works

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# BEGINNERS

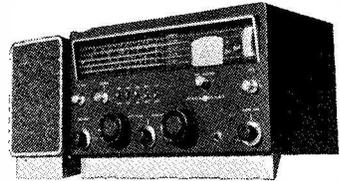


## NC77X

The perfect beginner's receiver — time tested, conservative design, as in the most expensive National equipment. 115v. A.C. transformer operation, eliminates hum and polarity problems, shock hazards and grounding difficulties, normally associated with AC/DC receiver. Features continuous coverage from 540 kc. to 31 mc. in four bands with separate electrical bandspread. Giant easy to read dial with standard broadcast, WWV, marine, aircraft, amateur and foreign shortwave frequencies clearly marked. Built-in 5" speaker. Front panel jack. Separate tuning coils on each band for top selectivity and sensitivity. Size: 7 $\frac{3}{8}$ " x 13 $\frac{1}{2}$ " x 8 $\frac{5}{8}$ " deep, weight approximately 15 lbs. Front panel is solid brushed aluminium with black trim, cabinet is rugged steel with blue-grey wrinkle enamel finish.

(with oiled walnut cabinet £37.0.8) **Price £28.3.4**

# ADVANCED LISTENERS



## NC190X

SSB, AM and CW amateur band performance plus calibrated foreign broadcast bandspread. NC190X provides double conversion, tune variable IF selectivity better than 1.0 uv. Separate product detector, SSB, AGC and calibrated USB/LSB BFO control. Frequency coverage from 540 kc. to 30 mc. in five main tuning bands; patented dial selector provides bandspread scales for 80, 40, 20, 15 and 10 metres.

**Price £85.16.8**

NTS-3B matching speaker £7.8.1.

# HAMS

## NCX-3

Tri-band SSB Transceiver a complete SSB/AM/CW station with a conservative 200 watts of SSB punch. Complete coverage of the 80, 40 and 20 metre phone and CW amateur bands.

**Price £148.8.4**

## NCL-2000

New, 2000 watt Linear Amplifier.  
Only £235

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7730 7840 7850 7788 800143 800769 8021 8036 8090 8091 8092 8103 8104 8110 8790

Most of our stock frequencies including the above are offered at 5/- each. A special discount of 20% (4/- in the £) on all orders for crystals in these ranges amounting to 25/- and over. Allow 6d. per xtal P. and P.

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10xac4 20187.5 and 20237.5 Kc/s. 10xac5 20287.5 and 20237.5 Kc/s. 10xac6 20837.5 and 20437.5 Kc/s.  
10xac10 (single) 31.5 Kc/s.

### HIGH SPEED IMPULSE COUNTERS

By DAVIS, WYNN and ANDREWS

4" dial and pointer registers up to 100 and 4-digit counter, both manually re-settable. The drive to the counter is by an inverse escapement so that there is no loading of the pointer mechanism when digits are changed, and adjustable pawls are unnecessary.

Coil resistance 100 ohms for nominal 50 volt operation, but the device works reliably from 20 volts at rates up to 10 impulses/sec. In circuit with a thyatron or neotron counting rates up to 100 impulses/sec. are possible provided pulse width is restricted to keep mean current to 100 mA.

Highly suitable as readout element for Geiger counters and similar devices where the pointer movement would give a clear impression of change in rate of count.

Brand new in individually sealed boxes. £4.7.6



### FOSTER VARIABLE VOLTAGE TRANSFORMER

Input 120—250v. Output 0—250 at 3 amps. or 280 at 2 amps. Brand new, in cylindrical pot, size 6 1/2" high, plus 1" control knob, diam. 6 1/2", weight 11 lbs.

Few only £7.5.0 P. and P. 4/-

### FIELD STRENGTH METERS

100—150 Mc/s. incorporates 0-1 M.A. meter I.S.5 telescopic aerial, batt. operation 90 and 1.5v., in black crackle case 7" x 7" x 7",

35/- P. and P. 2/9

### WIRELESS TRANS-RECEIVER

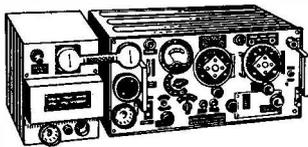
TYPE 19

with power pack for 12v. input, Covers 2-8 Mc/s. and 240 Mc/s. V.H.F.I.F. used 465 Kc/s. C.W. or speech. Untested, in good condition, fully valved.

£4.17.6 Plus £1 P. and P.

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Aerial Variometer, 17/6. Plus 2/6 P. and P.

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Control Box, 10/- Plus 2/- P. and P.

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Brand new with maker's guarantee

Plate size	£	s.	d.	carr.	18v. max. input	£	s.	d.	carr.
12v. D.C., 12 amps. ...	1	12	6	3/6	D.C. output, 1 amp. ...	1	5	6	3/6
12v. D.C., 18 amps. ...	1	19	6	3/6	D.C. output, 2 1/2 amps. ...	3	6	1/-	
12v. D.C., 36 amps. ...	3	19	6	7/6	D.C. output, 4 amps. ...	12	6	1/6	
12v. D.C., 54 amps. ...	5	17	6	7/6	D.C. output, 8 amps. ...	19	6	2/-	
24v. D.C., 18 amps. ...	3	19	6	7/6	New and guaranteed transformers suitable for use in conjunction with above, tapped at following voltages: 3, 4, 5, 6, 8, 9, 10, 12, 15, 18, 20, 24, 30.				
24v. D.C., 36 amps. ...	5	19	6	7/6					
24v. D.C., 54 amps. ...	11	15	0	7/6					
36v. D.C., 18 amps. ...	5	17	6	7/6					
36v. D.C., 36 amps. ...	11	15	0	7/6					
Plate size: 4 1/2" x 4 1/2"	£	s.	d.	carr.	2 amps. D.C. ...	1	5	6	3/6
12v. D.C., 8 amps. ...	1	19	6	2/6	4 amps. D.C. ...	1	19	6	4/-
24v. D.C., 8 amps. ...	1	19	6	3/6	5 amps. D.C. ...	2	5	0	4/6
36v. D.C., 8 amps. ...	2	19	6	3/6	10 amps. D.C. ...	4	15	0	8/-

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800 P.I.V. 550 M/A out, 7/6 each  
1,000 P.I.V., 9/- each P. and P. 1/- each

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12/6 P. and P. 1/-

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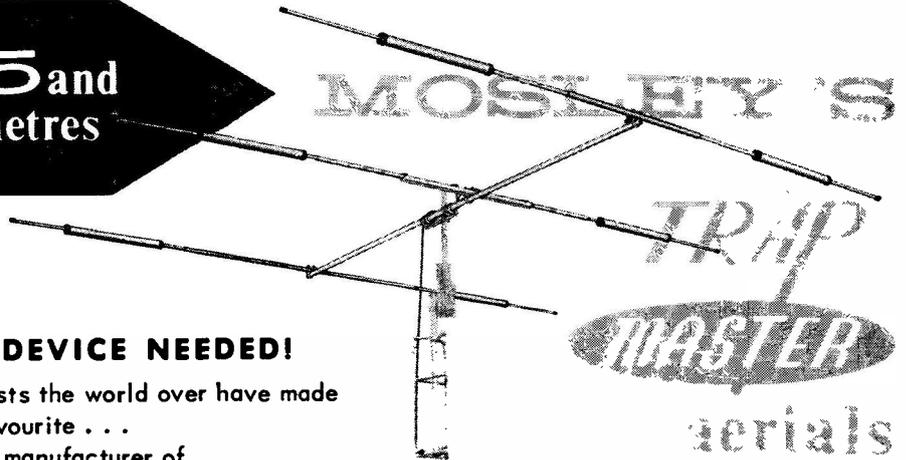
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# An Outstanding Buy! MOSLEY'S COMMANDO II

Commando II incorporates many features which makes it an outstanding transmitter buy. Only reliable "air-tested" circuitry is used. Power Supply is the latest cool-running Silicon Rectifier, fuse protected and conservatively rated. Power Amplifier employs two 6146 Tetrodes operating at 750 Volts Class AB<sub>1</sub> Linear Amplifier Service to give maximum I. C. A. S. rating at 180 watts P.E.P. The Pi-Tank circuit bandswitching 80 thru 10 metres gives efficient loading into low impedance coaxial lines. Sideband generation at 435 kcs. with half-lattice crystal filter for 45 db. sideband/carrier rejection. Sideband switch in "normal" position is correct for band in use, but, an "inversion" switch gives choice of alternate sideband.

for 10  
15 and  
20 metres  
its



## NO MATCHING DEVICE NEEDED!

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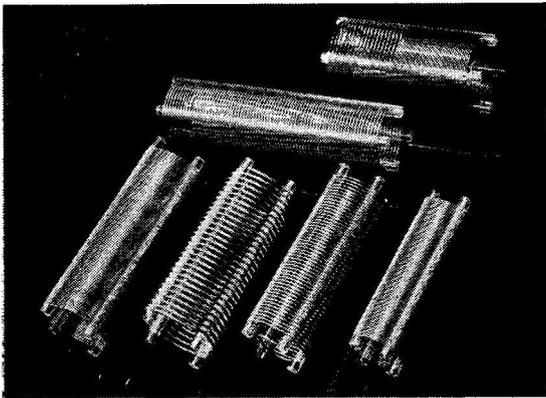
TRAPMASTER is now made in England too! Write for full details.

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TOP QUALITY—LOW COST



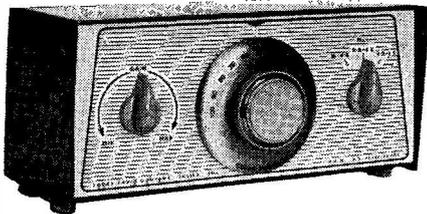
AMATEUR RADIO EQUIPMENT



## ★ CODAR-QOILS ★

### AIR SPACED INDUCTORS

CODAR have developed a complete range of low loss air spaced inductors suitable for all types of circuit application. There are over 40 different sizes from  $\frac{3}{4}$ " to 3" diameter and if you need a coil for a V.F.O., P.A. Tank, Pi-network, A.T.U., aerial loading, etc., there's a CODAR-QOIL that's just right for the job. Full data giving inductance values, Frequency/Capacity figures, "Q," etc., and prices free on request.



## ★ P.R. 30. R.F. PRESELECTOR ★

Frequency range 1.5-30 Mc/s.

The P.R.30 R.F. Preselector is used in commercial and amateur stations throughout the world, and it will substantially improve the performance of any superhet receiver whatever its age or make. It provides up to 20 dB gain using EF 183 Frame Grid Amplifier, and outstanding features include precision vernier tuning, gain control, selector switch for either dipole or end fed antenna, silver plated H.F. coils, etc.

Cat No. P.R.30. For external power supplies (obtainable from receiver) £4. 17. 6. Carr. 3/-.

Cat. No. P.R.30X. Self powered model for 200/250 volts A.C. Fitted with accessory socket to provide up to 25 M/a at 200 volts H.T. and 6.3 volts 1 amp for other accessories. £7. 2. 0. Carr. 3/-.

Both models complete, ready for use with all plugs, ccbles.

## CODAR A.T.5. 12 watt 2 BAND MINIATURE TRANSMITTER

"The tiny Tx with the BIG voice"

The CODAR A.T.5. is the newest, most compact, 160/80 metre Tx for fixed and mobile use.

Check these outstanding features—

High stability new type calibrated V.F.O. 1.8-2.0 Mc/s. and 3.5-3.8 Mc/s. (up to 4 Mc/s. export).

Low loss air-spaced CODAR-QOIL Pi-net output.

P.A. Plate current meter, plus neon indicator.

Plate/screen modulation.

AM/CW switch and Panel key jack.

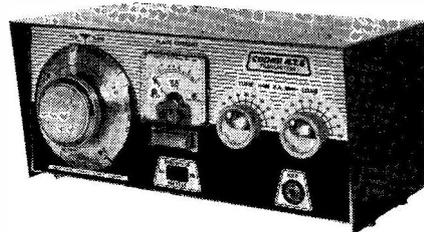
Plug changeover for 6 or 12 volt heater supply.

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Matching P.S.U. for 200-250 A.C. with Standby/Net/Transmit and aerial changeover switching, stabilised V.F.O. supply, neon H.T. standby/on indicator. Cat. No. 250/S. £8. 0. 0. Carriage 5/-.

12 volt P.S.U. available shortly.

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All publications marked\* were reviewed on pp.502-504 November 1963 Short Wave Magazine

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## SHORT WAVE (HULL) G5GX

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EDDYSTONE 670.	Marine	17	10	0
EDDYSTONE 740.	550 kcs. to 30 mcs.	25	0	8
EDDYSTONE 750	...	44	0	0
H.R.O. 60	...	110	0	0
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NATIONAL NCX3.	SSB transceiver, 80, 40, 20—200 watts	148	8	4
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HALLICRAFTERS SX111.	Amateur bands	120	0	0
EDDYSTONE 870A	...	34	5	8
EDDYSTONE 840C	...	62	0	0
EDDYSTONE 940	...	125	0	0
EDDYSTONE EC 10.	New transistor receiver early delivery	48	0	0
EDDYSTONE EA 12.	New Amateur bands receiver, ex-stock	185	0	0
TELREX	4 element w/s beam for 15 metres	18	0	0

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£65 allowed on your Eddystone 888A against a new EA 12

Wanted—your modern receivers, SSB gear, etc.

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SAVBIT ALLOY saves wear on soldering iron bits

The world-famous copper loaded alloy containing 5 cores of non-corrosive flux, that saves the soldering iron bit. Ersin Multicore Solder is also available in high tin quality alloys. 60/40 in 22 s.w.g. for printed circuits, transistors, etc.

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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. 18/6 each



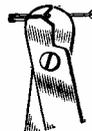
### THE HANDY DISPENSER



Easy to find in the tool box—simple to use. Virtually a third hand for tricky soldering jobs. 14 feet 5-core 18 s.w.g. ERSIN MULTICORE SAVBIT alloy in a continuous coil used direct from free-standing dispenser. 2/6 each

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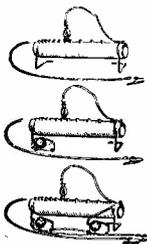
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FOR THE RADIO AMATEUR AND AMATEUR RADIO

# The SHORT-WAVE Magazine

## EDITORIAL

**Chaos** *Readers in the U.K. will hardly need to be told that this issue has been produced under somewhat difficult conditions, to say the least. In London, the postal delays started on July 10, and deliveries were still very uncertain at the time of going to press, more than a fortnight later. From a study of the post-marking and dates of letters received, there appears to have been the longest delay on postings made between about July 10 and 14. (This got into the sacks "underneath"). It means that we had not received—by the time this issue had to clear for press—much correspondence that is normally taken into the regular news features. At the moment of writing, the position is as follows:*

**DIRECT SUBSCRIBERS:** *The Post Office is not accepting wrapped mail in bulk, even if posted at letter rate. The subscriber copies will, of course, go out just as soon as the G.P.O. will accept them.*

**RETAIL DISTRIBUTION:** *This should not be seriously affected, and newsagents should have their supplies in the usual way.*

**SMALL ADVERTISEMENTS:** *All those received as at close of press have been taken in. It would seem that not many posted during the July 10-14 period have yet reached us.*

**BOOKS AND MANUALS:** *On July 17, the G.P.O. announced that anything weighing more than one pound could not be accepted. This immediately meant that we were unable to despatch many book orders, as nearly all these weigh over the 16 oz. All such orders have, however, been packed and are ready to go out as soon as the G.P.O. will take them.*

**COUNTER SERVICE:** *Copies of this issue are available for sale across the counter at 55, Victoria Street, S.W.1, and all books, maps and manuals as regularly advertised can also be supplied at the prices quoted on pp.324 and 375. Our counter is open from 9.15 a.m. to 5.15 p.m. all day Mondays to Fridays. It is easy to find—near the Strutton Ground turn off Victoria Street, on the District Bank side, with a ground-floor window display.*

*It is much to be hoped that the postal service will be more normal when the time comes round to get our September issue out—in the meantime, we can only assure readers that we have done all we can to minimise the inconvenience we share with them, to say nothing of the loss of business that a disruption of this sort causes. And as it is not unlikely that the long-term effect of such a heavy accumulation as they had at the main sorting offices could last into August, it would be as well to allow at least one extra day for mail to reach us.*

*Austin Forster,  
G6FO.*

## WORLD-WIDE COMMUNICATION

**Stop Press:** G.P.O. announced that facilities normal w.e.f. July 31.

## ONE-WATT TRANSISTOR TRANSMITTER

FOR 80-METRE CW—DESIGN,  
CONSTRUCTION AND RESULTS

P. T. BEER (G3AM)

*While it can fairly be claimed that the active AT-operator interest in low-power LF-band transistorised transmitters was first inspired by G3HMO's articles in "Short Wave Magazine" as long ago as 1954, it is some years since we have published any further transistor transmitter (TTx) designs. That discussed here is a very*

**C**OMPARATIVELY little has been published within the last few years on the subject of transmitting with transistors, other than an occasional design for a Top Band TTx. No doubt this has been due to the absence on the British market of RF transistors capable of reasonable output on higher frequency bands. Lack of information on the subject is certainly not due to any indifference to transistors, or QRP working in general, as has been amply demonstrated by the very great interest shown during the three months or so during which this little transmitter has been tested on the air.

Apart from interest in transistors and a leaning towards low-power working, the writer is so sited from a TVI point of view that, short of restricting operating to non-TV hours, the gentle art of QRP seemed the logical approach to peaceful co-existence.

The location at G3AM is such that some TVI is inevitable with a transmitter of normal output. The situation is a fringe TV service area with neighbouring aerials in close proximity to the only practicable sky-wire, a rather inefficient end-fed arrangement.

This state of affairs, together with a desire for something small and suitable for easy transport to an alternative address or portable site, and not dependent on a mains supply, led to the construction of the QRP transistor transmitter described here and incidentally, to a most interesting and rewarding project.

The following, whilst being a general description of the attempt to meet the specification and not intended to be a constructional

*practical CW transmitter for QRP working on the 3.5 mc band, with which our contributor has been obtaining very satisfying on-the-air results. A little rig of this sort is just about ideal for a /A holiday and, given a reasonable aerial, interesting QSO's should be possible all round the U.K. on 80-metre CW.—Editor.*

article as such, will enable those who have a taste for QRP, or TVI trouble (or simply an urge to get off the well-beaten track) to duplicate this little TTx.

Several factors led to the choice of 3.5 mc as the band for operation: (1) It would offer a wider range of possible contacts than Top Band; (2) Forty was ruled out as suitable transistors capable of producing a reasonable output on that band were not available at the time; (3) Whereas a reasonably efficient half-wave length of wire for 80m. could just be accommodated, anything like an efficient radiator for Top Band working was out of the question.

This matter of aerial length would of course also hold good for portable working, as a 3.5 mc antenna would be much easier to manhandle.

### Circuit Considerations

Having decided on the band one or two trial circuits were put together to determine the possibilities of available transistors in an eighty-metre Colpitts oscillator, and, as had been expected, XA102's in a VFO-BA-BA unit proved to be very satisfactory. The choice of Colpitts oscillator for the VFO because of its stability was later amply justified on test—and on the air.

As operation was required at the VFO frequency,



The completed G3AM TTx described in the article. It has now been in use on 80m. for more than three months. In that time all the U.K. has been covered, also Northern Europe as far as UA1. The cards in view confirm some of these contacts, obtained with a PA input of about 750 milliwatts only. An essential factor for success is a good ATU, as shown in the main circuit diagram, and a reasonable aerial. Though the VFO is fundamental, the buffer amplifiers ensure stability and a good T9 note.

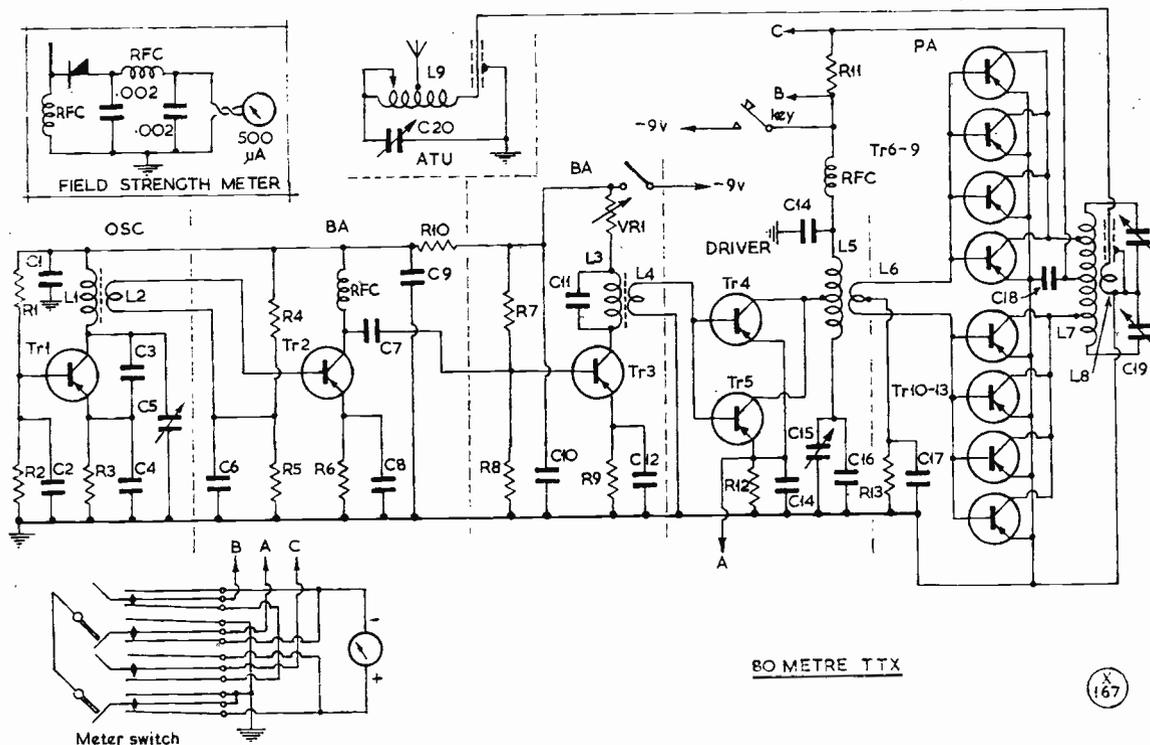


Fig. 1. Circuit of the G3AM TTx. It is a five-stage VFO-BA-BA-Driver-PA design, running about 750 mW in the parallel push-pull PA, using eight XA120's in two banks of four each. With only an indifferent aerial, this transmitter has given CW contacts all over the U.K. and much of Europe, with a T9 note and no traces of instability — in spite of the fact that all circuits are on the same frequency. An ATU to resonate the aerial exactly is a necessity to make the most of the available RF and the field-strength meter (shown inset) is an important adjunct in getting the aerial radiating efficiently. All necessary information is given in the article and some constructional details will be evident from the photographs.

effective screening had to be provided to prevent instability in the amplifier stages. The layout was therefore arranged to achieve this. The actual size was dictated by availability, a likely-looking screening box measuring 4in. x 3½in. x 2in. being "selected from stock" and the unit built to fit into it.

The whole VFO-BA assembly was constructed on two sides of a metal panel measuring roughly 4in. x 3½in.; this panel when mounted in position divided the screening box into two compartments one inch deep.

The Colpitts oscillator was arranged on one side of this panel, with the components grouped around the centrally placed tuning condenser C5, this being a 50 μμF variable cut down to 5 plates each side. Miniature porcelain stand-off insulators were used to provide rigid anchoring points and supports for the fixed condensers, resistors, and the VFO coil assembly L1, L2.

Throughout this transmitter the transistors themselves were held firmly in position by means of grid clips, from vintage valves, rivetted to the metal chassis and the transistors clipped in. This left the connecting wires ideally positioned for joining to the appropriate points, and also formed quite good heat sinks.

To provide adequate gain and VFO isolation two buffer amplifier stages were built on the reverse side of the metal panel. These were arranged around the

**Table of Values**

Fig. 1. The G3AM Transistor Tx for 80m.

C1 = 1 μF, paper	C20 = 140 μμF, var.
C2, C9 = .005 μμF, cer.	R1, R7 = 56,000 ohms
C3 = 150 μμF, s/m	R2 = 33,000 ohms
C4 = 603 μμF, s/m	R3 = 5,600 ohms
C5 = 50 μμF, var.*	R4 = 6,800 ohms
C6, C8, C10, C12 = .01 μμF, cer.	R5 = 1,200 ohms
C7 = 100 μμF, s/m	R6 = 270 ohms
C11 = 125 μμF, s/m	R8 = 2,200 ohms
C13 = .002 μμF, cer.	R9 = 82 ohms
C14, C17 = .01 μF, mica	R10 = 150 ohms
C15 = 80 μμF, var.	E11, R12 = Meter shunts
C16 = 25 μμF, s/m	R13 = 100 ohms
C19 = 80 μμF, twin gang var.	VR1 = 20,000-ohm potentiometer

NOTE: \*C5 is cut down to five plates on rotor and stator. The capacity used should be such as to give adequate spreading of the 3.5 mc band.

oscillator tuning condenser ball-drive, with small vertical screens added to isolate the inductances. The oscillator coil, L1, was mounted so that it projected through a hole in the panel, and a ten-turn coil L2 was used to couple this stage to the first buffer amplifier.

Originally an XA102 was used in the first BA but this was later changed to an OC170 with improvement in both gain and isolation. The second amplifier was tuned by means of the slugged coil L3 and fixed condenser C11 to the centre of the CW portion of the

the 80m. band; the damping effect of the transistor on the tuned circuit was sufficient to provide adequate broad-banding and drive throughout the 3.5-3.65 mc area.

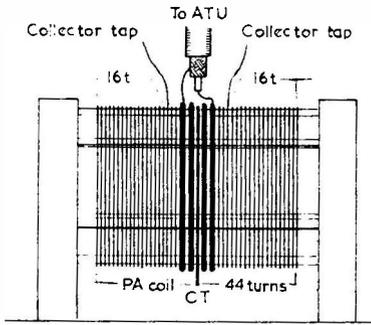
C11 was at first made variable, but as the advantages of variable tuning this stage were later not considered to be worthwhile, pre-set tuning was decided upon, and a 2,000 ohm miniature variable resistance VR1 was mounted in place of the tuning condenser. This controls the collector supply to the XA102 amplifier, and forms a drive level adjustment which has since proved extremely useful.

The performance of the completed VFO unit gave much satisfaction. The tuning constants chosen enabled the whole of the 3.5 mc band to be covered, should local phone working be required later. Stability

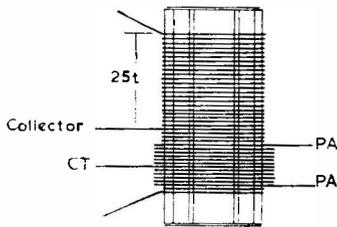
was quite satisfactory and the note clean. It was in fact the success of the VFO unit which provided much of the urge necessary to carry the project through to completion.

The complete transmitter, aerial tuning unit and batteries were housed in a cast aluminium box of W.D. origin, measuring 10in. x 6in. x 4½in., and the general layout was arranged to fit into this size. The photographs give some idea of the general construction.

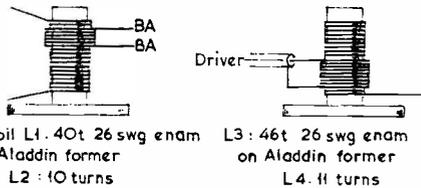
The VFO unit was fixed to the front panel and a chassis arranged around it to accommodate the driver, the power amplifier, and the aerial tuning unit. A coax lead from the VFO plugs into a socket above the driver compartment—a useful arrangement, this, in that it allows an alternative



L7: 44 t 22swg enam. 20t per inch on 1 5/8" dia. ribbed ceramic former  
 L8: Coupling coil 2t each side of centre



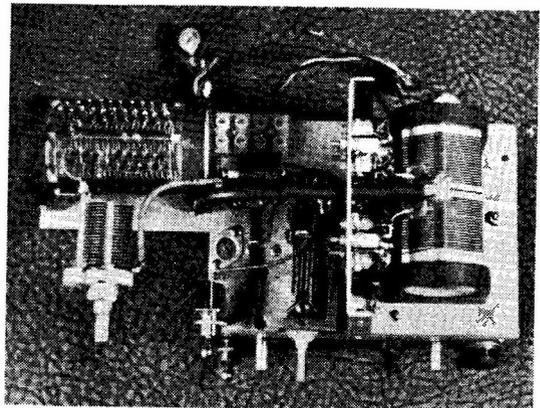
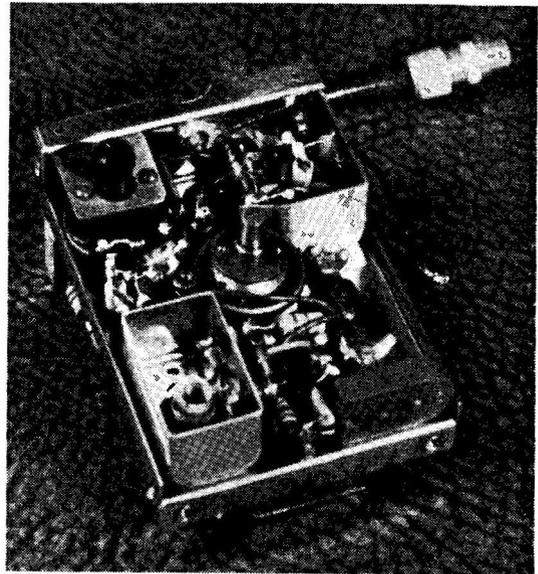
L5: 40t 20swg enam on 1" dia. former close wound  
 L6: 10t centre tapped



ATU coil L9 as PA coil L7

X  
168

Coil construction details for the G3AM transistor transmitter for 80m. CW. Note that the ATU coil L9 is made in the same way as the PA tank coil L7.

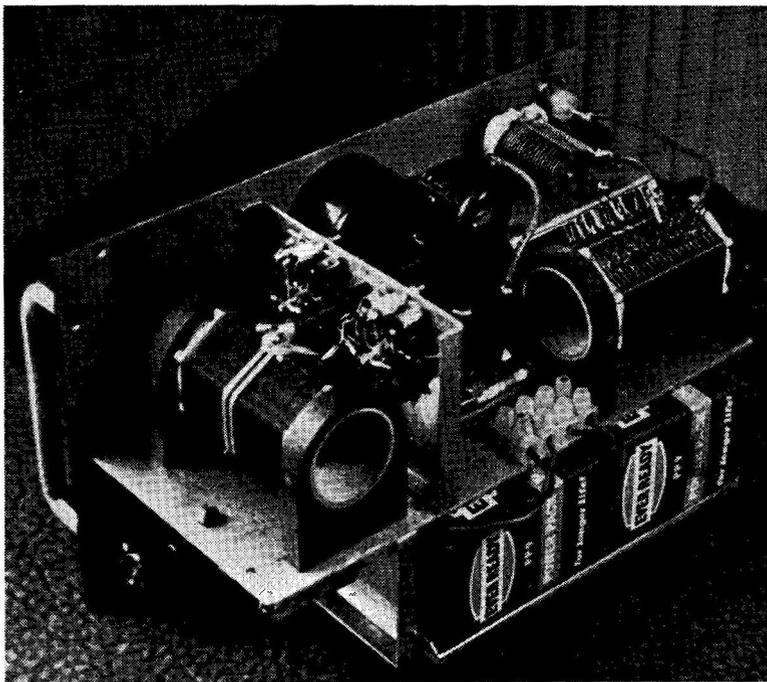


Showing stages in the construction of the G3AM TTx. Below is the ATU/PA section with the tapped aerial tuning coil L9 and its tuning condenser C20, on the left. The PA transistors can be seen grouped on the vertical panel, looking into the L7, L8 assembly.

VFO unit or PA stage to be tried out should the occasion arise at a later date. All leads carrying RF were passed through the various screens by means of polystyrene insulated feed-through connectors (salvaged from a TV chassis). These connectors are available from component suppliers, and, when inserted at appropriate points, they form a neat assembly and provide rigid anchoring points for components.

Coil L5, for the driver collector, was close-wound on a lin. diameter ribbed former, and, although rather large physically for the space available in the driver compartment, it proved satisfactory, in spite of its position close to the screens.

The collector tap was located well down towards the earthy end of this coil to minimise damping by the paralleled driver transistors. Also at the earth end is the centre-tapped coupling coil L6 to the PA transistor bases; the by-passed resistor R13 from centre-tap to chassis provides bias for the power amplifier.



General view, half-rear, of the construction of the G3AM transistorised 80m. CW transmitter. As explained in the text, it built in units, these forming the necessary screening partitions, since all five stages are on the same frequency. The PA tuning coil L7 is at left, with the link L8 for coupling into the ATU coil L9 — see text and Fig. 1.

### The PA Stage

The connecting leads from L6 to the push-pull PA transistor bases were made as symmetrical as possible, and high efficiency was aimed at in this parallel push-pull power amplifier. The tank coil L7 originally did duty in an Admiralty wavemeter, and it has since put up a very good performance in its new role.

Much time was spent determining the optimum points for the collector taps; the extremely low impedance of the paralleled transistors set these just a few turns each side of centre tap.

The coupling coil L8 to the aerial tuning unit was overwound on the PA tank coil, two turns each side of centre, and connection made *via* a short length of coax.

The PA and ATU coils are identical, except that the aerial tuning coil was tapped at every turn to provide accurate matching, and to ensure that all available power was radiated.

In the interests of stability the VFO unit runs continuously from its own 9 volt battery. The driver and power amplifier are keyed and have their own battery supply.

Arrangement was made for metering the driver and power-amplifier stages. A G.P.O. type key switch switches the basic meter into the appropriate circuit, with shunts arranged to accommodate the current ranges, 0-20 mA and 0-100 mA for the driver and PA respectively.

Some form of field-strength meter is essential for

setting up at such a low power level. Therefore, a diode detector with a short pick-up stub (*see* circuit inset, Fig. 1) was constructed and located at a point as remote from the operating position as possible. A fifty-yard length of twisted flex was run from this unit to a 500 microamp. meter standing by the transmitter. Filtering eliminated any direct RF pick-up on the meter leads and thereby enabled a true indication of radiation from the aerial to be obtained.

This device has worked exceedingly well in practice. After resonating the driver and power-amplifier stages it is simply a matter of adjusting with the ATU tuning condenser C20 for maximum indication on the field-strength meter, the taps on the ATU coil being selected for aerial matching and loading.

When loaded the PA draws about 80 mA and this, together with the current drawn by the driver, means a drain of about 100 mA from the 9v. battery. This load however, is intermittent when keyed, and a reasonable battery life is obtained.

For fixed station working an external supply from a mains unit or from an accumulator would be more economical.

No attempt has been made as yet to modulate the TTx, although NBFM has been considered and will probably be tried out in due course for local phone contacts.

The unorthodox arrangement of the paralleled transistors in the power amplifier was the result of



fitting a 10 Henry choke in conjunction with an 8  $\mu$ F reservoir condenser and a 16  $\mu$ F smoothing condenser; the original 40  $\mu$ F condenser is now omitted. The choke used is rated at 85 mA and

has a resistance of 250 ohms. The voltage drop across this component has a negligible effect on the performance of the receiver—which is now very satisfactory in all respects.

## AMATEUR LICENCE REVISION

### ADMINISTRATIVE CHANGES IN U.K. LICENSING SYSTEM

*Touching first upon the paragraph item on p.299 of the July issue, the last five lines in the right-hand column at the foot of the page should have appeared as the continuation of "New U.K. Licensing Regulations" in the lower left-hand column. Those who are particular about these things—and we hope they are many—might care to mark these five lines across in their copy (with a small T for "this") and then it will all make sense. And now we can look into the whole subject in more detail:*

WHEN the G.P.O. had finally rationalised all the small amendments and additions to the amateur transmitting licence that had been under consideration for a long period, they lost no time in producing a new set of licences, which were brought into force on June 1, 1964. They will replace all existing licences, but only as renewal fees become due.

There are no tremendous changes — none were expected, of course — but some of the amendments are important and must not be overlooked. The normal "full licence" is now known as the **Amateur (Sound) Licence A**; newly introduced is the **Amateur (Sound) Licence B**, available to applicants who have passed the R.A.E. but not the Morse Test. This licence allows the use only of frequencies above 420 mc, does not authorise Morse operating, and the call signs issued will be in the G8AAA series (three letters following the figure).

The **Amateur (Television) Licence** is now a separate entity, for which the call signs will be in the G6AAA/T series. Frequencies from 425 mc upwards are allocated, with a maximum DC input power of 150 watts on A3, A5, F3 and F5 modes.

#### Amendments and Additions

Readers will mainly be interested in the *Amateur (Sound) Licence A*, and it is here that most of the changes will be found. We will quote a few points worthy of note.

Section 1 (2) (c) reads "The station shall be operated only (i) by the Licensee personally, or (ii) in the presence of and under the direct supervision of the Licensee, by any other person who holds a wireless telegraphy licence issued by the P.M.G. to use another amateur station, or who holds an Amateur Radio Certificate issued by the P.M.G." Section 16 (1) (b) amplifies this by stating "References

to the operation of the Station shall include reference to the speaking into the microphone comprised in the Station." And an Appendix note relating to the latter states that this sub-clause 16 (1) (b) "Has been included in the licence to avoid further misunderstanding" by those who have represented that the licence terms do not prohibit persons visiting the station from speaking into the microphone.

In short: Operation (*including talking*) is to be done by the Licence only, or by another licensed amateur in his presence and under his supervision. This completely rules out all chat by XYL's and visitors (unless licensed), and also (a small point but perhaps important) makes it illegal for someone else to operate while the owner of the station goes out to listen to his own signals — because the operating must be done *in his presence*.

Section 1(2) (d) reads as follows: "Messages shall not be broadcast to amateur stations in general, but shall be sent only to (i) amateur stations with which communication is established separately and singly, or (ii) groups of particular amateur stations provided that communication is first established separately and singly with each station in any such group." The Appendix adds "In view of enquiries from amateurs about the practice to follow in 'netting,' this sub-clause has been re-worded to help amateurs." As we read the new sub-clause, it renders most of the current net operation illegal; if you wish to join a net, you must first establish communication *separately and singly* with every station in the net.

Section 6 deals with the log, and makes it clear that the following information must always be recorded: Date, Time of Commencement of every call (including tests for interference), Callsigns of all stations worked, Time of establishing and ending communication *with each such station*, Frequency (not merely *band*) and Class of Emission in each case, and Time of closing down. The comment here is that in some of these complicated net QSO's, it would seem to be a little difficult to state when communication was established and ended with each station—stations dropping in and out of the net tend to be vague. A general clean-up is indicated.

Section 9 makes it clear that a station using either "/A" or "/P" shall use the prefix letters appropriate to the country or place from which the operation is carried out. Incidentally the suffix "/A" is to be used for temporary *premises* and the suffix "/P" for temporary *location*. The call sign is to be sent (at a speed not greater than 12 w.p.m. or by telephony) at the beginning and end of each period of sending, and whenever the frequency is changed. When the period of use exceeds 15 minutes the call sign shall be repeated. And the use of the "Alpha-Bravo" phonetic alphabet is recommended

but not made compulsory.

### Additional Points

In a long section headed "Notes," many brief but important points are made. For instance: The aerial is to be sited as far as possible from existing TV or receiving aeriels; particular mention is made of indoor aeriels and the risk of transmitting interference through the mains wiring. The receipt and divulgence of the contents of unauthorised messages is, of course, re-stated; and one note states "It is an offence under Section 5 of the Wireless Telegraphy Act, 1949, to send by wireless telegraphy certain misleading messages."

A table gives the frequency tolerances required, with figures for band-centre and band-edges. In general the band-edge figures represent 10 kc for the HF bands, 100 kc for VHF and 1 mc for UHF.

One point that has always seemed to raise a

certain difficulty remains unaltered. Section 5 states "The Licensee shall not permit or suffer any unauthorised person to operate the station or to have access to the apparatus comprised therein . . ." Were this to be taken literally, the locksmiths would be busy.

The schedule of bands, classes of emission and power limits which forms part of every licence is reproduced in Table I. The various spot frequencies to be avoided, and so on, are clearly stated, but to avoid complication of footnotes, have been omitted here.

*The "New QTH" page and the continuation of the "Practical Application of Semiconductors" series are casualties this time due to the postal chaos, but will appear again next month.*

## RADIO SOCIETY OF GREAT BRITAIN

28 Little Russell Street, London, W.C.1

### Special Notice

No second class mail was being accepted by the Post Office at the time these notes went to press and the publication of the August issue of the *RSGB Bulletin* to members may therefore be delayed. However, the *Bulletin* is being printed for publication on August 5 and will be posted as soon as the Post Office will accept copies for distribution. The Society is most grateful to the Editor of *SHORT WAVE MAGAZINE* for placing this space at its disposal during this difficult period.

Insufficient members to constitute a quorum attended the Extraordinary General Meeting of the Society called for June 27, 1964, at the Royal Society of Arts, London, and the meeting was accordingly adjourned to July 4, 1964, at the Kingsley Hotel, London, when the new Articles of Association were adopted. The Minutes of the Meeting are being published in the August issue of the *RSGB Bulletin*.

A party of Belgian radio amateurs and their ladies are visiting London on August 7-8 and are being entertained at a Social Evening at the Kingsley Hotel, Bloomsbury Way, London, W.C.1, on Friday, August 7, commencing at 7 p.m. Amateurs in or visiting the London area are cordially invited to attend. Tickets cost 12s. 6d. each, including the buffet.

An RSGB Regional Meeting is to be held at the Seaview Hotel, John o' Groats, on August 29-30. The programme includes a business meeting and a lecture entitled "The Ionosphere" on the Saturday and a bus tour to the Gardens of the Castle of Mey for the ladies. The Dinner will take place in the evening. On the Sunday there will be a visit to Dounreay Experimental Reactor Establishment followed by lunch. A special events station will be operating on 3.5 mc and above under the call-sign GB2JOG. Further details may be obtained from G. B. Woffinden, GM3COV, 9 Hakon Road, Thurso, Caithness.

TABLE I

FREQUENCY BAND (in mc)	CLASSES OF EMISSION	MAXIMUM DC INPUT POWER
1.8- 2		10 watts
3.5- 3.8 7 - 7.10 14 -14.35 21 -21.45 28 -29.7	A1, A2, A3, A3A, A3H, A3J, F1, F2 and F3	150 watts
70.1-70.7	as above	50 watts
144- 146 420- 450 1215- 1325 2300- 2450 3400- 3475 5650- 5850 10000-10500	as above	150 watts
2350- 2400 5700- 5800 10050-10450 21150-21850	P1, P2D, P2E, P3D and P3E	25 watts mean power and 2.5 kilowatts peak power

- A1: Telegraphy by on-off keying, without the use of a modulating audio frequency (CW).  
A2: Telegraphy by on-off keying of an amplitude-modulating audio frequency or frequencies, or by on-off keying of the modulated emission (MCW).  
A3: Telephony, double-sideband (AM phone).  
A3A: Telephony, single sideband, reduced carrier.  
A3H: Telephony, single sideband, full carrier.  
A3J: Telephony, single sideband, suppressed carrier (SSB).  
F1: Telegraphy by frequency shift keying without the use of a modulating audio frequency, one of the two frequencies being emitted at any instant (FSK).  
F2: Telegraphy by on-off keying of a frequency-modulating audio frequency or on-off keying of a frequency-modulated emission.  
F3: Telephony (frequency or phase modulated) (FM).  
P1D, Various types of pulse-modulated telephony and etc.: telegraphy.

# ARTIFICIAL AERIAL FOR TRANSMITTER TESTING

IMPROVED EFFICIENCY BY  
CORRECT MATCHING —  
HARMONIC ELIMINATION —  
OUTPUT POWER MEASUREMENT

A. D. TAYLOR (GW8PG)

AT some time or other every one of us has had a QSO spoilt by the sudden appearance of an unmodulated carrier which varied in amplitude and "pulled" as the unknown operator played with his transmitter controls. While some adjustments, such as the final resonating of the aerial circuit, must of necessity be carried out on the air, most other tests are best done with the aid of an "artificial aerial," or non-radiating Tx load. When such a device is used QRM to other stations is eliminated and very often the results of tests can be made much more meaningful than if an open aerial is used.

The object of this article is to describe a simple artificial RF load suitable for use with most modern transmitters and to introduce its use as a test and development device by showing how it can be applied to improve the efficiency of the transmitter output circuits.

### Artificial Aerial Circuit

An artificial aerial circuit for loading almost any modern amateur-band transmitter is shown in Fig. 1. It is extremely simple, consisting of a non-inductive load resistor and an RF ammeter connected in series and fed from the transmitter output socket via a suitable coax cable. The range of the ammeter should be chosen to suit the transmitter input power. Assuming a PA efficiency of 65 per cent, an 0.3 amp. f.s.d. meter can be used with powers up to 10 watts, an 0.5 f.s.d. up to 25 watts, a one amp. meter up to 100 watts and a 1.5 amp. over 100 watts. R1 must be a carbon resistor of a value which matches the transmitter output impedance. Most modern transmitters have a theoretical output impedance of 70 to 80 ohms, so with such models a resistor of this value will be required, capable of dissipating at least half the transmitter input power. Suitable surplus types often appear in the advertising, and they can also be obtained commercially, though in this case the price tends to be high.

For inputs up to 30 watts a suitable substitute can be made up by connecting six 470-ohm, 2-watt carbon resistors in parallel. A few commercially-made transmitters have a 50-ohm nominal output impedance. A cheap, easily made load for them could consist of ten 1,000-ohm 2-watt resistors

connected in parallel; it should safely handle input powers up to 50 watts. If the transmitter has a 300-ohm balanced output (as in the case of some VHF equipments) the coax socket on the artificial aerial should be replaced by a socket suitable for ribbon feeder and the artificial aerial circuit itself isolated from its metal case. A 300-ohm load resistor suitable for use with powers up to 25 watts can be made by connecting six 1.8K 2-watt resistors in parallel.

### Application and Measurements

As already mentioned, most amateur transmitters in current use are, *in theory*, designed to have an output impedance of 70 to 80 ohms, unbalanced. This is achieved by using either a *pi*-tank circuit or a coupling link, and the RF output is fed to a coax cable having a nominal impedance of 75 ohms. In practice the cable impedance is likely to vary from the nominal figure by at least plus or minus 5 ohms and in

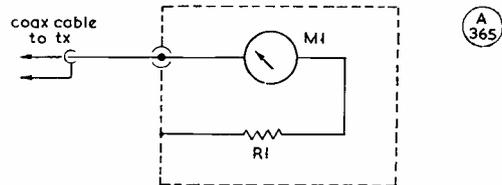


Fig. 1. Artificial aerial

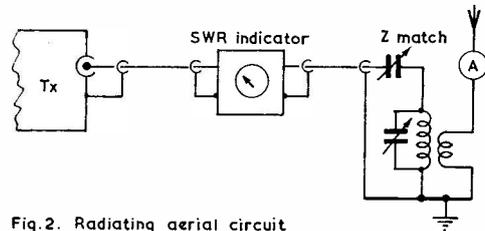


Fig. 2. Radiating aerial circuit

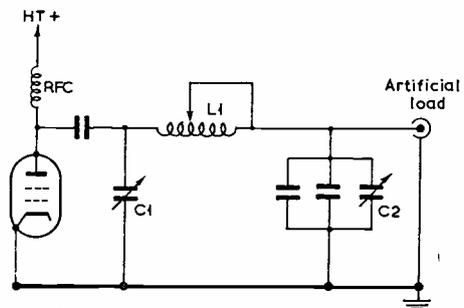


Fig. 3. Typical pi-tank circuit

Diagrams to illustrate points made in the article by GW8PG. As he explains, a dummy-load unit for the transmitter (irrespective of band, and running any DC power input) can be a very useful tool for testing, setting up and efficiency evaluation. It also has the merit of being essentially simple.

some instances this figure may be considerably exceeded.

Speaking from practical experience of a number of amateur transmitters of reputable design, the writer can state categorically that the variations in transmitter output impedance is infinitely greater than that encountered in coaxial cables! Investigations carried out on a number of transmitters using link-coupled outputs showed that not one of them would load properly into a 75-ohm resistive termination! In every instance the coupling link had to be considerably modified both in size and in position relative to the tank coil before loading could be obtained, and on some transmitters the inductance of the tank coil itself had to be altered to obtain resonance under the correct loading conditions.

The method of testing was to connect the 75-ohm artificial load to the transmitter output socket and then to tune the PA to resonance. This usually resulted in the PA drawing only 5 to 10 mA more than in the unloaded condition, instead of 40 to 70 mA. This indicated that the link winding (which is really the secondary winding of an RF impedance step-down transformer) was giving quite the wrong ratio to match into 75 ohms. On every one of the transmitters tried by the writer it was found necessary to increase the number of turns on the link winding and to move it closer to the "hot" end of the PA tank coil. Twenty minutes or so spent in making progressive adjustments produced a condition where the PA would work at its normal operating current with the 75-ohm resistive load connected, thus indicating correct matching. This was further confirmed when the resistive load was disconnected and replaced by a coax cable taking power to the aerial via an SWR indicator and a Z-match aerial coupler, as shown in Fig. 2, p.337. Tuning the Z-match for maximum aerial current produced a minimum SWR indication and altering the PA tank tuning from the point at which maximum dip was given into the resistive load caused the SWR to increase. Correct matching was thus indicated.

The benefit obtained from these adjustments was two-fold: First, as correct matching had been obtained maximum power was being transferred into the aerial. The actual power gain may only be 1 dB, but long reflection has brought the writer to the conclusion that "DX genius" is largely the ability to take infinite pains to produce an extra dB here and another there until six of them add together to give that additional S-point which makes all the difference. The second important advantage was that the correct matching adjustment produced minimum harmonic output from the transmitter. This meant that the biggest signal coincided with the minimum TVI.

An artificial load can also be of great use in setting-up *pi*-tank output circuits. It is possible to transfer power from a PA to a load via a *pi*-circuit set up to a wide range of L/C conditions, but there is only one set of L/C values at any given frequency

which will allow the circuit to act as a low-pass filter, thus giving maximum harmonic suppression. These depend upon the PA output impedance and the impedance of the load. Even when these values have been established, however, the operator without an L/C measuring bridge still faces the problem of setting them up. Here, the artificial aerial can be of considerable use. To illustrate the method, assume that the *pi*-tank circuit illustrated in Fig. 3 has been designed to feed a 75-ohm load. L1 is a continuously variable rotary inductance; C1, the resonating capacitor, is required to have a value of 150  $\mu\mu\text{F}$ ; and C2, the loading condenser, a value of 1200  $\mu\mu\text{F}$  (.0012  $\mu\text{F}$ ). Let us assume that C1 is a 200  $\mu\mu\text{F}$  variable condenser and C2 consists of a 500  $\mu\mu\text{F}$  variable capacitor in parallel with two 500  $\mu\mu\text{F}$  fixed capacities. Allowing 50  $\mu\mu\text{F}$  for circuit stray capacitance, we can set C1 to approximately 100  $\mu\mu\text{F}$  by adjusting it to exactly half-scale, thus giving 50 plus 100 = 150  $\mu\mu\text{F}$ . C2 already has .001  $\mu\text{F}$  of fixed capacitance, so we obtain approximately .0012  $\mu\text{F}$  total capacity by setting the 500  $\mu\mu\text{F}$  variable condenser to 2/5ths of its maximum capacity (40° from minimum on a 100° scale).

The 75-ohm dummy load is then connected and power is applied to the PA. L1 is then varied until maximum power, as indicated by the RF ammeter, is delivered to the load. *Small* adjustments are then made to C1, C2 and L1 to see if the output power can be increased any further. When these are completed the artificial aerial can be disconnected and replaced by a coax cable going to the aerial coupler through an SWR indicator. The aerial is then resonated and, if necessary, further *small* adjustments of C1, C2 and L1 are made to produce minimum SWR. Having started off with the values of C1 and C2 approximately correct and then adjusted L1 to produce matching into the correct load impedance, there is every likelihood that the circuit is now behaving correctly as a *pi*-filter and not as a pre-war "Collins coupler."

### Calculating Power Output

PA efficiency is the ratio of DC input power to RF output power, and it can be measured with the aid of the artificial aerial. Allowing for instrument errors and the tolerance on the load resistor value, the measurement will probably have an accuracy of plus or minus 10 per cent. The ability to calculate PA efficiency and the approximate RF power output means that the effect of PA modifications or changes in PA HT voltage can be exactly appreciated. Knowledge of the PA output power is also most useful to the LF band operator when calculating the efficiency of short Marconi types of aerial, and to the mobile enthusiast who wishes to investigate the performance of his loaded whip. The method of calculating power output and efficiency is the simple application of Ohm's Law, thus: If the PA of a transmitter draws 40 mA at 250v. we know that the DC input is 10 watts. If this same PA is found to produce

0.3 amps. of RF current in a correctly-matched 75-ohm load, then the RF output power is equal to  $I^2R$ , or 6.75 watts. The efficiency of the PA is then equal to:

$$\frac{\text{RF output} \times 100}{\text{DC input}}$$

which in this instance is equal to 67.5 per cent.

## HF-BAND TRANSMITTER

### SOME CONCLUDING POINTS

#### A. J. SHEPHERD (G3RKK)

These notes and circuits finalise the article on the HF-Band Transmitter, covered in the June and July issues of *SHORT WAVE MAGAZINE*.

For continuity, these circuits and the fault finding table should be read with Parts I and II.

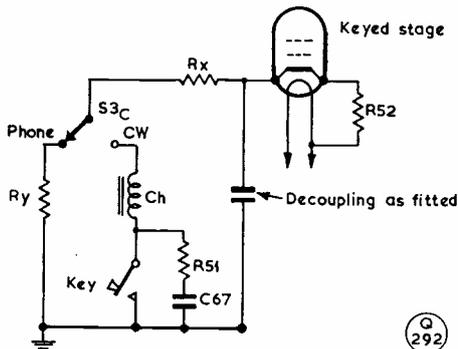
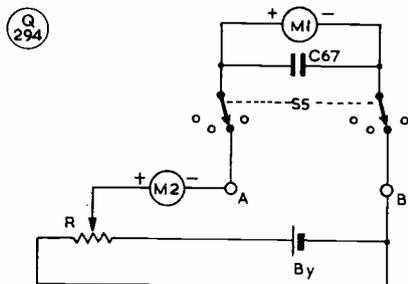


Fig. 6. Keying circuit for the G3RKK transmitter, when breaking V5 cathode: C67, 1.5  $\mu$ F; R51, 100 ohms; R52, 220K 1-w.; Ry = DC resistance Ch.; Rx + Ry = Cathode res. as originally fitted; Ch., 2 Hy 100 mA. If keying at V4: C67 is 1.0  $\mu$ F and Ch. is 5 Hy 20 mA. See circuits Part 1 June issue for references.



### Conclusion

There are many other purposes for which the artificial aerial can be employed, ranging from modulation adjustments to testing key-click filters. It is a simple but tremendously useful device which can reduce QRM while at the same time helping to give improved performance. There should be one in every active station.

Fig. 7. When the G3RKK Tx is used mobile or portable, the PA clamping circuit can be by relay, as shown here and originally described by G3LWM in the December 1963 issue of "Short Wave Magazine." Condensers C31, C32, C33, C39, C40 and R16, R21 are as fitted in Fig. 3 on p.221, June 64. In the circuit above, R1 is 18K, to equal the DC resistance of Ry (R1 and Ry replace R15) and Ry is any relay with a 2 mA coil, having contacts rated at the control voltages involved.

### TABLE II

For assistance in fault finding and setting up, a number of voltage readings taken on the author's transmitter are given below. They are only intended as a rough guide, but will give some idea of what to expect. In particular, they will have to be intelligently adjusted if different HT voltages are used.

*Measurement Conditions:* Band-switches in 20m. position. AF gain at minimum. Transmitter correctly tuned and loaded into dummy aerial. Meter sensitivity 10,000 ohms per volt. 500, 25 or 5 volt range as applicable. All are DC voltages to chassis.

HT	end of R3	150v.	V5	screen	150v.
V1	anode	80v.			this is critical
	screen	50v.			9v.
V2	anode	300v.	V6	cathode	-50v.
	screen	280v.	V7	anode	80v.
	cathode	6v.		screen	90v.
V3	anode	270v.		cathode	2v.
	screen	0-270v.	V8	anodes	200v.
	cathode	1v.		cathodes	2v.
V4	anode	320v.	V9, V10	anodes	400v.
	screen	270v.		screens	270v.
	cathode	8v.		cathodes	-22v.
V5	anode	450v.			
	(HT end of RFC3)			Junction R27, 28	300v.
				Junction R28, 39	330v.

Setting up the meter shunts for the HF-band Tx. This takes care of all necessary checks and measurements — and see Table II.

## CONSTRUCTION AND USE OF A SKELETON BRIDGE

FOR RESISTANCE, CAPACITY  
AND  
INDUCTANCE MEASUREMENTS

G. A. W. PARTRIDGE

FROM time to time it is found necessary to check the values of such items as resistors, condensers and coils—especially when making up apparatus from old or second-hand parts.

The writer has found the Skeleton Bridge system most useful for this purpose. Almost any combination can be accommodated provided suitable standards are available.

First of all, let us consider *resistance* measurement: Fig. 1 illustrates a typical Wheatstone Bridge circuit, but with only one ratio arm complete. *Rd* is a 20,000 ohm non-inductive rheostat which has been calibrated, done by fitting a card and a pointer to it. Calibration can then be carried out with a good-quality multimeter. Fig. 2 illustrates a typical result. Great care must be taken here as the accuracy of any subsequent test is dependent upon this calibration. The unit is mounted into a box (wood or metal) and wired up to five pairs of terminals which are marked as shown in Fig. 3, with connections made according to Fig. 1.

The unknown resistance is connected to terminals *C* and reliable resistors of known value are also connected to terminals *A* and *B*. *Ra* should be about 10,000 ohms and *Rb* about the same value as the unknown *Rc*.

A 3-volt dry battery is connected to the supply terminals and a 0-1 milliammeter will act as a suitable detector in most cases. Low resistances only require about 3 volts, but resistances of several 100K may need about 9 volts. Great care must be taken not to overload the milliammeter while adjusting the rheostat *Rd*. Start adjusting on 1½ volts and then move up to 3 volts or higher when the null point is starting to show up. The idea is to continue adjustment until there is *no* indication on the milliammeter. The needle must rest at zero—not to the right or left of it. If balance is unobtainable change the value of *Rb* and try again. During the initial stages, just touch one of the battery terminals with its lead, and adjust until the kicks on the milliammeter become less violent, then hold the lead on to the battery terminal for the final adjustment to null indication.

The value of the unknown resistor will be:—

$$R_c = \frac{R_d \cdot R_b}{R_a} \text{ ohms}$$

For example, the bridge balanced with *Rd* (variable resistor) reading at 15,000 ohms. *Rb* was 1,000 ohms and *Ra* was 10,000 ohms, hence:

$$R_c = \frac{15,000 \times 1,000}{10,000} = 1,500 \text{ ohms}$$

The circuit is re-arranged for capacity testing as illustrated in Fig. 4. The unknown value is connected to terminals *B* and a standard capacitor to terminals *C*. *Ra*, provided it is non-inductive, remains in circuit, but the bridge is now connected to a 6-volt AC supply or a 1,000 c/s oscillator. A pair of headphones takes the place of the milliammeter as a detector. *Cc* should be about the same value as the unknown *Cb*. *Rd* is adjusted until as little sound as possible is heard in the headphones. The unknown value is now found from:—

$$C_b = \frac{C_c \cdot R_d}{R_a} \mu\text{F}$$

For example, the bridge balances with *Cc* at .0005  $\mu\text{F}$ , *Rd* at 5,000 ohms and *Ra* at 10,000 ohms.

$$C_b = \frac{.0005 \times 5,000}{10,000} = .00025 \mu\text{F}$$

Here again, if the bridge does not balance, change *Cc* to another value. Do not test electrolytic condensers on this bridge as they are designed for DC working only.

Fig. 5 shows how the circuit is arranged for inductance testing. Here the AC supply and the detector are the same as that for capacitor work. A 100-ohm non-inductive rheostat is, however, connected across capacitor *Cc*. Adjust for null indication with *Rd* and then for even greater silence with the 100-ohm rheostat. If a good balance is not obtained try a higher value rheostat in place of the 100-ohm one. It may also help to change the values of *Rb* and *Cc*.

At balance calculate the value of *La* from:—

$$L_a = \frac{C_c \cdot R_b \cdot R_d}{1,000,000} \text{ Henry}$$

For example, at balance *Cc* was .005  $\mu\text{F}$ , *Rb* 10,000 ohms, and *Rd* 6,000 ohms.

$$L_a = \frac{.005 \times 10,000 \times 6,000}{1,000,000} = 0.3 \text{ Henry}$$

Smoothing chokes are not easily measured on a bridge of this type because their inductances are rated on DC so the values indicated may be quite different from that specified.

This type of work requires time and experience. After a while one knows what combinations to make up for each type of resistor, capacitor, or inductance to be tested.

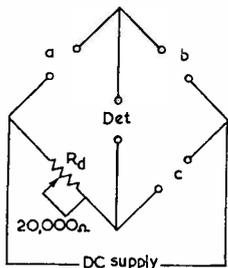
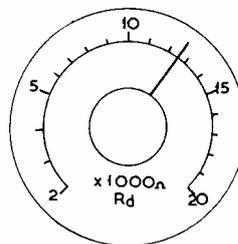


Fig. 1. Resistance Measurement



D  
193

Fig. 2. Calibrated Card and Pointer

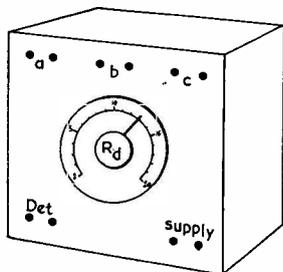


Fig. 3. The Bridge Unit

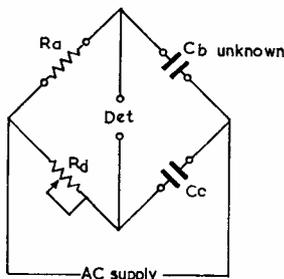


Fig. 4. Capacitor Testing

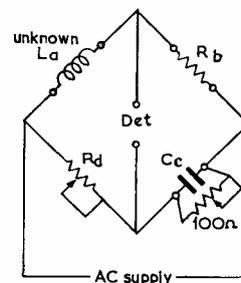


Fig. 5. Inductance Testing

These circuits illustrate the discussion on the opposite page, and are self-explanatory when read with the text.

**SPECIALLY ON THE AIR**

It is more than likely that several special-event arrangements—organised amateur participation for some local occasion—have never reached us in time for this issue because of mail delays. Though it is now getting towards the end of the season for these events (usually involving outdoor activities of some sort) if any are planned for September-October, we would like details intended for publication to reach us *not later than August 14* for the September issue of *SHORT WAVE MAGAZINE*—and remember, it is no use posting late in the evening of Thursday 13th to catch this deadline, particularly if the mails have not returned to normal by then.

**GB3SFS, August 7-9:** In Bents Park, South Shields, operated in conjunction with the South Shields Corporation Flower Show by members of the local Amateur Radio Club. All bands 10-160m. will be covered, with an LG.300 on AM Phone for the HF ranges. QTH for information and QSL cards: D. Forster, G3KZZ, 41 Marlborough Street, South Shields, Co. Durham.

**GB3SP, August 8-15:** Licensed amateurs from Norwich-Great Yarmouth who are Scouts will run a station on the Royal Estate, Sandringham Park, Norfolk, in connection with the International Scout Jamboree being held on the Estate. The intention is to operate all bands 10-160m. on AM, with SSB on 15-80m., using a special QSL card to verify all reports and con-

tacts. Visitors to the Camp site will be very welcome. Further information from: J. J. Wright, G3SEM, 10 Avenue Road, Gorleston, Great Yarmouth, Norfolk.

**GB2JOG, August 29:** Operated from the Seaview Hotel, John o' Groats, Caithness, in connection with the RSGB regional meeting. The prefix GB2 is a new one for a special-event station in Scotland. All bands 10-160m. will be worked. Details about the meeting arrangements can be obtained from: A. J. Oliphant, GM3SFH, 17 Rockwell Crescent, Thurso, Caithness.

**HB9RAS, till October 25:** Amateur station installed specially for the Swiss National Exhibition, Lausanne, operating all bands 10-80m. U.K. contacts and visitors will be specially welcome and, for those likely to be in Switzerland during the period, there is an Amateur Radio gathering every Friday evening, 8.30 p.m., at the Hotel de l'Europe, Lausanne, at which HB's will be glad to meet visitors. Further information from: B. H. Zweifel, HB9RO, Chemin Levant 123, Lausanne.

*The "New QTH" page and the continuation of the "Practical Application of Semiconductors" series are casualties this time due to the postal chaos, but will appear again next month.*

## LOCKING OSCILLATOR- MULTIVIBRATOR UNIT

### FOR FREQUENCY CHECKING AND CALIBRATION

E. F. TAYLOR (GW3SQX)

ONE of the requirements of the AT station licence is that some form of frequency checking apparatus be in use. It was for this reason that the unit described in these notes was constructed. It is easy and cheap to make, and is extremely useful.

The basic circuit is a transistor oscillator TR controlling a valve multivibrator. This provides check points at 500 kc, 100 kc or 50 kc as required, up to at least 17.5 mc. All power supplies are taken from the receiver (which, in the author's case, is an R.107). The R.107 has a 12-volt heater supply, but the unit may also be used on 6 volts.

#### Circuit

TR is a transistor, oscillating at 500 kc, the frequency of the crystal X. This is an FT-241A 54th harmonic type, marked 27.0 mc, which can be obtained very cheaply. In general, the frequency of X will not be *exactly* 500 kc, but it can be lowered by up to about 100 cycles by altering C1. To find the appropriate value for C1, a 500  $\mu\text{F}$  variable condenser can be wired in temporarily and adjusted until a harmonic of 500 kc is zero-beat with MSF on 2.5 mc or 5 mc. The value can be estimated from the amount the plates are in mesh. It may be possible to raise the frequency a little by grinding the crystal. Adjustment of C2 will also cause small changes in frequency, and this can be used for fine adjustment. The transistor used was an AF116, but it is probable that any good RF transistor will work here. L is one winding from an old 465 kc IF transformer, from which the core was removed. Output is taken from the oscillator by C4 for the multivibrator, or C3 for direct 500 kc output to the receiver. C4 was a beehive trimmer, but it is not essential to use a variable capacitor here.

The power for TR is supplied from rectification of the valve heater supply by D, a germanium diode, which is quite suitable for the low current required. The output from D is smoothed by C5, R2, C6, and is about 4 volts after passing through R2. If a 6.3 volt heater supply is used, R2 should be omitted, so that the collector voltage is high enough to keep TR oscillating. In any event, the collector voltage should not be increased above about 6 volts because, as the circuit is unstabilised, thermal runaway can occur.

V1A is half a double-triode in a multivibrator circuit. Using the ECC82 specified, a heater voltage of 12.6 volts or 6.3 volts can be used, the heater pins being connected accordingly. One of the heater leads must be earthed, in order to provide the supply for the transistor.

## Table of Values

### Circuit of the Oscillator-Multivibrator

C1 = <i>see text</i>	R5 = 100,000 ohms
C2 = 500 $\mu\text{F}$ , var.	R6 = 22,000 ohms
C3, C8 = 100 $\mu\text{F}$	R7 = 50,000-ohm var.
C4 = 3-30 $\mu\text{F}$ , trimmer	Xtal = 500 kc bar ( <i>see text</i> )
C5, C6 = 50 $\mu\text{F}$ , 25v.	L = IFT winding ( <i>see text</i> )
C7 = 180 $\mu\text{F}$	S1 = 3-p, 3-way
C9 = 600 $\mu\text{F}$	D = GD4, or similar
R1 = 1.5 megohm	TR = AF116
R2 = 220 ohms	V1 = ECC82
R3 = 3,000-ohm, var.	
R4 = 820 ohms	

Notes: Supply connections can be brought out to an octal plug, for receiver feed. Switch positions S1 are: 1, off; 2, xtal oscillator only; 3, multivibrator.

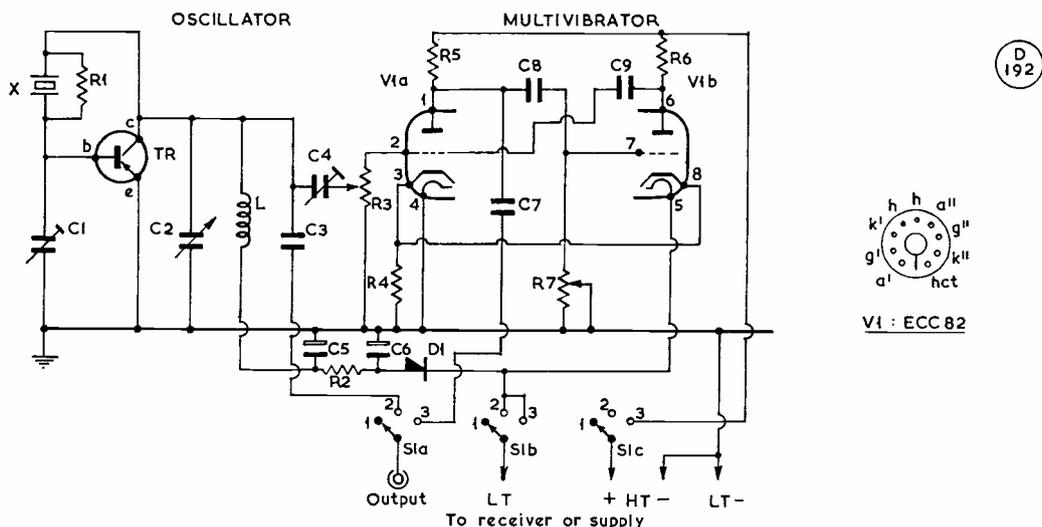
#### Operation

The frequency of oscillation can be adjusted by varying R3 and R7, and in the "free-running" condition, with TR inoperative, it can be varied between about 40 kc and 500 kc. Since the oscillation is something like square-wave, a large harmonic output is obtainable, and if the output is fed to a receiver, a rasping sort of noise will be heard when tuning through one of the harmonics. This is because, in this condition, the output is very unstable and it changes from moment to moment. If, however, a little voltage from some other source is fed in, having a frequency of the same order as that of the multivibrator, or higher, the multivibrator will lock on to this. It will now oscillate at this locking source frequency, or at a subharmonic of it, and the output will become as stable as that of the locking source. The actual subharmonic at which the multivibrator oscillates is decided by the voltage applied from the locking source and the circuit constants. The 500 kc output from TR is fed to the grid of V1A through C4, and the locking voltage can be varied by R3.

#### Adjustment

The method of adjustment is to set the locking voltage to zero, *i.e.*, the slider of R3 to the earthy end; then, listening to the harmonic output on a receiver, vary R7 until there is approximately the correct number of rasping beats for the subharmonic required between 500 kc points. For example, for 50 kc output, about 10 beats should be heard between 1.5 mc and 2.0 mc. Some voltage is fed in from TR by varying R3. As the voltage is increased it will be found that at a certain point the multivibrator suddenly locks on to the 500 kc input, giving the correct, or an adjacent, subharmonic. R7 is now adjusted to give the correct subharmonic, and R3 is set to give maximum frequency stability. Once the multivibrator is set up for a certain output, both the long and short term stability are very good. The adjustment of R7 is quite critical, but R3 can be adjusted quite a large amount without the frequency changing. The setting of C4 is that which gives just sufficient 500 kc output for correct operation of V1, and so unwanted interaction between TR and V1 is reduced.

All power supplies are obtained from the receiver, although there is no reason why any other source could not be used. An octal plug and socket with an



Circuit of the oscillator-multivibrator, TR-V1A/V1B. Either section will oscillate independently — TR at the crystal frequency (500 kc in this case) and V1A/V1B at a low frequency determined by the settings of R3, R7. With S1 at position 3, the multivibrator is locked to the crystal frequency, to give strong beats (which are calibration check points) right up to at least 21 mc. In this circuit, the HT for the transistor side TR is obtained by rectification of the LT to V1A/V1B, by diode D with its smoothing circuit C5, R2, C6.

8-core lead will connect the supplies from the receiver. For the sake of convenience, the output from the unit is also fed to the receiver aerial terminal via this lead. S1 controls the functions of the unit: Position 1 is off; 2 is crystal oscillator only; and 3 is multivibrator controlled by crystal oscillator.

Position 2 gives a check when initially setting up and for adjusting.

This unit has proved useful in calibrating and aligning receivers, and it makes an accurate and stable frequency standard for transmitter and VFO calibration.

## Miscellany

### COMMENT ON THE TIMES, AND SOME IRRELEVANT INFORMATION

Some interesting non-amateur statistics: There are now 2,380 TV transmitting stations in the world —nearly six times as many as in 1954 . . . in the same decade the number of sound broadcasting stations has nearly doubled, and is now 12,600 . . . At the receiving end, the U.S.A. leads on TV, with 60 million sets in 90 per cent of the homes; Japan comes second, with 13 million sets, which represents 95 per cent of Asia's total. Finally, in the ten years, 1954-64, the world total of radio receivers has risen by 60 per cent and that of TV receivers by 300 per cent (population growth during the same period was about 26 per cent).  
 ("World Communications," UNESCO)

supplied with bug keys made in a far-off land . . . no prizes for locating it.)

The *Radio Caroline* disease is infectious. Already an embryo disc-jockey has been heard announcing himself as "Radio So-and-So, transmitting on 1975 kc" and playing pop records. But he wasn't on 1975 kc, as it happened . . . and now, it seems, he isn't on any frequency. He was neatly D/F'd and put where he belonged—off the air. If these pests ever do try to invade the amateur bands, a warm reception is surely awaiting them.

"It is a key equipped with an apparatus capable of striking out a dot signal in rapid succession automatically, called Bug Key in common, and as it can in particular make out a machinery ordered dot signal in succession, a high-speed dot signal which needs an exquisite skill in keying can be made out in accuracy." (Part of the instructions

Substitute Radio Astronomy for Amateur Radio, and our ideas of DX and QRO are banished for ever. Meet the Quasar . . . the new name for a "quasi-stellar object," defined as a vast, luminous vibrating cloud of gas, too big to be a star and too small to be a galaxy. Nine quasars have been discovered in the last year or so, and

they are all two or three times farther away than the edge of the Universe was believed to be, until recently. They are at distances of up to 10,000 million light-years, but their signals are being detected on earth. It is estimated that the power necessary to pump light and radio signals over this sort of distance would have to be greater than that of one thousand trillion ( $10^{27}$ ) hydrogen bombs. To convert this incredible figure into megawatts, how many more O's should be added?

(*"Science Horizons," U.S. Information Service*)

— • • • —

The familiar transmissions from WWV on the HF bands are accurate to one part in ten million; but the new VLF stations WWVB and WWVL at Fort Collins, Colorado, will be accurate to one part in ten billion. The former is on 60 kc and the latter on 20 kc (at present only with one kilowatt but destined for 50 kW). These enormous aerials, high-powered transmitters and long wavelengths are back with us because short-wave transmissions do not reach distant points *via* a reliable path — ionospheric reflection introduces irregularities which nullify the accuracy of a time signal (when talking in terms of astronomical and space-age requirements). Hence VLF and "ground-wave" . . . world-wide coverage without reflection, since the ionosphere and the earth's surface form one enormous wave-guide. The wavelength of WWVL is roughly 10 miles!

— • • • —

"The rig still uses two electrolytics acquired in the early '30's . . . there are even some paper condensers that pass a leakage test despite 25 years of service . . . also such treasures as a toilet-roll coil former, film cassettes used as coil shields, Oxo tins, chassis made from a refrigerator tray, a portion of an electric-iron element, and a buffer coil wound on a box which used to hold the dog's worming pills . . ."

(*V5IAU, in "Amateur Radio," Australia*)

— • • • —

Seen in the rear window of a car equipped with a stylish Top Band whip: A neat notice reading "Caution — Disappointed Driver. Smoke Signals Only." (Wonder what had burnt out?)

— • • • —

"It seems to be accepted as a matter of course that, with 100 watts or even less, one can work an American almost at first attempt. This is all the more creditable in view of the enormous number of stations working simultaneously over there, and the resulting interference."

(*G6QB in "Wireless Weekly," November, 1925*)

— • • • —

Short answer to those "whistler" pests, as practised by certain VE7's:—"Your dog's not on this frequency, old man!"

The recently-published selection (May issue) of Readers' Opinions has brought forth a crop of counter-opinions. Not only did most of the views expressed in a couple of pages cancel themselves out, but almost each one of them, individually, is cancelled out by equally strong opinions from someone else. Thus it is obvious that articles should be more technical and also less technical; that the SWL Section should be abolished and also made monthly; that the Club notes are not wanted but are read with interest by all; that "Communication and DX News" (formerly "DX Commentary") is far too long but much too short; that no one reads the Editorials, which are much appreciated by many readers . . . and so on. No one even mentioned "Miscellany"—which is being interpreted as a Good Sign.

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Researches indicate that the worst 'phone signals can often emanate from the following sources:—(i) the highly competent CW operator; (ii) users of so-called efficiency modulation; (iii) the vast majority of home-brew addicts.

(*5Z4KPB, in "QTC," East Africa*)

— • • • —

Famous Last Words: "That can't be the B plus — it's a black wire."

(*"9G1 News"*)

— • • • —

A sinister new craze — composite Q-signals! Like this: QRLM—I am busy being interfered with . . . QRUQ — I have nothing to send faster for . . . QSPB — My relays are fading. Ah, well; you have been warned.

— • • • —

Those who think that we as amateurs have to pay a lot for our equipment might be considerably cheered up by perusing some of the catalogues dealing with commercial gear. One such, covering the products of a firm offering "Precision Electronic Apparatus for Science and Industry" includes the following small items, picked more or less at random:— Variable Inductors, £55 6s. 3d.; Standard Signal Generator, £1,180; Panel Feed-through Connector, £4 11s. 4d.; Gold-Plated Binding Post, 11s. 4d.; Fixed Air Capacitor, £31 17s. 6d., Condenser Microphone System, £218 5s.; Inductance Bridge, £466 8s. 2d. Ah well, perhaps we'll settle for some Alligator Clips (crocodile clips with knobs on?) at 2s. 8d. a time, and get on with re-building that home-brew rig.

— • • • —

The *Collector and Emitter* (A.C.A.R.C., Oklahoma) investigated Webster's Third New International Dictionary and quoted therefrom, as follows:— **Amateur**: *n.* One that engages in a particular pursuit, study or science as a pastime rather than a profession. **Ham**: *n.* An unskilled but flamboyant performer; exhibitionist; strutter; an inept or incompetent telegraph operator.

Out of 22 African nations which have recently achieved independence, 16 have no national Amateur Radio society; 5 have no amateurs at all; 14 have fewer than 10 amateurs; and 19 of them (that is, all except Nigeria, Ghana and the Congo Republic) have less than 40. *(IARU Region I Bulletin)*



Apparently the porpoises whose inter-communication ("talking"?) is being investigated by the U.S. Government are becoming awkward. They have requested typewriters that will work under salt water, so that they can put in a petition to the FCC. They claim that some 160-metre amateurs, and Loran, are giving them trouble, because their speech is supersonic and, in particular, their word for "No" centres around 1868.2 kc. As a result of QRM on this frequency, they claim, there are a lot of pregnant female porpoises who didn't want to be that way . . .



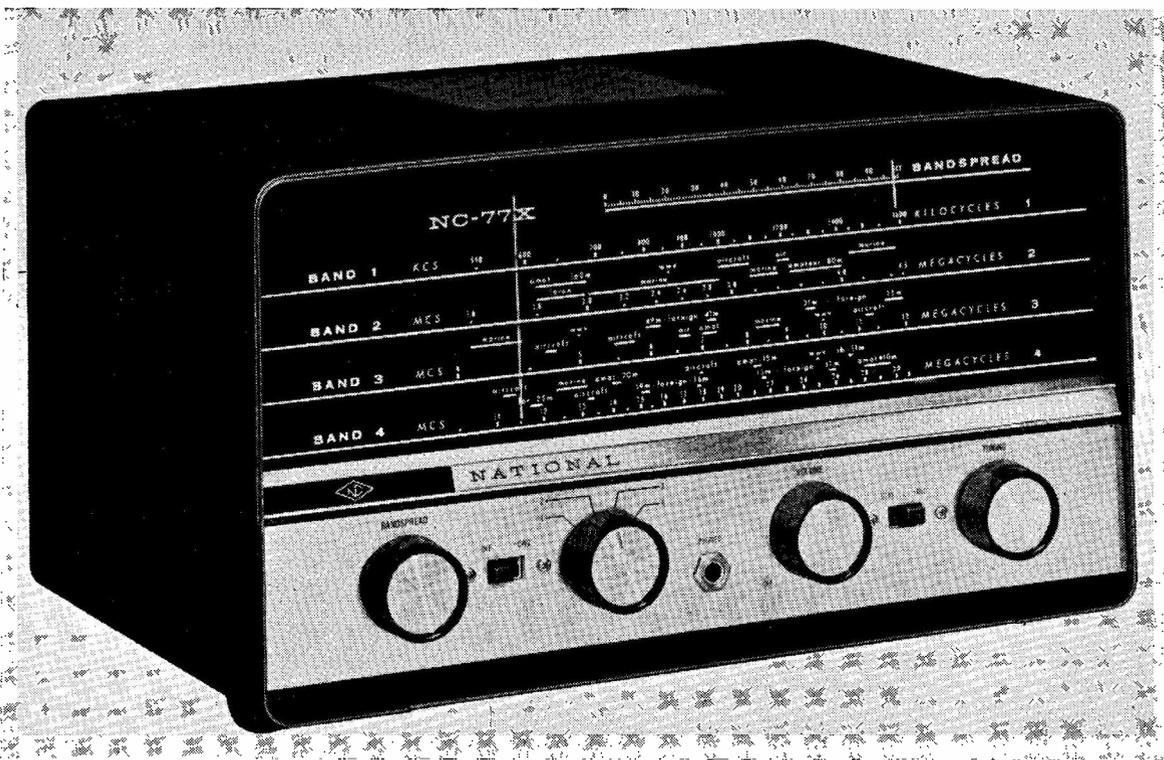
"The greatest reward experienced by the amateur technician can come through 'firing up' a piece of

home-constructed equipment. Starting with simple circuitry such as code monitors, simple converters, receivers, antennas, low pass filters and modulators can lead to the ultimate reward gained through building and operating a home-brew station . . . The more you learn, the better equipped you are to help others in your area. The more knowledge they in turn possess, the better our overall amateur fraternity will be." *("VHF-er," Michigan)*



The recent note in these columns about the national super-grid, parts of which are already operating at 400 kv, brought a note from G3PMR (Retford, Notts.). He writes: "This has produced the most tremendous hash I have ever heard on One-Sixty, and amateurs all along this line have been complaining. The noise is often S9, and in some areas has produced considerable TVI and makes all but the strongest medium-wave BC stations unreadable in wet weather." And there's worse to come—G3PMR has a 2000 megawatt power station being built less than a mile away!

**For anything radio you may want to buy, sell or exchange—use the Readers' Small Advertisement section in "Short Wave Magazine"—See pp.376-384**



Another new National receiver is the NC-77X, which covers the frequency-range 540 kc to 31 mc in four bands. Intended as a beginner or SWL receiver, it is in the lower-priced category, but has separate electrical bandspread and a built-in speaker. It is very nicely finished, in a grey-blue steel cabinet with brushed aluminium front panel.

## MW/BC RECEIVER CONVERSION FOR TOP BAND

USING THE IMAGE—QUICK AND  
EASY MODIFICATION

A. JAKUES (G3PTD)

THERE is now a fair amount of interest in Rx converters to bring in Top Band on medium-wave broadcast receivers—of either the domestic or car-radio type. Though such converters can be inexpensive and compact and very suitable for use /M, they can still cost several pounds, and usually degrade the signal-to-noise ratio of the main receiver.

So far as the writer is aware, it does not appear to have occurred to anyone else that for a 465 kc IF (one of the commonest in use) the image of a medium-wave receiver tuned to about 300 metres is—on Top Band, thus: 300m. is 1 mc, and 1 mc plus twice IF 465 kc is 1930 kc.

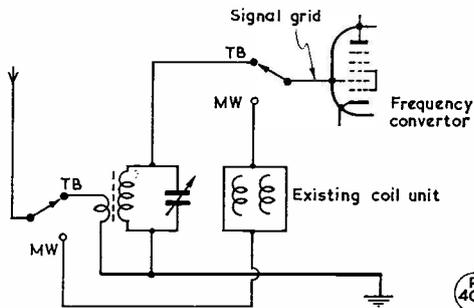
This suggests a receiver conversion that can be done within an hour. Basically, a tuned circuit for Top Band is substituted (by switching) for the existing Rx aerial coil pack; the oscillator, IF's and all other circuits of the MW receiver remain untouched. In other words, what we aim to do is bring in 160m. on the image, instead of rejecting at image frequency.

In the writer's case, 60 turns of 26g. enamelled on a  $\frac{3}{8}$ in. slug-tuned former, with a 500  $\mu\mu\text{F}$  trimmer in parallel, did the trick; the aerial link for 160m. reception is 10 turns over-wound at the earthy end of this coil. These details are not critical, and may well vary with different receivers.

The circuit, shown herewith, will be self-explanatory. The reason for switching at the FC grid instead of at the existing MW position on the Rx band-switch is because in most instances the wiring round the coil pack, etc. is pretty inaccessible, and the new coil itself may become critical if it has to track with the oscillator. The aerial circuit can, however, easily be made to tune to the required Top Band frequency, and will be reasonably effective over the rest of the band—though, of course, the MW signal (now the unwanted image) may begin to creep in if the receiver is tuned too far from the 160m. channel.

When the 160m. aerial coil is switched out, the Rx reverts to its normal BC function. The performance of the receiver as regards selectivity, sensitivity and signal-noise ratio is not affected and—when using the conversion /M with a loaded whip in the usual way—there is adequate pick-up on Top Band for normal mobile working.

This circuit has been used by G3PTD/M and by a local SWL converting a BC receiver, and results are as good as on most home-built converters. It is a quick and easy mod. to try on any car-radio Rx, even if only to listen on Top Band when out in



Circuit arrangement to obtain signal input at the image frequency, applicable to any MW/BC Rx for Top Band reception.

the car. The parts required are only a 2-pole 2-way Yaxley-type switch, one slugged coil former of  $\frac{3}{8}$ in. diameter, and a 500  $\mu\mu\text{F}$  trimmer.

### PHILATELIC NOTE

This item might also be entitled Recognition Indeed—for it is announced that the U.S. Government is issuing a 5-cent stamp to commemorate the 50th anniversary of the American Radio Relay League (ARRL), which is being celebrated in various ways during this year. The ARRL well deserves such recognition, for it has done a tremendous job for Amateur Radio, nationally and internationally, and its monthly journal *QST* has for long been recognised as one of the world's leading amateur periodicals.

### BEACON ON TEN METRES

It is announced that a new radio beacon, signing GB3LER and giving a keyed callsign at regular intervals, is now in operation on 29.005 mc, from Lerwick in Shetland. It should be a very valuable conditions indicator whenever heard in the U.K. because the aerial system is beamed north-north-east. Have a look at your great-circle map.

### K7UGA/6, SAN FRANCISCO

If you heard or worked K7UGA/6 during July 12-15, it was Senator Goldwater of Arizona, working portable from his suite on the 14th floor of the Mark Hopkins Hotel, San Francisco, during the Republican Convention, at which he was nominated—by an overwhelming vote completely extinguishing all rivals—their candidate for the Presidential election in November. What it comes to is that K7UGA could be the next President of the United States.

### SMALL ADVERTISEMENTS—USEFUL SUGGESTION

G3AAO (Leeds) makes the point that, when using box number addresses, advertisers would help prospective buyers by indicating the area or district in which the apparatus can be inspected, or collected. As he says, in these days of "buyers collect" it would enable interested readers to assess the transport problem involved.

## COMPOSITE QUAD ARRAY FOR TWO VHF BANDS

TWO AND FOUR METRES ON THE SAME BOOM

J. M. COX

SINCE its concept in 1937 the Quad Aerial has taken many forms in its role as a compact medium-gain array for the HF bands—indeed, many excellent designs have appeared in the pages of *SHORT WAVE MAGAZINE*. Little attention, however, seems to have been paid to its possible use as a VHF system.

Following are the main features of the Quad aerial: (1) Forward gain compared with a dipole, better than 5 dB, (2) Front-to-back ratio, approximately 25 dB, (3) Element dimensions, a square loop having quarter-wave sides, (4) Element spacing, less than one-eighth wavelength, and (5) Feed impedance, 75 ohms balanced.

From the foregoing it will be apparent that the Quad, in its basic two-element form, is capable of a performance which is better than a simple two-element parasitic beam and, in fact, takes up less space.

The layout of a two-element Quad is shown in Fig. 1. Table 1, with reference to Fig. 1, shows the dimensions for both a four-metre Quad and also a similar two-metre array. The basic equations from which the dimensions were derived are also shown.

The array shown in Fig. 1 is of the reflector, driven-element type. A similar set of dimensions may be used for a director, driven element type of array, except that the stub should be left open-circuit, *i.e.* capacitive.

It is perhaps interesting to note at this point that a three element Quad array, (director, driven element, reflector), with element spacings of  $1416/F$  mc (inches) exhibits a gain less than its three-element parasitic cousin, *i.e.* 7 dB for a Quad as opposed to 8 dB for the parasitic beam system.

Fig. 2 shows how two approximately harmonic related arrays may be mounted on a common support.

TABLE I

Freq. in mc	Side L: $\frac{2976}{F \cdot mc} = \text{ins.}$	Spacing S $\frac{1416}{F \cdot mc} = \text{ins.}$	Stub Length X $\frac{463}{F \cdot mc} = \text{ins.}$
70.4	42.25 ins.	20.1 ins.	6.5 ins.
145	20.5 ins.	9.75 ins.	3.2 ins.

Data for Quad Dimension calculations. From the formulae, length and spacing for any other frequency can be worked out. The 4m. band is 70.1-70.7 mc, and the 2m. band 144-146 mc.

The larger, two-element, four-metre Quad will exhibit a power gain of approximately 5 dB, and have a front-to-back ratio of the order of 25 dB. The feed impedance of the two-element array will be 75 ohms, unbalanced.

The smaller, three-element, two-metre array gives a 7 dB gain and has a front-to-back ratio of approximately 30 dB.

### Construction

The supports for the elements were constructed from  $\frac{3}{8}$ in. hardwood dowel, available from most D-I-Y shops. The centre blocks were cut from 3in. by 1in. planed softwood and mounted on a support boom of 1in. hardwood dowel. The centre, 3in. square, blocks should be drilled to take a  $\frac{3}{8}$ in. dowel on each of their four sides, and a 1in. hole drilled in the centre to accommodate the boom. The  $\frac{3}{8}$ in. dowels should be fixed in position with a waterproof glue. Three such assemblies as the one described are required for the complete aerial array. Fig. 3A shows the construction of the two composite 4m./2m. assemblies. From Fig. 3B the construction and dimensions of the smaller two-metre driven element support assembly can be followed—*see* p.348.

When complete, all component parts, including the main boom, should be given several coats of

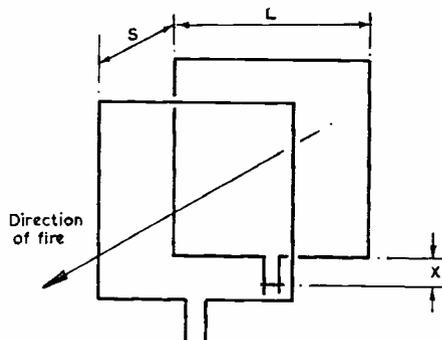


Fig. 1. Basic two element quad.

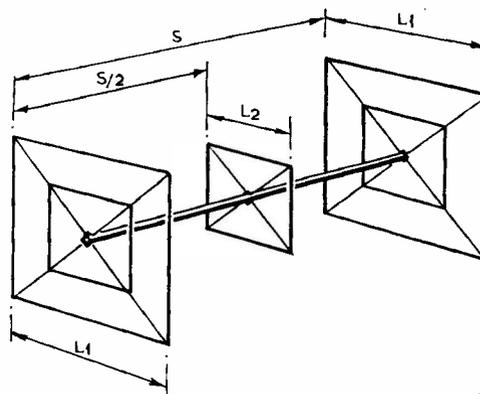


Fig. 2. Composite 2metre/4metre array

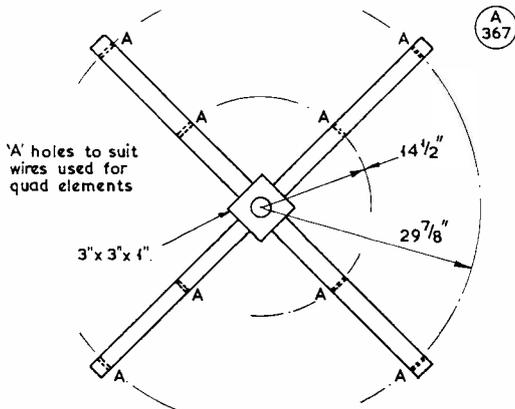


Fig. 3a. Support 'spider' for large end section

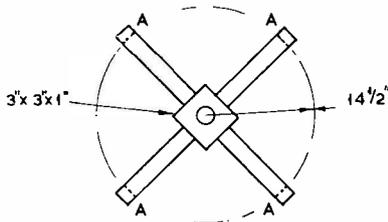


Fig.3b. Support 'spider' for 2 metre driven element

good quality varnish to protect them from the weather.

The Quad elements can be constructed from ordinary p.v.c. connecting wire of the heavy-duty type, or tinned copper wire of about 18g. The wire is passed through holes drilled in the support rods, shown in Fig. 3, and secured with lightweight nylon fishing line.

**Feeding the Array**

The two-element, four-metre array offers an impedance of 75 ohms, balanced, and may therefore be fed *via* a balun with 75 ohm coaxial cable. The use of a balun is essential for two reasons:

(1) If the Quad loop, or any other balanced radiator, is fed through an unbalanced feed-line the radiation pattern (which is normally perpendicular to the plane of the Quad loop) will "squint" towards the side of the loop connected to the centre conductor of the coaxial cable.

(2) No matter how close the impedance of the feed-line matches the aerial a high SWR will exist if the balance/unbalance condition is not corrected.

Fig. 4 shows a simple, easily constructed coaxial sleeve balun that will perform the required task.

The three-element, two-metre array is unfortunately not quite so easy to feed as the two-element system. There are, however, two methods we can

use to achieve an approximate match, and a third, but more complex, method which will achieve an exact match.

*Method 1.* The two-metre driven element should be threaded on to the main boom, placed exactly at the centre and secured. The two composite end-sections should be placed in position and fixed. The two-metre driven element may then be fed *via* a 50-ohm coaxial cable and balun.

*Method 2.* The array should be assembled as for Method 1 but the two-metre driven element is not secured to the boom. This element is again fed *via* a 50-ohm coaxial cable and balun but in this case the final position of the element is adjusted for minimum SWR.

*Method 3.* Fig. 5 shows the two-metre driven element fed with either 50 or 75 ohm coaxial cable and a gamma matching section. The element should be positioned midway between the two composite end-sections. The position of the tap, approximately 3 1/2 in. from the centre, and the value of the condenser approximately 10  $\mu\mu\text{F}$ , should be adjusted for minimum SWR. The spacing of the gamma matching section from the driven element should be one inch.

The capacitor, the variable factor, can be constructed along the lines described by GW3DFF in SHORT WAVE MAGAZINE for April '63. The driven element in this case was made from 14g. copper wire. With this method of matching it is possible

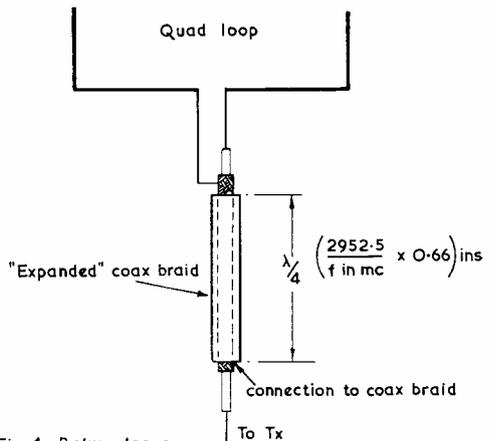


Fig. 4. Balun sleeve

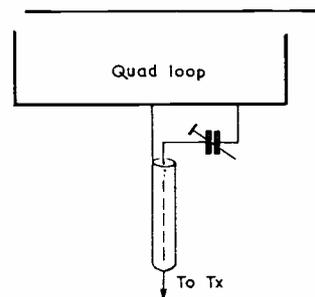


Fig. 5. Two metre gamma match section

to achieve extremely low values of SWR.

Some constructors may consider it necessary to adopt the gamma matching device for the four-metre driven element, in order to get the utmost out of the array. Suitable values are then of the order of 20  $\mu\mu\text{F}$  and 7 inches for the capacitor and tapping point respectively. However, the improvement in SWR experienced by the writer when using this

method was found too insignificant for the trouble involved.

Finally, the stubs on the director and reflectors should be adjusted. In the case of the two-metre director the open-circuit stub should be adjusted for maximum forward gain. The short circuit reflector stubs should be adjusted for optimum front-to-back ratio.

## QRO POWER SUPPLY WITH SILICON DIODES

UP TO 500 WATTS USING THE MULLARD BY100

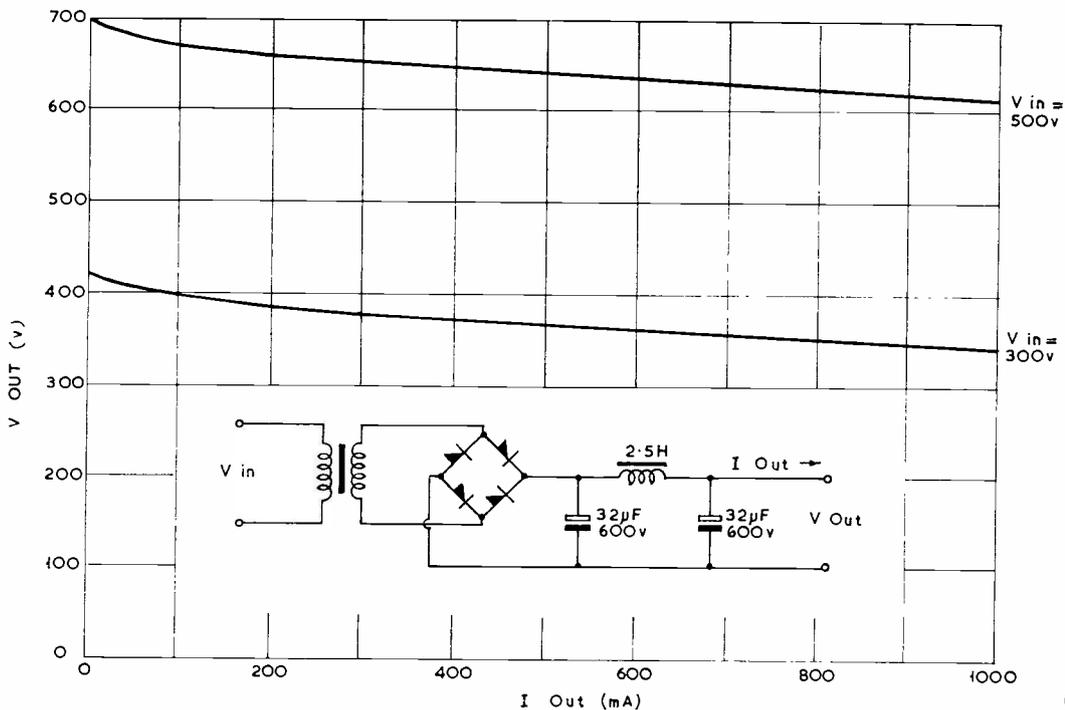
**T**HE *Mullard* BY100 is a silicon diffused junction rectifier developed mainly for use in half-wave circuits directly connected to the standard AC mains supply. It can be used equally well in other types of rectifier circuit having different waveforms.

Because of the very low forward voltage drop (about 1.2v. at 5 amps.) and the slight reverse leakage current (a few microamps. at 800v.) the heat dissipated in the BY100 is small enough to allow it to be operated without a heat sink—the BY100 can, in fact, be mounted simply by its connecting wires.

However, as in any semi-conductor rectifier, voltage transients (generally due to switching) can

cause complete breakdown if they are of sufficient amplitude and duration. Hence, unless the switching is "soft," measures should be taken to limit the amplitude of switch-on peaks; the usual precaution is to connect a condenser, or condenser and resistor in series, across the supply. In the case of the transformer-rectifier arrangements normally used, this spike-suppressor can go across the secondary winding of the transformer supplying the rectifiers. Actual values required depend on the voltage, but a 10K resistor rated 5w. into a .01  $\mu\text{F}$  1200v. condenser would be suitable for a transformer giving 500v. across its secondary with respect to the centre-tap.

A conventional bridge-rectifying circuit with condenser input for use with the *Mullard* BY100 is shown in the diagram, together with output characteristics when used with a transformer giving either 300v. or 500v. across the secondary. The data show that with 500v. r.m.s. input an output current of 1000 mA can be obtained. In amateur practice, a typical working point would be 650v. at 500 mA, using a transformer of appropriate current rating giving 500v. across the secondary.



# VHF BANDS

A. J. DEVON

THE trend-of-conditions developed as expected, so that during the period under review (end June to third week in July) there has been quite a nice lot of GD<sub>X</sub> about, and a certain amount of ED<sub>X</sub>, with northern EU's workable from the Midlands area. For reasons explained in this month's Editorial, it is probable that your A.J.D. has not heard from everyone who wrote in for the deadline—however, enough mail got through to form a pretty complete picture, and to hear about various individual successes on the different VHF bands.

As regards conditions, the W<sub>x</sub> set-up for July 15-17 was ideal for a good, strong tropospheric development late in the evening—a hot day, with a high glass, and then a cool evening under a clear sky, perhaps with some thin cloud layers here and there. This is the classic weather condition, and will almost always give good signal paths over and somewhat beyond the area covered—which, in this case, was the southern half of England and northern Europe. Apart from what your own barometer may have told you, all the clues were there, from the look of the TV weather chart to the sky condition. There was a collapse in all this by the evening of July 18, with violent storm conditions over most of the country.

Going back a bit, we had the RSGB's two-metre portable contest on July 5. Well supported as

ever, this was played off under generally good conditions, and some excellent scores will be turned in. F's, PA's and ON's were getting into the Midlands, and GD3KCB/P was giving nearly everyone he worked a new country. And he tried CW, too! Outstanding signals at medium distances from where your A.J.D. sits were G3KMT/P near Ludlow (who worked PAØCML at mid-day); GW3RUF/P in Brecon; G3IGV/P for Cornwall, with 70 stations worked by 1835; G8SB up in Cheshire, with 114S at about 1700; and G3EVV on SSB. In partnership for the event were G3AOS/G6AG, with two receivers and tuning the band both ways after every call or QSO; they finished up with 116S worked. Another high scorer was G3EGK/P, with 149S, which should be well in the running for the lead position.

Some interesting contacts observed by A.J.D. included G3KMT/P-GC2TR, towards finishing time; G5MA-GD3KCB/P on CW during the morning; G3KEU/P from near Romsey, Hants., working G6CW on the key and giving 579073 at 1840; and G3FD/P and party working "their usual 100 stations" from their favourite site near Dunstable.

One other thing that needs to be said—and it has been said before in connection with these contests—is that some of the /P phone quality was pretty shocking, shown up only too well by those having a good quality characteristic—such as G3KMT/P, with a strong, very well modulated signal having that peculiar penetrating effect, which must help a lot under contest conditions. His was not the only good one, but among the others were plenty of poor ones, and some very bad ones. There is no need for this nowadays, even with portable gear. It was noticeable that the stations having a generally good quality characteristic were also the well-operated ones. Some operators were evidently bawling it out at the tops of their voices and as fast as they could go, introducing a quite unnecessary note of panic-urgency into the proceedings! Never mind, it was all good fun for everybody.

## TWO METRES

COUNTIES WORKED SINCE  
SEPTEMBER 1, 1963

Starting Figure, 14

From Home QTH only

Worked	Station
74	G3BA
57	G3GWL, G3NUE
55	G3LRP
51	G3SAR
49	G3CO
46	G3HRH, G4LU
45	G3AHB
43	G2AXI
42	G3LAS, G3PTM
40	G3PSL
37	GM3LDU
36	G2CDX, G2BJY
35	G3CCA, G3DVQ
33	G3SML
32	G5JU
30	G3CKQ
28	G3KQF, G3PKT, G5UM
26	G3GSO, G8VN, GW3PWH
24	G2BDX, G3IOE, G3ONB
22	G3HWR
21	G3EKP, GW3CBY
19	G3KPT
16	G3OJY
15	G2DHV/P
14	G3OZF, G5FK, G5ZT

*This annual Counties Worked Table will close on August 31, 1964. Final claims should be put in as soon as possible and the Table for the Year will appear in the October issue. The new Annual Table opens w.e.f. September 1st., for 1964-'65.*

### Four-Band Man

There are not many who can work four VHF bands, and with entirely home-built gear at that. One of these is G3LQR, Dedham, Essex, who is now equipped as follows: For 4 metres, 50w. to a QQV06-40, with a 5-ele Yagi and an E88CC converter; for two metres, a 4X150A running 150w. on CW, into a 10-ele long-Yagi, with a 6CW4 type of converter; for 70 centimetres, also a 4X150A PA taking the full puff, with a 16-ele stack and a converter consisting of a 2N1742-G3BKQ arrangement; and for 23

centimetres, the PA is a 3CX100AS running 50w., the beam assembly four 10-turn helices at 60ft., and a half-wave trough-line converter on the receiving side.

This lot must take quite a bit of managing, inside and out. As to results, Simon has worked PAØCOB on 23 centimetres, and says "this band is great fun when there is some tropo. about." On 70 centimetres he raised GW3ATM/P for his 10th country on that band, and on four metres G3LQR has acquired 26 counties.

Another 23 cm. success story comes in from G3MPS, now of Ashcott, Bridgwater, and thus a near neighbour of G5DW. On the evening of July 16, over a path distance of about 175 miles, G3MPS had a good and solid contact with F8MX/A, in his summer hide-out at St. Valery. Signals were R5 both ways, peaking to S9 at times. At the F8MX/A end, the Tx is a 2C39A tripler taking 30w., with a 15-over-15 Yagi and a strip-line type converter. G3MPS has a 4ft. dish about 20ft. up, fed with 25 measured watts of RF from a straight 2C39A amplifier, the Rx being a radial-cavity converter. On the evening of the 17th, another contact was tried, successfully, but signals were very much weaker. So July 16 was evidently the peak night of the period. F8MX/A also reported a 23 cm. QSO with G3OBD/P, across the Channel at Swanage—but we have no details of the latter's gear. Incidentally, G3MPS is another to qualify as a four-band man; he is in a go-condition from 70 mc to 1296 mc. He says his new QTH is turning out very well, and he hopes to work up plenty of activity from Somerset.

**Four Metres**

The level of activity is certainly improving on the 70 mc band, and the current table shows about 10 movements. G5FK (G.E.C., Wembley) found 46 new stations to work before the June contest, and during the contest itself had no less than 71 contacts, with G3OCB/P for Cornwall as best DX, and GI3HXV just about identified. The 4-metre score for the G5FK boys is now 162S in 32C and three countries; those in

this party include G3HWR, G3RPE and G3SJT (said to be a fugitive from Top Band!). G3HWR himself has worked 112 stations in 16 English counties, is regularly active, uses CW a good deal, and has had interesting contacts with G5ZT (Plymouth) and G3YH (Bristol).

G8VN (Leicester) has had a 4m. /M holiday in Devon, and on the Sunday of the contest was knocking them off from Dunkery Beacon, on Exmoor; running only 4w. and a quarter-wave vertical whip on the car, the best contact turned out to be G3PIA/P at 85 miles — which, G8VN thought, was not too bad. Mention of Dunkery Beacon reminds your A.J.D. of a sunny Sunday afternoon in the summer of 1936, when he was up there with 5-metre "squish" gear; even after 28 years, and logs lost long since in the turmoil of war and all that has happened in nearly three decades, the excitement of super-regen. contacts with G2JL (then of Newport, Mon.), G5JU (at that time in Bristol) and G5SY in Torquay can be well remembered. And it was all to the wonderment of G3BO, who was A.J.D.'s companion on this trip and no believer at all in what we then thought of as VHF.

From another hill-top, Beacon Hill in Charnwood Forest, G8VN has been working G5JU (Birmingham) at 40 miles with the QRP /M rig; this site is also used by G3BNL/P and G3PXB/M, both on 4m.

G3EHY (Banwell) goes up two more in the table, and GI3HXV (Belfast) also chalks up another couple, with GI3RXV for 'Derry and G3AYT for Staffs. GI3HXV reports very pronounced sporadic effects evident on 70 mc, with Continental BC stations coming in strongly — but no amateur signals heard. He also says that the B44 Tx/Rx unit is helping a number of new stations to get going on the 4-metre band.

On the other hand, GC3OBM (Guernsey) reports only five stations heard to work in about six months, which is rather disheartening, to say the least. Perhaps a few 4m. skeds would help to liven things up for him — he is QTHR.

Harry of EI2W is back on 70 mc, and worked 29S during the contest, his total for the table now being the very respectable one of 38 counties, which includes some nice GDX.

**EA4AO-ON4FG by MS**

Though a follower of this piece for many years, EA4AO (Madrid) says he is writing in for the first time—to report a meteor-scatter QSO with ON4FG during the Arietids Shower over June 7-8. A sked for 0500-0700 GMT both days, on 144·100 mc, using 5-minute send-receive periods, produced contacts on both occasions, though conditions were better on the 7th, with numerous bursts throughout the

**FOUR METRES**

**ALL-TIME COUNTIES WORKED LIST**

Starting Figure, 8

From Home QTH Only

Worked	Station
43	G3EHY
38	EI2W
37	G3IUD, G3OHH, G3PJK
33	G5JU
32	G3NUE, G5FK
31	G2OI
30	G3JHM/A
27	G3PMJ
26	G3LQR
23	G3BOC
22	G3LZN
21	G3AYT
19	G3BNL
18	GI3HXV
16	G3BJR, G3FDW, G3HWR, G3OWA
14	G3OKJ
13	G2AXI, G2BJY
12	G5CP, G5DS
11	G3SNA
10	G2BDX
8	G3PRQ

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

## TWO METRES

## COUNTRIES WORKED

Starting Figure, 8

- 24 G3LTF (DL, EI, F, G, GC, GD, GI, GM, GW, HB, HG, LA, LX, LZ, OE, OH, OK, ON, OZ, PA, SM, SP, UA, UR)
- 22 ON4FG (DL, EI, F, G, GI, GM, GW, HB, HG, LA, LX, OE, OH, OK, ON, OZ, PA, SM, SP, UA, UR, YU)
- 21 G3HBW, G5YV (DL, EI, F, G, GC, GD, GI, GM, GW, HB, HG, LA, LX, OE, OH, OK, ON, OZ, PA, SM, SP)
- 19 G3CCH
- 18 G2JF, G6NB, ON4BZ, OK2WCC
- 16 G3BA, G3BLP, G3CO, G3GHO, G3KEQ, G5MA, G6RH, G6XM, PA0FB
- 15 G2CIW, G2XV, G3AYC, G3DKF, G3FZL, G3HRH, G3RMB, G4MW, GM3EGW
- 14 G2FJR, G2HDZ, G3AOX, G3FAN, G3HAZ, G3IOQ, G3JWQ, G3KPT, G3NUE, G3PBV, G3WS, G5BD, G5DS, G6LI, G8OU
- 13 G2HIF, G2HOP, G3AOS, G3DMU, G3DVK, G3EHY, G3GPT, G3GWL, G3HIT, G3LAS, G3NNG, G3OHD, G4LU, G6XX, G8VZ
- 12 EI2A, EI2W, F8MX, G2BJY, G2CDX, G3BNC, G3GFD, G3GHI, G3JAM, G3JLA, G3JXN, G3OBD, G3WV, G5CP, G5JU, G5ML, G8DR, GW2HIY
- 11 G2AJ, G2CZS, G3ABA, G3BDQ, G3BOC, G3GSO, G3IUD, G3JYP, G3JZN, G3KUH, G3LHA, G4RO, G4SA, G5UD, G6XA, GC2FZC, OK1VR, PA0VDZ
- 10 G2AHP, G2AXI, G2FQP, G3BK, G3DLU, G3GSE, G3JHM/A, G3KQF, G3LAR, G3LRP, G3LTN, G3MED, G3OSA, G3OXD/A, G5MR, G5TN, G5UM, G8IC, GW3ATM, GW3MFY, GW5MQ
- 9 G2BHN, G2DHV, G2DVD, G2FCL, G3BOC, G3BYY, G3FIJ, G3FUR, G3OJY, G3PSL, G3PTM, G4LX, G8GP, GC3EBK, GI3ONF, GM3DIQ, GM3LDU
- 8 G2BDX, G2DDD, G2XC, G3AEP, G3AGS, G3AHE, G3CCA, G3EKK, G3GBO, G3HCU, G3HWJ, G3KHA, G3PKT, G3MPS, G3VM, G5BM, G5BY, G8SB, GM3JFG

two hours. EA4AO got what he calls "a recording tape with the very fine signals of ON4FG, some times long enough to copy both calls repeatedly." Nice work, and congratulations to them both.

This result will be of particular interest to EDX and MS operators in the U.K., because it proves that in EA4AO we have a well-equipped and operated station to work with on DX tests on two metres. He runs 260 watts to a pair of 826's in push-pull; the receiver is crystal converter with 6CW4 pre-amp. into a National NC-173, the beam being a 10-element long-Yagi. EA4AO says

that he and ON4FG have tried using the *Echo II* satellite (the big balloon reflector) but no joy so far. As the VHF manager for the U.R.E. (the Spanish national amateur organisation) EA4AO is the obvious contact-man for EDX tests. He is *QTHR*, and there is no language problem. Thank you S enor.

## The Two-Metre Clip

In the June issue, we mentioned the Kincardine expedition, to be there during July, operated by the A.E.R. (92nd Signal Regt., T.A.) boys, and signing GM3SIG from one of the rarest of GM counties. This duly came off, and over July 18-19 they worked a number of Scottish stations on phone (for most of whom Kincardine was a new one). On July 19 G3BA, G3BNL and G3LRP were raised on CW, for very good GDY contacts. The gear used by GM3SIG was the standard Withers two-metre equipment. And we are informed that, learning from the experience, they hope to do better and get further next year. GM3SIG is, of course, the club callsign of an important Army Reserve formation, concerned with Service radio and teleprinter communications, and the GM3SIG effort was possible because the Unit was up there on summer training.

G3GWL (Bletchley) is one of the many who succeeded with GDY3KCB/P, also worked by G3HRH (Welwyn), who has advanced his totals considerably in the two-metre tables. Ray reports a new shack, with the QRO gear installed, and is now at work on a xtal-mixer VFO "to permit more flexible operation," as he puts it. We shall have to watch that he keeps in his Zone when he gets it going! Incidentally, G3HRH will welcome detailed SWL reports from distances over 200 miles, and will QSL *instantly*.

G3AOS (Hale Barns, Ches.) raised EI5AI/M for Co. Wicklow and his 83rd county in the All-Time; he and G6AG (Chalfont St. Peter, Bucks.) run a regular Sunday-morning sked, which is 100 per cent and sure-fire. G2BIY (Walsall) comes in with three more for the Annual, and G3LAS (Berkhamsted) says he is "now

enjoying SSB on Two" — but is rather surprised to find so many people *still* unable to resolve Sideband satisfactorily. This is also surprising to A.J.D., on whose (pretty basic) receiving equipment SSB is found easier to sort out on two metres than on any other band; for those who may be interested, the main Rx is an S.750, with the BFO properly centred, and plenty of front-end gain; there is absolutely no difficulty in resolving and holding any SSB signal.

A welcome report from GM3LDU (Clarkston), inactive for a long time because of absence, but back home for the recent contest, during which he made a number of useful scoring QSO's.

## Nice Time Out

Just as this was going down, the band was searched for the G3BA/G4LU expedition into Wales — there they were, peeling off the QSO's from Radnorshire, and at A.J.D.'s a better signal on the morning session (0745, July 27) than from the same site the previous evening. Incidentally, for the protection of the /M gear in his Triumph "Herald," Tom has devised an anti-thief switch device which makes the horn blow if any door is opened when the car is left — he says the effect is "quite frightening" if he forgets to throw the control switch when out shopping with the XYL! (Circuit next month. — *Ed.*) And by the evening of July 27, as this was being written, GW3BA/P "nine miles north-west of Monmouth," was starting the evening session.

## Conclusion—And Deadline

There we must leave it, with space and time running out, and reports acknowledged from G3SAR, G3CCA, GW3BCY, G3NUE and G8AAP. This should reach you by normal delivery, and all there is to say now is that for September the deadline is **Friday, August 21**. May Allah guide your foot-steps, don't be late, and send it all to: A. J. Devon, "VHF Bands," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. And if Allah is with us, we will be with you again on September 4. 73 *de A.J.D.*

# COMMUNICATION and DX NEWS

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

"I AM sick to death," said Arabackle Oblifork, "of being messed about by Bulgarian teenagers. I can no longer indulge in my simple and harmless hobby without being subjected to objectionable behaviour by beatles from Bulgaria, rockers from Roumania and mods from Mittel-Europa in general. I am a confirmed square, and I started Amateur Radio in the days when Good Manners were highly thought of, when a QSO was a contact between two people and not a bout of catch-as-catch-can for every aggressive adolescent on the far side of Long. 15° E."

"So what," we asked, "are you going to do about that?" (A purely rhetorical question, since we knew the poor chap could not do anything at all about it.) "I have two plans," answered Arabackle, "one for Phone and one for CW. It is on the latter mode that I suffer most. Only a few days ago I was calling a friend of mine in Arizona; a man I've known for years; an amateur of the highest integrity and a personal friend of K7UGA—and I need not tell you who *he* is. So I called him—and he heard me and replied; but after two words he was blotted out by one of these unmentionables, actually *calling him* (while he was sending!) This Boris (or Ivan, or Alexei, or Vlad) had a signal of 1930 vintage; roughly RST 594, with chirp, click and drift. Had he been transmitting a TV picture he would have sounded almost the same, but I should doubtless have seen that he had long hair down to his shoulders, was unwashed, suffered severely from acne, was frustrated in calf-love, and was unwanted by his unmarried parents (I'm a psychologist too, you know).

"Now, had I been able to communicate with my American friend in a form of Morse that was unintelligible to this spotty-faced aggressive, he would not have interfered, since he would not have known what was going on. So I plan to institute, among a few chosen friends, a modified form of the Morse code which will keep these

little tyrants at bay. The licence mentions 'plain language,' I know, so any secret code would be an infringement. But badly-sent Morse can be unreadable to those who have not studied the finer points of bad sending, and that is what a few of us are going to use in future. The dots and dashes will be distinguishable from one another only by a connoisseur of poor operating; the ordinary Lid will not understand what is going on; and my CW QSO's with a few chosen friends will sound just like teletype and will therefore be ignored. It might even be that the frequency will be avoided by the pests.

"For telephony the solution is also simple. I shall switch sidebands at a fairly rapid rate, which will be synchronised at the two ends of the QSO. The actual rate is at present the subject of discussion, but any frequency above one cycle per second would seem to be suitable. There are some technical problems to be overcome, but Amateur Radio is always a challenge, and what more fitting cause could we follow with our technical ingenuity? In time, I shall be able to work my chosen friends with no more interference than has been customary in the much-regretted past—that is to say, from vacuum cleaners, electric razors, leaking HV lines, static and the occasional (but *accidental*, mark you, not deliberate) straying of other stations on to the frequency."

So spake the oracle, leaving us with something to think about. (It's possible, you know!) Meanwhile, we have our own prescription for dodging all this deliberate QSO-busting. When the Lids are rampant on Twenty, go on to Fifteen. When the breakers ruin your contact on Eighty, move to Top Band. If horrible things happen to you on Forty, serves you right—you ought to know better than to expect anything else on that band. If all fails, become a disciple of A. J. Devon and go VHF . . . at least you will find a different kind of interference there. And if it

should be Bulgarian, you might even enjoy it!

The world is suffering from overpopulation, constantly increasing. And the rate of increase is also increasing. Within this, Amateur Radio has suddenly, it seems, become unwontedly popular, and its own rate of increase is also increasing. The solution is so simple that it's impossible—we want all our bands trebled in size.

## Ten-Metre Activity

Unfortunately the postal strike has interfered with the receipt of logs for the Activity Period on July 12—as, of course, it has held up much of the mail intended for this feature. However, quite a number succeeded in getting themselves through before the post boxes really choked up.

As on previous occasions, some stations worked only a few local G's; others achieved good ground-wave ranges; just a few broke into Europe *via* "tropo"; and a very few raised the very rare pieces of ionospheric DX. Conditions for DX, and even for Europe, were much inferior to those of May 10, but that's all part of the game, and the object of the exercise was to produce some signals on Ten Metres. This object was achieved.

SSB was fairly scarce; AM Phones slightly outnumbered CW signals; but the brasspounders were by no means rare, and they were the ones who managed, on the whole, to raise the most. (And some Old Timers were noted on the band who had not been heard there for several years.)

G3GZJ (Maidstone) worked several G's, heard VQ2WR (AM) at 1453, and worked 5N2JKO (CW) at 1638. IIT was also heard on CW at 1725. G3GZJ wonders whether "bursts of signal strength" observed around mid-day were due to meteor scatter (we imagined, on short-range signals, that they were caused by aircraft).

Laurie Margolis (Ilford) heard about 50 G's, CT1DU (AM) at

1940; and VQ2AP, HZ2AMS and 5B4CZ, all on SSB around 1430; M. Vincent (Cheltenham) logged a few G's plus DM2AMM, I1IZ and I1IT. And he thought conditions were improving towards the end of the period, and possibly still later.

Steve Gall (Old Coulsdon) received VQ2GJ (CW) at 1347 onwards; ZD6RM (CW) at 1410; I1IT and I1Z, both peaking RST 599 around 1600; and 5N2JKO (CW) at 1640. In addition, 37 G's, all in the south of England, were heard. R. Arnold (Solihull) also booked the G's, the IL's and 5N2JKO, and remarks that when the latter suddenly showed up, only one station appeared to call him. N. B. Henbrey (Northiam) covered the band on Phone only, and in among the G's he found VQ2DT (AM at 1422) and 5N2JKO (1555 on SSB). Derek Poulter (Morden) logged 5N2JKO's SSB for his only DX, all the rest of his log consisting of G's.

Many of the logs from transmitting readers consisted mostly of lists of stations heard; quite a few were obviously keeping quiet in between their own unanswered CQ's! G3RGE (Stockport) worked seven G's and heard six more . . . G3RKH (Dawlish) worked two G's and heard one other, as well as VQ2GJ and ZD6RM—all CW . . . G8LY (Lee-on-Solent) worked two G's and heard I1IT at 1626 (CW)—no other stations heard, despite being active 0900-1200 and 1530-1730. G3MEW (Gosport) had rather similar results, G8LY being one of his four QSO's.

G2XY (Leeds) worked six G's and heard three more; he found conditions very poor indeed . . . G3OMF (Birmingham) made six CQ calls with no replies, worked a couple of locals and heard one other station.

G3IDG (Basingstoke) heard quite a few G's plus I1IT, I1IZ and 5N2JKO; he, too, thought conditions very poor. G3HCU operated /P from Blackdown Hill, Sussex, using Heathkit equipment and a home-made 2-element beam. With 60 watts of AM Phone, he worked 28 G's but no DX, although at some places in the south of England he certainly had the most potent signal on the band (but, owing to blocked roads and other troubles, he didn't open up until 1245).

C. Whitman (Bristol) logged seven locals on Phone, 1000-1115, but nothing else. G6QB (Hastings) worked 14 G's, mostly CW but a few on SSB, and heard about 15 others; operating times were spasmodic and he missed all the DX!

Doubtless we shall have more logs by next month; up to date it seems that the DX signals, some half dozen in number, only fell in certain localised places, mostly in the southern counties; and also that, whereas transmitters in the Home Counties were having no difficulty in making dozens of contacts, those spread further out in the country could hear and work nothing but locals.

No doubt we struck a day when conditions weren't good—but you can't win every time!

#### Other Ten-Metre Doings

Strange goings-on have been reported by a few readers, in the shape of openings to the U.S.A., usually late at night. To catch one of these is quite a thrill. One evening such an opening was noted at 2230, and the band stayed open until after midnight, with W's packing it right up to 29.7 mc. G3OAD (Dudley), reporting on some of his recent QSO's, mentions WILMW and W0PAN/1, describing them as "via double-hop E layer"—whereas contacts with VQ2BC and 2DT are described as "via F layer." We don't quite know what justification G3OAD can produce for this assumption, but it sounds very reasonable.

G3OAD's contacts and loggings fall in four separate categories: Tropo, E-layer, double-hop E-layer and F-layer; the normal E-layer stuff includes CT, DL, LA, F, SM, HB, OE, GM (Shetland), ZB2 and 7X, while the "tropo" QSO's include GW's and G's at fairly long ranges. (We only need some meteor scatter and EME and we will really be competing with the VHF types!)

Finally, how much support could be counted on for an Inter-U.K.

Contest when the band is really at its lowest ebb, in mid-winter? G3OAD suggests that this might overcome the general lack of interest between one summer and the next. (Also, how about a "Counties Worked" Table for Ten Metres? If there is enough interest in the idea, that could easily be arranged.)

#### This-And-That

If any great philosopher ever discovered the existence of "DX," we might eventually find out more about its peculiar attraction. Meanwhile we study the wise words of G3NWT, who writes thus: "DX is a means of conveying into the shack personalities living in remote time-scales, little-understood political systems, unbelievable climates (and occasionally more than a suspicion of freer air), with a maximum time-lag of one-seventh of a second . . . DX, while appearing to shrink the world, also, paradoxically and most properly, makes it seem the whacking big place it really is. Upon the world continuing to seem a whacking big, and most varied place, depends most of the fun of living in it."

And a further thought: "People who have chased DX to the tune of 300-up, and will cheerfully spend a fiver on reply-paid cables trying to persuade the 300-and-n'th to come on must have been bitten by *something* compelling. Mostly they are people with wide interests, cultured people even, rational people, yet their one kick is in this strange, wildly irrational pursuit."

Now a letter from one who has *not* been bitten! G3RKH says "I'm not a great DX-chaser, so I don't work many of these exotic calls; I'm more interested in rag-chewing with the man behind the call. So my countries score is still fairly low. Again, I haven't the patience to sit waiting for a QSO with PX0BF/MM, or whatever."

On the subject of bad operating and bad manners, G3RKH continues: "There are bound to be some who are bad mannered and selfish in any society or group, Amateur Radio included. It is

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## Reporting the HF Bands

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no good being self-righteous about it: the only way of improving the problem seems to be to stop their number increasing. And if that means stiffer tests before the licence is issued, or incentive licensing, then it is long overdue. Personally, I regret the passing of the one year on CW with QRP. I know that I would be a better operator if I had not been able to get on 80-metre Phone at once . . . after all, the Editor's 'Budmarsh' is not the only source of trouble for Amateur Radio—the licensed idiot is even worse."

#### News Items

G3KEP will be signing GM3KEP/P from seven "rare" counties in Scotland, August 7 to 13 inclusive. Top Band, 2000-2300 GMT each night.

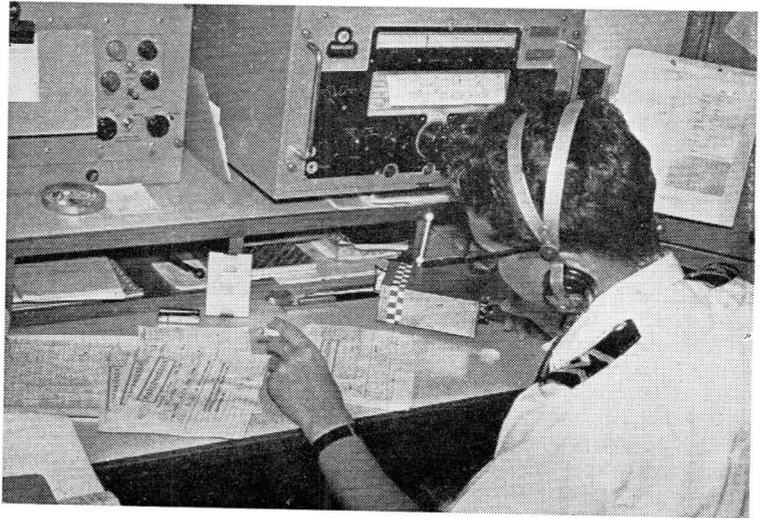
G3PGN will be using the same band from Eire, August 18 to 27 inclusive. He has been licensed under the call EI4AS/M, operated jointly by G3OQT and himself. Both Phone and CW will be used, according to conditions and QRN.

G3PLQ is ship-borne again, still on the West Africa run, and will by now have been listening on Top Band from Freetown (where he hoped to meet 9L1HX), Takoradi, Tema, Sapele and Warri. Further movements uncertain, and reports in due course.

ON4QX's travels in Europe may be over by now, but we had a QSL card from him signed ON4QX/3A2CZ/4U1ITU/OE1QX/DJ0BG/LX3AA. (Your conductor will shortly be joining a select organisation of people who have held only one call sign for the whole of their lives!)

The 1963 VK-ZL-Oceania Contest was better supported than previous events, and some overseas amateurs commented on the increased activity from Oceania and the VK-ZL area. We have not received the full results, but three high-scoring G's in the CW event were G4CP (1365), G3FXB (1274) and G5WP (1260). The only European station to beat them was DL7AA (2185).

The dates for the 1964 VK-ZL event are as follows: *Phone section*, October 3, 1000 GMT to October 4, 1000 GMT. *CW section*, same times October 10-11. *Scoring*: 2 points per QSO per band with VK-ZL stations;



John Walton, G3PLQ, in his capacity of radio officer, m.v. "Prahu," working Portishead Radio on 8 mc near the Canary Is. He uses his own el-bug for keying the ship's transmitters; the Rx in the picture is the Marconi "Atalanta." When at home, G3PLQ is on the air from Salisbury, Wilts; he is a very keen Top Band operator and has supplied many interesting DX logs covering that band when on deep-sea voyages—this DX being, of course, G's heard on 160 metres.

one point for other Oceania stations. *Multiplier*, total points multiplied by total VK-ZL Call Areas worked on each band. Logs to NZART, Box 489, Wellington, New Zealand, before January 16, 1965.

#### The A.I.O.T.W.A.R.W.?

At last, an award about which there will be no quibbling or argument; one which is unaffected by political upheaval or "change of status"; and one which is sufficiently comprehensive to keep the rabid DX'er busy for the rest of his life.

Vaguely foreseen by your conductor several years ago, it now becomes a fact—and the "All Islands of the World Amateur Radio Award" comes into being.

A directory of all islands will be prepared, supplements giving details of new islands "activated" by DX-peditions from time to time. An island is an island—even Australia is one—and whether it is split up into different "countries" or political groups matters not. For instance, G, GM and GW—one island; GC—each separate island counts; Isle of Wight, Lundy Island, each of the Orkneys, Shetlands and Hebrides—all are indisputably islands, to there's no argument.

To regularise the whole affair,

it is proposed not to include an island in the Directory unless it already has resident amateurs; or, if activated by an expedition, until a QSL card appears with the name of the island printed on it.

The Award will be instituted only when the Directory reaches 100 islands, and only QSO's taking place *after that date* will count. Everyone will start level, and it seems to us that all you will need is a good rig, a good atlas and a few thousand QSL cards!

Sponsor of the scheme is Geoff Watts of Norwich, who circulates his *DX News-Sheet* to subscribers; but watch these columns for fuller details as and when available.

One of the great advantages of this award will be that many amateurs will henceforth be able to organise their own DX-peditions and find themselves sought after by the DX'ers of the world. Indeed, there are few countries in the world from which a party of amateurs could not make a trip to several "new ones" which, at present, count for nothing.

#### A DX "Holiday"?

VK2AGH and his XYL recently "spent two whole weeks, away from the rat-race and ant-bed activity of the modern bustling City of Sydney,

only to take a transceiver and jump back into the dogpiles of ham radio." But the lovely unspoiled beauty of Lord Howe Island, together with the complete absence of noise, TV, ignition QRM and even static made the project worthwhile—especially as receiving conditions were fantastically good.

A three-hour flying-boat journey from Sydney presents no hazards, and the island has a white population of about 250. Only forty to fifty feet from the Guest House is a line of pines 120ft. high, into one of which Graham spotted a wire disappearing . . . someone had (we know) been there before!

First QSO from VK2AGH/LH was (your guess was right) a W6, and it was difficult to break through the California curtain to the East Coast of U.S.A. However, Graham wants to thank the W6 boys for the way they stayed off, their fingers itching and poised, when he called "East Coast only."

A spot of transmitter trouble and a nasty ionospheric disturbance didn't help things, but this was a holiday and not a Gus-type expedition! Very few G's were worked—some were heard and called without replies. Line voltage jumped all over the place, and other people (even VK2's) were heard complaining bitterly of QRN, which was not audible on the island ("no trouble at all in copying solid a signal of strength S0.5 to S1").

Results, summed up, showed 650 contacts (430 on CW, 220 on SSB) from all continents but very few countries. After duly making the last contact (yes, it was a W6 again) the gear was packed up and the return made to Sydney and the rat-race, after two weeks in idyllic surroundings from more than one point of view.

#### DX News from All Parts

The former G3WS is now VK5WS (Adelaide) and is also licensed as VK2SX (Sydney). He is already active on Fifteen, Twenty and Forty, and with the arrival of a new aerial he will be on Eighty, looking especially for G stations (2000-2200 and 0500-0700 GMT). Mainly CW, but always ready for an AM contact.

WPX-hunters! F0AB showed up in mid-July and may still be on the air; he is ON5DO—QSL direct . . .

OH0, so rare a few years back, is now almost commonplace; a recent sortie included OH2BH/0, 2BQ/0, 2BS/0, 2QV/0 and others.

And the Hammarlund "DX-of-the-Month" effort will be repeated, August 16-22, with OH2AH/0 and OH2YV/0 in operation, concentrating mainly on 14 mc SSB to the U.S.A. (but also working SSB on 28250, 21250 and 7045 kc); CW frequencies will be 28050, 21050, 14050, 7005 and 3505 kc. Operation will be from a better location than last year.

Hammarlund will also probably be in on a sortie to Heard Island (VK0) in November. This is credited to the "Southern Indian Ocean DX-pecities Co." and is expected to run for two months.

New prefix for Malawi (ex-Nyasaland) is 7Q. The amateur station in operation for the Independence Celebrations was 7QDI, with Peter, ZD6PBD and Ron, ZD6RM. (The call was a mistake—should probably have been 7Q6DI . . . perhaps some civil servant from Jamaica has been posted there?) All stations continue to use their ZD6 call until officially informed of their new one.

VK4TE is on Willis Is., but is too busy installing commercial equipment to show up on the amateur bands yet awhile . . . VK9DR continues from Christmas Is., often on 7010 kc CW (1130-200 GMT) . . . VK9RB is on Norfolk Is. (14044 kc CW but also on 7 mc) . . . Lord Howe Is. will be activated once more—this time by VK2AI, 2AAK and 3AHO for two weeks, beginning August 18, CW and SSB.

Phoneys become more and more difficult to separate out from the genuine stations. A character signing HL9TE/0 on 14055 kc CW started a pile-up, but when he said he was on a "field day operation" it began to sound a bit far-fetched. But rumours had been circulating about Korean Neutral Zone activity, and, as the WGDXC *Bulletin* says, "reminds us of the fellow who started a rumour, and then believed it."

We are always sorry for the man who assumes that so-and-so is a phoney, ignores him and then finds

he's genuine. Twice in recent weeks this has happened at G6QB! Early one morning a CQ was answered by an FO8 of such terrific strength that we didn't believe a word of it . . . but when he was heard working others all over the world and fading down to a more normal signal level, he looked all right. On another occasion a W6 was suspected of being a practical joker in the same county—no Polar flutter, no QSB, key-clicks and a distinctly European-sounding note . . . but he was the real thing after all. You never know.

#### For the CW Man Only

Phone enthusiasts, skip the next couple of paragraphs! VQ2W, in the Circular Letter of the FOC (First-Class Operators' Club) pleads for full break-in on CW, and says that once you have had it, you can't do without it. "A decent muting system can be adjusted to give instant recognition of the breaking signal between strings of 30 w.p.m. dots; or the Rx recovery can be slowed down to the point where it is little more than automatic send-receive switching. Between these two extremes there is a range of adjustment for every mood.

"To those not familiar with the operating technique, I suggest tuning the Rx to a lively CW band, say 14 mc. Tune the VFO on a lower band, so that the harmonic is about the same strength as the signals being received. Then indulge in some sending practice, at the same time paying attention to what is happening on the frequency."

There is certainly a lot to be said for it in present-day conditions, when one never knows if one's signal is being blotted out by you-know-who. VQ2W continues: "With full BK you can hear the careless ones zero'ing on the frequency as you call CQ—and disconcert them by mentioning it. You can hear the DX station come back to someone else while you're still calling. You can listen to the competition, know exactly when they stop, and then sign off with your own callsign on a clear frequency. You can have a rapid give and take of ideas in a

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*The Zone-Band and Top Band Counties tables will appear again next month, with all amendments received in time.*

ragchew . . . you can have a lot of fun."

Only one snag . . . it takes two fully-equipped stations to enjoy the latter; but *one* is better than none at all.

#### Sheepskins and Suchlike

Every month someone asks why we don't print full details of all new certificates and awards as they appear—rules, where to write for them, number of IRC's and all that. And every month someone else writes to know why we waste so much space on the very same thing. The same mixed bag of correspondence arises from *Contests*—and we can assure you that if we printed the full rules for every contest of which we are notified, there would be little room for anything else in these pages.

So we propose to do more or less what we always have done, which is to give the briefest details of new awards (when they rise above the purely trivial or frivolous level) together with the QTH of the originator, who can be chased for further details if they are wanted.

Thus: WECC (Worked All European Capital Cities)—Class A award for 30 of them, Class B for 20, Class C for 15. Details from SM7DQK (certified list and 10 IRC's needed for award).

WANR (Worked All Northern Rhodesia)—Work six VQ2's in 3 different towns, or, for 1st Class, ten VQ2's in five different towns; QSL's, or certified list, with 7 IRC's, to NRARS, Box 332, Kitwe.

The last-mentioned award runs only until October 24, after which Northern Rhodesia becomes independent and the Radio Society of Zambia takes over.

The Benelux Award, sponsored by the well-known Antwerp (OSA) CW DX Club, requires confirmed QSO's with seven ON's, seven PA's and two LX's—details from ON5AX, Box 331, Antwerp.

At least ten other sheepskins have been announced this month, so you will see what we mean about space! See if you can track them down for yourselves . . . DPM (Majorca), 20-K, Nevada 1864-1964, WAPUS, 80 x 80 and—"What do you know about the Roumanian People's Republic?" (No kidding, we promise.)

#### Contest

A late (in fact last-minute) reminder that the Tenth European (WAE) DX Contest is imminent. The CW half runs for the 48 hours of the week-end August 8-9, and the Phone half similarly on August 15-16. Bands 3-5-28 mc, rules as before (as circulated by the D.A.R.C. they occupy four closely-printed pages).

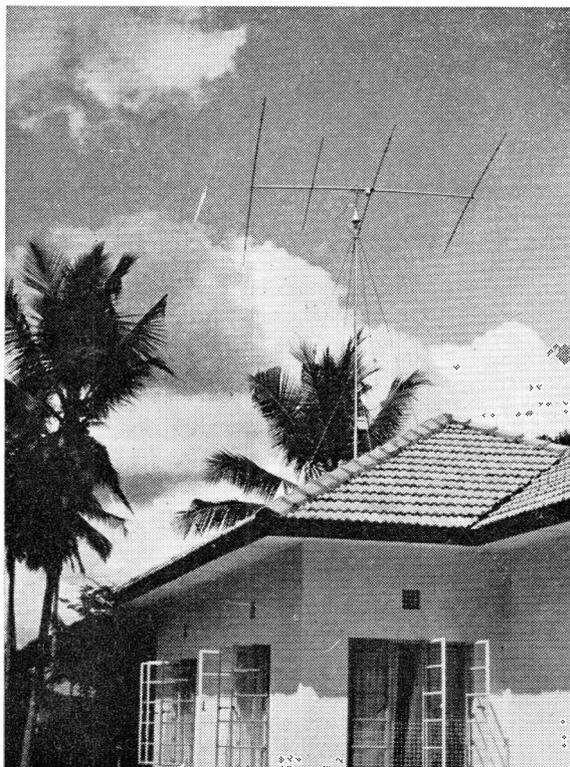
#### More DX Shorts

SWL Dave Gray supplies the following gen.: 7Z3AA is W8GCN, whose QTH is about 25 miles from MP4BBW (Cliff Swann, Box 2437, Dhahran, Saudi Arabia) . . . WØPI, often heard around 14250 kc SSB, 0800 GMT, is engaged on ionospheric and tropospheric work on Midway Island . . . 6W3AN (Box 454, Dakar) should interest WPX hunters . . . ZS1AB says he calls Northern

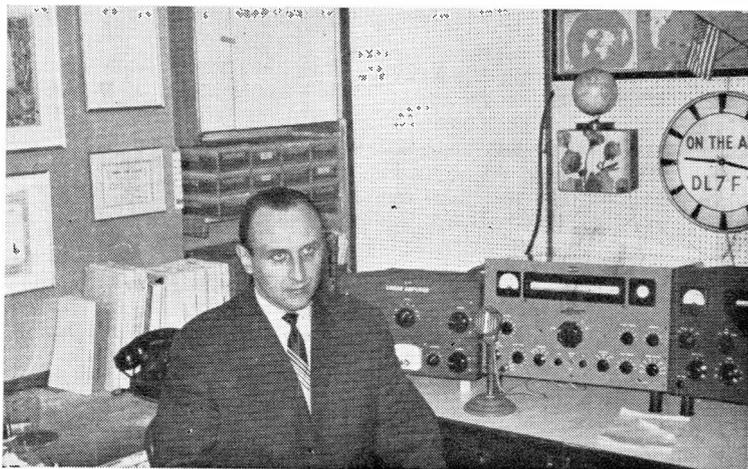
Europe on Fifteen nearly every day, but Italians (whom he can work almost any time) usually block out the other signals . . . PX1MO was logged on 3772 kc SSB, 2200 . . . Finally, heard on Eighty SSB: "There's someone calling you on AM" (pause) "There can't be—I don't *know* anyone on AM!"

Gus Browning, W4BPD, is reported to be "studying Pidgin English" pending his return to Sikkim and Bhutan for his protracted holiday. He and his wife expect to be living in Bhutan for a year. Meanwhile his lecture-tour of the U.S.A. is keeping him pretty busy.

If you can't work new countries—invent 'em! ARRL/DXCC is besieged all the time by requests for ratifications of places that *might* qualify. One of the latest is a neutral zone between West Pakistan and Afghanistan. [over



On p. 229 of the June issue, we showed Bob Tanner, 5Z4AA (P.O. Box 5121, Docks, Mombasa, Kenya) in his station. Here is how the QTH looks from outside, with the Hygain TH4 for 10-15-20m. at a height of 47 ft. This beam is controlled by an AR-22 rotator, and is fed through 52-ohm balun matching.



DL7FT, Franz Turek, Petunienweg. 99/1, West Berlin, also holds 3A2CU and hopes to be in either PX, ZA or 9A later this year. He is on SSB from the home station, as shown here.

FG7XT/FSØ promises activity from St. Bartholomew Island, probably mid-September . . . a PYØ was due to be on from Trinidad, St. Peter and St. Paul Rocks during July . . . HKØAB was likewise expected on from Baja Nuevo . . . and VR1B/A (British Phoenix Is.) has returned to his home QTH in the Gilbert Is.

Future DX-peditionaries please note, in the light of earlier announcement: A house on an island in the Thames, off Hampton Court, was advertised in the Sunday papers, July 19. What a scoop for someone!

*Late Note:* Just as this was going down, letters received (unfortunately too late for inclusion) from G3OHP,

G3JRL, G3OZT, G3GZJ, G2DC, G3CWL, G3SNU, G3PKY, G3NOW, G3WP, G3SGH and SWL M. Harrison—and no doubt there were others on the way.

### Sign-Off

This offering has been a little unusual, since hardly any of the normal regular mail got through in time to be incorporated. So, while we apologise to all those who wrote to no avail, we promise to use all we can of their writings when they do arrive. It is to be hoped the mail will be back in full working order by the deadline, which will be first post on Monday, August 17. If you can get it through before that date, please do . . . there is not quite so much need for topicality under the new title, except for unusual DX worked at the last moment.

Address everything to "Communication and DX News," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1, and we can only hope that it will all arrive on time. Meanwhile, keep watching those bands, and let us know what goes on . . . 73 and—BCNU.

### POLICE WARNING

From the Assistant Chief Constable, Gloucestershire Constabulary, we have a report of an extraordinary occurrence. A local amateur was heard telling a contact, over the air, not only that he was going away on holiday, but also giving his home QTH and the date he would be leaving. A check at the local Police Station showed that the amateur concerned had not informed them that his house would be empty. As the Asst. Chief Constable remarks, these days the criminal element makes full use of radio, so that here was a case of a member of the public offering a golden opportunity for a break-in. He suggests that radio amateurs should refrain from doing this sort of thing—remember, you never know who is listening—and, as the police always request, holiday absences should be reported to the local station. A further suggestion is that /M's should fit some sort of anti-theft device to their vehicles, to protect valuable equipment when the car is left unattended. It all seems pretty reasonable, not to say straightforward common-

sense, to us—apart from the fact that it is the duty of every citizen to help the police in all possible ways.

### FARNBOROUGH AIR SHOW

This takes place during September 7-13, at the R.A.F. Station Farnborough, Hants. Not only is it the shop-window for the whole of the British aircraft industry, but the static display will, as usual, include a large exhibition covering electronics and radio communication in the field of civil and military aviation. The Show is open to the public on certain days, and is always well worth a visit.

### OBITUARY—G3OHB

We were very sorry to hear of the recent death of Miss Enid Bottomley, G3OHB. This brave young woman had been in St. Teresa's Cheshire Home, Penzance, for some time, and had been on the air from there in co-operation with her fellow-patient, Graham Thomas, G3OGT. Their joint effort was the first AT-station in regular operation from a Cheshire Home.

## RTTY Topics

### RECAPITULATION— PRINCIPLES OF AMATEUR T/P OPERATION—PROGRESS TO DATE

W. M. BRENNAN (G3CQE)

*Every now and again, it becomes necessary to restate principles and to clarify ideas. In the nature of things, RTTY is still very much a minority interest on our bands, largely because of the difficulty of getting the apparatus. But that does not mean that amateur T/P working is without merit or communication value—in fact, it has a fascination all its own, as those who operate RTTY well know. Our contributor's offering this month is intended to bring the general reader—who may not at present be much interested in radio teleprinters—up-to-date with RTTY as a practical communication system.—Editor.*

IT is now well over three years since the first of these articles appeared and during this period the writer has endeavoured to cover as many aspects as possible of Amateur RTTY operation. It would seem, therefore, that the newcomer to RTTY merely has to spend some time in reading through back issues of SHORT WAVE MAGAZINE (if he has them!) in order to get a fairly good idea of what radio teleprinter operation is all about. However, it has been pointed out that not everyone has a large file of back copies of the *Magazine*. Moreover, there are readers who would like to see, for general interest only, a quick run-down on what RTTY operation is all about. Therefore, this time this feature is in the nature of a recap. for those readers.

#### What is RTTY?

RTTY is the American abbreviation for "Radio Teletypewriter"—or radio teleprinter—and as the term implies it means communicating by radio using machines called teleprinters (T/P) for encoding and decoding the transmitted intelligence. This form of communication became general during World War II on Service channels and these days the commercial news networks, the Armed Forces and similar authorities make widespread use of the system. RTTY was first introduced on a strictly amateur basis in 1946, in the U.S.A., where all the pioneering work was done by a small but very enthusiastic group, a number of whom had had wartime experience of the mode. During the last five years RTTY has spread rapidly and today there are amateur radio T/P operators in all six continents and in all the

major European countries.

In RTTY working the transmitting operator merely types the message on the keyboard of a teleprinter and the message is typed out on a sheet of paper on the T/P at the distant receiving end. More often than not, the sending T/P is also made to produce a monitoring copy (called "local copy") of the message it is transmitting. Once the RTTY signal has been properly tuned in at the receiving end there is no need for the receiving operator to be present whilst the message is being sent.

As far as amateur operation is concerned, the speeds at which messages can be passed via RTTY is either 60 or 66.6 words per minute—there being two speeds in amateur use. Commercially, speeds of 100 w.p.m. and higher are now commonplace. Here it is worth noting that the speeds quoted are actual *maximum* speeds—the operator is not obliged to type at this fast rate, a common misconception among the uninitiated! T/P's are so designed that their keyboards will lock after each key is depressed and the next key cannot be pressed until the machine has completed transmitting the code for the character selected. Since this takes 150 milliseconds, there are few amateur operators who find that their typing speed is fast enough persistently to beat the machine rate of operation.

At 66.6 w.p.m. the rate of passing information on RTTY is about half that of the average unhurried phone operator. However, it is three or four times the average Morse speed of 15 to 20 w.p.m. Though there are many CW men who can read Morse at 35's, there are not so many able to write the message down at this speed, and even fewer who can maintain such a performance for long periods. The T/P will, of course, accept copy at 66.6 w.p.m. and print it for days on end. Moreover, by using other machines associated with RTTY it is possible to record incoming messages and later to re-transmit them automatically even if the original message was received from an operator typing very slowly at the keyboard. With RTTY the whole QSO winds up in print and it is possible to refer to the contact days after it has taken place, when the details of a phone QSO will almost certainly have slipped from the memory.

The actual code used for T/P operation is called the Murray Code, sometimes referred to as the "5 Unit Code." Unlike Morse, the duration of each character in the Murray Code is exactly the same (150 mS at the 66.6 w.p.m. speed). The intelligence is conveyed by a combination of five pulses, each of which may take up one of two conditions called "mark" or "space." This gives a total of  $2^5$  ( $2 \times 2 \times 2 \times 2 \times 2 = 32$ ) different combinations that this code will allow. This number is insufficient for the 26 letters of the alphabet *plus* the figures and punctuation signs required for normal communication purposes. To overcome this difficulty, each code combination is made to represent two characters; on the one hand the letters of the alphabet and known as the primary or lower case characters, and on the other the figures and punctuation signs called the secondary or upper case characters. The T/P

mechanism is informed whether an upper or lower case character is required by means of a special code combination transmitted before the actual figures or letters. These operational code combinations are known as the figure-shift and letter-shift signals. Thus, if the letter shift signal is followed by the code which gives either the letter "R" or the figure "4" then the machine will print "R." Conversely, if the figure shift signal is received prior to this code combination the machine will print the "4." This upper and lower case system almost doubles the number of combinations available from a five-unit binary code.

In actual fact there are five operational signals for T/P working that must be the same for upper or lower case and so the actual number of combinations available comes to 54. In addition to the five code pulses in the T/P signal there are also two synchronising pulses, one at the commencement of the signal, called the "start" pulse, and the other at the end of the signal, the "stop" pulse. These are provided to help hold the receiving T/P in synchronism with the sending machine. The terms "mark" and "space" are left-overs from the early days of telegraphy, when the pen recorders on Morse machines made a mark on a paper tape as a current was received by the machine, and when no current was incoming the pen was raised producing a space. As far as the Murray Code is concerned, the "start" pulse is always a "space" signal and the "stop" pulse is always a "mark" signal.

### The Teleprinter

This is the machine which does all the work. When one of the keys on its keyboard is pressed the mechanism selects and transmits the code combination corresponding to that character, automatically adding the start and stop pulses. When a T/P receives such a signal it will select the actual type corresponding to the code combination and print the required character. The machine is rather like an electrical typewriter with the exception that the keyboard is not mechanically linked with the printing mechanism in any way. In actual fact, the transmitting mechanism is completely separate from the receiving and printing mechanism. The transmitting side of the T/P consists of a keyboard which controls a power driven coding mechanism and signalling key. The receiving section of the machine can be divided into three parts:

1. The electromagnet, a form of polarised relay which converts the received electrical signal into the mechanical action required for controlling the T/P mechanism.
2. The selecting mechanism, which selects the character which is to be printed in accordance with the information derived from the mechanical movement of the Electromagnet.
3. The printing mechanism which actually prints the required character on a roll of paper.

Both the receiving and transmitting sections of a T/P are powered from a common electric motor . . . apart from this the two sections are completely independent of each other.

### The Radio Link

Connecting two teleprinters together by means of a long pair of telephone wires presents several problems—such as overcoming the effects of the distributed inductance and capacity, and the resistance of the line, on the T/P signal. However, such a line is a highly stable transmission medium in comparison with an HF radio link, which exhibits such effects as fading, interference and noise. This is where the real challenge lies—in controlling T/P's by radio.

As mentioned earlier, the two conditions of a T/P signal are "mark" and "space." This type of information could be transmitted on CW in much the same way that amateurs now transmit Morse—the key-down position (carrier on) indicating a "mark" signal and the key-up condition (no carrier) giving "space." At the Rx end the receiver would require a BFO to produce a note from the mark signal and also a form of converter which would change the audio tone thus produced into a pulsating DC signal suitable for operating the T/P electromagnet circuit. This system has in fact often been used for transmitting RTTY in the past. However, a little thought will soon show that during the key-up (space) condition the receiver will be wide open to any noise or interference that may appear on the frequency.

A much more effective system is the one at present in use by all RTTY amateurs on the HF bands. This is a form of frequency modulation called "Frequency Shift Keying" (FSK). Here "mark" is denoted by a carrier transmitted at one frequency and for "space" this carrier is moved lower in frequency. Alternatively, FSK can be looked upon as being two carriers on slightly different frequencies. One carrier is on only when a "mark" signal is being sent and the other only when "space" is required. One carrier is therefore being transmitted all the time. The amount by which the mark and space frequencies differ is called the "shift." General practice in amateur circles at present is to use a shift of 850 c/s, though experiments are being done with much lower values of shift in order to offset the effects of multipath propagation and to reduce the bandwidth required for RTTY.

For taking FSK a receiver with a BFO is again required. The BFO is set to one side of the receiver IF passband and the RTTY signal is tuned in so that the mark and space frequencies are either side of the centre of the IF response. The FSK will therefore produce two audio notes in the receiver output and if the FSK shift is 850 c/s, then these two AF notes will differ by 850 c/s. The actual frequency of these two tones will of course depend upon how far the BFO is offset from the centre of the receiver passband. The two-tone output from the receiver is passed to another piece of apparatus called a RTTY Converter—or Terminal Unit (TU). This converts the two-tone RTTY signal into the DC pulses

which are then passed to the T/P electromagnet. Alternatively, the conversion from FSK to DC pulses can also be carried out at the receiver intermediate frequency by means of a narrow-band FM discriminator, since the 850 c/s FSK is in fact FM with a deviation of  $\pm 425$  c/s. Both types of converter are used, but the two-tone type of TU is the most popular with amateurs.

Producing FSK is a fairly simple matter and consists of nothing more complicated than arranging that the DC signal from the T/P keyboard electronically switches in additional capacity in parallel with the Tx VFO circuit, thus moving the transmitted carrier lower in frequency each time a space signal is required.

Bearing in mind that with FSK a movement in frequency conveys information, it will be appreciated that the transmitter VFO and the receiver local oscillator must possess a high degree of stability.

There is yet another means by which the T/P signal can be sent by radio and this is known as Audio Frequency Shift Keying. Earlier it was mentioned that with FSK the receiver BFO is employed to beat with the received signal and produce two audio tones (one for the mark and one for the space frequency). With AFSK the T/P is made to key a two-tone AF oscillator and this two-tone signal is then fed into the AF stages of a normal AM Tx. The resulting AM signal is demodulated by a receiver in the same way as a normal phone signal and the two-tone output from the receiver is again passed into the Terminal Unit in exactly the same manner as was the FSK signal. With AFSK a much greater bandwidth is required than with FSK and therefore in amateur working this type of transmission is usually confined to the VHF bands. Although AFSK does not require the same degree of stability as FSK, it has the disadvantage that a modulator and also a two-tone AF oscillator are required. Moreover, it is not as effective as FSK and so VHF operators are changing over to FSK with improved copy from weaker signals.

### Activity

The most popular bands for RTTY operation are at present 80, 20 and 2 metres. On 80m. FSK signals may be heard between 3550 and 3600 kc and also around 3750 kc. A special RTTY news bulletin in English is broadcast on 3625 kc on RTTY by PAØAA, the Hq. station of V.E.R.O.N., every Friday at 2030 GMT. In addition a test transmission intended to help those who are in the process of setting up RTTY gear is transmitted every Sunday morning on a clear channel between 3550 and 3600 kc by members of the British Amateur Radio Teleprinter Group (the U.K. RTTY society) at 1100 hours clock time. Twenty is of course the DX band and this is probably the most popular hunting ground of all for RTTY. Between 14090 and 14110 kc it is possible to work RTTY stations in all continents and some of the countries available are quite rare ones. The bulk of the regular activity comes, however, from the

U.S.A. where there are now some 10,000 RTTY stations. Operation on 15 metres centres around 21090 kc when that band is a going concern. There is quite a lot of activity also on two metres these days; on this band there are no accepted frequencies though it has been suggested that the top 200 kc should be used.

In this country RTTY operation is permitted on all amateur bands other than 160m. Although individual permission has to be obtained from the G.P.O. to operate on this mode, this is readily granted.

The British Amateur Radio Teleprinter Group (Hon. Sec. G2UK, *QTHR*) periodically issues a newsletter to its members. A monthly magazine *RTTY* is published by the RTTY Society of Southern California. This carries technical articles of a very high standard and also a regular DX Column. It is produced by W6AEE, and is now in its 11th year of publication and has a worldwide following. The American magazine *CQ* carries a regular RTTY feature and the same publishers produce the *New RTTY Handbook* (obtainable through the SHORT WAVE MAGAZINE Publications Dept., price 32s.). The official publications of many of the National Amateur Societies publish RTTY articles from time to time and these become more frequent as time passes, showing that radio T/P communication is becoming more popular in amateur circles. Although Amateur RTTY has come quite a long way during the last few years there is no doubt at all that during the next few there will be some great improvements in the various techniques associated with operating T/P's by radio. Also, the fascination of producing a printed message in the shack of someone tens, hundreds or thousands of miles away is going to attract many more amateurs to RTTY as time goes on.

See you on the paper roll—73 *de* G3CQE.

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### SUMMER ISSUE "CALL BOOK"

The latest *Radio Amateur Call Book* in both editions (U.S. and DX Listing) is available from us, from stock. The U.K. section is included in the "DX Listings" edition, and is now the latest and most up-to-date G-callsign directory in print. It takes in all new callsign-addresses, and changes of address, published in our "New QTH" feature up to and including the April '64 issue of SHORT WAVE MAGAZINE. In other words, if you have appeared in our lists any time up to that issue, you are in the latest *Call Book*. The "DX Listings" edition also includes, of course, the whole of the rest of the world *except* the radio amateurs of the United States—they are shown separately, in "U.S. Listings." Cost of the *Radio Amateur Call Book*, the only directory to the amateurs of the world, is 27s. for the "DX Listings" edition, and 45s. for "U.S. Listings"—or the two together at 65s., all post free. Orders, with remittance, to our Publications Dept., 55 Victoria Street, London, S.W.1.

## • • • *The Mobile Scene* • • •

### LONGLEAT, WESTON-SUPER-MARE AND WETHERSFIELD IN PICTURES

#### —SUCCESSFUL EVENTS WITH GOOD ATTENDANCES

#### KEY TO PHOTOGRAPHS

(A) The box shown here is an ingenious self-contained two-band transceiver, for operation on either 2m. or 160m., fitted in a Vauxhall Victor. Seen at the Longleat Mobile Rally, the owner is thought to be G3GQE/M—but we would like a check on this.

(B) The two-metre control station for the Longleat Rally on June 21 signed G3SJI/A and when this picture was taken the operator was G3OUK. A very neat installation consisted of a Withers 2m. Tx (left) with a TW converter incorporated in the main receiver assembly.

(C) G3PGK/M, London, S.W.4, has a top-loaded whip with a capacity hat—actually, a 10-inch gramophone record, metalised and painted. Good idea, and it does the job very well, too. Seen at Wethersfield on June 28.

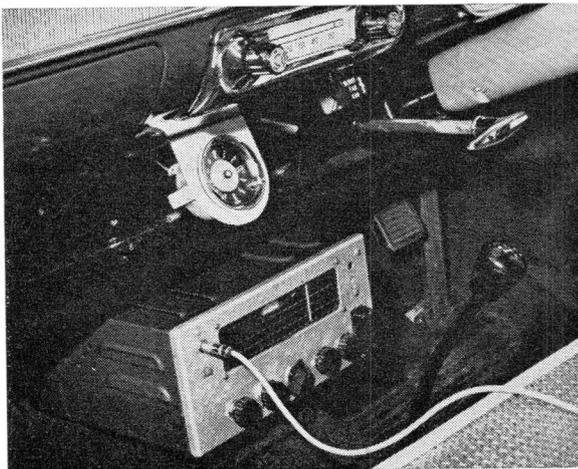
(D) One of the competitive events at the Longleat Rally on June 21 was a frequency-setting contest. For this a Marconi Frequency Counter Type 1417/2 was used, capable of giving the answer to nine decimal places! The winner was G3JFH/M, using the G6VX Sideband Transceiver described and illustrated in our June issue. The error he got was only 200 cycles—which most people would probably consider near-enough on a Top Band mobile rig!

(E) The rally site, Weston-super-Mare, on June 5, when the R.A.F. Amateur Radio Society celebrated its 25th anniversary. The "masts and yards" in the background constitute the G8FC aerial assemblies. The scene will be familiar to the many hundreds of those who have passed through R.A.F. Locking in recent years.

(F) G3OTN/M, Woodford Green, Essex, has his 2m. rig in the boot of his Triumph Herald. The installation is unique in that the Rx tunes itself automatically to any signal appearing in the two-metre band, and locks on. The mechanism can be re-started to find another signal on which to "home."

(G) The 160m. talk-in station for the Weston-super-Mare Rally signed, appropriately enough, G3RAF and used a Heathkit DX-100U with the Top Band mod., and a Racal receiver. When this photograph was taken, the operator was G3NET. For the visitors, an additional "Work Your Own DX" station was provided, with which operators signed their own call, suffixed /A—rather a good Rally notion, which attracted considerable interest and caused a certain amount of fun!

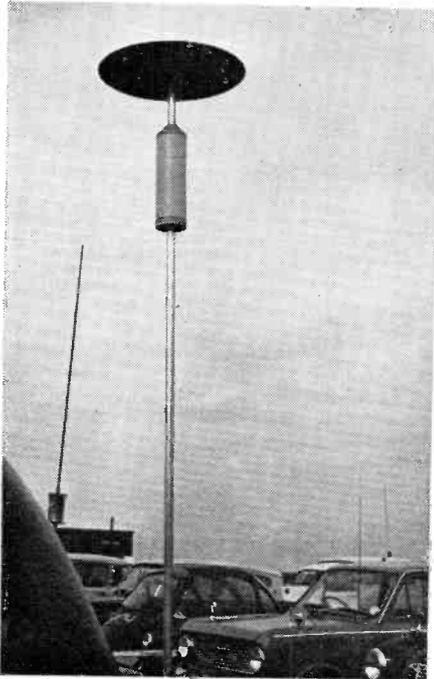
(H) Making his annual personal appearance at the West of England Mobile Rally on June 21, the Marquis of Bath, owner of Longleat, presented the prizes. The little girl at lower left is his youngest daughter, Lady Sarah Thynne (who took a keen interest in all that went on). On the microphone is G3JMY, of the Rally organising committee.



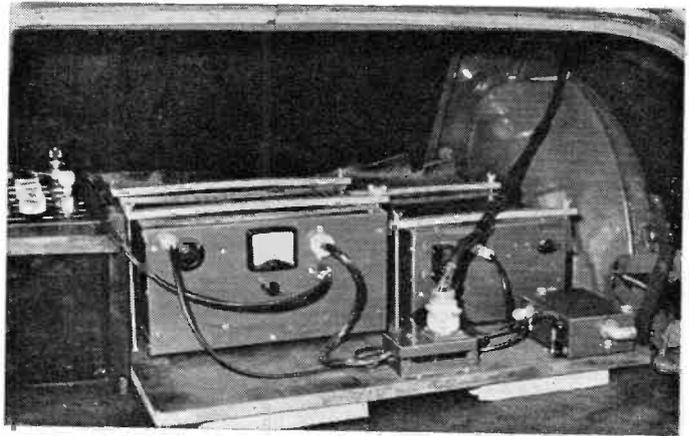
(A)



(B)



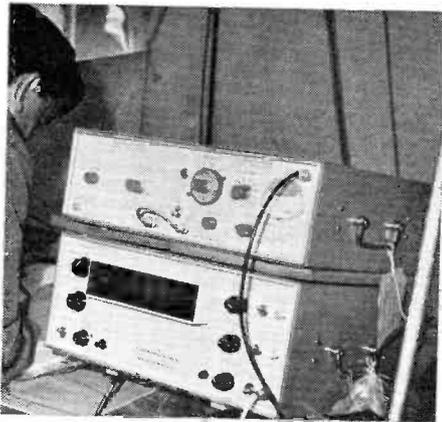
(C)



(F)



(G)



(D)

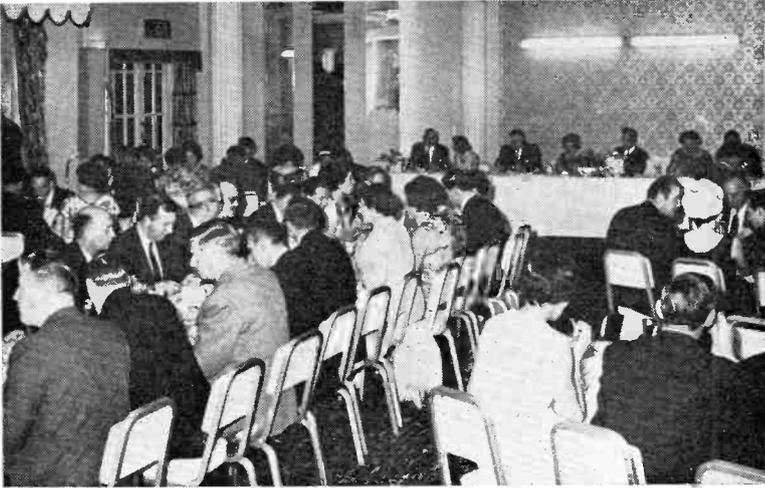


(E)



(H)

Rally pictures, all taken by G3GMN,  
from Longleat, Weston-super-Mare  
and Wethersfield



Scene at the 25th anniversary dinner, RAF-ARS, at the Grand Atlantic Hotel, Weston, on the evening of July 4. There was strong official R.A.F. representation at the top table, and most of those present had served in the Royal Air Force at some time or other.

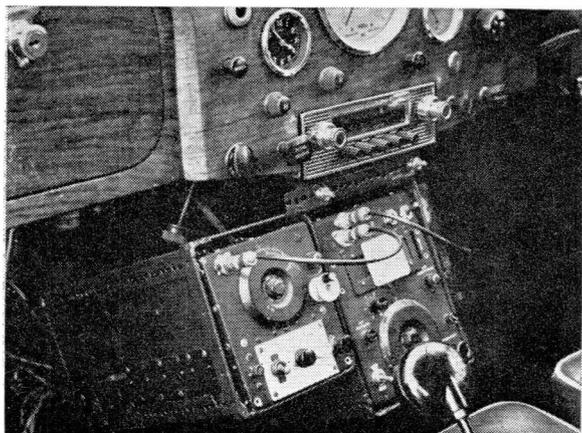
General view inside the exhibition hangar at the RSGB's Mobile Rally at Wethersfield on June 28, with trade stands occupying the full length of one side. The attendance totalled nearly a thousand people, in warm and dry weather.



Longleat, near Warminster, the seat of the Marquis of Bath, was the setting for the annual West of England Mobile Rally, held this year on June 21. They had reasonable weather and the usual enthusiastic attendance, there being about 150 vehicles fitted mobile, of which no less than 30 were on two metres.



Part of the line-up of some 250 cars fitted /M, for the Mobile Rally at U.S.A.F., Wethersfield, which is an active station, operating Voodoo fighters.



At left, the home-constructed /M installation, based on "Command" Tx/Rx items, built into his Daimler by G3RDG/M, of London, N.W.11. He was at Wethersfield for the RSGB event on June 28. At Weston-super-Mare on July 4, for the R.A.F. Amateur Radio Society's 25th anniversary celebration: Caught at the dinner on the Saturday evening preceding the Rally, left to right, standing, G5DW and GW5BI. Seated, right to left, G6VX (cigar), xyl/G3JUC and G3GEW.

(All Rally photographs in these pages by G3GMN)

### THE MOBILE RALLY CALENDAR

As explained in the Editorial, preparation of this issue of SHORT WAVE MAGAZINE was considerably disorganised by the postal chaos, and it has not been possible to run the Mobile Rally reports as planned. Some of the material on which they could be based never reached us in time, and others so late that they could not be included.

The calendar following is complete so far as our information goes—if anything that should have appeared is missing, it is simply because we did not get it before this had to go to the printers.

**August 9:** Mobile Rally at the Royal Naval College, Dartmouth, Devon—one of the loveliest sites in south-west England—organised jointly by the Britannia R.N. College Radio Society and the Torbay Amateur Radio Society, with G6VJ on 1880 kc talk-in and G3LMG/P available for /M contacts on 4m. (70·27 mc) and 2m. (144·13 mc), both stations opening at 10.0 a.m. There will be numerous attractions and competitive events for all comers, with various awards for attending

mobiles. Further details from: B. E. Symons, G3LKJ, 52 Reddenhill Road, Babbacombe, Torquay, Devon.

**August 16:** Derby and District A.R.S. annual Mobile Rally, Rykneld Schools, Bedford Street, Derby (off Ring Road), with all the usual attractions, including the biggest junk sale in the country and a large prize draw. There will also be a trade show, radio-controlled model aircraft display, and events for the youngsters. Refreshments will be available on site, with free admission and car parking, and there is ample covered accommodation if the Wx is wet. The talk-in stations, G3ERD/A on 160m. and G3EEO/A on 2m., will open at 10.0 a.m. Further details from: T. Darn, G3FGY, 1 Sandham Lane, Ripley, Derbyshire.

**August 23:** Informal Mobile Rally and Get-Together at Hednesford Camp, Cannock Chase, Staffs., with G3ABG/M and G3RSX/P as Top Band talk-in stations, starting at 2.30 p.m. Visitors should make for Cannock, Rugeley or Penkridge

(end M6) and call control from these points for route information. There will be a raffle and a display of model aircraft flying and, after a picnic tea, a mobile tour of Cannock Chase, finishing at the Park Gate Inn, Castle Ring. Any other information from: C. J. Morris, G3ABG, The School House, 24 Walhouse Street, Cannock, Staffs.

**August 30:** The U.B.A. (Belgian) International Mobile Rally, near Namur, Ardennes. Applications for temporary ON/M permits, and information about the Rally itself, should have been in before August 1st, and full details were given on p.299 of the July issue.

**September 12-13:** International Mobile Rally Week-End organised by VERON, the Dutch amateur organisation. Special callsigns for /M operation in Holland will be issued to U.K. visitors, but applications for these must be in with VERON, P.O. Box 9, Amsterdam, Holland, by August 10 latest. Send a photostat of your U.K. mobile

licence, full details covering the car, your home QTH, and say when you expect to be in Holland. And ask for Rally details.

**September 13:** RSGB Mobile Rally at Woburn Abbey, Beds.

**September 13:** Annual Mobile Picnic, Reading Amateur Radio Club, at the Childe Beale Trust Pavilion, Lower Basildon, nr. Pangbourne, Berks. Talk-in stations will be operating on 160m. and 2m. Car screen stickers and any further details can be obtained from: R. G. Nash, G3EJA, 9 Holybrook Road, Reading. (Visitors should provide their own refreshments.)

**May 30, 1965:** Date booked by R.N. Amateur Radio Society for a major Rally event near Petersfield, Hants.

And that seems to be all for this season. We would be glad to have brief reports (with some photographs, if possible) from any U.K. amateur who may attend the Continental events on August 30 and September 13.

## NIGHT BEFORE BARFORD

AN HISTORICAL NOTE—U.S.  
AMATEUR OPERATES U.K.  
STATION FOR FIRST TIME

SYLVIA MARGOLIS (xyl/G3NMR)

**BARFORD ST. JOHN** is a remote village in Oxfordshire. But Barford St. John is on the map. For history was made there on July 4th, 1964.

The annual Barford Rally is one of the largest events in the Mobile Calendar? Agreed.

The annual Barford Rally is now the annual Barford Weekend? Agreed.

The annual Barford Rally was the first Anglo-American rally, pioneered by the Amateur Radio Mobile Society? Agreed.

The annual Barford Rally is the only Amateur Radio event in Britain which always gives a large part of its proceeds to a chosen charity? Agreed.

Yet the Fifth Barford Rally made history.

Reciprocal Licensing has been one of the noisiest "platforms" of the Amateur Radio Mobile Society. Two years back they were still faced with the plateglass barrier of official stonewalling. But determined nagging, beaverbrooking, applying, writing, phoning, pleading, arguing and filibustering eventually made some cracks. The first hole appeared in April, 1963, when, after negotiations between A.R.M.S. members and the Dutch and Belgian authorities, temporary mobile licences were issued to overseas visitors for the Verviers Rally.

The experiment was repeated for the Red Cross Centenary Rally in Brussels that September. Now West Germany has followed the example and issues temporary licences for specific occasions.

Meanwhile in Washington President Johnson had

signed the Reciprocal Licensing Bill. Rumours that members of A.R.M.S. held the inkpot and handed him the pen are untrue, but not unbelievable.

In Britain we were still given that blank rebuttal—Thursday, July 2nd.

That afternoon the hon. secretary of A.R.M.S. G3FPK, had a phone call from the Radio Services Department of the G.P.O. Permission was granted for A.R.M.S. to allow licensed U.S. amateurs to operate the talk-in station G3NMS during the period of the Fifth Barford. How about that? The Boston Tea Party had been forgiven at last!

There was frantic phoning, so that the news could be put out over the MARS frequencies; designs for a commemorative QSL; plans for a ceremonial launching—all this besides the massive planning we need for Barford.

As the Fifth Barford came to an end, on July 5, the Editor of SHORT WAVE MAGAZINE asked me smoothly:—

"Any catastrophes?"

Well he knew just what can happen when a committee of half-a-dozen odd (maybe "odd" is the right word, too!) organise an event designed to attract at least a thousand people.

They begin to arrive on Saturday morning, in cars and jeeps, Air Force trucks and great lorries, trundling caravans and dogs and mothers-in-law and innumerable children.

Soon the desolate old war-time airfield starts to look alive again. In 1964 Barford blooms with its brilliant tents and elegant trailers and the ghosts relinquish their lonely vigil for just a few hours.

Above the control tower is the Daddy-Of-All-Antennas. In the old Ops. Room the talk-in stations are being set up, whilst G3NMS is testing the dishy Collins gear that the local MARS station, AJ1AH, has put at our disposal.

All rallies mean work and more work and Barford means even more work because it provides even more activities than usual. But to the Fifth



K4RUT operating G3NMS/A at Barford on July 4, 1964, by permission of the G.P.O.

Barford A.R.M.S. brought yet another innovation—the biggest trade show outside the Radio Communications Exhibition. Perhaps this had never been done before because of the sheer physical difficulty of organising such a project in a remote rural area. One man, and one man alone, was responsible for this incredible effort—G3AGP. It wasn't until we saw those trucks and trailers begin to roll in, that we understood the crazy plan was going to gell at all.

By nightfall everything was set up and we ate Gwen Frisbee's barbecue, hot dogs with onions, for a hundred people, cooked under camp conditions, free to all A.R.M.S. families and men of good will.

Then that thing happened which was to confound certain sage prophesies that "it could never happen here"—G3NMS went on the air with an American operator!

K4RUT, Bill Snedigar, stationed at Ruislip, was the lucky guy. His voice even trembled a little, either with lack of practice or with emotion, as he put out the first CQ.

Pictures were taken of that moment, but no camera could ever record the excitement. Back came the calls, tentative at first—*What the Hell's Going On Over There*—but soon they got the picture and the pile-up began, faster and faster, Stateside stations rushing to climb on the bandwagon. No exotic DXpedition, this, yet more sensational, and K4RUT/G3NMS handled it all with elegance and dexterity. This was what we had all been working for and what they had all been waiting for.

They never slept. How could they give up? This was borrowed time, just a few hours of enchantment, then these amiable Cinderellas would have to leave the Ball and go back to the frustration of gagged transmitters.

Just before we went to sleep that night I looked out of the caravan window at our temporary village. A few hoots of laughter, a dog's bark, then silence. A dark night, windless and unpromising. I thought of tomorrow.

My part at Barford is small. With a tiny group of workers I run the Reception Bay . . . remember to give out identity labels . . . hand the Mayor and the Colonel to the Organiser, Vic Frisbee, G3KVF . . . check those exchange rates—it is our boast that we take any currency and some joker always produces a zloty or a yen . . . this year's chosen charity is the Kennedy Memorial Fund . . . send a copy to artist Felix Topolski, whose marvellous portrait of the late President fronts the souvenir brochure . . . welcome the Press prettily . . . tell the customers where the new toilets are . . . remind them about the Trade Show . . . remember that G3XYZ never spends a penny and don't lose your temper with him . . . that bird with G3YXZ isn't his wife . . . what will the weather be . . . will they all turn up . . . who will be offended this time . . . and why do we do this?

Then I realised that all these people sleeping close around me were my friends, with whom I had worked and laughed and quarrelled today and with whom I was to work so much harder tomorrow.

And it was a good feeling.

And, in the dark silence, the only sign of life now was the brilliant light streaming from that sleepless station, G3NMS, with K4RUT at the mike . . .

The Fifth Barford Was Already A Success!

## G9BF CALLING

*More Clever Stuff!*

Lots of people writing in to say "This piece not funny and complete and utter waste space." Editor in complete agreement but G9BF slightly furious. Truth is beginners like moths round candle wanting know what makes it tick work real DX like G9BF. Only ur old guide-light in position explain. All intelligent moths congregate round G9BF candle (SUSIE, *pse* QSL).

No need burn wings if you have pair 813's running cool at 600 watts—es no use fiddling anything less. Secret real DX working remains plenty urge up spout. Take old pal MOIFFI (*repeat* no connection R.A.F. medical branch) working bags DX using only house-wiring ring main as ant coupled through .005  $\mu$ F (rated HV of course), dapped on near earthy end PA tank. Every time MOIFFI presses key or speaks to mike, cooker fuses blow. This real test QRO/PA efficiency es pal MOIFFI in close touch EU/DX.

Any chap on Top Band working G9BF for new county or whatever always blinded by science like "Here running abt nine watts to pair gas-filled

thytrons in push-pull driven on cathode through modulated buffer amplifier using BBC Light Programme Tx as VFO." This guaranteed stifle any technical back-chat like "What ant you using for such weak signal." Old pal XX2XX also FB at blinding with science with quick cracks like "You provide the carrier and I put in the audio," guaranteed puzzle beginners not *au fait* or in groove *re SSB*.

Of course pal AV2PBE right with it, on it es through it as usual. Specialising UHF Phone-only his Rx well designed *super* super-regen job with pair oscillating detectors in push-pull on theory chop-noise halved this way making UHF/DX audible through colossal *sharsh*. No signals heard yet but AV2PBE not discouraged es going ahead with Tx using long-lines oscillator having steel rule—es this is ingenious part—cut to right number millimetres for freq. (Readers wishing adopt this advanced technique advised purchase steel rule with milli-

metre scale before local ironmongers dried out by huge demand.) PA at AV2PBE consists pair 2C39's in crossed feed-back push-pull mode (813's found not too satisfactory at this freq.—*hi!*). Cunning inter-connection Tx/Rx produces characteristic *sharsh* mod. effect very satisfying all UHF workers. This Tx guaranteed generate loud smearing noise floating across large frequency area around UHF unlikely missed by any *super* super-regen Rx. AV2PBE now in happy position able talk with himself any time in absence tedious QSO some unknown bod anxious argue technicalities like "How do you generate pump frequency." (Quick reply from AV2PBE always "Patents pending.") Any strange phenomena noticed on their screens by /T boys almost certain concrete evidence existence this fine new UHF rig at AV2PBE.

(And if you don't like it, *pse* write and say so, otherwise we shall never stop him.—*Editor*.)

### Do You Know That—

— An octal valveholder can be used to mount two crystals of the type having solid pins at  $\frac{1}{2}$ in. spacing. (*G. Whitehead, West Wickham, Kent*).

— In lieu of a main fused switch for the shack master supply, you can fit an automatic circuit breaker rated at 20 amps. This provides for excess current, gives full earth-fault protection, and requires resetting if tripped. Your local Electricity Board sales office can supply. (*GM3LRG*).

— A crystal can be moved LF by the simple application of a few strokes of a soft black-lead pencil. (*G3JEQ*).

— By connecting a suitable resistor across a high-value potentiometer, any required range of variable resistance can be obtained, *e.g.* a 250-ohm resistor across a 25K potentiometer will give a resistance variation of 0.65K; and 10K across a 50K pot. a swing of 0.15K—in each case with the maximum value at the centre of the potentiometer travel. This also means that a "plus-minus" or "right-left" variation is given with respect to the centre setting of the slider, useful in some circuit applications. (*T. G. Davies, Llantrisant, Glam.*).

— You can have a no-cost Morse practice oscillator ready in seconds just by putting the key in series with one speaker lead and, holding the key down, tuning the Rx to any strong steady-carrier signal (such as a BC station) with the BFO in. Change of pitch can be effected by BFO variation. But *before* you break the speaker lead, put a fixed resistor of about twice the speaker impedance across the LS connections, on the receiver side of the key; this will maintain a safe load on the Rx output valve under key-up conditions. (*GM3MCH*).

— Dirty condensers and resistors salvaged from surplus equipment can be made to look like new by using a cloth soaked in methylated spirit or carbon tetrachloride (*Thawpit* again). This will not only clean and de-grease the bodies but also the

wire ends, making them easy to solder into circuit. (*G3OJV*).

— Perforated zinc, obtainable at ironmongers and also at Woolworths, makes ideal screening material for RF circuits and radio equipment generally. It is easy to work and solders readily. (*A. King, Whitwick, Leics.*).

— Thin gauge nylon fishing line makes an ideal locking cord for ferrite dust cores. A short piece inserted with the core will prevent it from moving even under the severest vibration, and yet permit adjustment easily and without fear of damage to the core. Half-a-crown's worth of the '006 ("six thou") gauge will be enough to fix more cores than you ever dreamt existed. (*J. M. Cox, Southall Middx.*).

— The "O's" of the white plastic screw-on letters sold by Woolworths make ideal insulators for light-weight aeriels, and similar purposes. They are so cheap that they can be considered "disposable" if necessary. (*G3MCY*).

— A simple cure for brake, and tyre, static with disc brakes, requiring no interference with the assembly, is to insert a strip of 20g. dural between the edge of the disc and the spring under the two split pins which hold the brake pads in the caliper. (*R. Wells, St. Albans*).

— Hum on modulators and amplifiers is sometimes the result of earthing bus-bar and microphone screening cable at the input (mike socket) end of the chassis. By using a fully isolated microphone input socket and earthing the cable screen at the first valve centre earth spigot, hum level can be reduced, if not eliminated, by finding experimentally the bus-bar earthing point which gives minimum hum level. The main chassis earth connection is then made at this point. (*G3OWQ*).

— When using chassis cutters, punches and other tools on aluminium, a smear of paraffin round the work will act as a lubricant, making cutting easier and cleaner, with a better finish round edges. (*G3SFL*).

# THE OTHER MAN'S STATION

**GW3ITQ**

**S**AM WEAVER runs GW3ITQ from 2 Princess Street, Gelli, Pentre, Rhondda, Glam., South Wales. He started in 1951 with a TA-12B as transmitter, which was followed by an "Elizabethan." This gave excellent service till one Sunday in March 1961, when disastrous floods struck the Valley—at GW3ITQ the water quickly reached ceiling level, every single item of gear being completely ruined. And then, as if this were not enough, a fortnight later Sam was injured in a local railway accident.

It was over a year before his call was heard again on the air, with a new all-band transmitter running 120 watts to a TT21 in the PA, backed up by a separate rig for Top Band, and a double-conversion receiver. All metering and monitoring functions are carried out by means of frequency-calibrated audio oscillators, mainly transistorised.

On the aerial side, the QTH is far from ideal. Gelli is a small mining village in a narrow, twisting part of the Rhondda Valley, with the hills rising steeply to over a thousand feet on all sides. Yet GW3ITQ gets out, using a Mosley TA-33Jr for the HF ranges and an 80m. dipole with folded ends, which can also be pressed into service for Top Band.

GW3ITQ has the distinction of having coached two sons through the R.A.E.—they are now GW3KXX and GW3SHP. One of his keenest



collaborators is his wife, Doris, who not only looks after the domestic side, but also acts as fitter's mate and secretary—she is as adept with the soldering iron as she is on the typewriter or the cooker. These are additional responsibilities she has accepted because GW3ITQ is one of our sightless colleagues (hence the reason for his monitoring devices being referred to audio tones).

He is extremely active in the interests of the blind, and is a well-known worker for their cause throughout Wales and the West Country. GW3ITQ is also chairman of the Rhondda Valley Amateur Radio Society and on the air his main hunting grounds are the LF bands (through which he keeps the local boys in order, we have no doubt!), with a chase after the DX as opportunity offers.

Though the photograph does not, perhaps, do full justice either to GW3ITQ or his station, we are glad to publish these notes about Sam Weaver and the contribution he has made, and is continuing to make, to Amateur Radio.

# THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for September Issue: August 14)

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

IT is a very healthy trend that we notice more and more among the Club Newsletters—that of self-criticism. And it must be a relief to their harassed editors, on occasion, to find a subject which leads to so much correspondence and controversy.

A few Club publications still read like small local newspapers—they met on so-and-so, at somewhere-or-other, and a Good Time was Had by All. Mr. Thingummy's talk was received with great pleasure, and a Vote of Thanks was proposed by the Chairman.

With all due deference, we suggest that this sort of thing is rather a waste of effort. When, however, a newsletter comes in full of queries about the poor turn-out of members, the lack of interest in some activity or other, the reasons for some recent failure—*then* we know that there is some live blood within the club, and that anything seriously wrong will probably be put right.

A prime example of this is referred to in the Activity Notes—A.E.R.E. (Harwell) are busy, really tearing themselves apart concerning their abject failure in NFD—practically the whole of a 10-page publication is devoted to this one topic. We feel quite certain, after reading it all, that next year's score will be considerably higher! And *this*, surely, is what club publications are for?

On another subject—it has never been clear why so many clubs go into complete liquidation during the holiday months. Surely *all* their members don't go away for the *whole* of August and September? How about those who are left behind and would welcome some sort of activity even more, because of their extra free time? An exception, of course, is the club that meets in a local school and is therefore deprived of its normal meeting for a few weeks; but even such a club could surely arrange something to keep its members together. Round the local shacks, outdoor events . . . *anything* is surely preferable to a complete close-down, after which a certain amount of enthusiasm nearly always seems to have vanished, and members have to be weaned back again.

## ACTIVITY REPORTS

**Acton, Brentford & Chiswick** will be holding a Two-Metre Night on August 18, when they hope to have a station actually operating. Club Hq., 66 High Road, Chiswick, as usual, at 7.30 p.m.

**Scarborough** are now in new clubrooms in a pre-fabricated building at the rear of No. 7 Trinity Road; visitors to the town are invited to the meetings, 8 p.m. every Thursday. The programme is a little loose

while the equipment and fittings are finally being installed.

**Torbay** met in June and welcomed visitors G3SSA from Hull, and G3SGQ from the BRNC Radio Club, Dartmouth. Members took part in a "Three-Minute Potted Talk" session. On July 12 the Exeter, Plymouth and Torbay clubs held a joint Hamfest on Dartmoor.

**Wimbledon** will be one year old this month and now boast 50 members, which is good progress; they meet on the second Friday at The Community Centre, 28 St. George's Road, Wimbledon, S.W.19, at 8 p.m. Recent lectures have covered SSB (by G3JJG) and the Joystick (by G3LRO); on August 14 G3EPU will be talking about Receivers.

**Barnet** will meet on August 25 (no details of subject) and on September 29, the latter meeting being their AGM and Film Show. Red Lion Hotel, High Barnet, 7.30 for 8 p.m.

**Reading** devoted their July meeting to simple SSB gear, dealt with by G5TP, G5HZ and G3OLA; on August 29 the evening will be devoted to a description, by members, of sundry items of gear they have built themselves.

The **Royal Signals Amateur Radio Society** held their annual reunion weekend (June 26-28) and operated GB3RCS, making 472 contacts with 50 countries, including several with other Royal Signals units. Membership is open to all past and present members of the Corps, with a life subscription of £2 2s., or annual subscription of 2s. 6d. (See panel for secretary's QTH.)

**Southgate** will not be meeting at all during August, but September 10 is booked for a Film Show—Atlata Lodge, Tottenhall Road, London, N.13.

**Wirral** will be hearing about Valve Uses (by G3EGK) on August 5, and will hold an Evening D/F Contest on August 19. It is hoped to run an R.A.E. Course this winter at Birkenhead Technical College, probably on Thursday evenings.

**Chester** are in full action throughout August, with a Discussion on the 11th, an Open Night on the 18th and a subject "to be announced" on the 25th. Visitors to the City are cordially welcomed during the holiday season, if they will contact the secretary.

**"MCC"—MAGAZINE CLUB CONTEST**  
**Dates are November 14/15, 1700-2100 GMT.**  
**Rules much as last year, and will appear October issue. Get the planning started now!**

**Blackpool & Fylde** have published their schedule of weekly meetings right up to February 1965—a feat of organisation not equalled by many clubs! On August 10 they have a Questions and Answers session; on the 12th (7 p.m.) a visit to Police Hq. at Hutton, Preston; on the 17th, G8GG will talk about Mobile Gear. The 24th is an Open Night, and on the 31st G3OPT will cover the subject of Batteries.

**Civil Service** will be at the Science Museum on August 17 for the last meeting of the present session; this one will be informal, but a tape recording will be available—G2BCX on the subject of . . . Tape Recording! **Clifton** already have a member licensed as G8AAA—holder of the first 'phone-only VHF licence, otherwise known as the Amateur Sound (B) Licence. The club have a D/F day on August 16, starting from Badgers Mount, Knockholt, Kent, at 11 a.m. Weekly meetings continue, 8 p.m. on Wednesdays and Fridays at 225 New Cross Road, S.E.14.

**Slade** are breaking completely new ground by presenting, on September 18, a full evening's programme of "interest and entertainment" by closed-circuit TV. A large studio with three or four cameras and telecine equipment is planned, and members and visitors may watch either the live show or the TV screens in a separate viewing room. 7.45 p.m. at Church House, High Street, Erdington, Birmingham, 23.

**South Birmingham** will be running an exhibition



A real radio amateur wedding. The bridegroom is Bryan Woodfield, G3REL, and his bride Pat Westoby, G3SFU. They were married at St. Peter's Church, Anlaby, Hull on June 20, their friends and supporters including G3PKC, G3RMX and G3SQH, with other members of the Hull & District Amateur Radio Club. G3REL is employed by the BBC at Lime Grove, and G3SFU in the BBC overseas department at Bush House. They hope shortly to be operating a joint station from Acton, W.3—we wish them luck and happiness.



During the Scout International Week-End over June 13-14 at Gilwell Park, Chingford, Essex, the Baden-Powell House Scout Radio Group put GB3GP on the air. With no less than nine Scout operators available, about 140 contacts were made with 21 different countries, using mainly 20m. SSB and 80m. AM. The station attracted considerable interest, there being an audience in and around the operating tent at all times. Here we see G3CJQ at the GB3GP controls, with G3SDG looking on.

station at Marston Green on August 22—Top Band, Eighty and possibly other bands will be covered, and there will also be an exhibition of gear. Their Newsletter *QSP*, now features descriptions of members' gear, whether commercial or "Magazine-inspired home-brew."

**Crawley** meet on August 26 for the ever-popular Junk Sale, with G3FRV as auctioneer; visitors always welcome. **Hounslow** have a Brains Trust on August 10; on the 24th G3NHR will talk about the Grid Dip Oscillator; and the 31st is a Club station Activity Evening.

**Lothians** held their AGM recently, and report a "heated but friendly" discussion on their new constitution! GM2CFU was appointed president, and GM3OWI is the new secretary (see panel for QTH).

**South Manchester** also had an AGM, at which they elected G3JRK chairman, G3MAX vice-chairman, and G3HZM secretary. On August 14 they will be visiting Jodrell Bank; Morse classes and lectures will re-commence in September. **Midland** announce "Demonstrations of Modern Amateur Transmitting Equipment" on August 18, and their AGM on September 15.

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**Northern Heights** have had a very busy period, with several outside visits and exhibition stations. On August 8 they will be active from the Halifax Agricultural Show; on the 15th, from the Crossleys Carpets Gala; and on the 16th they will visit Jodrell Bank. August 19 is booked for a Ragchew ("so we can have a rest"), and on September 2 they have invited the members of Manchester to join them for a Pea-and-Pie Supper.

**Maidstone (YMCA)** meet for R.A.E. Instruction and Morse Revision on August 12; the 19th is Club Tx night and library period. On the 26th they have an R.A.E. and GPO Regulations exam, and a 12 w.p.m. Morse test (a kind of dummy run for aspiring candidates—a very good idea, this). They meet every Wednesday at the YMCA, Hollingworth Hall, Union Street, Maidstone.

**Salop** report an interesting series of summer events and outside visits, covering Shrewsbury Telephone Exchange, the GPO long-distance phone Station at Criggion, the County Police headquarters and (on August 3) the Church Stretton Traction-Engine Rally, at which they operated G3SRT, for the first time, on Top Band and Eighty.

**AERE (Harwell)** devote almost the whole of their *Newsletter* to an inquest on their NFD efforts—and "inquest" is certainly the word. (Other words appearing include "pantomime," "fiasco," "abortive," "chaotic," "appalling.") However, this report should result in greatly improved organisation and preparation for future events.

**Cheshunt** will be operating GB3GRC from the Goffs Lane Playing Field on September 5, and it is hoped that many local supporters and interested

people will turn up to make personal contact. Meetings are on the first Friday, 7.30 p.m. in the Civil Defence Centre, the next being on publication day, August 7.

**Surrey (Croydon)** had two talks on unusual subjects at their July meeting—the first was on "Weather—and the prediction of VHF Propagation Conditions," and the second on "Chemistry in Electronics." The secretary remarks that instead of having to appeal to members to turn up, these days, he is bothered in case they can't cope with the numbers! On August 11 the speaker is Miss Nelly Corry, G2YL, with a travelogue on her African Safari.

**Bradford** have held a display of members' gear, and a Junk Sale; on August 18 they have a lecture on Civil Defence, by G3NNO, and on September 1st an informal meeting—all at 66 Little Horton Road, Bradford.

**Worcester** will be running an exhibition station on August 15, at the Sports Ground adjacent to the Club Hq. (Hut 35, Perdiswell Park), where the normal meetings are held every Saturday at 7.30 p.m.

**Yeovil** were visited by a party of Russians on holiday, and gave them a demonstration of the club station in action. One of the visitors came from Dickson Island (UAØ) and knew several of the Polar Radio Club operators there.

Four members of the **Roding Boys' Society** recently walked eight miles with a trek-cart to collect a tent for their camps and field days, for which the club is now well set up. Other activities were running a stand at the Borough's "What We Do" Exhibition, testing out the P-E set for the camping

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

ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, W.3.  
 A.E.R.E. (Harwell): C. Sharpe, G2HIF, Building 347.3, A.E.R.E., Harwell.  
 A.R.M.S.: N. A. S. Fitch, G3FPG, 79 Murchison Road, London, E.10.  
 BARNET: F. Green, G3GMY, 48, Borough Way, Potters Bar.  
 BRADFORD: E. G. Barker, G3OTO, 63 Woodcot Avenue, Baildon, Shipley.  
 BLACKPOOL & FYLDE: J. Boulter, G3OCX, 175 West Drive, Cleveleys, Blackpool.  
 CHESHUNT: B. B. Charge, c/o 3 Robinson Avenue, Goffs Oak, Cheshunt.  
 CITY OF BELFAST: H. A. Gabbie, 15 Virginia Street, Belfast 7.  
 CIVIL SERVICE: G. Lloyd-Dalton, 2 Honister Heights, Purley.  
 CLIFTON: J. Rose, G3OGE, 63 Broomfield Road, Beckenham.  
 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.  
 HARROW: R. C. Ray, G2TA, Wintons End, Springfield, Bushey Heath, Herts.  
 HOUNSLOW: D. F. J. Walmley, G3HZL, 153 Worpole Road, Isleworth.  
 LOTHIAN: T. Spears, GM3OWI, 24 Priestfield Road, Edinburgh 9.  
 LOUGHTON: A. W. Sheppard, G3JBS, 11 Barfields, Loughton.  
 MAIDSTONE (YMCA): B. G. Harker, 41 Cork Street, Eccles, Maidstone.  
 MEDWAY: P. J. Pickering, G3ORP, 101 Chatham Road, Birmingham 17.  
 MIDLAND: C. J. Haycock, G3JDJ, 360 Portland Road, Birmingham 17.  
 NORFOLK: A. W. Preece, G3TCO, School of Biological Sciences, Wilberforce Road, Norwich, NOR.54.H.  
 NORTHERN HEIGHTS: A. Robinson, G3MDW, Candy Cabin, Ogden, Halifax.

NORTH KENT: B. J. Reynolds, G3ONR, 49 Station Road, Crayford.  
 PLYMOUTH: R. Hooper, G3SCW, 2 Chestnut Road, Peverell, Plymouth.  
 R.A.F.A.R.S.: R.A.F. Locking, Weston-super-Mare, Somerset.  
 R.A.I.B.C.: Mrs. F. E. Woolley, G3LWY, 10 Station Road, Saxilby, Lincoln.  
 READING: R. G. Nash, G3EJA, 9 Holybrook Road, Reading.  
 REIGATE: F. D. Thom, G3NKT, 12 Willow Road, Redhill.  
 RODING BOYS: R. J. Phipps, 51 James Lane, London, E.11.  
 ROYAL SIGNALS: J. E. Hudgkins, G3EJF, 2 Sqn., 8 Sig. Regt., Catterick Camp.  
 SALOP: Dr. K. E. Jones, G3RRN, Greystones, Shrewsbury Road, Church Stretton.  
 SCARBOROUGH: P. Briscoe, G8KU, Roseacre, Irton, Scarborough.  
 SCOTLAND: A. Barnes, GM3LTB, 7 South Park Terrace, Glasgow.  
 SLADE: D. Wilson, 177 Dower Road, Four Oaks, Sutton Coldfield.  
 SOUTH BIRMINGHAM: A. E. Bishop Jr., 40 Cecil Road, Birmingham 29 (Acting).  
 SOUTHGATE: R. E. Wilkinson, 33 Amberley Road, London, N.13.  
 SURREY (CROYDON): S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon.  
 TORBAY: Mrs. G. Western, G3NQD, 118 Salisbury Avenue, Barton, Torquay.  
 W.A.M.R.A.C.: Rev. A. W. Shepherd, G3NGF, 121 Main Street, Asfordby, Melton Mowbray.  
 WIMBLEDON: E. N. Hurle, G3RZN, 156 Monkleigh Road, Morden, Surrey.  
 WIRRAL: A. Seed, G3FOO, 31 Withert Avenue, Bebington, Wirral.  
 WORCESTER: G. W. Tibbetts, G3NUE, 108 Old Hills, Callow End, Worcester.  
 YEOVIL: D. L. McLean, G3NOF, 9 Cedar Grove, Yeovil.

activities, and a Parents' Meeting.

Loughton held a social evening, principally for the YL's and XYL's, which is almost certain to become an annual event. A recent talk, by G8AB, was about early radar installations, and the club is now approaching a Special Activity Week, operating GB3LOU.

Reigate report three new calls among their ranks—G8ABC, G3TFJ and G3TGI—making a total of 26 calls out of a membership of 36. Their Newsletter, *Feedback*, reached its 50th edition in July. A recent demonstration of Amateur TV attracted a good attendance which included W9NTP, W9CNW and six members of the Crawley club. Next meeting (informal) on August 15 at the George and Dragon, Redhill.

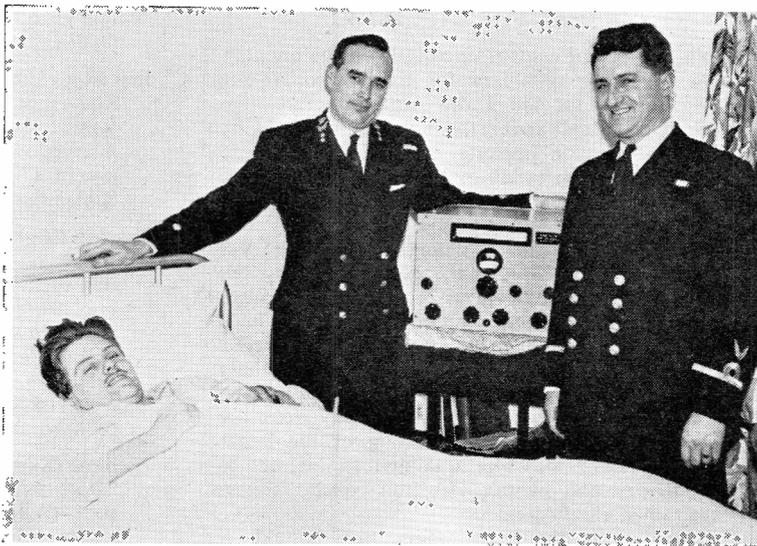
Crystal Palace are also holding an informal gathering on the same date, their July meeting having taken the form of a History of Local Meetings, NFD's and so on. Harrow will be hearing a description of the G8PD transmitter on August 7, and will hold a Practical Evening on the 14th. Their Club Net runs on Wednesdays (2000 GMT) on Top Band phone.

Derby continue their usual full programme right through August, despite holidays and other diversions. On the 5th they had a Junk Sale; on the 12th they are preparing for the Mobile Rally, at Rykneld School, and the 16th is the day of the rally itself. August 19 is booked for D/F Practice Event No. 5, the 26th is Juniors' Night, and on the 29th they have an Exhibition at the Railway Show, in the Loco Works at the Midland Station. Two working exhibits and a static display are planned.

Plymouth report two very active months (June and July), with well-attended weekly meetings and their combined picnic (with Torbay and Exeter) on Dartmoor. Two new members are G2DFH and G3OIQ.

#### CLUB PUBLICATIONS RECEIVED

We acknowledge with thanks the receipt of the following Club Publications: A.E.R.E. (Harwell), *Newsletter*, June and July; A.R.M.S. (*Mobile News*, May and June/July); Blackpool and Fylde (*Syllabus*, 1964/5); City of Belfast (*G16 YM News-Sheet*, June); Medway (*MARTS Newsletter*, June); Midland (*News Letter*, June and July); Norfolk (*NARC Challenge*, Summer); RAFARS (*Newsletter*, Special Edition); R.A.I.B.C. (*Radial*, June and July); Radio Club of Scotland (*GM Magazine*, April and June); South Birmingham (*QSP*, July); Southgate (*Newsletter*, July); Wirral (*Newsletter*, Vol. 17 No. 5); North Kent (*Newsletter*, July); Cray Valley (*Newsletter*, July); Crystal Palace (*Newsletter* No. 104); Plymouth (*QUA*, July); Reigate (*Feedback*, July); Surrey (Croydon), (*SRCC Monthly News*, July); WAMRAC (*Circular Letter* No. 44).



Representatives of the Royal Navy A.R.S. (G3JFF at left) presenting 17-year old John Hall, Crewe, with a B.28 Rx to help him while away the hours—he has a spinal injury which has deprived him of the use of his legs. Before this happened, John Hall was serving in the Royal Navy. Always keen on Amateur Radio, his next objective is a ticket.

Courtesy "Crewe Chronicle"

#### "THE OTHER MAN'S STATION"

Readers are reminded that we are always glad to see offerings for this feature—which appears as often as space is available. The requirement is a good photograph of the station—a glossy black-and-white print not smaller than "120" or larger than about post-card size—accompanied by a full description, including results achieved, main interests on the air and such personal notes as are allowable for publication. From all this, we write the story, which is paid for at the usual space rate, immediately on appearance. So long as the amateur concerned holds an active transmitting licence, home or overseas, there are no limitations—we welcome newcomers as much as those with more experience on the air.

#### BBC-2 TRANSLATOR FOR GUILDFORD

The first of the new fill-in stations, to improve BBC-2 reception in shadow areas, will cover Guildford. The apparatus is being supplied by Mullard Equipment, Ltd., and is of the translator (or "transposer") type. It will take Crystal Palace on Ch.33 and re-radiate on Ch.46. Sited so that its receiving aerial is within an area of adequate field strength from C.P., it will have an omnidirectional radiating system with a gain of 10 dB, giving about 10 kW e.r.p. from a combined video-sound power output of 1 kW. An interesting feature of the design is that the PA is an air-cooled klystron, with tunable cavities, and it can actually be set up on any channel within Bands IV-V simply by fitting and tuning the appropriate cavity. The station will operate automatic-unattended, and is the forerunner of other similar UHF transposers for other parts of the country.

### COURSES FOR THE R.A.E.

At a number of centres up and down the country, courses are being organised for those who require basic instruction for the Radio Amateur's Examination, which is held under the auspices of the City & Guilds of London Institute, and is Subject No. 55 in their examination syllabus. Note that the Institute does not itself instruct for the examination—it only sets the paper and produces the results.

There will be an exam. sitting in December this year and again in May next, the latter being the main one, following the courses of instruction through the winter session. These courses are held at local technical colleges, evening class centres and similar institutions, usually under the local County Education Authority. Fees are nominal, and instruction is by qualified teachers, who in many cases are themselves licensed amateurs. Certain of the larger Clubs, who have members qualified to instruct in R.A.E. theory and Morse, also run regular classes for their own candidates.

In most cases, the Examination itself is held—if not at the centre giving the instruction—somewhere within easy travelling distance. The examination syllabus, together with recommended reading and copies of past question papers, can be obtained on application to: Sales Section, City & Guilds of London Institute, 76 Portland Place, London, W.1, price 3s. post free. Be sure to ask for "Subject No. 55—Radio Amateur's Examination."

Following is a preliminary list of centres at which courses of instruction are offered. There are undoubtedly many others (notification of which may not have reached us due to the long mail delays during July) and, in any event, an enquiry at the local office of the County Education Authority should produce information as to any courses being held locally—as before, quote "Subject No. 55, Radio Amateur's Examination, City & Guilds."

**Bristol:** At the Technical College, Ashley Down Road, on Mondays, 6.45-9.15 p.m., R.A.E. theory and Morse, commencing September 21. Register at the College, September 10-14. An amateur station operating on the HF, VHF and UHF bands, using CW and phone and also equipped for TV transmission, is available for practical instruction, under the callsign G5FS.

**Derby:** At the College of Technology, Kedleston Road, under G2CVV as instructor, offering R.A.E. theory on Tuesdays 7.0-9.0 p.m., and laboratory and practical work on Fridays, same time, commencing September 22, with enrolment at the College during September 14-16. Maximum fee for the whole course is 50s. for those over 21, down to 1s. only for those under 18.

**Durham:** At the Technical College, Framwellgate Moor, commencing in September, R.A.E. theory and Morse. Apply Head of Engineering Dept. in first instance, as courses depend upon a sufficient number of candidates offering.

**Halifax:** At the Percival Whitley College of Further Education, with registration September 7-10, or

apply A. Robinson, G3MDW, Candy Cabin, Ogden, Halifax, for details.

**Leicester:** At the College of Technology, Dept. of Electrical Engineering, under G3PMD, with R.A.E. theory taken by G3PSL and Morse instruction given by G2DSP, on Wednesday evenings, with enrolment commencing on September 14, at the College.

**London (Brentford):** At the Evening Institute, Clifden Road, on Monday evenings (R.A.E.) and Thursday evenings (Morse), starting September 21. Fees are 30s. for one class, plus 7s. 6d. for an additional class, for the whole course, and enrolments will be accepted by post to: Head of Evening Institutes, Education Offices, Town Hall, Chiswick, W.4, or by personal application at the Institute during enrolment week, September 14-17.

**London (East Ham):** At the Technical College, High Street South, on Mondays (Morse) and Wednesdays (R.A.E. theory), 7.0-9.0 p.m. each evening, commencing September 21, with fee for both courses of 51s. if over 21, and 41s. for those under 21. Enrolment September 14-16, 7.0-9.0 p.m., at the College. Any further information can be obtained from: H. Reeve, G3JXZ, 284A Barking Road, East Ham, E.6.

**London (Ilford):** At the Ilford Literary Institute, Cranbrook Road, Ilford, commencing September 23. Enrolment September 7-10, 7.0-8.30 p.m. This course has been running continuously since 1948, with a notable success record, under the same instructor, W. G. Hall, G8JM, to whom application should be made in the first instance, with s.a.e. QTH: 48 Hawkdene, North Chingford, E.4.

**London (Wembley):** At the Evening Institute, Copland School, Wembley High Road, on Monday evenings, 7-10 p.m., starting on September 21, with enrolment during September 14-17, 7.15-9.15 p.m. The inclusive fee for the 30-week session, covering R.A.E. theory and Morse, is 30s., and candidates take their examinations at the Institute.

**Manchester:** At the Openshaw Technical College for Further Education, Whitworth Street, Manchester 11, with enrolment towards the end of September, and classes on Tuesday evenings (R.A.E. theory) and Thursdays (Morse and Practical). An amateur station signing G3NLT is available for demonstration purposes. Courses are dependent upon sufficient candidates coming forward, and those from outside the area of the Manchester Education Authority should obtain permits to enrol from their own local education body. Further information can be obtained on application, with s.a.e., to: M. Barnsley, G3HZM, Greenways, 11 Cemetery Road, Denton, Manchester.

**Oldbury, Worcs.:** R.A.E. classes are being arranged at the College of Further Education, Wolverhampton New Road, Causeway Green, and application should be made immediately to the Principal, at the College.

**Reading:** At the Technical College, a course for the R.A.E., with enrolment at the College during September 9-11. Apply for details to: R. G. Nash, G3EJA, 9 Holybrook Road, Reading.

**West Bromwich:** R.A.E. classes are proposed for the district, and prospective candidates are asked to get in touch with: W. L. Woodcraft, Organiser, Education Offices, Highfields, West Bromwich, as soon as possible.

**Wirral:** At the Birkenhead Technical College, on Thursday evenings, with G3EGX as lecturer. This course, arranged through the Wirral Amateur Radio Society, has been run successfully for several years. Application for details should be made either direct to the College, or to L. Roberts, G3EGX, 18 Croxteth Avenue, Liscard, Wallasey, or to A. Seed, G3FOO, 31 Withert Avenue, Bebington, Wirral.

If your locality is not included in the list, try your local Education Authority office for information. As it is intended to publish a further list in the September issue of SHORT WAVE MAGAZINE, those responsible for organising R.A.E. Courses are asked to let us have details (in the form shown here) by August 14. In case notifications already sent but not included in this list have been caught up in the postal chaos, they should be *repeated*, to reach us by August 14. Reader enquiries about courses should not, repeat *not*, be addressed to us; we publish all the information we have.

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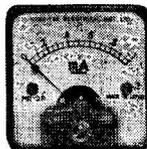
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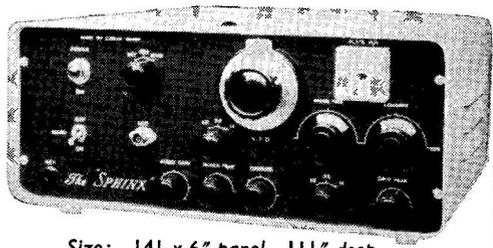
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**WANTED:** CR-100, appearance not important provided electrically OK, full details and prices to—M. Whelan, 44 Synge Street, South Circular Road, Dublin 8, Eire.

**SALE:** 4-813's new boxed, £2 each. Miniciter, £6 10s. 2-811's, 30s. pair. Drive unit 8223 (Babs Mk. 4) new, £8. Etel 4EP7, new, £5. Newnes *R and TV Servicing*, 7 vols. to 1961, £8. 22 Sets, £6. R.1224B, £6. BC-221M, £10. DG7-5 CRT, £1. QOV06-20A, £1. AR77 Vib. pack, 30s. Radar Band I part. gen., £8.—G3RAS, 7 Fernbank Road, Bradford, 3.

**COLLINS** 75S-3 Rx, 312B-2 speaker, both as new, £240. Eddystone 840A, £25. R.209 mobile Rx, £20. 35ft. telescopic mast, £5. Mosley TA-33 Jnr., complete, never used for transmission, £18.—Box No. 3054, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**DST-100**, £17 10s. Eddystone 640, £15. Valve Voltmeter, £3. Mullard Resistance-Capacitance Bridge, £2 10s. AF Voltmeter, £3.—Melhuish, 31 Shepherds Bush Green, London, W.12. *Any morning only.*

**AR88D**, 150w. Tx in 6ft. rack, 3in. Oscilloscope. Buyer collects the lot for £30. Also 2-metre Converter and Tx, offers?—G2BFP, 133 Sycamore Road, Farnborough, Hants. (Tel. 753.)

**CQ de VS1LJ**, four-gang 75  $\mu$ F miniature variable wanted. Ex-RF unit FB.—*QTHR.*

**FOR SALE:** 20-valve double-Superhet, £8. Acton signal generator, £4. Mains powered Class-D, £2 10s. Lot £13.—Knott, 16 Gloucester Road, North Harrow, Middx.

**HRO5T**, new, mint, 9 coils, 28 mc bandspread, PSU, nearest £23, plus carriage.—Phillips, Firdowne, Gomeldon Hill, Salisbury, Wilts.

**SALE:** DX-40U, brand new, £30. VF-1U, £6. Mohican, £18. Panda ATU, £3. Teleprinter PU, £4. 300v. 6.3v. power supply, 500-0-500/500-0-500v. 250 mA power transformer; many transmitting components, including valves, variables, etc.—Box No. 3055, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**WANTED:** Commercial Vertical or G.P. Antenna for 80m., Hy-Gain, Mosley or similar.—Box No. 3056, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**CODAR** CR-66 Rx with tuning indicator, £10. CR-300 with PSU, 240v. AC and 24v. DC, £5. AVO-8, overhauled by makers, offers?—Marshall, GM3RXZ, Braehead, Balbardie Road, Bathgate.

**4X150A** valve holders, Elmac type SK606, new, £2. Air Chimney for above, 12s. 6d. Valves type 4X150A and 4X150G, £2 2s. 6d. New unused G30Em.—McCarthy, 74b Southover Street, Brighton 7, Sussex.

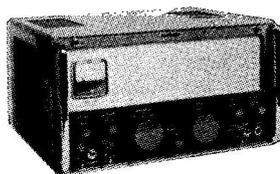
**SALE:** DX-100U, excellent condition and performance, £55 o.n.o.? HRO, miniature front end, product detector, full set of nine general coverage coils, £14. AR88 speaker, £1. Mosley V4-6 vertical, £6.—Davies, GW3OCD, 7 Cae Cotton, Llanelly, Carmar.

**SALE:** American DX-160 Transmitter, as new, cost £80, must sell, accept £55 cash, or part exchange for small Top Band Tx. Buyer collects, Lancashire area.—Box No. 3057, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

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## EDDYSTONE "EA12" AMATEUR BANDS RECEIVER



(Tunes only over six Amateur Bands)

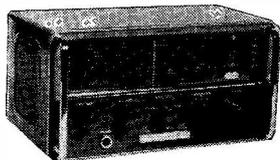
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Answers all the problems of Amateur Bands reception. Highly stable—Xtal Control — superb bandspread — internal Xtal Calibration — switched SSB selection with fine tuning—deep slot filter — impressive "S" meter — two AGC

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**£48** (delivered U.K.)

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**UHF Boosters**, in use by thousands of fringe BBC 2 viewers, now  
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fantastic gain at low noise level.

Full money back guarantee if your signal/noise ratio is not improved.

Model	Covers	Typical Gain	Noise Level
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C.144	" " 2 " "	18 dB	3 dB
C.430	" " 70 cms. "	15 dB	6 dB

Power required:—12 to 18 volts DC.

Masthead, fully sealed version, Model A, available for optimum results.  
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down lead. Battery unit with switch for either model, 10/- extra.

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## SMALL ADVERTISEMENTS, READERS—continued

**L**G.50, 50w. Tx, excellent condition and very little  
used, nearest £25. Top to Twenty, 12v. Phone/  
CW Tx, VFO controlled, complete, £6 o.n.o.? Brand  
new mains transformer for Eddystone S.640, £2.  
Delivered reasonable distance, but prefer buyer  
inspects and collects.—G3OCY, 56 Lumley Crescent,  
Ferryhill, Co. Durham. (FH 311.)

**M**OSLEY V4-6 U.S.A. vertical, 40-10 metres, plus  
Hy-Gain loading coil for 80m., cost £17, sell £7.  
—G2HNO, 52 Seafield Road, Southbourne, Bourne-  
mouth.

**V**ALVES, ex-equipment, 4X150A, 20s.; TT15, 15s.;  
3C24, 10s.; 12AT7, 12AU7, 12AX7, 5Z3, 5Z4,  
5U4, 5Y3, 9001, 9002, 9003, 9004, 6AQ4, 6V6, 2s.;  
6AQ5, 2s. 6d.; 807, 6AH6, 3s.; 6SN7, 12SG7, 1s.  
12E1, 5s. Mixed valves, 2s. dozen, postage 6d.—  
GM3PIP, Strichen, Aberdeenshire.

**S**ALE: 120 watt CW Tx (Gelosio VFO) 80-10  
metres, £18 o.n.o.? 160m. Tx, similar K.W., 5763  
PA, £12. K.W. Gelosio 80-10 metre converter, 4/6  
IF, £16. Transistor stereo amp, each channel inde-  
pendent, 10-watt (as *Wireless World*, Dec. 1961), £15,  
s.a.e. for details, o.n.o.?—N. J. Gregory, 785 Harvey  
Road, Alvaston, Derby.

**E**XCHANGE: Clarion Transistor Tape Recorder  
for receiver suitable for SSB reception. Commer-  
cial or well constructed home-built acceptable.  
G2DAF Rx preferred. Cash adjustment if required.—  
G. Morrison, 9 Keats Road, Stratford-upon-Avon,  
Warks. (Tel. S/A 4739 between 6-7 p.m.)

**T**R.1986's Dowkey T/R switch. 30ft. sectional mast.  
*Wireless Worlds* 1949/63. Mains Transformers,  
valves, crystals, VCR97, VCR138; s.a.e. list other  
component bargains.—Goldsbrough, G3ERB, 56  
Kings Lane, Bebington, Cheshire.

**M**INIMITER Top 2-7 CW/AM 24w. transmitter.  
160/80/40 metre bands, basically sound and  
working, but needs overhaul. Sell first reasonable  
offer over £15.—Palk, 18 Everest Drive, Seaton,  
Devon.

**S**ALE: 32ft. Lattice Tower in good condition,  
1½in. steel angle, 4ft. square base, 1ft. at top,  
disassembles into 20ft. and 12ft. sections. Buyer collects,  
£12 10s.—Eyre, G5KMM, 9a Woodstock Road,  
Barnsley, Yorkshire.

**M**INIMITER FB5, £2 15s. Xtal Calibrator No.  
7, £2 10s. WANTED: GDO, D/F gear, Rx,  
etc.—Box No. 3058. Short Wave Magazine, Ltd., 55  
Victoria Street, London, S.W.1.

**E**DDYSTONE 888A, FB condition and excellent  
performance. Complete with S-meter, matching  
speaker and instruction manual, £65.—Box No. 3059,  
Short Wave Magazine, Ltd., 55 Victoria Street,  
London, S.W.1.

**F**OR SALE: QQV02-6's, 15s.; QQV03-10's 10s.;  
QQV03-20A's, £1. 12v. Transistor PSU, 350v. at  
300 mA and 150 mA, £14 o.n.o.?—G3OHC, 24 Wood  
Green Road, Birmingham, 18.

**S**ALE: TA-33 Jnr. Beam, £12. BC-453 Q-Fiver,  
new condition, £5. Crystal checked frequency  
meter W.1191A, £5.—Willmott, 59 Green Lane,  
Eastwood, Essex.

**L**G.300, new condition, modulator, power supply  
LV only, cabinet to match, extras, £45 o.n.o.?  
BC-221, uncalibrated, blank book, £10. Goodmans  
Axiom 101, new, £4 10s. HRO tuning condenser and  
dial, £1 10s. HRO coils, bandspread, £2 each. Pair  
35T's, £1 each; 813's, £2 each. UM2 Mod. Trans.,  
£3 10s. BC-455, 35s.; RF-26, 12s. 6d.; 640 Xtal Filter,  
£1. WANTED: *Short Wave Magazine*, November  
'56.—G3GHS (Lower Hook 3741, evenings).

SMALL ADVERTISEMENTS, READERS—continued

**T**W2 Tx (less QQV03-10), £15. BC-221J PSU/LS, £12. HMV push-button car radio, £10. Mosley Tri-Band mobile whip, £3. Bug-key, new, £4. TA-33Sr traps, unused, £10. 10in. Goodmans LS in corner cabinet, £4. Pair QY3-125 with bases, £2 each. QY3-65, £1 10s. All items o.n.o.—Ring G3LAS, *Berkhamsted 1186.*

**C**OMPLETE three-band Aerial System TA-33Jr. —30ft. pipe mast, slip-ring bearings and guys. Prop pitch motor with geared selsyns, transformer and desk indicator; seen working, £25. Prop pitch motor with geared selsyns, extension shaft and mounting bracket, with desk indicator, £12. For two-metre fans: 24v. AC motor, cowl-gill, reversible with extension shaft, £2. 230v. AC reversible motor, 37 r.p.m., 30s. 24v. DC motor with cycle sprocket and bearing, 1½ r.p.m., 30s. Buyer collects near Manchester.—Tel. *Marple 2616*, or Box No. 3060, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**W**ANTED: SB-10U in good condition, also linear PA.—G3RDX, Parsonage House, Woodbury, Exeter.

**T**IGER 200B, five bands, 10-80 metres, 813, 100w. Modulator, TVI proof, perfect, £50.—G3HNA, 17 Bickham Road, St. Budeaux, Plymouth. (*Phone 31531.*)

**M**AINS TRANSFORMERS. (1) 110/240v. In, 0-110-240v. 2A, 50s. (2) 240v. In, 0-4-1-6-3v., 2A x 3 (i.e. 6.3 at 6A), 10s. (3) 230v. In, 750-0-750v. 150 mA, 4v. 6A, 6.3v. 4A, 6.3v. 3A, 4v. 2.5A, 40s. (5) 50-watt, 240v. to 110v., 7s. 6d. (6) 220/240v. In, 375-0-375v. 180 mA, 4v. 4A, 6.3v. 4A, 6.3v. 9A (CT), 30s. Chokes (1) 10 Hy 200 mA, 10s. (2) 10Hy 250 mA, 12s. 6d. Nitrogol Condensers 4 mF 3kV, 20s. the pair. Postage extra.—Box No. 3061, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**B**44 Tx/Rx: Circuit, components, valves and alignment details, available at 5s. post free, from—G3IUG, 39 Curlieu Road, Oakdale, Poole, Dorset.

**C**ONVERTER 80-10 metres, 6 mc IF, £6. QQV06-20 (3), 10s. each. Trans. 400-0-400v. 200 mA, 6.3v. 5v., 25s.—Marriott, R.A.F., Weyhill, Andover, Hants.

**E**DDYSTONE 888A, S-meter, set spare valves, £60. Linear Amplifier and Power Pack, CW/SSB, £30.

**W**ANTED: Minimitter Mercury preferably with 807's. EXCHANGE: Latest Exacta Varex Pentaprism Reflex Camera, value approximately £70, anything Rx/Tx line, HRO and cash? Write first.—G3RCO, Westleigh, Fore Street, Beer, Devon.

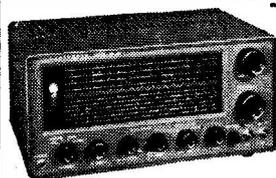
**15-20** watt 2-metre Tx RF section, QQV03-10 PA (uses your 160 metre mod./power), £7. 10in. x 8in. photo dryer/glazer, 50s. 4-metre Nuvistor converter, 29.1—29.7 mc IF with built-in PSU, £7 10s.—B. M. Sandall, 21 Dale View, Ilkeston, Derbyshire.

**N**EW CR-100 Handbook, 35s.; Hallicrafters SR-150 Transceiver Handbook, 22s.; Bush VHF90C, £10 (send P.O.).—Box No. 3062, Short Wave Magazine Ltd., 55 Victoria Street, London, S.W.1.

**W**ANTED: Faulty Receiver for hard-up student, HRO, CR-100, Eddystone, etc. must be cheap. Please send details. Will pay carriage (Middlesex).—Box No. 3063, Short Wave Magazine Ltd., 55 Victoria Street, London, S.W.1.

**S**ALE: CR-100 Receiver, S-meter, manual, £15. HE-40 Receiver as new, £18. Green & Davis two-metre converter, £5. Two-metre J-Beam new and boxed (6in. x 6in.), £3.—G3ELJ, Claypole, Newark, Notts.

WORLD WIDE COVERAGE COMMUNICATION RECEIVERS



9 valves 4-waveband

MODEL HE-30 **£35.0.0** BRAND NEW

Delivery from stock also SR40 **£21.0.0**

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NEW 9-TRANSISTOR CRYSTAL CONTROLLED TRANS RECEIVERS

Complete with leather case, Telescopic aerial, internal batteries, full speaker output, excellent range up to 5 miles.

Size: 9" x 3" x 2" **PRICE £25** per pair Also—Lower power version. Complete at £9/19/6 pair Full details on request

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AC107	14/6	OC75*	6/-
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AF117	8/6	GET114*	6/6
AF118	17/6	GET115	9/6
ADT140	15/-	GET116*	15/-
OC44	6/-	OC83*	6/6
OC45	5/-	OC84*	8/6
OC71*	4/-	OC170	7/6
OC72*	6/6	OC171	8/6

POWER TRANSISTORS

OC25	12/-	OC35*	15/-
OC28*	17/6	OC36*	15/-
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\*Matched Pairs available

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NEW 86 PAGE 2/6 P.P. ILLUSTRATED CATALOGUE

VALVE, TRANSISTOR and CRYSTAL LIST 1/-

**HENRY'S RADIO Ltd.** PAD 1008/9

303 EDGWARE ROAD, LONDON, W.2

Mon.-Sat. 9-6 p.m. Thurs. 9-1 p.m.

**K.W. Corner No. 3**

(A monthly review of news, views and advice)

**TOKAI "Walkie Talkies."** We have just received a large consignment of the latest model manufactured by this well known Japanese company enabling us to sell at a very competitive price. This is the only type available in this country today with the output power increased to 200 mW. Receiver performance has been improved by the addition of an R.F. stage (so far as we know, all other models have no R.F. stage and maximum output power is 100 mW.). The equipment was, of course, originally designed for Citizens Band use but for the Amateur market we replace the crystal in the Tx and Rx sections, and re-align for operation on 28.5 mc/s. This particular model is one of the few models approved by most European countries for use on the Citizens Band (27 mc/s.). It has also passed most stringent tests for performance, harmonic radiation, reliability, etc. applied by the Bundespost of W. Germany. Already many radio amateurs have found these units invaluable for Beam adjustments, Functions, Rallies, Exhibitions, etc. and we have heard of a "G3" who has worked six countries using a Tokai "walkie talkie" with his Beam during the introduction of legislation covering the operation of this equipment on the Citizens Band and we feel in this day and age of electronics this should be done as a service to the community. For example, a simple effective life saving instrument is available at a very small cost to such persons as yachtsmen, mountaineers, Garage proprietors, farmers, builders, security specialists, crane drivers, to name a few plus the G.P.O. Engineering Departments in their many aspects. Furthermore, this could be a very substantial source of revenue for the G.P.O.

**KW Sales Office.** Newest call sign to join the KW staff is G3JSA. Don Wilcox, who comes from VE3, will be handling many of your enquiries by letter and phone. In Canada his experience has been with a large Communications organisation on the technical sales. Address letters directly to Don if you wish.

**KW Holidays.** There will not be a complete shutdown of our Works for the holiday period. During the first two weeks of August a skeleton staff will keep Sales and despatches moving at the fastest rate possible and perhaps you would allow an extra 24 hours delivery period for your urgent requirements.

**K.W. ELECTRONICS LIMITED**  
VANGUARD WORKS,  
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## FIXED OR MOBILE GET WITH IT!

WHATEVER YOUR INTEREST, TW EQUIPMENT IS DESIGNED TO GIVE YOU OUTSTANDING PERFORMANCE AND RELIABILITY

- 70 cms. **A2521 TROUGH LINE CONVERTER.** 6D54 nuvistor G.G. mixer, 6BQ7A cascode I.F. 12-16 mc/s. or to order 616 xtal osc. 60S4 multiplier. £18
- 2 m. **TW-2 10w. TX.** Complete with modulator. 23 gns.  
**TW NUVISTOR CONVERTER (6DS4)** any I.F. (With built-in mains supply £15). 11 gns.  
**TW TWOMOBILE.** All transistor RX. 144-146 mc/s. Self-contained. £30
- 4 m. **TW TRANSISTOR CONVERTER.** 1" x 1" x 3". Philco transistors. I.F.s 4-6, 14-16, 24-26 mc/s. Suits any RX. 9 gns.  
**TW NUVISTOR CONVERTER.** Any I.F. Same price as 2m. models.  
**TW4 10w. TX.** Complete with modulator. Same price as 2m. model. £30  
**TW TRANSISTOR RX.** 70.2-70.4. £30  
**TW TRANSISTOR CONVERTER.** 1" x 1" x 3". 9 gns.
- 160 m. **TW TOPBANDER.** 10w. TX. Complete with modulator. High stability V.F.O. £23  
**TW TOPMOBILE.** All transistor RX. 19 gns.

Mains and Mobile P.S.U.s for the above transmitters, complete with aerial switching, £15

For full details, write to:—

**T. WITHERS (Electronics)**

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## G. W. M. RADIO LTD.

**MURPHY RECEIVER OUTFIT CAS, AP. 100335.** A modern, high quality receiver issued in 1957, covering 59 to 555 kc/s. and 1.47 to 30 mc/s. Two R.F. separate oscillator with provision for crystal control. Three I.F., twin crystal filter. Three audio plus B.F.O. and noise limiter. Switched selectivity, 8, 3, 1 kc/s. and 200 c/s. (audio filter). I.F. is 800 kc/s. Audio 2 watts to 600 ohms. Size: 14" x 13" x 14½"; weight: 64 lbs. Supplied complete with power unit for 230 volt AC, 75 watts, 20" x 9" x 14", completely overhauled by Radon of Worthing, £40, carriage £1/10/-.

**CR100/B28 RECEIVERS.** 60 kc/s. to 30 mc/s. crystal filter, B.F.O. Two R.F. and 2 I.F., etc. Good condition and working well, £18/10/-, carriage £1.

**RELAYS.** Ex-equipment, 12 volt coil, single make 50 amp. contacts, 3/6, post 1/6. 1000 ohm high speed, single pole changeover, ideal for remote keying. New, 7/6, post 1/6.

**SPEAKERS.** 5" in crackle case, used, good order, 3 ohm coil, 7/6, post 2/6.

**LAST FEW SCR522 TRANSCEIVERS,** complete in rack with all valves and modulation and driver transformers. Good used condition, 50/-, carriage paid.

**THERMOSTATS.** 4" rod type. 10 amps., 250 volts AC. 25 to 105 degrees centigrade. Differential 4 degrees. Brand new, 12/6, post 1/6.

**RECEIVER SECTION OF 68T WALKIE-TALKIE.** 3 to 6 mc/s. or 18 set, 6 to 9 mc/s. Complete with 3 ARP12 and AR8 valves. Price 15/-, post paid to clear.

All equipment offered is complete but not tested unless otherwise stated. Carriage charges quoted are for England and Wales only.

Terms: Cash with order. Early closing Wednesday.

40-42 PORTLAND RD., WORTHING, SUSSEX

SMALL ADVERTISEMENTS, READERS—continued

**840A,** working order, £20. Buyer collects Saturday afternoon.—Box No. 3070, Short Wave Magazine Ltd., 55 Victoria Street, London, S.W.1.

**FOR SALE:** DX-100U, factory-built, 5 months' old, immaculate, £65.—J. W. Garrett, 21 Meadow Road, Tonbridge, Kent.

**SALE:** TA-33 Beam, excellent, offers around £10. 160-metre Command Tx, built-in modulator, £4. Marconi Marine Receiver, 170 kc to 4.5 mc, less PSU, £2 10s. Buyer collects or local delivery; letters only.—G3OJV, 6 The Shellings, Hornchurch, Essex.

**WANTED:** Manuals for Hallicrafters BC-669 or BC-699 Transmitter-Receiver, Bendix BC-433 or MN-26 Radio Compass. Also TCS Collins Transmitter, Receiver.—Box No. 3064, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**MINIMITTER** Top 2-7 (mint), as new, £25. M Valves: 6SQ7, 7s.; 6K6, 2s. 6d.; 6K8G, 4s.; 6K7G, 2s. 6d.; 4D1, 4s. Heater transformer 0/250v., 6-3v. 1-5A, 5s., RSC Power Pack 230/250v., 250v. 60 mA, 6-3v. 2A, £1. *Short Wave Magazines*, Vol. XXI: 2, 4, 5, 6, 7, 8, 9, 10, 11, 12. R.S.G.B. *Bulletin*, Vol. 37: 4, 6, 7, 8, 10, 12. Vol. 38: 1, 3, 4, 7, 8, 9, 11, 12. Vol. 39: 1, 2, 3, 4, 5, 6, 1s. 6d. each. All inc. p. & p.—G3LOL, 30 Johnson Road, Berrow, Bury St. Edmunds, Suffolk.

**FOR SALE:** K.W. "Valiant" (inc. 160m.) with 600v. PSU, £25. R.107, with S-meter, handbooks, and AR88 speaker, £10. Panda Explorer 150w. Tx, with Minimitter LP Filter, £40.—Green, The Cottage, Mill House Farm, Fulmer, Bucks.

**SALE:** R.1475 Receiver, good condition, handbook, £13. Collins TCS-12 Receiver, 200-250v. AC, needs attention, £5. Crystal Calibrator No. 10, modified 3v. heater working, instructions, 35s. Two No. 38 Transreceivers, 35s. *Practical Wireless*, 1s. 3d. each, Aug. '58-Jan. '63. *Short Wave Magazines*, 1s. 9d. each, Feb. 1960-Dec. 1962. Other radio publications. Send s.a.e. for list.—Box No. 3065, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**SALE:** Eddystone S.640, £15. Hallicrafters S.120, £20 o.n.o.?—Jones, 24 Forest Avenue, Foresthall, Newcastle-upon-Tyne, Northumberland.

**WANTED:** Fairly small, cheap Oscilloscope for amateur use (e.g. Heathkit OS-1). Details, price to—Shepherd, 3 Cearn Way, Coulsdon, Surrey.

**MOSLEY** 3-band vertical V3Jr. Aerial, perfect condition, £5.—David Morgan, G3MEM, Jevington, Hilltop Road, Earley, Reading, Berkshire.

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**WANTED:** AR88D or Eddystone Rx, any surplus equipment, working or not. Condition immaterial. Could collect S.E. England.—Box No. 3066, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

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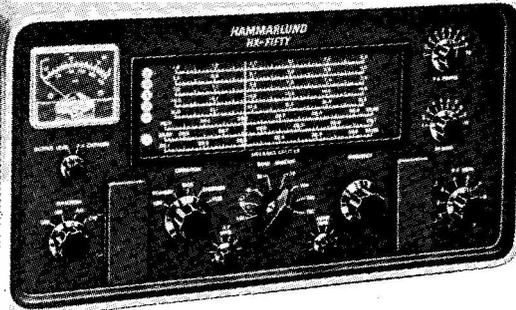
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V-7A



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DX-40U



RA-1



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