

# The SHORT WAVE Magazine

VOL. XVI

DECEMBER, 1958

NUMBER 10



**communication**

**world wide**

**FOR THE RADIO AMATEUR AND AMATEUR RADIO**

# Here is UNSOLICITED PROOF of EDDYSTONE 888A Performance



3 GLADYS ROAD,  
SOUTH YARDLEY,  
BIRMINGHAM.

22nd August 1958.

Dear Mr. Edwards,

I am writing to express my pleasure with the results obtained using one of your model 888 receivers.

It has been in constant use for several months and during that time results have exceeded expectations. It performs excellently on all bands. Sensitivity and signal to noise ratio leave nothing to be desired. My chief interest lies mainly with the CW side but it has been observed that performance on the telephony side is equally good.

I have always been keen on DX chasing and contest work. As a point of interest, during the last ten years I have managed to finish top G, 14 mc, cw, in the CQ DX Contest. Using the 888 receiver during the last contest I succeeded in reaching the Honour Roll, finishing top on 14 mc, cw, in the world. All 40 zones were heard (38 worked) and a total of 100 countries worked during one weekend.

This is the first time a G station has qualified for this award. I do not hesitate to say that the 888 receiver was a large contributory factor in attaining the above results.

You have my permission to use my name and call sign at any time you may consider a reference necessary when discussing your model 888 receiver.

Yours sincerely,

A. T. Martin  
G2LJB

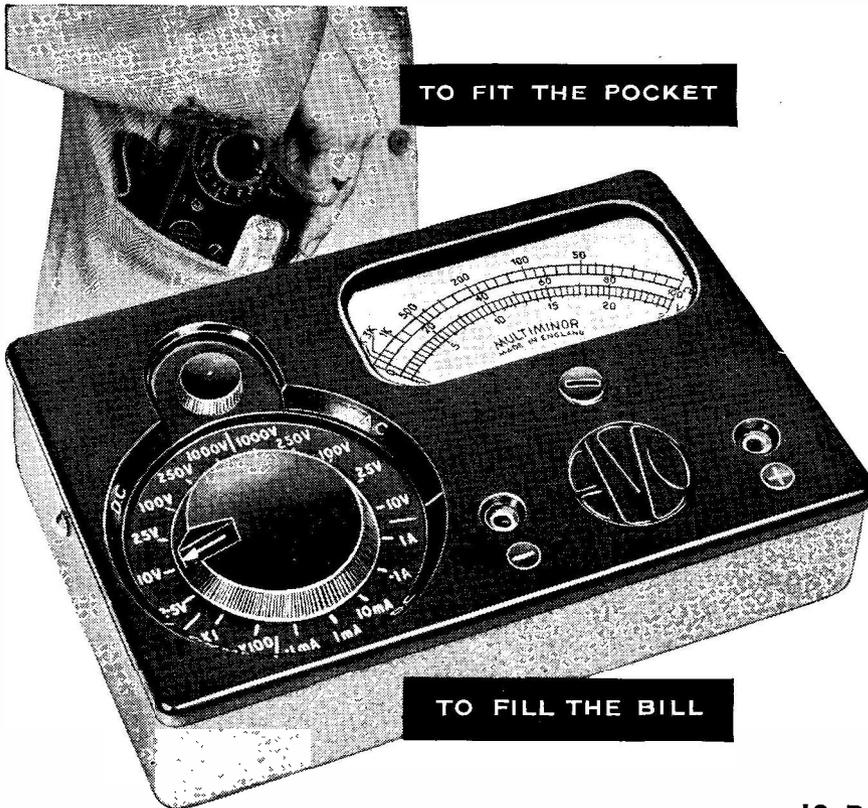
A. C. Edwards, Esq.,  
Stratton and Co. Ltd.,  
Eddystone Works,  
BIRMINGHAM 31.

The real criterion for any piece of equipment is the actual performance obtained under practical operating conditions. The letter above concerns the "888" receiver and leaves no doubt at all about the capabilities of this model. The newer "888A" is even better than the original "888," particularly for reception of c.w. and SSB signals, and it is confidently recommended to the serious amateur. The "888A," like other Eddystone models, is built to function consistently and reliably over a long period of time.

There are Eddystone stockists throughout the British Isles and in many countries of the World. We shall be happy to put you in touch with the nearest Agent.



Manufacturers : STRATTON & CO. LTD. - WEST HEATH - BIRMINGHAM, 31



TO FIT THE POCKET

TO FILL THE BILL

This splendid AVO Instrument has been developed to meet a definite demand for a sturdy pocket-size multi-range test meter at a modest price, suitable for use on modern electronic apparatus as well as for radio and television receivers, motor vehicles, and all kinds of domestic appliances and workshop equipment.

Readings are obtainable quickly and easily on a very open scale, and range selection is by means of a robust clearly marked rotary switch of the characteristic AvoMeter type. Measurements of A.C. and D.C. Voltage, D.C. Current, and Resistance are made by means of only two connection sockets.

**Sensitivity:**  
 10,000  $\Omega/V$  on D.C. voltage ranges,  
 1,000 " " A.C. " "

**Accuracy:**  
 3% of full scale value on D.C.  
 4% " " " " A.C.

To meet special requirements, instruments can be supplied to a higher degree of accuracy for a small additional charge.

### 19 Ranges

D.C. Voltage.	A.C. Voltage
0—100mV.	0—10V.
0—2.5V.	0—25V.
0—10V.	0—100V.
0—25V.	0—250V.
0—100V.	0—1000V.
0—250V.	
0—1000V.	
DC. Current	
0—100 $\mu$ A	
0—1mA	
0—10mA	
0—100mA	
0—1A	
Resistance	
0—20,000 $\Omega$	
0—2M $\Omega$	

List Price: **£9: 10s.**

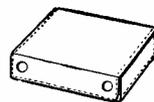
complete with  
 Test Leads and Clips.

Size: 5 $\frac{1}{4}$  x 3 $\frac{1}{2}$  x 1 $\frac{1}{2}$  inches

Weight: 1 lb. approx.

# THE MULTIMINOR

● Write for fully descriptive leaflet.



Leather Case  
 if required 32/6



**AVO Ltd.** AVOCET HOUSE, 92-96 VAUXHALL BRIDGE ROAD, LONDON S.W.1 VICTORIA 3404 (9 lines)

**Available from stock**

	<i>Post Free</i>
ANTENNA HANDBOOK (Published by A.R.R.L. (8th Edition).....	19s. 0d.
A COURSE IN RADIO FUNDAMENTALS (New Edition).....	10s. 6d.
BASIC AUDIO COURSE.....	22s. 6d.
BASIC RADIO COURSE.....	19s. 0d.
BEAM ANTENNA HANDBOOK.....	22s. 0d.
BETTER SHORTWAVE RECEPTION COLOUR TV FOR THE SERVICE TECHNICIAN (H. W. Sams).....	20s. 0d.
COMMAND SETS (Published by C.Q.) Information on conversion of many Command Transmitters and Receivers	12s. 6d.
ELECTRONICS MADE EASY.....	6s. 6d.
HAMS INTERPRETER (Published by OH2SQ).....	7s. 0d.
HAM REGISTER.....	42s. 0d.
HIGH FIDELITY by G. A. BRIGGS (Published by Wharfedale Wireless).....	12s. 6d.
HIGH FIDELITY (Gernsback).....	12s. 6d.
HIGH FIDELITY CIRCUIT DESIGN (302 pp.) (Gernsback).....	48s. 0d.
HIGH FIDELITY TECHNIQUES (Gernsback).....	8s. 6d.
HINTS AND KINKS, Vol. 5.....	11s. 0d.
HOW TO BECOME A RADIO AMATEUR★.....	5s. 0d.
LEARNING THE RADIO TELEGRAPH CODE.....	4s. 6d.
MAINTAINING HI-FI EQUIPMENT	24s. 0d.
MOBILE HANDBOOK (Published by C.Q.) (Second Edition).....	24s. 0d.
MOBILE MANUAL (Published by A.R.R.L.).....	23s. 0d.
MODEL CONTROL BY RADIO.....	8s. 6d.
NOVICE HANDBOOK (see p. 37 March)	23s. 6d.
OPERATING AN AMATEUR RADIO STATION (Published by A.R.R.L.)★.....	2s. 8d.
POWER TOOLS (Published by Popular Mechanics).....	5s. 6d.
PRACTICAL DISC RECORDING.....	6s. 6d.
RADIO AMATEUR DX GUIDE★.....	12s. 6d.
RADIO AND ELECTRONICS HANDBOOK (H. W. Sams).....	40s. 0d.
RADIO AND TV HINTS.....	8s. 6d.
RADIO DESIGNERS HANDBOOK (4th Edition) 1,498 p.p. (F. Langford Smith)	50s. 0d.
THE RADIO MANUAL (Sterling) (Published by Van Nostrand).....	71s. 6d.
RAPID TV REPAIR.....	24s. 0d.
RADIO VALVE DATA (Iliffe).....	5s. 9d.
SERVICING COLOUR TV.....	24s. 0d.
SERVICING RECORD CHANGERS	24s. 0d.
SCATTER PROPAGATION THEORY AND PRACTICE (H. W. Sams).....	25s. 0d.
SINGLE SIDEBAND FOR THE RADIO AMATEUR.....	14s. 6d.
SURPLUS CONVERSION MANUAL Volume 1.....	21s. 0d.
Volume 2.....	21s. 0d.
TECHNICAL DICTIONARY (H. W. Sams).....	16s. 6d.
TELEVISION INTERFERENCE — ITS CAUSES AND CURES.....	15s. 6d.
THE OSCILLOSCOPE.....	18s. 6d.
THE RECORDING AND REPRODUCTION OF SOUND (H. W. Sams)	64s. 0d.
TRANSISTORS— THEORY AND PRACTICE (Gernsback)	16s. 6d.
TRANSISTOR TECHNIQUES (Gernsback).....	12s. 6d.
TV IT'S A CINCH.....	24s. 0d.
UHF ANTENNAS, CONVERTERS AND TUNERS.....	12s. 0d.
UNDERSTANDING HI-FI CIRCUITS	24s. 0d.
VHF HANDBOOK.....	24s. 0d.
LOG BOOKS—Spiral Bound (Published by A.R.R.L.).....	6s. 6d.

(★ Not strictly applicable under U.K. conditions).

## Technical Publications

### RADIO AMATEUR CALL BOOK

AUTUMN ("FALL") EDITION

Abridged Edition excludes only American Stations. Otherwise complete with latest call sign-address listings for all countries, and including much DX data. In its 36th year of publication.

Complete Edition 41s. 6d. post free.

Abridged Edition 25s.

### THE RADIO AMATEUR'S HANDBOOK

1958 Edition.

Published by A.R.R.L. 34s. post free.

### WORLD RADIO HANDBOOK

1959 Edition. Available end of Dec. 15s. 3d.

### HOW TO LISTEN TO THE WORLD

1959 Edition. Available end of Dec. 7s.

### DX ZONE MAP New Edition

Paper 9s. 3d. post free.

Linen 11s. 9d. "

#### MAGAZINES BY SUBSCRIPTION

	<i>One Year</i>
AUDIO.....	40s. 0d.
CQ, RADIO AMATEUR'S JOURNAL.....	44s. 0d.
ELECTRONICS (Trade only).....	160s. 0d.
POPULAR MECHANICS.....	32s. 0d.
POPULAR SCIENCE.....	48s. 0d.
QST, ARRL.....	43s. 0d.
HIGH FIDELITY.....	56s. 0d.
RADIO AND TELEVISION NEWS.....	36s. 0d.
RADIO ELECTRONICS.....	36s. 0d.
SERVICE.....	24s. 0d.
TELEVISION.....	48s. 0d.

Subscription Service for all American Radio and Technical Periodicals.

## SHORT WAVE MAGAZINE

Publications Department

55 VICTORIA STREET, LONDON, S.W.1

Telephone ARBEY 5341

# G.W. SMITH & CO (RADIO) LIMITED

Phone: GERRARD 8204/9155  
Cables: SMITHEX LESQUARE  
3-34 LISLE STREET, LONDON, W.C.2

**R.1155 RECEIVERS.** Std. model in perfect working condition, aerial tested, etc., £7/19/6 each. Models L and N incorporating the top band, £12/19/6 each. P/P 7/6. Combined power pack and audio output stage to operate either model from A.C. mains, 85/- each.

**300FT. BRAIDED COPPER AERIAL WIRE.** Ex-U.S.A., 3/6. P/P 1/-.

**LEACH TX. AERIAL C/O RELAYS.** 12v. D.C. Double pole. New, 7/6 each. P/P 9d.

**AMERICAN M.100 MORSE KEYS.** Superb jobs, fitted with lead and std. American jack plug. Brand new, 7/6 each. P/P 1/-.

**ADMIRALTY 750 WATT AUTO TRANSFORMERS.** 110/230 volt. New, 69/6 each. P/P 5/-.

**HOOVER H.T. II MIDGET ROTARY TRANSFORMERS.** 12v. D.C. input 310v. 30ma. output. Brand new, 12/6 each. P/P 1/3.

**XTAL MICROPHONE INSERTS.** 4/6 each. P/P 6d.

**PARMEKO TABLE TOPPER TRANSFORMERS.** Primary 230v. 50c/s. Secondary 520/550/375/0/375/550/620v. 250ma. 5v. 3 amp. 5v. 3 amp. Size: 6½ x 6½ x 5½in. Brand new and boxed, 45/- each. P/P 3/-.

**AMERICAN MULTI-RANGE TEST-METERS.** F.S.D. 1,000 O.P.V. VOLTS: AC/DC.—2.5, 10, 50, 250, 1,000, 5,000v. MILLIAMPS: 1, 10, 1,000, 1,000ma. OHMS: 500, 100,000 l. megohm. DECIBELS:—10 to % 69 db. Brand new in wooden case with leads, battery and full instructions. £5/19/6 each. P/P 3/-.

**COLLINS 20 WATT MODULATION TRANSFORMERS.** Push-pull to parallel 807's Brand new, 12/6 each. P/P 1/6.

**AMERICAN SUPER LIGHTWEIGHT HEADPHONES.** Res. 50 ohms. Extremely good quality. Brand new, 15/- pr. P/P 1/3.

**CERAMIC TX. SWITCHES.** Double spaced, 2 pole 6-way, 2 banks, 5/6 each. P/P 1/-.

**56 PAGE ILLUSTRATED CATALOGUE AVAILABLE, 1/6.**

**100 Kc/s. CRYSTALS.** Std. British spacing, 15/- each. P/P 6d.

**A.R.88 SPARES.** 6-bank wavechange switch with screens, 17/6 each, new. P/P 2/6. Model D. 1st I.F. new, 3/6. P/P 9d.

**CR.100 SPARES KIT.** Contains complete set of valves: 2, X66; 2, U50; 2, DH63; 2, KT63; 6, KTW61. Also set of resistors, condensers, pots., toggle sw and o/p transformer. Supplied brand new and boxed, ONLY 59/6. P/P 4/6.

**MINE DETECTORS No. 4A.** Brand new equipments complete in transit cases. Operates from 60v./1.5v. battery. Only 99/6 each. Carriage 10/6.

**W.1191 WAVEMETERS.** 100 kc/s. to 20 mc/s. Complete with xtal., valves and cal. charts. Good condition, £5/19/6 each. P/P 6/-.

**ROTARY CONVERTERS.** 12v. D.C. input. 230 volt A.C. 50 cycles. 150 watts output. Complete with case, meter and voltage control rheostat. Perfect order, £9/19/6 each. P/P 10/-.

**POTTED MAINS TRANSFORMER.** Pri. 230v. Sec. 350/310/0/310/350v. 220ma. 6.3v. 5A. 2 X 6.3v. 3A. 2 X 6.3v. 1A. 5v. 3A. Oil filled, 49/6 each. P/P 3/6.

**UNIVERSAL AVOMINOR S.** Reconditioned as new, complete with leather case and leads, £5/10/- each. P/P 2/6. Also new AVO MULTIMINOR, £9/10/- post paid.

**PARMEKO TRANSFORMER.** Pri. 230v. Sec. 350/0/350v. 150ma. 6.3v. 5A. 5v. 4A. Brand new, only 32/6 each. P/P 2/6.

**UNIVERSAL AVOMETERS MODEL D.** Reconditioned, perfect order with leads, £8/19/6. P/P 4/-.

**NATIONAL H.R.O. RECEIVERS.** Senior Model. Complete with 9 general coverage coils, 50 kc/s. to 30 mc/s. Table model, perfect condition, less external power pack, 21 gns. each. P/P 22/-.

A.C. Power Packs, 69/6 each, extra.

## G8KW AND STAFF WISH YOU ALL A VERY MERRY CHRISTMAS

### THE K.W. "VANGUARD" TRANSMITTER

**FINEST VALUE! NOW AVAILABLE :-**

Complete Kit 10-80m ... ..	54 gns.
" " 10-160m ... ..	57 gns.
" Tx wired and tested 10-80m ...	64 gns.
" Tx " " 10-160m ... ..	67 gns.

Carriage extra on the above.

Easy terms available—you can have a complete "Vanguard" Kit for as little as £6/17/2 initial payment. Also New One Third Deposit Terms.

★ ★ ★

**MOSLEY "Trapmaster" BEAMS** and vertical aerials.—3 BANDS, 10, 15 and 20 metres with single feeder.

**TA33JR.** 3 element, 3 band beam, 8 db gain on all three bands. Weight 20 lbs. Max. Element length 26' 8". Boom 12'. Price £25.

**TA32JR.** 2 Element, 3 Band Beam. 5.5 db gain on all three bands. Weight 14 lbs. Max. element length 26' 8". Boom 6'. Price £18.

**V-3-JR** Vertical for 10, 15 and 20 metres. Overall height 11' 9". Weight 2 lbs. Price £8.

JUST ARRIVED!

#### THE NEW GELOSO 2 METRE

**VFO-DRIVER UNIT.** Suitable for driving 832 or QQVO3-20A. Uses 12AT7, two 6CL6's and 5763. Price £5/10/- (less valves). New style Escutcheon and calibrated dial £2/7/6.

AVAILABLE FROM STOCK:

The new 4/104 V.F.O. Unit, £5/17/6 less valves; Dial and Escutcheon, £2/7/6. New (Guaranteed) Valves for 4/104 6CL6, 18/6. 5763, 20/-.

4/102 V.F.O. Unit, £5/17/6. New style Dial and Escutcheon, £2/7/6.

Microphones from 3 gns. 6146 Valves, 35/-.

G209 RECEIVER for Sideband, A.M. and C.W. incl. Valves and 4 crystals, 83 gns.

K.W. Low Pass Filter, 75 ohm, £3/17/6 (post paid).

High Pass Filter, 18/6 (post paid).

**NEW Geloso Pi Coils.**

4/111 for 100w. pr. 807's, 24/- (post paid).

4/112 for 60w. single 807 or 6146, 24/- (post paid).

**Geloso Front End Units.**

2618 Coil Unit from G209 Rx. Gang and Dial, Drive and Escutcheon. Supplied with all necessary fixing brackets, £14/3/-.

★ ★ ★

**KW-GELOSO Converter.**

Designed around the Geloso Coil Unit from the G209 Receiver. I.F. output 4.6 mc/s. Bandspreads 10, 11, 15, 20, 40 and 80 metres. Dial (same as G209) 8½" x 5". Uses 6BA6, 12AU7, 6BE6, VR150 and 6X4. In kit form—ready drilled chassis and front panel complete with P.S.U., valves and all components, £19/15/-.

Ready wired and tested. Complete in cabinet, £23 plus 10/- carriage.

4.6 mc/s. I.F., 75 ohm secondary, 9/6.

4.6 mc/s. I.F., High impedance secondary, 11/6.

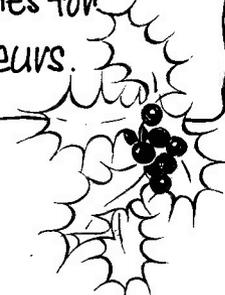
Send S.A.E. for details:

## K.W. ELECTRONICS LIMITED

136 Birchwood Road, Wilmington, Dartford, Kent

Tel.: Swanley Junction 2137

**Painton & Co. Ltd.** send their Best Wishes for  
Christmas and the New Year to all Radio Amateurs.



**Manufacturers of  
High Quality  
Electrical Components**

.....

ATTENUATORS & FADERS  
STUD SWITCHES  
TOGGLE SWITCHES  
PUSH BUTTON SWITCHES  
HIGH STABILITY  
CARBON RESISTORS  
'METLOHM' METAL FILM AND  
'FIBERLOY' GLASS FIBRE RESISTORS  
FIXED AND ADJUSTABLE  
WIREWOUND RESISTORS  
MIDGET R.F. CHOKES  
WIREWOUND POTENTIOMETERS  
KNOBS · DIALS · POINTERS  
TERMINALS  
PLUGS AND SOCKETS  
PRINTED CIRCUIT CONNECTORS

.....



**Painton & Co. Ltd.**  
KINGSTHORPE NORTHAMPTON  
Tel: 32354-7 Telegrams: 'Ceil, Northampton'

**INDEX TO  
ADVERTISERS**

	PAGE
Anglin ... ..	553
Avo, Ltd. ... ..	505 & 559
Brookes Crystals ... ..	554
Candler System ... ..	557
Forth Motor Co. ... ..	560
G.E.C. ... ..	510
Gilfillan ... ..	560
Harris, P. ... ..	558
Henley's ... ..	556
Henry's ... ..	cover iv
Home Radio ... ..	554
K.W. Electronics ... ..	507
Labgear ... ..	555
Minimitter ... ..	557
Norman Birkett, Ltd. ... ..	554
Osmor Radio Products, Ltd. ... ..	555
Painton & Co., Ltd. ... ..	508
Peter Seymour ... ..	560
Small Advertisements ... ..	555 - 560
Smith & Co. (Radio) Ltd. ... ..	507
Southern Radio ... ..	559
Southern Radio & Elec. ... ..	560
Stratton & Co., Ltd. ... ..	cover ii
S.W.M. Publications Dept. ... ..	506
Wilkinson, L. ... ..	558
Whitaker ... ..	cover iii
Young ... ..	cover iii

# SHORT WAVE MAGAZINE

VOL. XVI

DECEMBER, 1958

No. 184

**CONTENTS**

	<i>Page</i>
<b>Editorial</b> ... ..	511
<b>Simple Standing-Wave Indicator</b> , by R. C. Ray (G2TA) ... ..	512
<b>NBFM Applied to the Geloso VFO</b> , by J. R. Hunt (G3KQH) ... ..	515
<b>Trip to Zanzibar</b> , Notes by VQ1PBD ... ..	516
<b>Getting the Best Out of an EI-Bug</b> , by K. E. Felton, B.E.M. (G3IEF) ... ..	518
<b>Key-Controlled Break-In</b> , by N. P. Spooner (G2NS) ... ..	521
<b>DX Commentary</b> , by L. H. Thomas, M.B.E. (G6QB) ... ..	526
<b>SSB Topics</b> , by J. C. Miller (DL4SV/W9NTV) ... ..	533
<b>Some Notes on Amateur D/F</b> ... ..	538
<b>Radio Hobbies Exhibition — Report and Review</b> ... ..	539
<b>VHF Bands</b> , by A. J. Devon ... ..	541
<b>VHF Propagation by Meteoric Ionization</b> , by K. R. R. Bowden, B.Sc., A.R.C.S. (G3HQ1) ... ..	545
<b>New QTH's</b> ... ..	547
<b>The Other Man's Station — G2BCX</b> ... ..	548
<b>The Month with the Clubs — From Reports</b> ... ..	549
<b>Top Band in Westmorland</b> , by N. Kendrick (G3CSG) ... ..	552

*Managing Editor:* AUSTIN FORSYTH, O.B.E. (G6FO)

*Advertisement Manager:* P. H. FALKNER

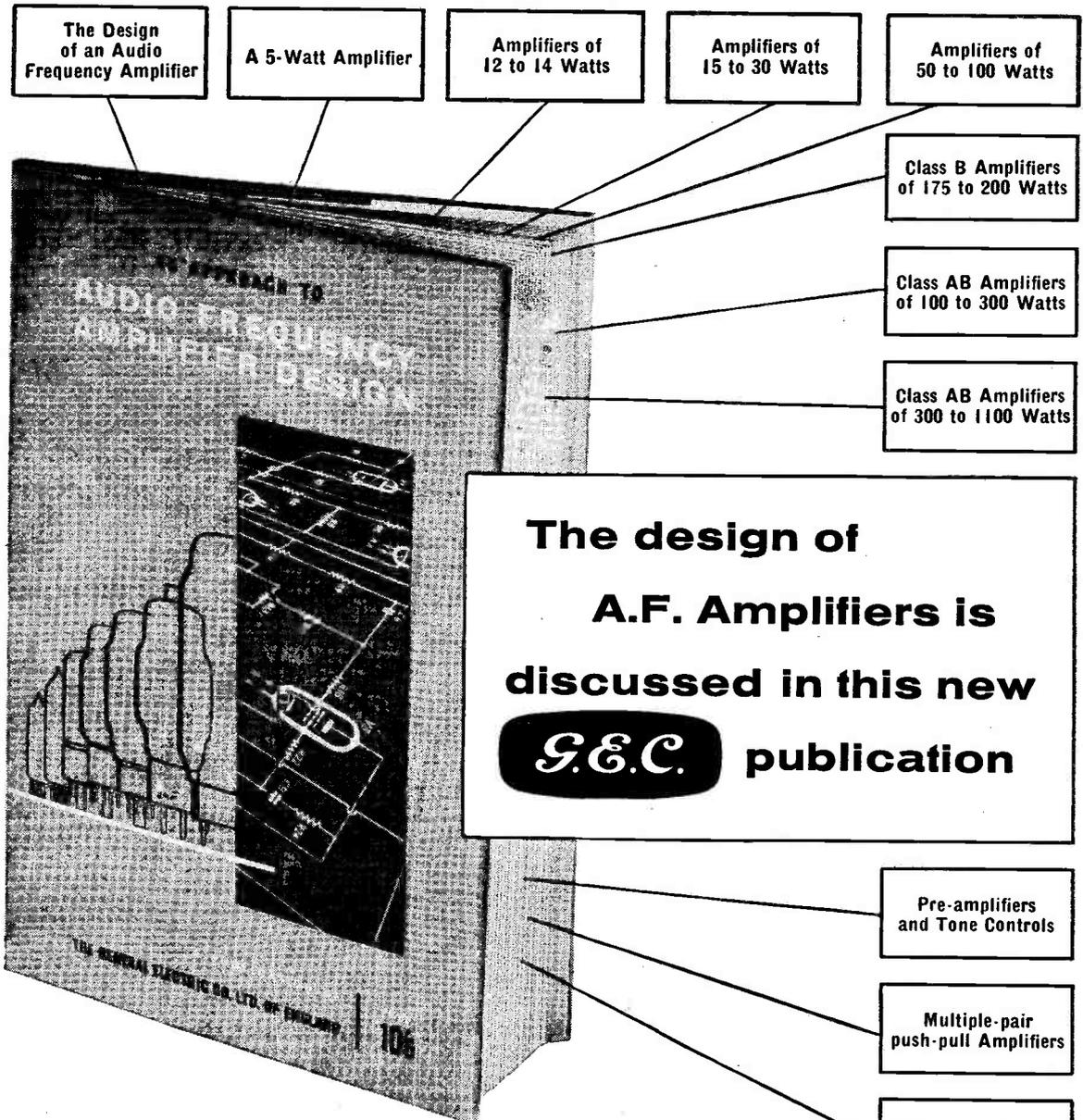
*Published the Friday following the first Wednesday each month at 55 Victoria Street, London, S.W.1. Telephone: Abbey 5341/2*

*Annual Subscription: Home and Overseas 33s. (\$5.00 U.S.) post Paid.*

**Copyright Reserved throughout the World.**

**AUTHORS' MSS**

*Articles submitted for Editorial consideration must be typed double-spaced with wide margins on one side only of quarto or foolscap sheets, with diagrams shown separately. Photographs should be clearly identified on the back. Payment is made for all material used, and it is a condition of acceptance that full copyright passes to the Short Wave Magazine, Ltd., on publication.*



The Design of an Audio Frequency Amplifier

A 5-Watt Amplifier

Amplifiers of 12 to 14 Watts

Amplifiers of 15 to 30 Watts

Amplifiers of 50 to 100 Watts

Class B Amplifiers of 175 to 200 Watts

Class AB Amplifiers of 100 to 300 Watts

Class AB Amplifiers of 300 to 1100 Watts

The design of  
**A.F. Amplifiers** is  
 discussed in this new  
**G.E.C.** publication

Pre-amplifiers and Tone Controls

Multiple-pair push-pull Amplifiers

Output Transformers and Stabilisation

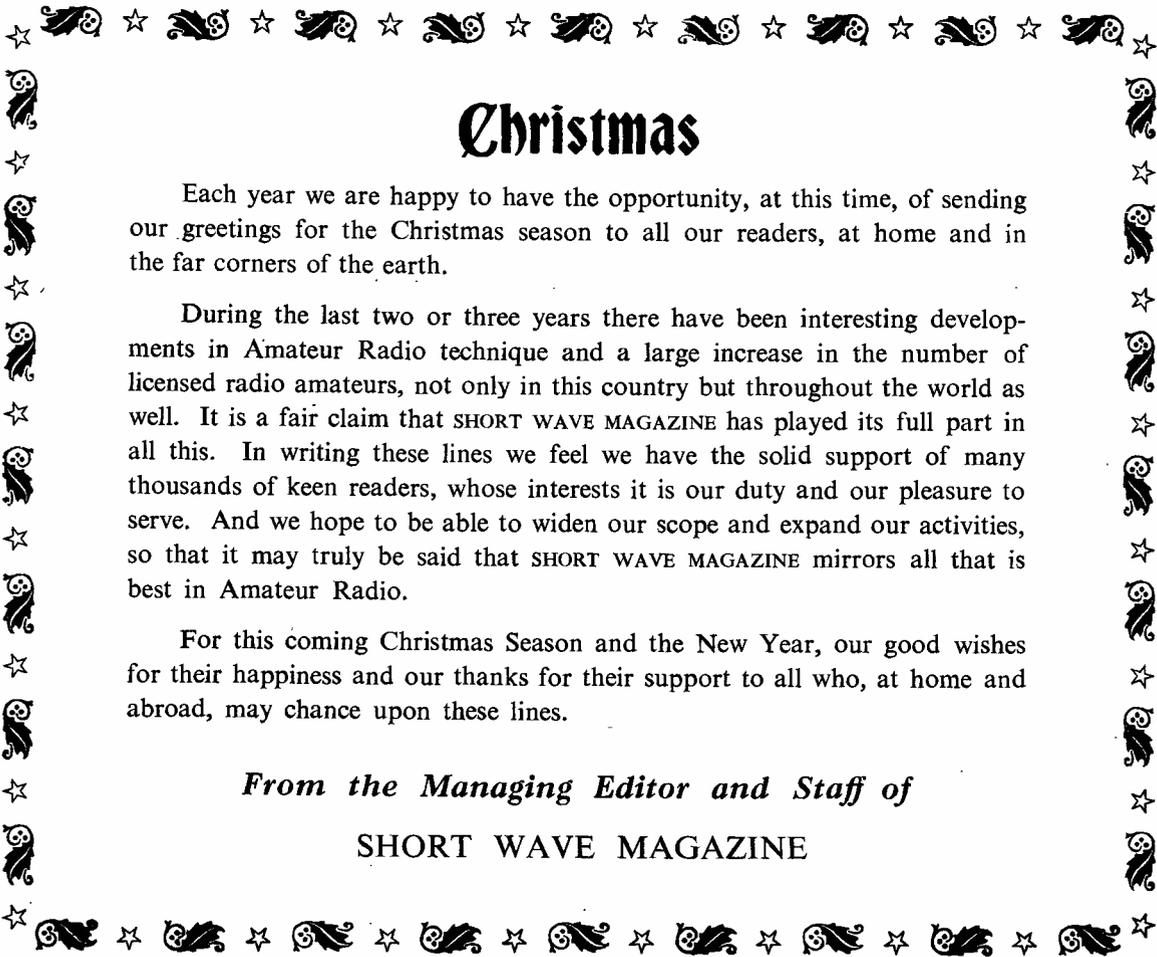
“An approach to Audio Frequency Amplifier Design” has been prepared under the auspices of the G.E.C. Valve and Electronics Department to present—in a readily accessible form—the essential details and circuit diagrams of a comprehensive range of audio-frequency amplifiers. Pre-amplifier units are also discussed in this invaluable work of reference.

Available from  
 booksellers  
 only

**10/6**

FOR THE RADIO AMATEUR AND AMATEUR RADIO

# *The* **SHORT WAVE** *Magazine*



## Christmas

Each year we are happy to have the opportunity, at this time, of sending our greetings for the Christmas season to all our readers, at home and in the far corners of the earth.

During the last two or three years there have been interesting developments in Amateur Radio technique and a large increase in the number of licensed radio amateurs, not only in this country but throughout the world as well. It is a fair claim that SHORT WAVE MAGAZINE has played its full part in all this. In writing these lines we feel we have the solid support of many thousands of keen readers, whose interests it is our duty and our pleasure to serve. And we hope to be able to widen our scope and expand our activities, so that it may truly be said that SHORT WAVE MAGAZINE mirrors all that is best in Amateur Radio.

For this coming Christmas Season and the New Year, our good wishes for their happiness and our thanks for their support to all who, at home and abroad, may chance upon these lines.

*From the Managing Editor and Staff of*

SHORT WAVE MAGAZINE

# Simple Standing-Wave Indicator

FOR 300-OHM RIBBON FEEDER

R. C. RAY (G2TA)

*This interesting device — which can be made up for a few shillings, and is christened the “Kipper” — is a practical test instrument for checking the behaviour of a transmission line. It can be calibrated, and so can be made to give direct readings of SWR.—Editor.*

FOR a number of years, a conventional standing wave detector has been in use around the station at G2TA and has given satisfactory results with coaxial cable. Measurements on 300-ohm ribbon, however, were confined to the “twin lamp” method, which at best only gave a rough indication of the presence of standing waves, and could produce erroneous results in the presence of “antenna” currents.

The need for a more accurate means of measuring standing-wave ratios on 300-ohm ribbon became apparent during recent experiments on stub matching. After some nostalgic reflection on the advantages of using open-wire transmission lines, the “Kipper” was devised as a solution to the problem of standing wave measurements on ribbon-type feeders.

## Bit of Theory

A transmission line has a certain “characteristic impedance” depending on such factors as wire diameter, spacing, and so forth, and it is an important property of such lines that if they are terminated by a resistance equal to the characteristic impedance then all the power sent along the line will be absorbed in the terminating resistance, or load. The line is then said to be matched to the load. If this load impedance is different from the characteristic value, then some power is reflected back along the transmission line, causing standing waves on the feeder line; this, of course, represents not only wasted power, but can result in all sorts of trouble with the transmitter, particularly when working phone.

If we were able to examine the current along a *properly matched* line we should find it to be the *same at all points*. However, if the load is incorrect, we should find regions where the current is abnormally high, alternating with

regions where the current is far too low. In the same way, the voltage between the lines will be abnormally low in regions of high current, and *vice versa*. This situation is undesirable for two reasons — first, some loss of power occurs in the transmission line and, secondly, if the standing waves are very bad, insulation breakdowns or local overheating of the insulating material can occur.

In order to talk quantitatively about these effects, the term “standing wave ratio” (SWR) is used, where the SWR is simply the ratio of the maximum to the minimum currents (or voltages) appearing on the line. It also happens that the SWR is the same as the ratio of characteristic impedance to load resistance, thus:

$$\text{SWR} = \frac{I \text{ Max.}}{I \text{ Min.}} = \frac{E \text{ Max.}}{E \text{ Min.}} = \frac{\text{Characteristic Impedance}}{\text{Actual load resistance}}$$

In order to measure the current at any point in the line, it would be necessary to break the line to insert an RF meter, but a satisfactory indication of the current flowing can be obtained by coupling a small loop to the line and using the induced current to operate an indicator such as an RF ammeter, crystal detector or even a small flashlamp bulb. The difficulty in making this procedure give quantitative results lies in maintaining constant coupling between loop and line. Any variations in spacing between loop and line will alter the degree of coupling obtained, and so change the reading on the indicator. The “Kipper” was, therefore, designed to provide a simple means of keeping the coupling constant while at the same time allowing the measurement to be made at any point along the line — which is essential if the readings are to mean anything.

## Constructional Details

Basically, the thing consists of a small loop connected to a sensitive RF milliammeter and arranged so it can be held in close contact with the ribbon feeder. A piece of hard wood about  $\frac{1}{2}$  inch  $\times$  2 inches  $\times$  1 ft. long should be planed smooth, and one face carefully trued up to be straight and flat — see sketch. Along the centre of the true face a shallow rebate should be made the exact width and depth just to take the ribbon feeder with which it is to be used. Next, saw the piece into two lengths, one about half-an-inch longer than the other; place them face to face and check that the rebates exactly coincide. Now, drill two holes to take the pins of the RF ammeter, near the end of the longer piece, and push the meter pins through as shown in the sketch. With a little care a good

tight fit can be obtained, and no other fixing will be necessary. Cut a short length of ribbon feeder, just long enough to fill the rebate on the piece holding the meter. Solder one pair of ends to the meter pins and short the other ends together, solder up, and snip off any spare wire so that the loop so formed will lie neatly in the rebate. Cement the loop firmly into the rebate with Durofix or similar adhesive.

Place the two trued surfaces together and check that the whole will slide easily along the length of a piece of ribbon feeder; the fit should be good but not sloppy. If the rebate has been cut too deep, it can be reduced by planing down the surface, or alternatively, glueing a small strip of felt to the bottom of the rebate. Finally, place the pieces face-to-face in a vice, and fit a pair of small hinges along the edge so as to allow "the kipper to swim either folded or flat."

#### Method of Use

If constructed as described, the device should give a reading of 200 to 300 mA when connected to a "flat" line with inputs of about 100 watts—but with standing waves on the line, it is very easy to burn out the meter. Take *great care* the first time you couple the Kipper to the line and if necessary reduce input in order to get a reasonable reading. With low power (say, 25 watts or less) it may be necessary to use a longer version of the Kipper, to give more coupling. Now slide the thing along the line taking care to keep it shut tight to avoid variations in coupling.

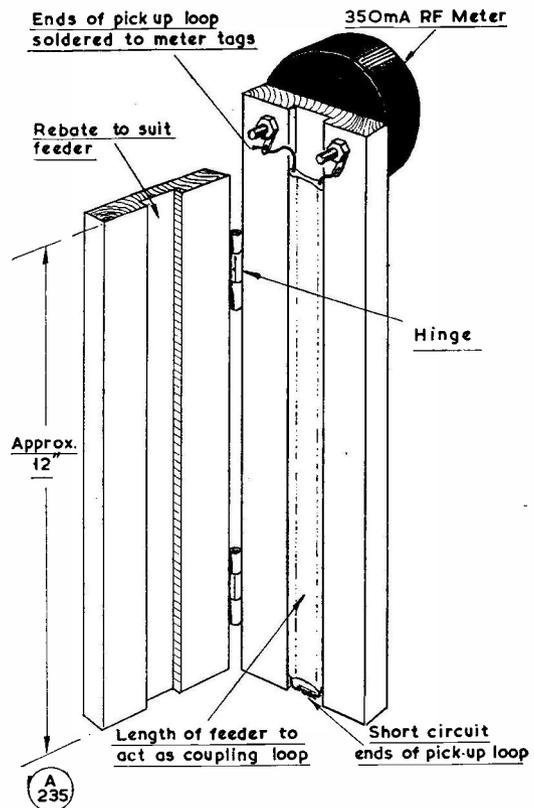
It should be possible to identify points of maximum and minimum current spaced alternate quarter wavelengths along the line; a constant reading indicates a "flat" line with no standing waves. You will be lucky if you achieve this at the first attempt.

Measurement of the distance between adjacent maxima or minima will give the dimensions of a physical half-wavelength of line, and you may be interested to work out the velocity factor of the particular line in use. This is done by dividing the distance in feet between adjacent points of maximum (or minimum) current, by half the wavelength in free space :

$$\text{Half-wave} = \frac{492}{F(\text{mc})} \text{ feet}$$

The fraction represents the "shortening" of the waves due to their having to travel on the transmission line. In the same way, the SWR can be calculated by dividing the maximum meter reading by the minimum reading.

Once any adjustments to eliminate the



Sketch of the Kipper, which is self-explanatory. Indication is on an 0-350 mA RF meter, though the meter range depends to some extent on the power normally used. The pick-up loop is the length of 300-ohm ribbon (right-hand section), where a 300-ohm feeder line is in use. The general idea could be applied to any form of open-wire balanced feeder.

standing waves have been made (or alternatively it has been decided to put up with them, as the desired 1:1 ratio can only be the theoretical possibility) the Kipper can be taped in position at the transmitter end, where it will act as a useful line-current monitor for tuning up the rig or measuring the effect of any changes made. If a reliable RF ammeter is available the device can be calibrated in terms of actual line current by measuring the current in the line and comparing it with the reading on the Kipper at the same point, *i.e.*, the Kipper must be pushed right up to the RF ammeter so that they are both influenced by the same value of current.

#### Disadvantages

It will be apparent that the device as described here suffers from two disadvantages:

- When used on low frequencies, it requires access to a considerable length of feeder (half a wavelength is a long way on 7 mc),
- The range of the instrument is small, *i.e.*, for SWR's greater than 10:1, the minimum

current becomes too small to read accurately.

Little can be done about (a) except to borrow a length of feeder which can be spliced in for making the measurements, and taken out again for normal use, but for (b) the range of the instrument can be extended by a switched shunt increasing the maximum reading by four or five times, so permitting measurements to be made with a higher input.

The cost, including a "surplus" RF meter, should not exceed three or four shillings, and for simplicity and usefulness you will find that hard to beat!

### THE NEW DX ZONE MAP

As announced in the November issue of *SHORT WAVE MAGAZINE*, the revise of our well-known *DX Zone Map* is now ready, and is going out in large numbers; many were also sold at the Amateur Radio Exhibition, where the Map was on display at our stand. The size overall is  $25\frac{1}{2}$  ins. by  $34\frac{1}{2}$  ins. wide, on heavy cartridge paper. The new *DX Zone Map* is a 5-colour design and is drawn to a great circle projection centred on London. This means that the world is "opened out flat" as seen from the United Kingdom, and, on the scale used and at normal beam widths, can be taken as being accurate from any part of the U.K. An outer degree scale gives compass bearings for correct beam alignment, and there is a distance-scale in miles and kilometres.

Thus, one finds from the Map that on a beam heading of, say,  $60^\circ$  (060), one is right for Helsinki, Ulan-Bator (JT1), Brisbane in Australia and Dunedin in New Zealand, and that the distance from the U.K. to Ulan-Bator is just under 4,500 miles, or about 7,200 kms. As another example: To work VK0's on Macquarie Is., in the far South Pacific at a distance of 11,600 miles from London, the beam heading should be  $120^\circ$  magnetic—and that the Fiji Is. (VR2, in Zone 32), at a distance of 10,200 miles, are reached over the North Pole. If you plan a rhombic for the W6/W7 area, the Map tells you that you should aim it at San Francisco, bearing  $320^\circ$  magnetic from the U.K.; this will splay your signals over the whole of Zone 3.

For DX and other Amateur Radio evaluation purposes, the world has for many years been arbitrarily divided into 40 geographical zones. These are shown on our new Map, with the principal prefixes for each Zone given in the margins. Thus, we find that Zone 9—listed as the "northern Zone of South America"—incorporates the prefix areas HK, YV, PZ, FY, VP3, VP4 and PJ; and that Zone 34 is the northern Zone of Africa, embracing Libya (5A), Sudan (ST) and Egypt (SU).

In addition to all this, a very large number of the less usual place-names are accurately plotted—

like Arequipa and Barreras in South America, Ghat in the Sahara Desert, El Fasher in the Sudan, Darjeeling in West Bengal, Wagga-Wagga in Australia, and Yakutsk and Tiksi in Siberia (Zone 19). On the other hand, we assume you know what South Africa looks like on any map, and where Japan should be, so their names, and such-like obvious places, are *not* given. This prevents over-crowding the Map with unnecessary names. But if you should work someone who gives you a QTH not marked, and you then look it up in a gazetteer, the latitude/longitude divisions on the *DX Zone Map* are such that his location can easily be plotted within the scale accuracy of the Map itself, e.g. we do not mark Dar-es-Salaam (VQ3), but it can be plotted on the Map at lat.  $6^\circ 40' S.$ , long.  $39^\circ 5' E.$ , with sufficient accuracy to bring it on to the eastern coast-line of Tanganyika, opposite Zanzibar—which is where it is.

For those interested in the VP8's and the roots of Zones 12, 13, 29, 30, 32 and 39, the whole of Antarctica (the largest continental area in the world) is now included, marked with many of the place-names made familiar by Sir Vivian Fuchs and the recent Antarctic journeys.

Finally, there is an hourly time-scale from which you can deduce that when it is tea-time in London they are thinking about breakfast in California, and it is tomorrow in New Zealand.

The new **DX Zone Map**, which is a very fine piece of printing, costs only 9s. 3d. post free. For those who like everything *de luxe*, we have done a small quantity on durable linen paper at 11s. 9d. Orders, with remittance, to: Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1. While this printing lasts, delivery is from stock, in a special cardboard postal tube to prevent damage in transit.

### USEFUL NEW CATALOGUE

We are glad to be able to draw the attention of readers to the new AVO catalogue. This is a very well-produced 40-page publication giving full technical data on the whole of the extensive AVO range of measuring instruments and test gear, including their new AM Signal Generator Type 378, which covers 2-225 mc in seven bands, and up to 450 mc from harmonics of the G-range, 80-225 mc. The catalogue is obtainable free on request to: AVO, Ltd., Avocet House, 92-96 Vauxhall Bridge Road, London, S.W.1.

### TRAINING FOR SCIENCE

It is announced that the BBC, which is already producing regular educational programmes for some 30,000 schools in the U.K., is to embark on a further expansion, in the field of technical and scientific education. The BBC regards itself as having a duty in this respect, as it is a national institution supported by public money. While the basic need is to assist science teachers through TV, the BBC says that television costs six times as much as sound, and more channel space is needed to do the job properly.

# NBFM Applied to the Geloso VFO

PHONE WORKING DURING TV HOURS

J. R. HUNT (G3KQH)

WHILST listening around the bands both during and outside TV hours, it is noticeable that (in the populous areas, at least) G's are conspicuous by their absence while TV is on. This is especially so on 80, where the band seems to have been taken over by DL's and DJ's and numerous unidentified stations with indescribable signals, especially during the evenings. A few U.K. SSB stations are, however, on every evening.

When TV ends at 11 p.m. or thereabouts, up come the TV viewers (?), and fortunately for these late-comers there are plenty of stations who appear to suffer from the same complaint. Modulation bars on Vision, and voice break-through on Sound seem to be among the reasons for being non-operational during TV hours. If that is the only reason why these stations cannot operate in the evenings, then perhaps the following notes may be of some help.

Before describing the unit in use at G3KQH it must be stressed that it cannot be expected to cure TVI where harmonics falling in the TV channels are already present. A clean carrier is essential, and with all the usual precautions taken at the transmitter, and the output fed into a well matched radiating system, this is not too difficult to obtain. The small unit described here can be applied equally well to any VFO, of course; the only reason the Geloso is shown is because it happens to be the one in use at G3KQH. It also has the advantage of being bandswitched and while kept set up only for the band most worked (20 metres) it can and does give fair results on the other bands.

The Geloso Signal Shifter itself was described in detail in the March 1957 issue of *Short Wave Magazine*, and it is not necessary to reproduce the complete circuit. Fig. 1 shows the point of connection to the Geloso and enables NBFM to be applied on all bands without having three audio input points. The actual connection from "C" to the feed point must be kept as short as possible. Coax cannot be used due to the high capacity effect on the VFO tuning. As it is, a mere inch of 7/0076 PVC wire can lower the frequency by 25 to 30 kc. So after this connection has been made it will be necessary to

re-align the oscillator section in the normal manner. If it is found impossible to raise the frequencies sufficiently, the length of the NBFM connection should be re-checked, and shortened if possible.

## Modulator Unit

The NBFM section itself presents no difficulty, apart from ensuring that the crystal diode is a good one. (If results are not satisfactory this should be replaced with another type, as some xtal diodes are not suitable for this application.) As will be seen from Fig. 1, audio is fed into a conventional filter/rectifier network, and unlike the unit described by G5GQ some time ago using miniature valve diodes, does not require any heater supply. Audio is tapped off the speech amplifier or, better still, if the driver in the modulator is single ended, this stage could be used. The speech side at G3KQH consists of a 12AX7 amplifier, a 6C4 driver, and two 807's in Class-AB2, and was easily modified by the addition of a two-way switch and a coax outlet socket (see Fig. 2).

The primary winding of the driver transformer (DT) is connected to point "B" on the two-position switch, and the load resistor R taken to point "A," "C" being the moving wiper section of the switch. The condenser C1 was also connected to point "A" and the coax socket on the

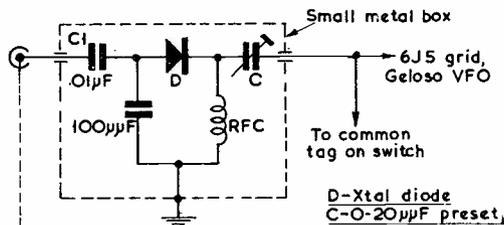


FIG. 1

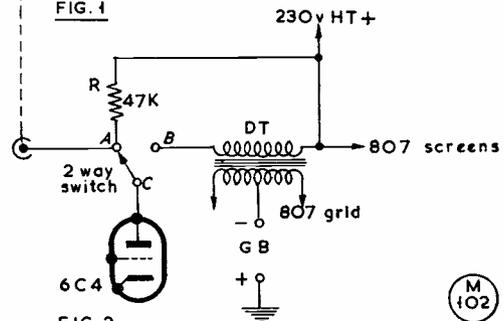


FIG. 2

The circuit arrangement discussed in the article by G3KQH. Change over from AM to NBFM is by the switch. The lead from the pre-set 20 μF capacitor C should be made as short as possible, as it is "hot" to RF. As explained in the text, the deviation must be kept low, not only to minimise adjacent-channel QRM but also to make the signal resolvable on an AM receiver.

panel. This was found to have a slight effect on the oscillator frequency when the coax connection was removed, so C1 was taken into the NBFM unit, although this means that there is DC on the socket outlet.

The screens of the 807's in the G3KQH modulator are low-impedance fed from the 230v. speech amp./driver supply, with fixed battery bias on the grids, and with the driver transformer primary out of circuit, there is a slight rise of standing current on the 807's. As this is only a few more mA it is of no importance, and any disadvantage is outweighed by the advantage of being able to change from AM to NBFM at the turn of a switch.

Depending on the individual modulator, speech gain must be adjusted to a low level (the exact setting being found by experiment) before switching over from AM to NBFM.

### Receiving NBFM

Just a word on reception of NBFM. The tuning will have to be adjusted to either the upper or lower sideband, there being no audio at zero beat. It may be found that there is more audio in one sideband than the other, this being due to non-linearity in one or more stages. Providing the deviation from the centre of the carrier is not excessive one side or the other, the receiving station will usually tune to the side more easily read so again, whilst this non-linearity could be remedied, it will not cause any trouble if a little care is taken when setting up. An oscilloscope is not essential, but would be of great assistance when making initial adjustments.

One word of warning! A *very small* amount of audio voltage is all that is required to swing the VFO a couple of kilocycles and increasing the power input to the PA stage from 50 watts to 100 watts does *not* mean that 100% more audio is required at the VFO. This remains the same, and any increase in audio would only increase the frequency deviation and make reception almost impossible, as well as causing trouble to other stations on nearby frequencies.

### Results

The NBFM Unit as described was suggested to the writer by G3KPC (who uses NBFM with a TA12C transmitter) although its origin is not known. However, this method may not have occurred to many of the more recently licensed operators and perhaps by its adoption a few more of them will be available on 80-metre phone in the early evenings.

The unit described has been in use off and on for 12 months now, and tests have been carried

out using AM against NBFM with VK, ZL, W and Continental stations. Whilst AM was more readable in QRM, the NBFM was copyable and under favourable conditions reports are always "Readability 5, no trouble at all." A five-band NBFM test was also run through with a local station (G3MJW) one Saturday afternoon during TV sports programmes, 80m. to 10m. (*note*: 15m. also) and no complaints were received from viewers.

## TRIP TO ZANZIBAR

VQ1PBD, OCTOBER, 1958

*From Notes by VQ3PBD*

**I**N August, 1956, ZE3JO (ex-G2SO) visited the Protectorate of Zanzibar and was on the air for nearly a fortnight under call sign VQ1JO—this expedition was fully reported in the November, 1956, issue of SHORT WAVE MAGAZINE.

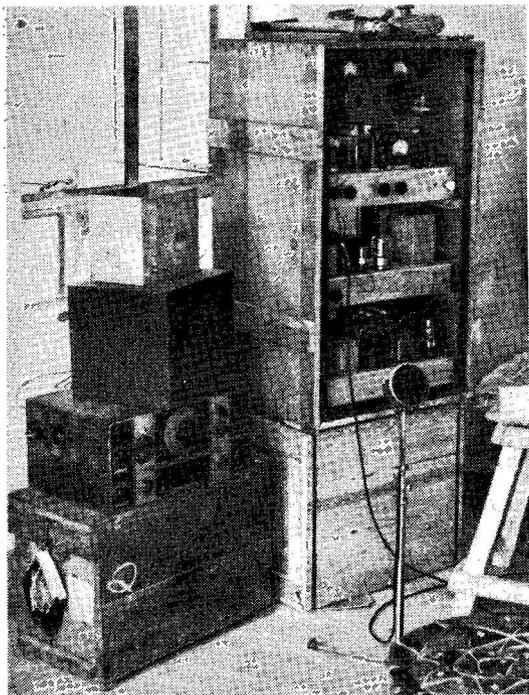
During October 12-16 this year, Zanzibar was again on the air; this time the visitor was VQ3PBD of Dar-es-Salaam, signing VQ1PBD and operating almost exclusively on 10-metre phone.

From his point of view—and, no doubt, that of the 447 stations in 55 countries worked in about 39 hours' air-time—the trip was an unqualified success and most enjoyable. As he was single-handed on the operating side, these totals represent pretty intensive activity, working out at an average of nearly ten hours a day actually on the air. This meant that VQ1PBD's kind hosts, and his patient but most co-operative XY's, were left very much alone during the visit and had to console themselves in the evenings with, of all things, three-handed bridge!

### Gear Used

The 20-mile crossing to Zanzibar was made by sea, in the yacht *H.H.S. Seyyid Khalifa*—owned by the Sultan of Zanzibar and used as a passenger ferry—because it was considered that the gear would be safer going that way than by air. The transmitter taken was the standard VQ3PBD rig, consisting of an EF50 CO through wide-band coupled 6L6/6V6 stages into the 815 PA on ten metres; this is run at 400v. 120 mA, and is modulated by another 815. The speech amplifier is a conventional 6J7-6J5-6SN7 arrangement, with a m/c microphone. Several crystals were available to give some choice of frequency. The necessary power packs for the gear had also to be taken, and as receiver, VQ1PBD used his NC100X—*see* photograph opposite.

For the trip, the only item which had actually to be constructed was the knock-down 3-element 10-metre beam, made up of lengths of ordinary H-section curtain-rail, the feed being by a 75-ohm matching section into a length of 600-ohm open-wire line made up with bamboo spreaders. The wooden framework for the beam had a 2-in. diameter pipe-flange fixed at the point of balance; the beam could be



For the four days October 12-16, VQ3PBD worked as VQ1PBD from Zanzibar, using 10-metre phone almost exclusively. In this period, 447 stations were raised in 55 countries; "CQ DX" was called 132 times, the number of U.K. stations brought back being 50, and the total of W's worked, in all districts, was 162. Only 14 stations called by VQ1PBD did not respond.

mounted by screwing a short section of pipe into the flange and slipping it over the top of any suitable pole; in this case a 21ft. length of mangrove wood was used. The foot of the pole rested in a hole in the ground, and turning of the beam was by hand.

### Results and Experiences

The gear worked right away, and the first contact under the VQ1PBD call was made with ZS4IF at 1520 GMT on October 12; the last was with ZS5OV at 1450 on the 16th. From the "rate of striking" achieved during this four-day period, it will be evident that no particular direction or area was favoured—contacts were taken as they came, and made as rapidly as possible, so as to give a chance to all who might have wanted VQ1 for a new country. Apart from this, it was in any case essential to keep QSO's short, as the 10-metre band was very much "in and out" during the period, and a station given S9 one minute might be down to S2 on the next over.

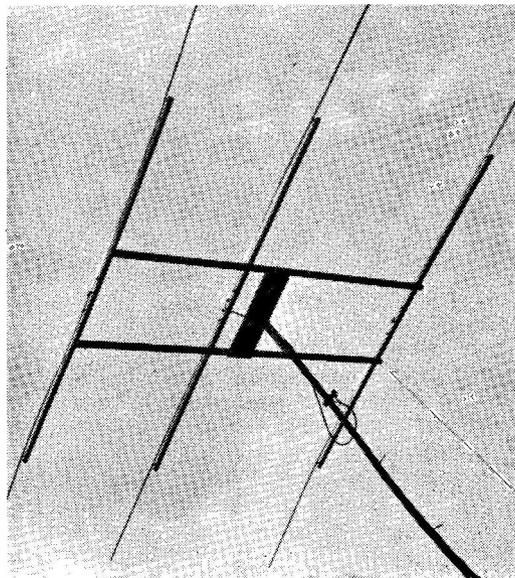
Apart from the QRM on the VQ1PBD frequency, which was severe for most of the time, QSB was troublesome, and ordinary static noise (not local or man-made) was extremely bad to the west in the early evening and to the south in the morning. The rate of QSO'ing varied from 4-5 stations an hour in the quiet periods to as many as 35 an hour during

the busy evening sessions.

Looked at from the Zanzibar end, the great majority of operators clearly realised that VQ1PBD was only there for a short time, trying to give as many stations as possible a QSO, and "played ball" accordingly. Some, however, were not so co-operative. One was downright abusive, another wanted a long-winded beam test, and a third insisted on trying to find out why VQ1PBD was not in his *Call Book!* a well-known DX operator was very angry because VQ1PBD happened to pitch on "his" frequency, and another DX man said he "wasn't interested in VQ1." There was a good deal of blind calling by hopefuls who evidently knew VQ1PBD was there but didn't know the frequency. On two mornings, a heavy, unmodulated carrier kept bouncing on and off whatever channel VQ1PBD was using, apparently to cause intentional QRM.

On the other hand, on the return to Dar-es-Salaam on October 17, there was the first batch of airmail QSL's, from as far afield even as W6, all with profuse thanks for the VQ1 contact, and some with congratulations and other kind remarks on the effort.

It was great fun and, for VQ1PBD, a great success—but it was very tiring! And it will take 2 month to catch up on those QSL's, which are coming in thick and fast. For those who may have tried to work VQ1PBD but were unable to get through the QRM, it may be of interest to let it be known that two further VQ1 expeditions are now being planned—one by a VQ3 party who will work 10-15-20 metres, AM and SSB, and another by VQ4ERR, who will run 15-metre SSB. One of these may even be on by the time this appears in print.



The three-element, 10-metre beam used by VQ1PBD on his Zanzibar expedition was constructed of ordinary H-section curtain rail, on a wooden mounting using curtain-rail supports. The whole thing can be broken down into a number of sections not more than 9 feet long, for easy transport.

# Getting the Best Out of an El-Bug

IDEAS IN THE PURSUIT OF PERFECTION

K. E. FELTON, B.E.M. (G3IEF)

THERE can be no doubt that one of the best aids to CW operating is a *properly* constructed, adjusted and operated electronic keyer. Better quality Morse at twice the speed with a fraction of the fatigue is possible—admittedly at the price of “losing individuality,” but Morse is Morse and ideally should sound the same whoever sends it. Try and decipher some of the Continental individuality to be heard on the bands and decide if you prefer that sort of thing to a good el-bug.

Now, there are el-bugs and el-bugs—they're rather like transmitters. Any chum can generate RF but what counts is getting it into an aerial system that radiates. It is rather the same with el-bugs—it's what they sound like after they have been built and put on the air that matters.

So far as general construction and adjustment go it is, of course, almost impossible to give much advice, since so much depends on relay resistance and sensitivity; contact and armature travel and contact tension; circuit constants; type of valves used and the available HT voltage. One just has to sort out all these variable and interdependent factors for oneself to get the key working as well as possible—but, having got this far, there are a few more things that can be done to help it along the road to becoming a good el-bug.

The writer has constructed a number of keyers, the latest having been built into a small ventilated cabinet, complete with its own internal power supply.

It suffers, however, like all its predecessors, from the same maddening fault—the fact that it is very sensitive to mains fluctuations, which cause changes on the HT line and “send it all over the place.”

These days, the mains do not fluctuate to so great an extent as they did just after the war, but on Sunday mornings when many cookers and such are switched on, down go the mains and up goes the blood pressure.

The answer of course is to stabilise the HT line and this may be done in a number of ways. If you have a variac or some other type of voltage regulator for the station your troubles

are over and you need not worry any more on this point; however, such things are expensive and not many stations have them, so the answer must be sought elsewhere. Stabiliser valves are a good answer but with a HT line around the 250/300 volt mark two such of the VR-150/30 type will be needed, as well as a series resistance dissipating heat and taking up room.

The problem has been overcome by the writer by switching the mains to a lower tapping on the primary of the mains transformer whenever his electronic keyer begins to have a fit of the jitters, *see* Fig. 1. This immediately steadies it up and if the mains come back up, or the switch is left in the wrong position for the next operating period, the HT is just high enough to give the keyer the jitters in the opposite sense, so to speak, and the switch is simply put over the other way. Provided a good quality mains transformer is used with a fairly high primary inductance no harm will come to it if, for instance, the mains are 240 volts and the tapping is set at 220 volts for a short while. One has to use a little common sense about this, of course, and use say the 220-volt position for the second switch position when the local mains are a nominal 240 volts.

In practice the scheme works well. Normally, the mains are connected to the 240-volt position and all goes happily until a low mains period when the switch is just flicked down and operating continued uninterrupted, the next time the keyer misbehaves the switch is thrown back the other way.

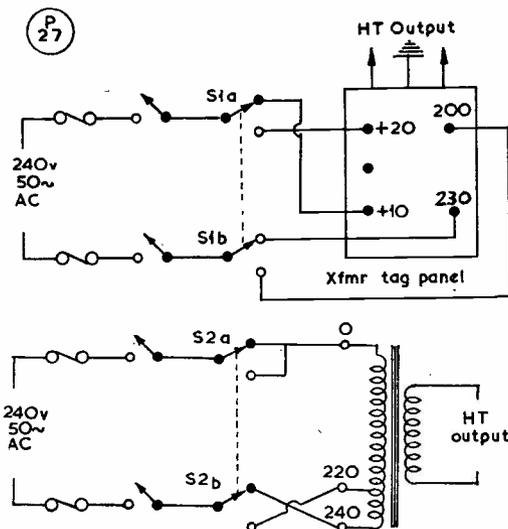
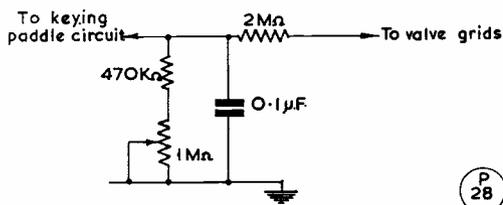


Fig. 1. Two different types of transformer primary connection are shown. The DPCO switch must be of the kind suitable for switching at mains voltage, and it is most important that the contacts “break before make,” i.e., that they do not bridge.



P 28

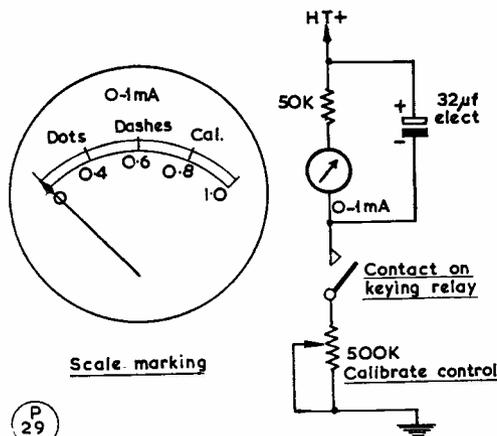
Fig. 2. The values for a typical timing circuit to give a narrower speed range on the electronic key.

**Selection of Relays**

Quite a lot has been said about having sensitive relays in an el-bug, but you can have them too sensitive. From long (and bitter) experience the writer advocates the Post Office Type 3000 relay around the 2000-ohm mark. If they are more sensitive than this there is trouble with the first relay operating too quickly and the timing circuit is locked out before it can charge properly. While on the subject of relays, the lightest smear of EP oil on the knife edge and under the residual stud or screw will help to prevent wear; relays operated as many times as they are in an el-bug soon go out of adjustment due to wear, as they complete in a few months the usage that would normally take years even in an automatic exchange. (EP oil is the sort that is used for the back-axle and gear boxes of some cars and the residual point on the relay is the stud or screw that stops the armature from coming in contact with the core of the relay.)

The next point is the value of the circuit constants in the timing circuit. Look at Fig. 2: What's the good of having two words a minute at one end and a mad blur at the other? Or when you want to push it up a couple of words a minute only having about a thousandth of an inch movement on the control knob?

Here again one cannot quote constants to use, but a little time getting them right is well spent and in the writer's keyer, using 6SN7 valves and the values shown in the diagram plus a 300-volt HT line, the speed range is about 10 to 35 words a minute with plenty of movement on the knob when one wants to go from, say, 18 to 20 w.p.m. Finally, built into the keyer is its own calibrating meter. This meter is an 0-1 mA movement with a calibration mark on the 0.8 mA position, dashes marked at 0.6 mA and dots at 0.4 mA. See Fig. 3. The meter is damped by a 32 μF condenser and 50,000 ohm resistor and is operated by a pair of contacts on the B relay (the one which carries the transmitter keying contact). The meter is set to the calibration mark by the ½-megohm variable in its circuit, with the con-



P 29

Fig. 3. Circuit arrangement for calibrating a meter to give proper visual control of dot-dash ratios when running an El-Bug, or electronic key.

tact in the circuit closed. This contact must be so adjusted that it makes and breaks at exactly the same instant as the keying contact.

Not only can you always check your dot/dash ratio by "running out" dots or dashes at any time, but it is most valuable for the initial setting up of the key, since if your dots and dashes coincide with the marks after having calibrated the meter first, then you have theoretically perfect Morse.

**SHIP-SHORE TELEPHONY**

A new service recently inaugurated by the Post Office permits communication between suitably fitted ships within about 40 miles of GNF, North Foreland, and any telephone subscriber in the United Kingdom. The shore equipment at GNF is the Marconi two-channel VHF/FM installation. It is intended to extend the service to GNI, Niton, and GLD, Land's End, during the coming year.



"... This is a Government establishment ..."

### SIGNALS COMMAND, ROYAL AIR FORCE

All those who have at any time served in No. 26 (Signals) Group, No. 60 (Signals) Group or No. 90 (Signals) Group will be very interested to know that the post-war 90 Group organisation has now been re-constituted as Signals Command, Royal Air Force. The change became effective on November 3.

This is a significant decision for the reason that it emphasises the importance of the Signals Branch in the post-war Royal Air Force. To all who had any operational experience or administrative responsibility in the higher echelons of the R.A.F. command structure during the war, it was self-evident that the Signals Branch had to play an essential, not to say a controlling, part in the conduct of all war-like operations. And it will hardly need saying that since the war this dependence on all that is meant by "Signals" has been enormously increased, due to the great technical advances that have been made in weapons and their application.

These facts are recognised by the establishment of the new Command, which covers a large area of responsibility in the nation's defence strategy.

The Air Officer Commanding-in-Chief, Signals Command, is Air Vice-Marshal L. Dalton-Morris,

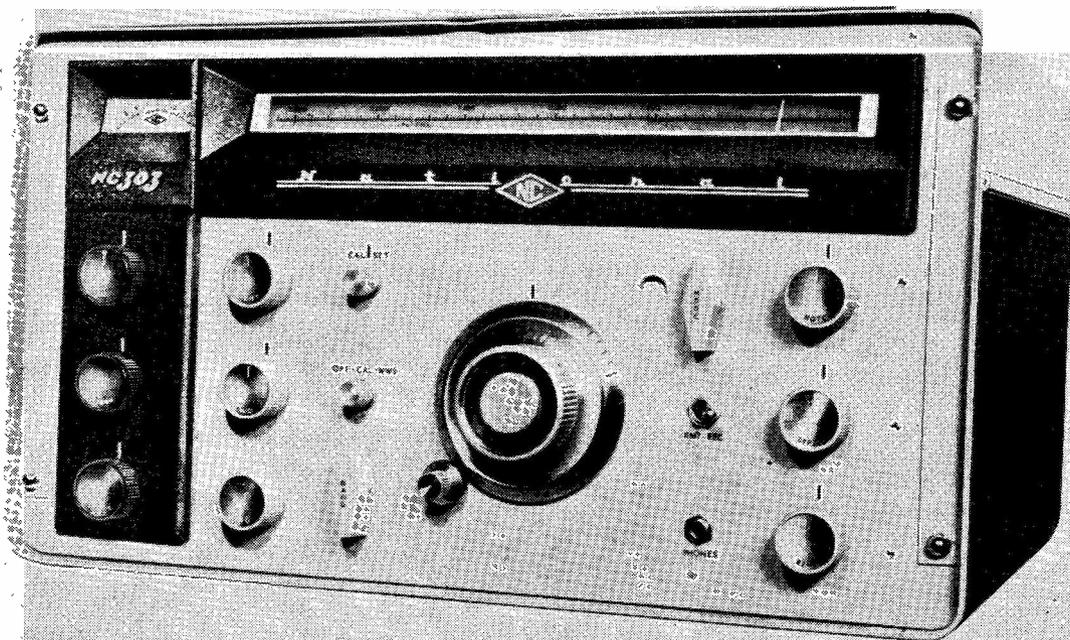
C.B., C.B.E., a distinguished Signals officer with great experience of the administrative, technical and operational aspects of radar, radio and telecommunications, on the ground and in the air, going right back to Bawdsey days, when radar was first conceived. He was Chief Signals Officer, Bomber Command, R.A.F., during a most critical period of the war, and later he became head of the Signals Branch of the R.A.F. on appointment as an Assistant Chief of the Air Staff (Signals).

### GIFT SUBSCRIPTIONS

There is still time for you to take out a gift subscription to *SHORT WAVE MAGAZINE* for your overseas friend or favourite contact. Send us his name, call-sign and address, with your remittance for 33s., and he will be assured of receiving the *Magazine* for twelve months, starting with the next (January) issue.

### HORROR WITH A T.1154

A new play called "Blood of Frankenstein" drags in the electronic theme, and the "machine" used on the stage to generate the urge is, believe it or not, a T.1154. Of course, there are some who would say that in such a context the choice could not have been bettered! G3FOE sent us the press cutting.



The new National NC-303 amateur band receiver is an interesting example of advanced American design. Features include an IF shift control for selecting either side of an SSB transmission; a Q-multiplier having a rejection slot 60 dB deep; five positions of IF selectivity, providing optimum adjustment for SSB, CW and AM phone; dual noise-limiters, with a separate manual limiter for CW and SSB; calibrator circuit for the 10 mc WWV transmission; a 40:1 ratio main tuning dial with a vernier control for precision tuning; and a "fast attack, slow release" AVC circuit. The NC-303 is a dual conversion superhet with a crystal controlled second oscillator. The current U.S.A. price is \$450.00, or about £160 sterling.

# Key-Controlled Break-in

## CIRCUITRY AND KEY MODIFICATIONS FOR CHANGE-OVER AND MUTING

N. P. SPOONER (G2NS)

*Our contributor discusses a completely silent, full break-in (BK) arrangement requiring only a modified Morse key, a fixed condenser and a couple of resistors. Most types of key can be adapted to provide auxiliary contacts for receiver control and muting.—Editor.*

THERE were times during the war when stations avoided disclosure of their whereabouts by remaining silent, and messages then had to be hopefully directed towards them on schedule without knowledge of their copying conditions or the possibility of getting any acknowledgement. Today, by our QSO procedure and by calling stations long after they have established contact elsewhere, we are still perpetuating this business of "sending blind." How often are we not told: "Sorry, old man, I lost all that in QRM." With break-in working, we ourselves would already have heard the interference because the sending frequency is opened to our ears every time the key is up. The only exception is when the interference is purely local at the receiving end, in which case the station copying can at once stop the sender. Likewise, with break-in operation, we would have fallen patiently silent the moment the called station touched his key in reply to another.

By sending blind and then having to repeat what has been lost in the QRM, we not only add to the general turmoil but we also waste our own operating time, and transmitter power.

An extremely simple remedy will transform these one-sided broadcasts into flowing conversations, but when G3BQR pointed all this out, while discussing the modernisation of an old system, the writer's first reaction was forcibly to express his horror of painful headphone noises and the vagaries of unsuitable relays. Objections were quickly over-ruled, however, by an assurance that no relays (except for direct keying if a bug-key was used) would be involved, and that the proposed modification would ensure complete silence in action. The existing LF transmitting long-wire was accordingly earmarked as the required new separate outdoor receiving aerial and its general signal pick-up was found to compare quite favourably

with that of the narrow combined transmit-receive beam alongside, so little would be lost on that score. The existing T9 VFO was already keyed in its cathode as an alternative to buffer cathode keying, and the PA clamped to obviate a separate bias pack and allow the use of an ordinary grid-leak. This then only left receiver protection and muting for consideration.

### Receiver Protection

The additional strip of springy metal suggested as an auxiliary contact in Fig. 1 puts the separate receiving aerial down to earth shortly before the front contacts meet in keying the VFO. Readers who prefer "ready-made" break-in keys, have two choices. The first is to advertise (in *Short Wave Magazine*) for the now rare but ideal Post Office double current key, with send-receive switch and glass cover, beneath which depression of a divided lever operates two sets of change-over spring contacts. Shortening the gap between one (receiver protection) pair, to allow it to close just before the other (VFO keying) pair is all that is required.

The second choice, and the one made in the present case, is to cannibalise a "surplus" Telephone Set D Mark V for its divided-lever calling key, which closes a pair of (receiver protection) auxiliary contacts shortly before the (VFO keying) front contacts meet. As shown by Fig. 2, the only alteration required is the extension of the divided lever and knob, for better Morse manipulation. The hand-set should be unplugged, the necessary screws removed and the paxolin deck with magneto bell, key and buzzer lifted out of its casing. Single and bunched key leads should be carefully labelled with their associated contacts, *i.e.*, fixed or moving back, auxiliary and front, before being snipped through close up to the key tags. The deck may then be sawn through from front to rear, allowing sufficient surround of paxolin (and including the four original bolt holes) for re-mounting on a new wood base. A substitute key will be required if the set (which, incidentally, makes an excellent XYL-to-OM intercom.) is not to be laid aside. The size of this substitute key and its consequent new positioning will probably necessitate the lengthening of the labelled leads. To save dismantling the calling key, the pinned and screw-held knob can be removed by drilling a small hole up through the base from immediately below and inserting a driver to turn the screw. The freed knob lifts off and may then be mounted at the near end of a strip of insulation—in the present case perspex, about four inches long,  $\frac{3}{8}$ -inch thick

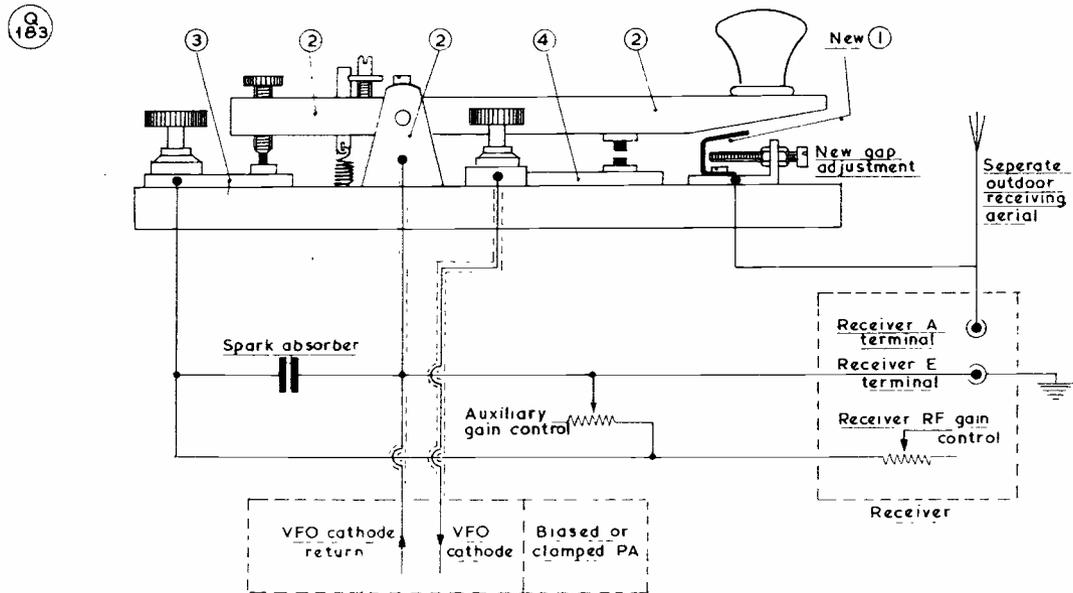


Fig. 1. Circuit arrangement for CW break-in working, as suggested by G2NS. (1) New auxiliary contact; (2) Common earth and all moving contacts; (3) Back contact; (4) Front contact. The key should be modified accordingly.

and the width of the lever — to which it is re-bolted by using the original knob hole. Before screwing down the key on four stand-off collars, to its new base, fresh insulated leads are taken from the key tags below to four terminals (or a connector block) mounted together with the auxiliary gain control on the same new base.

An Aerial terminal, number 1, is joined to the auxiliary fixed contact; a common Earth terminal, 2, to all moving contacts, *i.e.*, back, auxiliary and front; a Receiver cathode terminal, 3, to the back fixed contact; and a VFO cathode terminal, 4, to the front fixed contact. The external connections are as in Fig. 1.

Turning now to the substitute key, the telephone circuit requires insulation between the front and back contacts. It is therefore easier with a straight key to ignore the original back contacts and make up instead a fresh pair from old keys, relays, bells or other electrical equipment. A second pair for auxiliary action, closing shortly before the front contacts, should also be made up for bolting, with the back pair, to a cross strip of insulation. This in turn is fixed to the moving bar of the key.

Much of this work can be avoided if the old R.A.F. key Type 1969, of Fig. 3, can be found, with its small circular inspection window in the cover and two pairs of insulated back contacts as distinguishing features. By reversing one back contact to "make" instead of "break," we have an auxiliary moving contact that will

meet a new fixed contact immediately overhead, when added for this purpose. Modified in this manner, the R.A.F. key will serve either for break-in or as a telephone calling switch.

### Receiver Muting

The receiver is taken from its cabinet and the lead from the slider of the RF gain control is traced from the potentiometer to the point where it goes to chassis. It is removed from this earthed point and by an additional length of insulated wire is taken through any convenient exit and out to join the auxiliary gain control on the new key base. This control determines the strength of the transmitted signal heard in the headphones for monitoring purposes during key-down intervals, all other incoming signals being controlled as usual by the receiver gain itself. The auxiliary value will depend on the receiver, in the present case an RF gain control of 10,000 ohms and an auxiliary of 50,000 ohms together provide complete muting and transmitter monitoring at comfortable headphone strengths. Whether a muted RF stage will alone be sufficient, depends upon the receiver shielding and the pick-up from the transmitter, and is a matter of trial. One or more IF stages may have to be included in the muting circuit but, in the interests of stability, the cathodes of frequency changer and oscillator stages should *not* be broken.

To sum up the full break-in actions so far outlined: Upon initial depression of the key,

the back contacts in Fig. 1 open, the auxiliary gain control resistance is added to that of the receiver gain and the set is muted. With further depression of the key, the moving bar meets the auxiliary fixed contact, an earthed path through the bar is presented to the receiving aerial, pick-up of radiated RF is greatly reduced and the receiver input is protected. At the downward limit of the key's travel, the front contacts meet, an earth return through the bar is presented to the VFO cathode, the transmitter is put on the air and its outgoing signal is heard in the headphones, for monitoring purposes, at a strength set by the auxiliary gain control.

Upon release of the key, the front contacts open, the VFO cathode return is broken and RF radiation ceases; the auxiliary contacts open, the aerial short is removed and incoming signals are accepted; the back contacts meet, the moving bar presents an earthed path to the receiver gain control, the auxiliary gain resistance is subtracted, muting ceases and normal control of incoming signal strength is once more restored to the receiver gain.

Although long-winded in print, in reality each complete cycle of muting, protecting and radiating takes place at keying speed and QRM is lessened by thus abolishing excessive calling, fruitless sending, long repeats, rig switching and changing-over.

### Setting Up

Where visual adjustment of the key contacts is uncertain, an audio oscillator (or buzzer and battery) can be connected between the auxiliary fixed contact and earth terminals 1 and 2, and a continuity meter (or flashlamp bulb and battery) between the front fixed contact

and earth terminals 4 and 2. With the key only partially depressed, the audio oscillator (or buzzer) alone should operate. With full depression, the meter (or flashlamp) should additionally confirm that the (VFO keying) front contacts are definitely meeting *later* than the (receiver protection) auxiliary contacts. To check the muting, switch on the receiver and find a strong signal with all gains at their customary settings. Upon depressing the key, this should disappear and the receiver sound completely dead. Where this is not the case, try a coax or shielded connection between the receiver aerial terminal and the key, test all gain control spindles for insulation and if needed, mute additional stages.

### Procedure

To introduce a good style of break-in operating to newcomers, let us take an imaginary session between stations A and B: A comes on the air with a non-pausing, repetitive call of CQ de G . . . BK, which he continues. B hears A and, with all other stages dead, puts his *VFO alone* on A's frequency before attempting to attract A's attention with a series of measured dots. Hearing them, A stops and tentatively replies with *IMI*, whereupon B identifies himself with G . . . de G . . . and contact becomes established. RST, QTH and other exchanges follow, with both A and B indentifying themselves frequently with their respective call signs. Let it now be supposed that QRM commences while A is sending and B is copying. This is immediately heard by A (unless purely local to B, in which case he can stop A with a series of measured dots) who accordingly anticipates interruptions from B. Hearing nothing he may

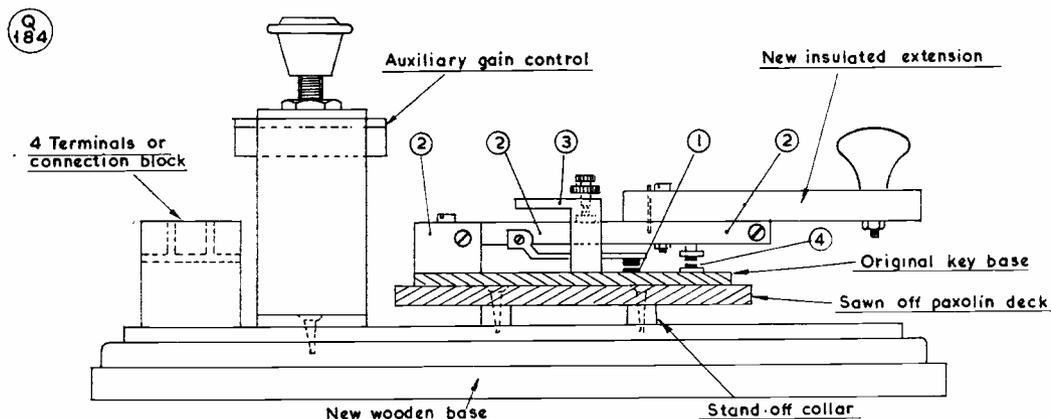


Fig. 2. Modification of the "Telephone Set D Mk. V" calling key from which a break-in key can be fabricated for Morse working. Lettering corresponds to Fig. 1.

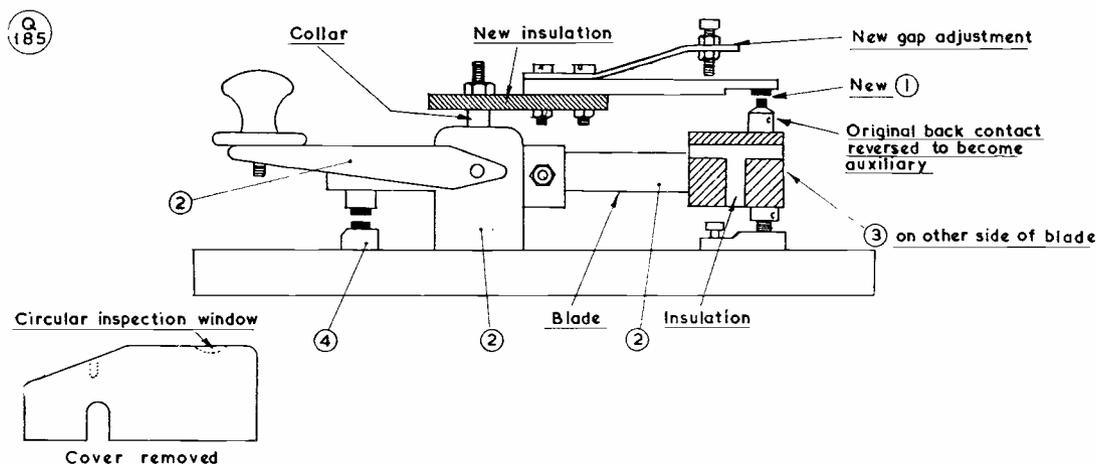


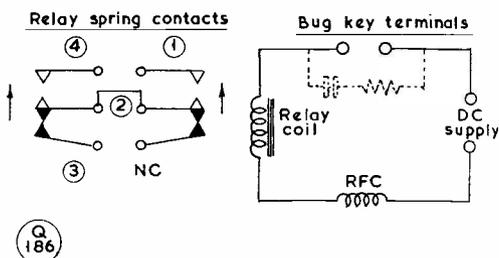
Fig. 3. The R.A.F. key Type 1969 — the pattern with a cover and an inspection window — can be modified with this sketch to give receiver muting and aerial shorting to earth. The principle is the same as in Figs. 1 and 2.

enquire QRK IMI, to which B would simply reply GA (Go ahead) if still copying reasonably well. Alternatively, the QRM might have worried B when it commenced and he would have already stopped A with a series of measured dots. A then remained silent until told to GA. The QRM continued for a considerable time and as B was the station in copying difficulties, the decision rested with him as to whether and where a QSY was to be made. B informed A of his intention, A confirmed and B, leaving his VFO at its original setting, searched on his receiver for a clearer spot nearby. Having found one, B, still on his original frequency, indicated to A the position of the proposed move with "Ten Up" or "Five Down," or whatever. A confirmed that he understood, B re-tuned his transmitter to the new frequency and proceeded therefrom to call A. A found him, put his VFO alone on to B and conversation was resumed. Very frequent QSY is not usually necessary but it can, of course, be carried out *ad lib.* up and down an entire CW portion of

any band, providing both operators check each new frequency with their meters and log it together with the time of each move. It is not good manners to burst into a break-in net already in progress but a quick "BK de G . . ." slipped in at an opportune moment is in order, when announcing one's presence. Likewise, if one of the participants has to drop out hurriedly, a quick BK de G . . . SRI CHAPS MST QRT 73 ALL  $\bar{V}A$  will (or should be) be understood by everyone.

### Bug Key Control

Although responsive to slower manual dashes, the average Type 3000 GPO relay will not follow fast automatic dots without some juggling with lever and buffer springs and armature travel. In direct contrast, the movement of a Type 600 with two sets of change-over spring contacts is far more agile and Fig. 4 shows how one may be wired up without alteration to perform the functions of the back, auxiliary and front contacts of a straight key. To stop the distraction of key contact sparking being heard in the receiver, an RF choke is inserted in the DC supply to one coil tag and a condenser and resistor (value by experiment; at present  $1\mu F$  and 100 ohms) is placed across the key terminals. Voltage through the coil is increased until a sharp decisive response to automatic dots is obtained, as indicated by the crisp, clean keying of an audio oscillator temporarily clipped across contacts 4 and 2 (fixed and moving front), or by keying the VFO itself.



Q 186

Fig. 4. Using the Type 600 GPO relay, with two sets of change-over contacts. Connections are as given in the sketch at Fig. 1

### Refinements

Receiver protection is merely a refinement

with low power transmitters, according to the reliable opinion of G3BQR (a five-watts-only CW break-in enthusiast whose country score with this low input is at the time of writing nearing the 50 mark on 7 mc.) and is not strictly necessary up to five watts. For the QRP man, break-in thus becomes simpler still, without an auxiliary contact, and at once offers full and silent operation to anyone who possesses a Morse key with front and back contacts! Telephony addicts will also find that depression of the CW key as described, while speaking into the microphone, permits snappy press-to-talk working if feedback with the headphones is avoided. Alternatively, a pressel switch could be wired up to a DC supply and a multi-contact relay carrying out the same number of functions as the key. In many cases the refinement of a net gain control will be welcomed, if the VFO alone is not audible in the receiver with normal muting. The auxiliary gain has first to be manually altered to hear the VFO and then restored to its original setting for normal working. This additional manipulation is avoided if a telephone key switch, or any similar switch with two pairs of "make" and one pair of "break" is used. This allows the resistance of the auxiliary gain to be lessened by the amount of the net gain control, while zero-beating with the VFO. As will be seen from Fig. 5, the key switch also completes the VFO circuit and brings it on by shorting across the key front contacts.

Double-current key owners will find that the complete below-base re-wiring, now detailed, will provide front, back and auxiliary contacts where required and that the Send-Receive switch on the key will disconnect the back contact and render the key inoperative when alternative bug-key control is used (the lead to relay spring contact number 3 also being easily disconnected to render the bug and relay inoperative when the straight key is in use). The top left-hand (zinc) terminal becomes number 1 and is wired to the left-hand fixed upper contact tall pillar, the left-hand fixed lower contact short pillar being disconnected and not used. The top right-hand (carbon) terminal becomes number 4 and is wired to the right-hand fixed upper contact tall pillar. The top centre (receive) terminal becomes number 3 and is taken to the short inner stud of the send-receive switch right-hand pair of studs (inside the glass cover). The bottom left-hand (up-line) terminal becomes number 2 and is looped to the right-hand divided-lever pivot and on to the left-hand moving blade of the send-receive switch. Both divided levers are strapped together electrically by a short

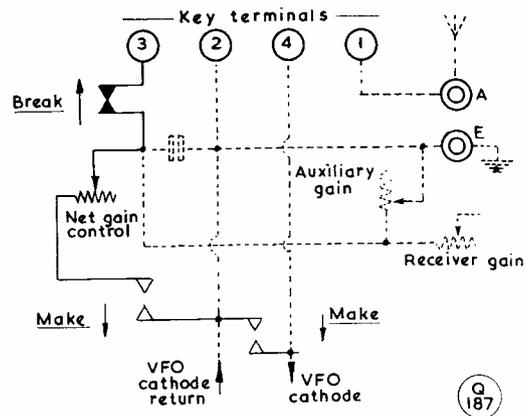
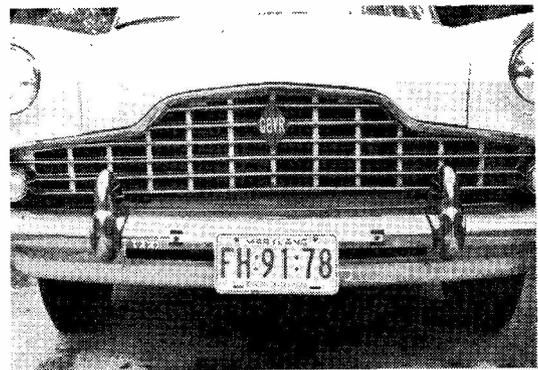


Fig. 5. Circuit for net, gain control and key short (for phone), using a manually-operated key switch having two sets of "make" and one pair of "break" contacts.

length of bare wire held beneath each of the inner moving contact tightening bolts. The bottom right-hand (down-line) terminal becomes another number 3 and is looped to the right-hand moving blade of the send-receive switch and on to the right-hand fixed lower contact short pillar. This latter looping connects the top centre terminal 3 (Receiver muting), when the switch is in the "Receive" position, through the bottom right-hand terminal 3 to fixed contact 3, but with the switch over to "Send" the receiver muting lead becomes disconnected. All terminals and contacts have been named when looking straight down on top of the key in its normal operating position.

Acknowledgements and thanks are due to G3BQR for introducing this extremely simple and silent method of key control to the writer, and for giving generously of his time in helping to set it up and carry out preliminary tests.



G8VR (of Meopham, Kent) is now in America, and has motored through 31 States, as well as visiting Canada and Mexico, displaying this callsign plaque.

# DX COMMENTARY

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

THE DX keeps rolling, on all bands and at all times. There is never a shortage of something interesting enough to work, although one may have to do some flitting about to find it. *Ten* and *Fifteen* are liable to be up one day and down the next, but they are hardly ever really flat, and quite a lot of time is spent band-changing in case the other one is better than the one set up at the time.

However, no one wants to grumble about conditions—they are doing us proud at present—which is more than can be said for the appalling selection of noises that make such a penance of the average DX session. *Fifteen*, in particular, has become the receptacle for everyone's unwanted garbage (although most of it probably comes from one certain direction, as usual). Jammers, harmonics of jammers, whiskers from jammers, whiskers from harmonics, harmonics from whiskers—the whole sordid lot goes round and around, representing the most monumental waste of technical effort that one can imagine. Jingle-bells one half tolerates, in the belief that they are transmitting information of some kind to someone, although we often think mis-information might be a better description, but all jammers are a stupendous dead-loss.

There's not much point in getting hot under the collar over all this—there's nothing we can do about it. But when we hear of commercial interests decrying Amateur Radio in any way at all, we do see a little bit of red. In fact, we sometimes wonder whether it isn't the only kind of radio that is doing a really good



ZC4PN

## CALLS HEARD, WORKED and QSL'd

job in the international sphere. And now let us talk of more pleasant things, such as the vibrations of the jungle-telegraph concerning the month's choicest offerings . . .

### DX Gossip

*Danger Island*: Those two ZK1's, having been turned down flat by the ARRL, have been turned up again, and it is now announced that KH6MG/ZK1 and WØPBW/ZK1 have been given "country status" for DXCC . . . The same applies to FF8AC/GN in *French Guinea*, who has by now left the territory together with the other French nationals.

PYØNA (phone) and PYØNE (CW) started up from *Trinidad Island* around October 26-27 and have been pretty active on all HF bands . . . VK3ARX promised operation from *Lord Howe Island* during the CQ DX Contest weekend, CW section, which was November 29-December 1 (in case you hadn't noticed it!)

MP4TAC has been active from *Trucial Oman*, and we gather that MP4DAA (*Das Island*) will also

count as Trucial Oman—it is one of the Trucial States, it seems . . . VKØKT and ØTC are both leaving *Macquarie Island* in mid-December. No news of any other activity thence . . . *Wallis Island* has been represented now and then, 14 mc CW, by FW8AA. The FK8AS/FW8AS expedition doesn't seem to have materialised yet, or if it has, we couldn't find it!

KS6AF has left *American Samoa* for California . . . VS9MA is putting the *Maldives* on 7 mc CW . . . VP8BK is on *South Georgia*, and reputed to be active every week-end (14 mc CW), mostly looking for LA's (he is LA7BB) . . . ZAIMA is yet another phoney, making *Albania* one of the most doubtful spots in the history of Amateur Radio!

*Socorro*, on the other hand, is probably one of the most difficult to cope with, and there has never been a word of a phoney XE4 (and precious little of a good one, either!) So the San Diego Club's efforts at running out an expedition there early in the New Year are mighty interesting. XE4 must be well in the running for the rarest prefix of them all . . .

Cards for SM5WN/LA/P, *Svalbard*, will be handled by SM5AHK . . . Up in the North still, *Jan Mayen* is being rather doubtfully represented by LA3VB/P, strongly suspected of being Not Good.

XW8AI, very active in October and November, was due to leave *Laos* on November 20 . . . There is one active station in *Egypt*—SUIIM . . . VQ1AQ and VQ1GT may be emanating from *Zanzibar* during December. The operators will be VQ4AQ and VQ4GT.

If you heard BY1PK recently, it wasn't a nightmare or even a pirate! He was on the air from Peiping, China, during a high-speed telegraphy competition, and repeatedly called WSEM. So far as we know, he only worked stations in the WSEM group, including LZ's, SP's, DM's and such; he worked on 14 mc at all sorts of hours, usually with a good signal.

The *Juan Fernandez Archipelago* is another place that has been officially blessed with Country Status, and some CE's promise to go there in January. Calls will apparently be CEØZA, ØZB and so on. All HF bands, but (as usual nowadays) more phone than CW. Full details next month.

EA9AW may possibly be in *Ifni* around the time you read this. If he is, he promises operation on 14050 kc CW, 0900-1000 Saturdays and Sundays . . .

AP5HQ is on from 600 miles north of *Karachi (Pakistan)* is quite rare these days) . . .

CN8IU hopes to work from 3A2-land, December 14-20 . . . W6SAI also expects to be very active as 3A2AF at various times during the next six months, which he will be spending in Europe. Other spots, including PX and (possibly) HV, are also on the agenda.

VR6XC might be good, but it seems there are doubts . . . VS9AC operated for a few days from *Oman* recently, but had only an 8-watt portable and made few contacts . . . AC5PN in *Bhutan* is said to have been on again, but ever since we worked a bogus one we have been chary of AC5 activity.

VK9AD is on *Norfolk Island* . . . C3AL says he is on

*Formosa* . . . XW8AH will also be leaving *Laos* at the end of the year . . . VQ4AQ definitely plans to go to VQ9 next year . . . ZL1ABZ has left the *Kermadecs* without an amateur representative—his relief is "not interested."

VP2KFA, as many will know by now, is not a "Klub" station but VP2VB on *Anguilla*. (VP2KF was his call on St. Kitts) . . . The recent Galapagos Expedition did not make as many contacts as most of these efforts. Whenever we heard them they seemed to be taking five minutes per QSO, with an enormous pile-up getting more and more exasperated.

VQ6AB wants 7 mc QSO's with G's . . . VKØKT is still active on 14040 kc . . . UL7KAA and LA2JE/P both on 7 mc around midnight . . . ZC3RF seems to be the phoniest of phoneys, and at least one SWL seems to know exactly where he hails from.

AP2AD says AP licences have not been cancelled; one individual was closed down, and this started the rumour . . . VR6AC is now on 28 mc, getting out better than on 14 . . . FM7WU is on from *Martinique* . . . VP2SI (St. Vin-

cent) is on 21 mc SSB . . . OY7ML will shortly be on SSB, he hopes . . . IT1ZGY/IP and IT1ZWS/IP will be on the *Pelagian Islands* during the CQ Contest—new one for WAE but not DXCC. And what call-signs!

**DX on Ten Metres**

As always, 28 mc has shown a shocking shortage of CW, but the phone DX workable has been almost unlimited. No one has yet explained to us why this band, so much more than all the others, appears to produce terrific reports, irrespective of power and aerial system, provided it is open. On one of those really wide-open days it seems that the man with 25 watts and a piece of wire does just as well as the chap with 800 watts and a 3-element beam; on more normal days things show up in their true perspective.

G3FPK (London, E.10) bagged four new ones on CW—ET2, UC2, DJ and ZP. LA2JE/P was heard on CW, UO5PK and VP6PV on phone. The "long-way-round" ZL's at midnight have packed up, and the band closes much earlier to W's.

[over

**FIVE BAND DX TABLE  
(POST-WAR)**

Station	Points	Countries				Station	Points	Countries							
		3.5 mc	7 mc	14 mc	21 mc			28 mc	3.5 mc	7 mc	14 mc	21 mc	28 mc		
DL7AA	905	113	171	245	199	177	260	G3IGW	343	44	69	103	66	61	131
G3FXB	766	73	131	215	197	150	245	G3JZK	336	17	56	77	117	69	161
G5BZ	749	64	118	258	188	121	265	G3INR	336	46	60	131	62	37	141
G2DC	729	80	106	216	180	147	244	G3HZL	314	31	62	106	68	47	128
G3DO	654	24	45	241	172	172	265	G3LET	311	14	54	153	68	22	164
GW3AHN	623	16	55	191	224	137	246	MP4BBW (Phone)	276	1	5	88	117	65	141
G3WL	541	41	91	176	127	106	205	G2BLA	272	32	50	66	69	55	110
G3ABG	535	45	84	174	119	113	202	G2YV (Phone)	270	12	27	83	95	53	138
G3BHW	530	15	32	181	173	129	225	G8DI	266	25	56	74	62	49	114
W6AM	517	30	58	287	86	57	287	G3HQX	266	15	37	78	68	68	121
G2YS	494	71	87	163	110	63	180	G3DNR	252	10	21	88	64	69	119
GM2DBX (Phone)	425	34	31	160	102	98	176	G3KXT	157	8	6	41	13	89	115
G6VC	403	34	52	150	98	69	172	W3HQO	153	3	6	35	82	27	94
W6AM (Phone)	369	13	32	264	39	21	264	G3DNF	130	6	30	41	35	18	60
G3JLB	367	43	50	95	89	90	163	G3IDG	114	11	15	29	27	32	50
G3FPK	346	34	73	118	74	47	143								

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

G3MCN (Liverpool) sends his first report, and on this band he worked XE2DO, VK5VZ, 9G1BA, W7UFB (Wyo.) and FP8AR. This with 100 watts of phone only, dipoles, ground plane and a Mini-beam.

G3KXT (Croydon) added new ones with PYØ (Trinidad). ZD1, CO, OA and VQ1; others worked were HC, VS6, KR6, VP9, JA, FQ8, KP4 and KL7, to mention a few.

G3IGW (Halifax) "resurrected" his 3-element beam, built a new modulator, and worked CR6, HK, M1, OHØ, TI, VP5 and 9, VQ2 and 5, ZD3, ZD6 and 9G1. He says ZD3E is now the only one in Gambia; he has a rotary cubical-quad and is looking for old friends.

G3DNR (Broadstairs) collected new ones with 9K2AP, VS9AM, KR6LW and an LZ—on CW. G3DNF (Wembley) worked Europeans, many W's, and SVØWR and CR6CK.

G3ABG (Cannock) sends another vast list of phones worked on Ten. In red ink are YS10, ZS9G, HI8GA and VP1BS; in among "the rest" are such nice ones as 9G's and 9K's, CE's, CR4AI, nine CX's, HK's, KR6's, VS6's, VS9AM and 9AO, XE2DO and ZP5CG. This sketchy selection represents over 400 contacts on Ten in one month!

E16X (Limerick) mentions UA9OI, VE8BD, VP8DS and dozens of VE6-7 and W6-7—in fact, he worked ten VE7's in one afternoon! G2YS (Filey) raised VS6AE on CW but failed (several times) with VS9AP.

G5BZ (Croydon) worked very little on the band, but mentions KH6AFS and W7CKY/KL7. GW3AHN (Cardiff) was one of the few lucky ones who raised HC8LUX, other nice contacts being HI8GA, TG9AD, VP9L, VS6DL, YS10 and 9K2AZ—all phone.

G2DC (Ringwood) is fed-up with the lack of CW activity on 28 mc, there being very little to choose from except JA's and a ZL or two in the morning and masses of W's from mid-day onwards. Three new ones raised were LA4CG/P, FF8AI and IT1TAI, others being EA8, OQ5,

JA, UAØ, ZD7SE and ZLIASZ. ZL2AI's harmonic from 14 mc was heard at S6 and caused quite a lot of head-scratching, as none of the stations he was working could be heard!

G3MJL (Liverpool) has been working LU, CE, ZP and the like, but his best was YN1CT with a "9-plus" phone contact on NBFM.

### Fifteen Metres

Most people seem to think that 21 mc is still our best band. If only the CW activity on this one were duplicated on 28 mc, what a band that would be! But fortunately there is plenty for the key-thumper on 21, and at all times of day. We should put the Phone/CW ratio as about 60/40.

G3FPK listened during the late evenings, and the only one of note for him was ZD1GM (Box 67, Freetown). On many nights the band was dead by 2300, but this chap was working W's galore as late as 2330.

G3MCN (phone) raised YN1JR, VP8ØI and 8CR, VS9AO, HL9KT, ZD1EO, VP4MM and PYØNA, all of whom were new for him. G3DNR registered new ones in JA, ZS6 and CX, also working a KL7. G3DNF found it the best band, and it gave him ET2VB, O D 5 L X, OQ5IG, ZL1AH (his first ZL), Europeans and several new W districts.

G3ABG crammed so much effort into Ten that he didn't have much time elsewhere, but he did raise VP2KFA on CW, with VS2DW, VP6FR and CO2ZS on phone.

E16X's phone got around to HI8GA and 8BE, VP3MC, HP1CC, OX3KW, OQ5's, XE2GT, CE6AB, VP7BX, HR2MT and AP2AD, among others which included "dozens of VK's and ZL's, all districts."

G2YS added VP6FR, VP6LT and VP9L, plus sundry W's and Europeans, to his phone log. G5BZ filled up his odd moments with OY1R, UAØCI, JA9AB, VS9MA, VO1EX, VP2KFA and sundry VE's, W's and ZL's.

G2DC calls it the leading band—for CW, at any rate—and lists LA3BV/P, VP2MX, VP2KFA, SVØWAE (Rhodes), UP2KBC,

XZ2TH and 9K2AN as new ones; plus EL, OY, LUØAC, VP7, VS9MA, VS9AQ and UAØGF.

GW3AHN, who still leads the field on this band with 224 countries, sends two long lists. CW accounted for KH6CD, KM6BL, KZ5CM, LA2JE/P, PYØNE, SVØWAE, VP2KFA and 2MX, VP6DL, VP8DG, VR2DG and YN1AB. Phone pulled in CO2BL, HC8WGF, HL9KT, KX6BP, PYØNA, VP6FR and VP8DG, as well as some KL7's. He says HC8WGF was raised, first call, on 21250 kc (AM phone), after which he put out several CQ DX calls and said he was tuning the DX

### Short Wave Magazine

#### DX CERTIFICATES

*The following have been awarded since the publication of our last list, in the September 1958 issue:*

<b>MDXA</b>		
No.	5	G8GP (London, S.E.4)
<b>WFE</b>		
No.	37	ZL1RD (Owhango)
<b>FBA</b>		
No.	129	G3KAY (Southport)
	130	SM3AST (Sundsvall)
	131	LA6CF (Sarpsborg)
	132	LA5QC (Narvik)
	133	OH3TH (Tampere)
	134	G3GSZ (Castle Eden)
	135	G3HIW (Ilford)
	136	LA1K (Trondheim)
	137	SP2AP (Warsaw)
<b>WNACA</b>		
No.	179	G3PR (Birmingham)
	180	G6PJ (Sheffield)
	181	VK3ATR (Warracknabeal)
	182	UA9CC (Sverdlovsk)
	183	LU9FAY (Santa Fe)
	184	LU9DM (Buenos Aires)
	185	LU2BN (Buenos Aires)
	186	G13JXS (Dunmurry)
	187	G8KU (Scarborough)
	188	PY1NC (Rio de Janeiro)
<b>WABC</b>		
No.	174	G3KEP (Bradford) (Phone No. 3)
	175	G3FGT (Birmingham)
<b>WBC</b>		
No.	115	FQ8AP (Bangui)
	116	EA7EM (Sevilla)
	117	DL1PM (Hamburg)
	118	VE2AFC (Quebec)

Details of MAGAZINE DX AWARDS and CERTIFICATES, and the claims required for them, appeared in full on p. 84 of the April, 1958 issue.

Overseas claimants (*only*) may send either (a) A check list, without cards, duly certified by the Hq. of their national Amateur Radio Society, or (b) An uncertified check list, from which any or all cards may be called in by us.

U.K. claimants must send the relevant cards for each award.

A full list of U.K. Counties appeared on p. 82 of the April, 1958 issue.

portion of the band. No takers at all! VK9AD (Norfolk Island) was heard on phone, S8; and the Trinidad Island boys, PY0NA and PY0NE, were worked several times, both CW and phone.

G3BHJ (Norwich) worked phone with CX8BM. DU1FR. EL0J/MM, FE8AP. OQ0P/D. SV0WB/Crete. TI2OE. VP5AK. VP9G and many others.

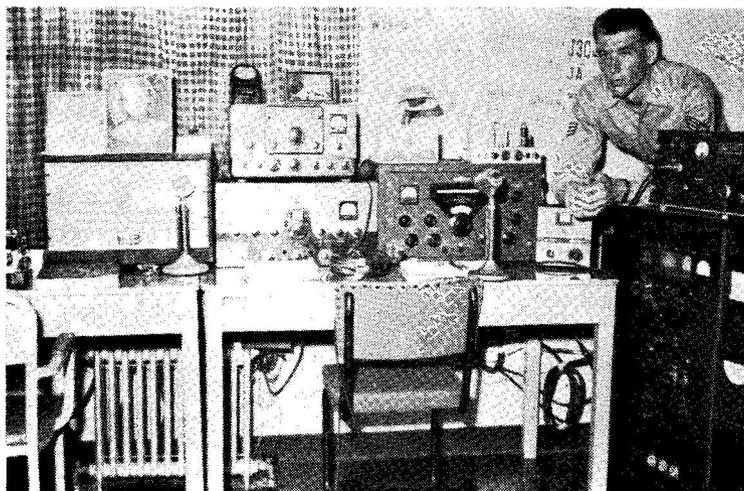
### Twenty Metres

What a band! Something of everything for the boys—that's Twenty these days. Cheek by jowl with the rarest pieces of DX you can find lovely old vintage T5 notes, just as they used to be on those Sunday-mornings-on-Forty before the war. It's rather like the fable of the man who built a house so that he could have the finest view in the country, and then couldn't see a thing for the junk in his own back-yard. The trouble seems to be that this particular junk is so robust that it will never fall to pieces . . .

G2DC says that the really wonderful conditions of late October have now deteriorated, even the California-Kw's in the mornings having fallen off. He heard a station signing ZA1AA—excellent signal and first-class operating—working the whole world for a couple of hours or so. He wonders why a chap with such operating ability has to "go pirate." (Probably it's just the thrill of hearing everyone come back to him, for once.)

G8KS (Petts Wood) logged three good ones—FU8AE, VR6TC and FW8AS—all around 0630, and all being worked by W's. He couldn't break through the screen himself, but it was nice to hear them . . . G3DNF winkled out SV0WC for a new one . . . An addition for G3IGW was UH8KAA . . . G3DNR improved his total with UG6KGU, FQ8 and CT3.

G3FPK worked UA0FF, at Ulegorsk City on Sakhalin Island, which reminds us that we have always wondered why Wrangel Island should be a "country," but not Sakhalin. Called but not worked were F9QV/FC, SM5WN/LA/P, OY1J, XW8AI and XZ2TH (the latter two at 1900 and 2000). A contact



KR6HP, now on Miyako-Jima in the Pacific, is K2LEQ when back home in White Plains, N.Y.

with ZD2FNX in September proved phoney, the said station having been off from January 6 until November 1. Others were probably taken in, too.

G3ABG, on CW, raised FF8AC/GN, ZD1FG, VP2MX and VP2KFA (all new), also VS1JF and ZL4CK via the long path. Phone connected with CO2OZ. GW3AHN didn't use Twenty much, but worked VP2MX, VS1JF, XW8AI and ZP5AY, all on CW.

E16X rose at 0500 for a couple of mornings, and was amazed at 14 mc, which, he says, sounded just like 28 mc does in the daytime. With just a dipole he got "5 & 9" from W, HC, HP, TI, and also worked HV1CN for a new one. SU1KH is another one mentioned, but, as remarked elsewhere, SU1IM is said to be the only active Egyptian call, so it makes you wonder.

G5BZ has a longer list for 14 mc than the other bands, and from it we extract VP2KFA, ZS9M, FF8AC/GN, XW8AH, KM6BK and 6BL, VP2MX, VP8BK, UA0KQB and UM8KAB. It also contains hordes of JA's, some KH6 and KL7 and "all the usual." G5BZ remarks that if anyone wants a quiet backwater in which they can enjoy a few trouble-free QSO's, they should retire to 14330 kc. Up there he has been working W, VK, KH6

and so on, including CW contacts with SSB stations. Anyone really lucky might even raise FU8AE, FO8 and, perhaps, an FW8, too.

G31NR worked HS1C, VS9MA and a 9KT, all new ones . . .

### Forty Metres

G3JAG (Rochdale) sends a long letter entirely about 7 mc, and encloses a summary of his results on this band between 0600 and 0800 GMT. In particular he mentions W6MOJ (nearly 150 contacts) and W6YMD; W7's in four States; VE6SZ, VE7AOP and VE8OM; KH6ARA, KL7CTG, LA2JE/P, HE9LAC, KP4AOO, OY1J and a bunch of ZL's. G3JAG wonders where LA6EG/Y is? He has a real DX flutter.

Further comments on Forty: A real intruder problem exists, with commercials keeping skeds at the low end. BC QRM doesn't lessen, and certain amateur purveyors of clicks, chirps and vintage notes don't improve things at all. G3JAG finds BK a great advantage, and listens to some of the sharp practice on the frequency while he is still transmitting!

G2DC has been keeping skeds with VQ6AB, early evenings, with no luck as yet. He quotes W6UOV as an outstanding one in the mornings. Three new ones were OY7ML, LA2JE/P and UQ2AB.

G3DNF pulled in a 4X4, but

finds the band pretty difficult at his QTH . . . G3FPK reports all the grinding noises in full fettle, and one new beast is a jammer on 7024 kc; but through all that lot he heard W6MOJ and K6VTQ, both around 0100, also IS1MM and LU2ACH. A new one worked was TI2PZ.

G2YS remarks that occupants of this band don't know what "CQ DX" means—it appears to include DL, YU and even G! G3LNR (Nottingham) worked W1, 2, 3 and 4 in the mornings, and heard CN8BP, EA8BK, VE's and ZL's.

### Eighty Metres

G2DC put in very little time, but raised OY7ML for a new one . . . G6QB was very surprised to have a "599-both-ways" with FA8BG at 1815 GMT, and no one even bothered to call the FA8 afterwards . . . G3FPK added UB5, UA9 and YO to his collection; others heard were 4X4WF and UP2AL.

DX should be livening up on

Eighty from now on, and it's always worth watching in the not-too-early mornings.

### Top Band Topics

It is still rather early in the year for good Trans-Atlantic conditions, and no real DX has been reported. But conditions within Europe are good again, and our friends the DL's have once more been issued with their limited licences—until March 15 next year, 1825-1835 kc only. They are easy to work most nights, and so are the OK's, who are fairly numerous.

During the *Magazine Club Contest* it was possible, even on the South Coast, to hear good signals from practically the whole of England by 1630 GMT; which shows that the dull evenings one encounters are only due to lack of activity. MCC produced some sizeable pile-ups at times, and the signals from the stations with really good aerials were colossal.

G3ABG worked DL1YA for his *sixth* band with that station; G3IGW raised DL1FF, 1YA and 300; G3LNR added GM3KHH and GM3KSJ to his list; and G2CZU (Bath) only needs Northumberland for all English counties on phone.

G2NJ (Peterborough) worked DL300, and says that HB9T and the OK's have also been very active.

### Seven-Metre Flash

G3JON (Sheffield) reports that UB5FG is working on 38.5 mc every day between 0900 and 1000 GMT, looking for replies between 28.1 and 28.4 mc. Apparently the Russians are licensed for 7 metres, and there may well be more activity there.

### Miscellany

Concerning certificates, EI6X tells us that he has made his WAVE and WNACA, also TPA, CIA and DUF3—five sheepskins in one month! G3MCN, writing in for the first time, reports nearly 2000 contacts since being licensed, with WAC, WBE and DXCC claimed, and cards coming in for DUF, OHA and WASM. His score is 134 countries, 34 Zones, 46 States—any challengers from

G3M's?

G2DC says that the origin of most of the horrible noises on the bands was made obvious during the WSEM Contest on October 26; at least 60 per cent. of the signals were T7 or worse, and 14 and 21 mc were almost unusable for some hours.

G3FPK suggests that those interested in the new WALT award (*see* last month's Commentary) might congregate on 7 mc CW, Sunday mornings, with the object of hunting out the London Postal Districts (we were under the impression that that was already going on, judging by the QRM!)

G5BZ disapproves of most of the "band-splitting" suggestions discussed last month, and says that the main requirement is the ability to concentrate and to separate the station one is working from the other six on the same frequency. He thinks the general behaviour has improved a lot in recent months. We rather agree.

GW3AHN has received the Zone 19 QSL for his 25-watt on Phone, and sends a nice picture of the 40 QSL's involved (too late for appearance here this month, unfortunately).

W6AM (Long Beach) makes his phone score 264 with ZL1ABZ and VQ4ERR . . . ZC4PN (G3ICH) has now worked 100 countries, mostly 14 mc CW on 25 watts. He says activity is high out there, and ZC4AM (Nicosia R.A.F. Club) have just received 2000 cards from the printers. ZC4GT has started up again.

DL2GA is trying hard to put the twenty-seven DL2's (British nationals) back on the map. He has found activity very slight, and hopes to arouse some more enthusiasm with circular letters and the like. He thinks they are a bit of a Forgotten Legion. Meanwhile, will anyone out there who reads this, holds a G licence but not a DL2 one, contact Lt. J. E. P. Philp, R. Sigs., DL2GA, 2 L. of C. Signal Regt., B.F.P.O. 34.

It is said that the VE8 card handling system is very unreliable; it is better to QSL VE8's direct, it seems. VE8TO (Baffin Is.) is the source of this comment.

### TOP BAND COUNTIES WORKED

(Starting Jan. 1, 1952)

Station	Confirmed	Worked
G2NJ	98	98
G6VC	96	96
G3JEQ	96	96
G3JHH	92	93
G3FNV	91	92
G2AYG	88	88
G3KEP	85	85
G2CZU	79	79
G3DO	75	75
GM3COV	68	70
G2CZU (Phone)	62	63
G3FGT	62	62
G3LBQ	61	67
G3KEP (Phone)	60	62
G3LHJ	56	66
G3JSN	49	62
G3MCP	46	54
G3LEV (Phone)	39	47
G3LNR	39	47
GW3HFG (Phone)	30	40
G3LNO	23	41

### Strays

G6PU (Portsmouth College of Technology) is being pirated on 7 mc. The genuine one is not active . . . G3LGX (C. A. Gledhill, 49 Larch Hill, Odsal, Bradford) wants reports from anyone, anywhere, on his Top Band phone, 3.5 phone and CW, and 7 mc CW . . . OK1JX asks for patience concerning cards for JT1AA and JT1YL; the system was temporarily blocked and the QSL's kept flooding in. All is now organised!

New Sheepskins for disposal: The WWW Maritime Mobile Certificate issued by LA6CF, invented primarily for /MM's, is now available to all as the WWW. You must work the same six stations, one in each continental area, once a day for five days within the same week, starting Monday at 0001 GMT. QSO's with the same station must be at least twelve hours apart, and one of them, with a DX station, must be of more than 30 minutes' duration. The "/MM" part of it is that any Maritime Mobile may count as a "joker" and a substitute for any continent you like. The whole thing is rather complex, but we have a few printed slips available if you write in for them.

And yet again: The OHA-100 and OHA-300 are for working 100 and 300 different OH stations; the first one must include the ten OH districts on each of two bands, the second the ten districts on each of three bands. Applications to SRAL Awards Manager, Box 306, Helsinki.

### The WAE DX Contest

Rules are out for the WAEDC 1959 (the fourth event of the series) and are available from DARC DX-Bureau, Fuchsienweg 51, Berlin-Rudow. It is a CW-only event, and runs from 2100 GMT on January 9 to the same time on January 11. Bands are 3.5-28 mc. QSO's are between European and non-European stations. Six figures denote RST and a running serial number, starting 001, irrespective of bands. Contacts on 3.5 mc count two points, other bands one point.

The multiplier is made up of the DXCC Countries List, with all

numerical districts of W, VE, VK, PY, JA and so on counting separately, *i.e.* as if they were countries.

The same "QTC" rule as in previous contests will apply—only from non-European to European stations. Rules are far too long to print in full, but the printed slips are available (*not* from us, but from DARC — see p.475, November).

### New SWL Section

Good news for the SWL's! We shall be giving them a bi-monthly section of their own, starting next month, in which they can air their opinions, discuss technical points, describe their layouts and aerial systems, and get together in general for their mutual benefit.

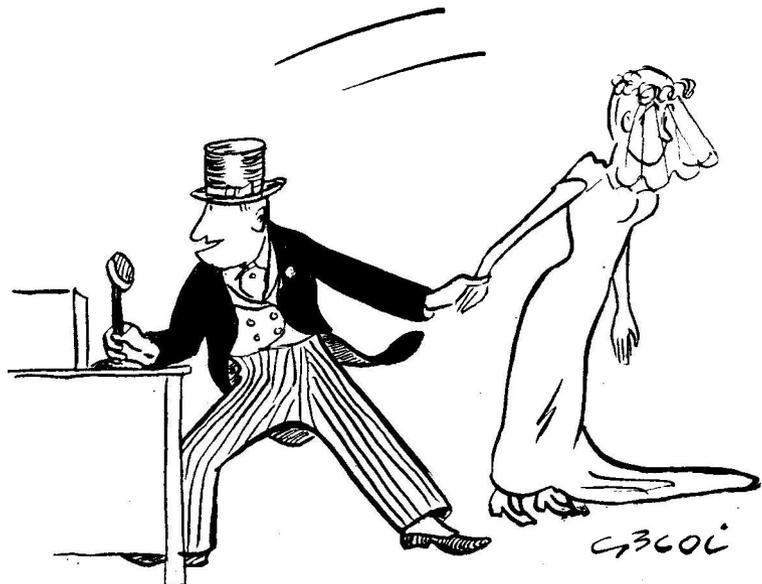
Except that it will *not* be a DX feature, the plan is completely flexible and will depend largely on what the SWL's themselves tell us that they want. Any of their items of "DX Gossip" which are so useful will be transplanted into this Commentary, together with notes of any outstanding DX heard, but the main business of how the SWL's live will be dealt with in their own feature, "SWL."

This month, P. Day (Sheffield) sends another of his all-band reports, in which the chief item

of note is the reception on 50 mc of W1HOY, 1GKE, 2UTH, 3GXW, 3TNP, VE1BB and VE1II on phone, as well as VE1HT, W1HDQ and W1LUN on CW. The first 50-mc opening was on October 19, and the band behaved itself again on November 8 and 12. Excellent work. P.D.! Also worthy of note: VO1's on 3.5 CW. 11AIM/M1 on 3.5 mc phone; VP3YG, LA2JE/P and UH8KAH on 7 mc CW, CN9CJ, KP4PZ and UA9CM on 7 mc phone; MP4TAC and XZ2SY on 14 mc phone, and PYØNE on 21 mc CW.

J. Kelly (Newtownstewart) is a 16-year-old GI listener who has covered some good DX on 28, 21 and 14 mc; with only a domestic receiver and an RF-24, he has heard 90 countries.

P. Evans (Hanwood) mentions "colossal signals" from YN1CJ on 28 mc phone, also VP8SZ, SL2HS and HZ1AB on 28 SSB. J. Baxter (Hull) logged plenty of DX on 20-metre phone, and finds 7 mc good in the early mornings when the BC stations are not on. M. J. Cahill (Co. Antrim), 14 years old, sends a nice list of calls heard on 28, 21 and 14 mc with a 0-V-2 receiver, which reminds us that there is still plenty of interest in a well-designed set of this type.



“. . . . Just QRX a minute . . . .”

This we will discuss in the new feature.

C. N. Rafarel (Birmingham) thought conditions exceptionally good, especially for ZL and VK in the early mornings on 28 mc; PJ2CE, YS1CA and YS1IM were also logged; on 21 mc the best were KX6BT, VP8DT and PY0NA; on 14 mc, EA6AY and two XE's, 1FT and 2NE.

G. D. Eddowes (Bournemouth) reports that CE0AF is looking for G's on 14100 kc phone (Easter Island, of course). Heard on 21 mc phone were TG9HB, ZD1GM, KL7, CR6 and ZS's.

#### A Rare One

We forgot to mention in last month's issue that G8GP (London, S.E.4) recently qualified for that rarest of rare awards, the *MDXA* (Magazine DX Award) No. 5. The previous holders are G2PL, G8KP, W2QHH and W8K1A, so G8GP joins the select ranks of those who can add 3 continents and 15 countries on Top Band to a goodly array of DX on the other bands. Hearty congratulations to G8GP . . . and who's next?

#### Late-Flash Items

SWL G. P. Watts (Norwich) forwards details of VR3A's movements. Ray Baty broke his leg during the early summer and had to return to Australia, leaving everything but his clothes behind. Logs, cards and so on were some-

where between VR3 and VK2 during September, and should have caught up by now. Ray is uncertain of his next move, but says he would not be surprised to be returned to VR3 "either in November or March." He used to have a V-beam, but was building a cubical-quad to replace it at the time his accident occurred; let us hope he does get back to put VR3 on the air again.

OK7HZ/7ZH are due to start their five-year DX-pedition on December 31. We have already given some details of their itinerary, but it seems that almost any port of call is possible. The first will almost certainly be Albania, whence we shall hear a genuine ZA at last.

San Diego DX Club's XE4 DX-pedition is now planned for March 1959 . . . Two possible new ones down in the VQ8/VQ9 area are the Agaelega and Carajos Islands, both of which have weather stations . . . Malaya stations drop their VS2 and become 9M2 as from January 1. VS2DQ, on leave in England, views the prospect of becoming 9M2DQ with quite a lot of bleakness!

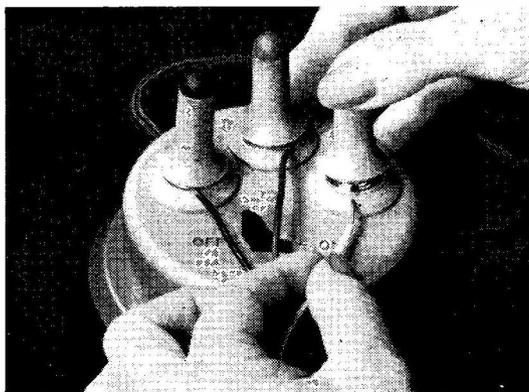
W0MLY is talking of a DX-pedition to Ifni, Rio de Oro and French Togoland next March or April . . . FF8AK says the French Guinea authorities have not yet considered amateur licensing; FF8AC/GN leaves the

territory on December 1 . . . UM8DX is on 14 mc phone . . . The present VS9AQ was allocated VS9AP, a re-assigned call, but so many people thought he was a pirate that he had it changed.

And now, for the thirteenth time in the history of this column, we wish all readers a Happy Christmas and a Prosperous (DX-wise) New Year. There are a few who have stayed faithfully with us over the entire twelve-year period, but far more who have joined up on the way. To all of them our sincere thanks for their support. May 1959 bring them all the DX they dream of—and we hope they will write and tell us about it!

Finally, acknowledgments, as ever, to W4KVVX's *DX*; to the West Guf DX Club's *Bulletin*; to W6YY and to all the correspondents, including the SWL's, who supply us with the DX gossip that makes the news.

The next deadline, slightly out of joint owing to the Christmas dislocation, will be **first post on Monday, December 15**—please be sure to catch this, as the mails will start running late very soon after. May you all have plenty to report by then, and send it all as usual to "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. Meanwhile we wish you 73, "MX" and a very Happy New Year. *BCNU*.



The T.I.M. Snap Action Appliance Connector is designed for the test bench. It consists of three insulated spring-loaded quick release terminals mounted on a metal base, with an on-off mains switch. The special time-saving feature of this product is that equipment under test can be connected to the mains without plugs or screw terminals. Safe and positive contact can be made, or un-made, in an instant.

#### SHORT WAVE RECEPTION

For the absolute beginner to short-wave listening and the efficient reception of long-distance broadcasting stations, we can recommend the new (1959) edition of *How to Listen to the World*. This little book is written specially for those who want to get the most from their short-wave broadcast receivers. It will be ready by the end of this month, costs 7s., and can be ordered from our Publications Dept.—see advertisement in this issue.

#### CORRECTION — "LF Band Transceiver"

In the main circuit diagram of this article, on p.457 of the November issue, there is a slight drawing error. The junction of the capacity network C4-C5-C7, round V1 at top left of the page, should be joined to the cathode of V1, and not bridged as shown above the RF choke.

## SSB Topics •

SUPPRESSING THE CARRIER — OUTPUT MONITORING

ANOTHER VOX CIRCUIT — NEWS, VIEWS & QUERIES

● Conducted by J. C. MILLER, DL4SV/W9NTV

THE urge to return to the high end of Eighty seems to go hand-in-hand with the first cool evenings of late autumn. With the seasonal reduction in static levels and the improvement in propagation, 80 metres again becomes busy with nightly single-sideband nets. Renewing old acquaintances among the European sideband group is always a pleasure on this band. One can usually count on a lively technical discussion or a good chat revolving around a variety of interesting subjects—plus the usual friendly argument or leg-pull. Another aspect of 80-metre operation that is always enjoyable is that of meeting and becoming acquainted with the newcomer. His genuine interest and enthusiasm in SSB techniques is invigorating. Many helpful suggestions are offered to assist him in solving his newly-acquired—and seemingly complex—problems.

During a recent late-evening 80-metre QSO, the subject of carrier suppression was presented and discussed. It was apparent that several of the newcomers had been taken to task by a few of the more experienced operators for transmitting an SSB signal with an excessive amount of carrier. There appeared to be several problems concerning this subject that had somewhat baffled the new Sidebanders. How much should the carrier be suppressed? What steps could be taken to improve suppression? How could carrier level be continuously monitored?

This matter of carrier suppression is one that has been with the sideband gang for a long time and it has been tossed about on many occasions. There was a time, some years ago, when many receiving operators *required* a little carrier, as a reference for tuning in the receiver and adjusting the BFO to exact zero-beat. A few operators had carrier locking arrangements in their receiver adapters, that required some carrier to keep the locally generated carrier synchronized with that from the transmitter. The problem of transmitter frequency drift, which had resulted from poor oscillator stability, was one which many of the fellows had not taken care of in the excitement of first getting on sideband. (After all, this slight frequency variation was of little consequence in earlier AM operation!)

Although it was first thought that the radiation of a "pilot" carrier was desirable it has been found through experience that—unless the received signal's carrier is amplified and reinserted—it can do more harm than good. This is because a strong audio beat will be produced between the pilot carrier and the receiver BFO (or external carrier insertion oscillator) when the reinserted carrier is not quite on the transmitter frequency—but yet not far enough off seriously to affect the intelligibility of the demodulated speech were the carrier absent. It should be noted that any transmitted carrier leakage

can be considered—and actually is—the same as a pilot carrier. A sideband signal 1000 cycles or so from a given net frequency and displaced in the same direction as the net's sideband will fall in the receiver passband and produce "monkey chatter." While this adjacent channel interference makes for unpleasant listening, it isn't nearly as annoying as the birdie which can result from this transmitter's inadequately suppressed carrier.

### How much Carrier Suppression ?

Although there are no formal performance standards for amateur SSB equipment, current operating practices—developed by experience—have established certain requirements.

In most commercially manufactured amateur SSB equipment, carrier suppressions of the order of 50 to 80 dB may be obtained and maintained—assuming perfect initial adjustment and alignment of all circuits. The amateur who constructs his own sideband gear, using good design and layout procedures, may readily obtain carrier suppression of the order of 40 dB or more below peak envelope power output.

It should be remembered that the superiority of SSB systems can be, to a great extent, attributed directly to the suppression of the carrier. The best results by far are obtained when the carrier is completely suppressed. Therefore—*we should suppress carriers as much as possible.*

### Improving Carrier Suppression

Good carrier suppression can only be realised when all single-sideband generating circuits are stable. This not only refers to balanced modulators and "brute force" carrier rejection crystal filters, but also to all oscillator circuits. Mechanical or temperature variations which affect the tuning of these critical circuits can degrade the suppression.

Virtually all oscillators will drift during the initial warm-up period. Therefore, it is desirable for all oscillators in the sideband generator to remain on during both transmission and reception. "Keying" an oscillator, as in voice-controlled operation, may result in rapid changes of frequency. This is *not* considered good practice!

Voltage regulation of all frequency determining oscillators is a basic requirement. Sideband generators without voltage regulated oscillators may shift frequency enough, when the mains voltage changes by a minute amount, to throw the carrier oscillator off frequency. This will not only increase the carrier level, but may also produce a "warble" in the speech.

Carrier suppression is normally obtained by using a balanced modulator. This is basically a device designed to produce the side-frequency (side-

### Table of Values

Fig. 1A. The Pierce Crystal Oscillator

C1 = 100 $\mu\mu\text{F}$ variable trimmer	R1 = 100,000 ohms
C2, C4 = 0.1 $\mu\text{F}$	R2 = 250 ohms
C3 = 500 $\mu\mu\text{F}$	R3 = 25,000 ohms
	Xtal = 400-500 kc

Fig. 1B. The Clapp CC Oscillator

C1 = 400-500 $\mu\mu\text{F}$ , variable trimmer	R1 = 50,000-100,000 ohms
C2, C3 = .004 $\mu\text{F}$	L1 = 455 kc BFO coil
C4 = 250 $\mu\mu\text{F}$	RFC = 2.5 mH RF choke

band) components without passing the carrier. Balanced modulators may take any of a number of different forms, but the purpose remains the same. The perfection of balance required in an SSB generator is usually quite high, and some means for satisfying the conditions necessary for balance must be provided. Very few arrangements automatically provide the conditions necessary for perfect balance, due to normal variations between valves and diodes, as well as the element of stray circuit capacities. It is suggested that some arrangement giving both phase and amplitude-balance adjustments be used—rather than to wish for a fortunate set of conditions that might permit balance. The grid-to-anode valve capacities and circuit strays can be balanced with trimmer condensers. Also, separate bias adjustments for setting the modulator operating points will be found helpful.

Many useful suggestions pertaining to balanced modulator design and adjustment can be found in ARRL's *Single Sideband for the Radio Amateur*, and in *Single Sideband Techniques*, published by *CQ Magazine*.

Concerning the matter of the carrier rejection crystal filter, it should be mentioned that this does not refer to the sideband filter, the purpose of which is to pass one sideband—either upper or lower—and to reject the other. Rather, we are interested in the crystal element which is shunted across the sideband filter, to provide a sharp notch at the carrier frequency.

It would at first appear that the choice of a carrier rejection crystal would be a simple matter. However, merely choosing a crystal with the same marked frequency as the carrier crystal is not quite the answer. The reason, of course, is that the crystal used in the carrier oscillator goes off on its parallel-resonant frequency, while the rejection crystal provides maximum attenuation at the series-resonant frequency. In most cases the two resonant frequencies appear within a few hundred cycles of each other. The problem is to adjust these two resonant frequencies so that the carrier frequency will coincide—*exactly*—with the attenuation notch of the rejection crystal.

This can best be accomplished by providing a method for varying the frequency of the carrier oscillator. While a very, very stable VFO is a possibility, it is simpler to use a crystal oscillator with a small trimmer condenser across the crystal—so that the frequency can be set exactly in the slot of the carrier rejection crystal. Two circuits which

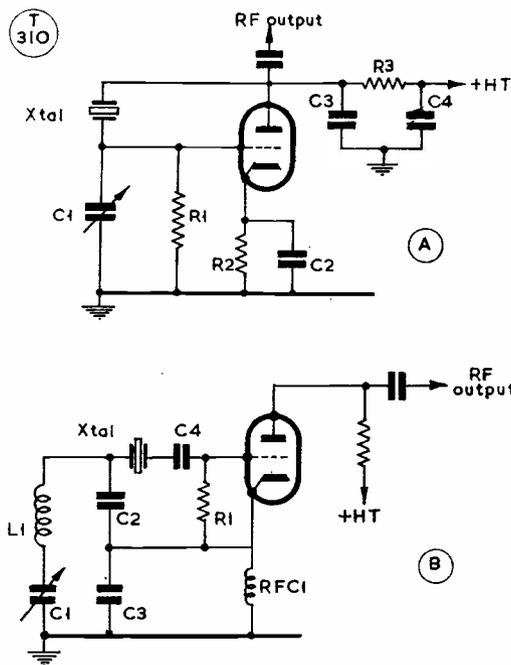


Fig. 1. Shown at (A) is a Pierce CO with variable control on the crystal. This permits slight adjustment of the carrier frequency in an SSB exciter and consequently better carrier rejection. By tuning C1 the CO frequency can be set exactly in the slot of the suppression crystal. In (B) a CO of the Clapp type is shown, C1 having the same purpose as in (A). The oscillator crystal frequency can be varied by about 2 kc, plus or minus; pulling too far will stop oscillation. In both these circuits, any common triode or half-triode may be used.

include the frequency adjustment feature are shown in Fig. 1.

As a final suggestion: The best working carrier suppression setting will be obtained if adjustment is made after the SSB equipment has reached a normal operating temperature. This usually takes about two to three hours. Also, suppression should be checked from time to time.

#### Monitoring Carrier Level

A common method of removing the carrier from the output of an SSB exciter is to tune it in on the receiver, reduce the audio gain to minimum and then adjust for minimum carrier, as indicated on the S-meter. While this is an excellent method for making the initial adjustments, it does not permit continuous monitoring of the carrier level during operating periods—the receiver being also in use for another important purpose!

If a monitoring oscilloscope is part of the station equipment, it can be put to good use as a carrier monitor, as well as for the all-important linearity measurements. However, it may be difficult to see small carrier levels unless very close coupling to the RF output is used to increase the 'scope sensitivity. Unfortunately, increasing the RF pick-up may overload the input of the instrument on voice peaks.

A simple circuit providing continuous monitoring

of carrier suppression is shown in Fig. 2. This indicator may be built into the sideband exciter as a permanent monitor, or used as a separate test instrument, to be connected to the exciter output when desired. It is designed to be left in the RF output circuit at all times, without pinning the meter pointer on voice peaks. Excellent sensitivity is shown in the milliwatt range, and yet it is not overloaded by a peak output of from 10 to 15 watts. The RF voltage is rectified by a germanium crystal diode and indicated on the DC voltmeter. The selenium rectifier has little or no effect at low voltages, indicating the amount of residual carrier. At high voltage levels the selenium conducts and "shorts" the meter. When used across a 52-ohm output, the voltmeter will indicate 0.2 and 2.6 volts for the RF outputs of 3 and 225 volts. This circuit was developed by W2ALJ, and is described in *Single Sideband for the Radio Amateur*.

A similar RF output indicating circuit is built into the Hallicrafters Model HT-32 transmitter, permitting adjustment of the equipment for correct output, carrier suppression, and so on. In fact, this is the only meter in the entire unit, greatly simplifying tuning procedures. As shown in Fig. 3, the output level meter indicates the RF output of the transmitter in dB below a "zero dB" reference. The meter sensitivity control permits adjustment of the output reading from full scale ("0" dB) down to a quarter of full output power—any level below this may be easily read on the meter.

Carrier suppression is measured by setting the sensitivity control for zero dB with maximum single-tone SSB output. (Maximum output in the HT-32 is reached at the point where further audio tone input does not cause an increase in the meter reading.) Carrier level is directly indicated on the meter when

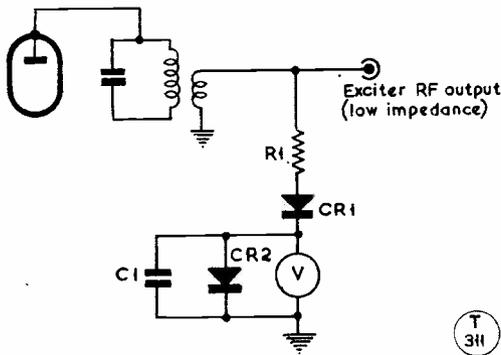


Fig. 2. A carrier null-RF output indicator. This circuit provides for continuous monitoring of the carrier suppression, without over-driving the meter on voice peaks. The selenium rectifier CR2 "shorts" the meter at high values.

**Table of Values**

Fig. 2. Carrier null-RF output indicator

C1 = .005 $\mu$ F	CR2 = 150v, 40 mA selenium rectifier
R1 = 2,000 ohms	V = 0.3v, m/c meter, 1000 o.p.v.
CR1 = Xtal diode	

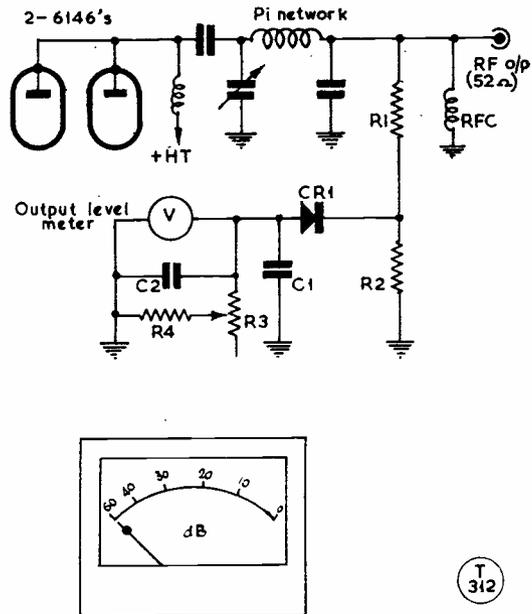


Fig. 3. A rather more sophisticated RF output indicating circuit, as used in the Hallicrafters HT-32; the sensitivity control R3 is adjusted for zero-dB on the meter (full-scale deflection), as a reference point, and carrier level can be read off directly when tone is removed. The sketch of the meter-face shows the calibration (in the HT-32) in terms of actual carrier suppression.

**Table of Values**

Fig. 3. RF output indicator, Hallicrafters

C1, C2 = .01 $\mu$ F	R3 = 50,000 ohms
R1 = 6,800 ohms	R4 = 25,000 ohms
R2 = 1,200 ohms	CR1 = Xtal diode

the tone is removed.

While not indicated in the circuit diagram, a diode is included in the meter to provide damping action, so that high-level signals will not drive the pointer off scale. (The meter actually swings approximately 2/3 full scale with average voice input.) The meter scale is compressed through the use of shaped pole faces, to enable useful indication of low-level signals.

A novel RF output indicating device has been incorporated in the popular Multiphase Exciter, Model 20A, manufactured by Central Electronics. A magic-eye valve is used instead of a meter for indicating RF output. The circuit is shown in Fig. 4, where it will be noted that one-half of a 12BH7 is used as an RF rectifier. Substitution of a germanium diode should prove satisfactory, unless an unused half of a dual-triode valve happens to be available. While a 6E5 magic-eye is shown, other types with similar characteristics will work equally well. Maximum sensitivity of the magic-eye is provided in one switch position. This is for carrier suppression adjustments. The switch can also be set to place the sensitivity control in the circuit for magic-eye deflection adjustments.

In operation, the switch is first set to the "carrier null" position and, with no audio input, the carrier is

balanced out. The switch is then set to the "maximum level" position, when all RF circuits can be peaked for maximum output, and the proper speech level determined. This is done in the 20A by inserting an audio tone, or by reinserting the carrier to a level where no further increase in output is observed on the eye. The sensitivity control is then adjusted to just close the eye and the tone or carrier is removed. The maximum undistorted peak output may be obtained by adjusting the exciter speech level control until voice peaks reach about 80% of the full carrier value. The level of carrier may be observed at any time by switching the magic-eye to the "carrier null" position.

### Circuit for Voice-Controlled Operation

An interesting system for performing VOX functions with only a single-pole double-throw relay has been received recently from YUIAD. It may be used in conjunction with any conventional voice-controlled amplifier circuit, such as the KWS-1 arrangement previously described in this column—see p.89, April, 1958.

The circuit, shown in Fig. 5, functions as follows: In the "receive" condition the normally-closed relay contact shorts the receiver bias voltage to earth, the full blocking bias is applied to cut off the sideband exciter, and the final amplifier receives blocking bias from the adjustable voltage divider, R1-R2.

With voice input, the relay contact operates to earth the normally open contact, thus removing the blocking bias from the exciter. One end of R2 is also earthed, permitting normal operating bias to be applied to the PA grid. The receiver is cut off by the application of blocking bias, through R4 and the vacuum diode, to the receiver AVC bus.

It is suggested that the receiver bias control, R4, be adjusted so that the cut-off is positive. It is possible to monitor the transmission in the receiver headphones if this adjustment is carefully made. YUIAD advises that any vacuum valve may be used for the diode gate. He does *not* recommend use of a germanium crystal diode, as an infinitely

high back resistance is required. The writer agrees with this, as experience with similar circuits has shown that the back-resistance of germanium diodes can decrease after a little operating time.

With the VOX in operation and the relay closed, the PA bias control R2 is adjusted to provide normal operating bias voltage to the PA grids. For the record, this circuit has proved quite successful in YUIAD's parallel-6146 linear amplifier. He further adds that it might be desirable to use a form of noise limiter to prevent popping in some receiver audio systems.

### Query Department

The most recent of several letters requesting circuitry and operating data for the G2MA (or "Scotsman's Dream") Linear Amplifier has been received from VK2AQJ. It seems that he is one of our more recent readers, who has been unable to locate the June 1957 issue of SHORT WAVE MAGAZINE, which contained the original circuit description. G2MA has recently been contacted regarding the continuing interest in his linear circuit. It is hoped that he will soon be able to advise of further developments, operating experiences and additional suggestions of interest for the many Sidebanders who are now using—or who are contemplating the construction of—this very popular linear amplifier.

The type of relay recommended for voice-controlled circuits seems to be a puzzler for many of the gang. G3DVQ (Purley) writes that he is interested in the KWS-1 circuit (as already mentioned), but would like more information about the relay specification.

In most control circuits the relay coil appears as the anode load for a triode-type valve. This relay

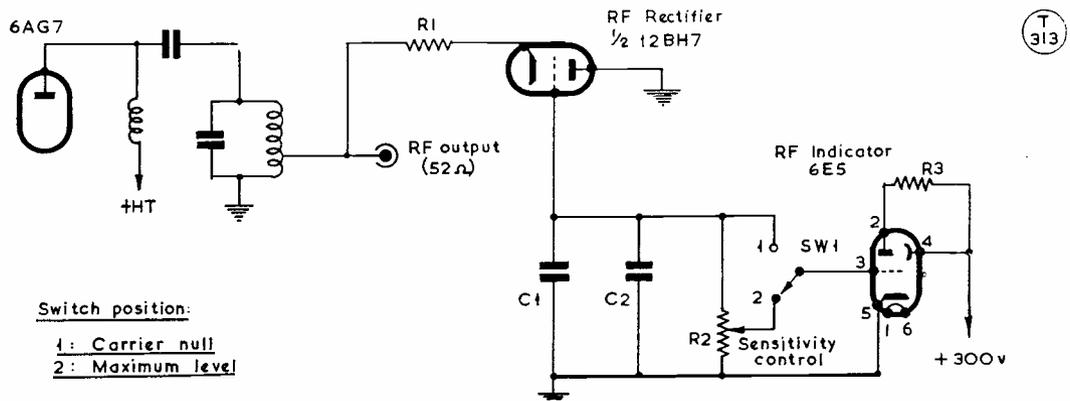


Fig. 4. The RF indicator device in the 20A Exciter. A magic-eye valve is used instead of a voltmeter. The triode rectifier may be replaced by a crystal diode. The switch can be set for maximum sensitivity, to permit carrier suppression adjustment, or for variable sensitivity using the magic-eye sensitivity control. The maximum undistorted peak output may also be observed following adjustments in the exciter.

### Table of Values

Fig. 4. The Central Electronics RF Indicator

C1 = .005 $\mu$ F	R2 = 1 megohm potentiometer
C2 = 0.25 $\mu$ F	R3 = 1 megohm, 1/2-w.
R1 = 1.000 ohms, 1-w.	SW1 = SPDT toggle

### Table of Values

Fig. 5. VOX circuit, after YUIAD

R1 = 1 megohm, $\frac{1}{2}$ -w.	R4 = 1 megohm linear potentiometer
R2 = 10,000 ohm potentiometer	Ry = 5,000-15,000 ohm DC, 1-2 mA, SPDT contacts
R3 = 250,000 ohms, $\frac{1}{2}$ -w.	

must be of a high-resistance type, with a DC resistance of from 5,000 to 15,000 ohms, and an operating current of just a few milliamperes. The number of working contacts will depend upon the circuit switching requirements. Several of the London "surplus" shops carry GPO Type 3000 telephone relays, and Siemens high-speed relays. G3WW has found that the Magnetic Devices Series 2400, with a 10,000 ohm coil, and a relay available from Porter's, of Cathedral Road, Worcester, with a 11,000 ohm coil, work well. It will make your search easier if you specify the desired DC resistance, the relay closing current, as well as the number of contacts.

### News and Views

A most interesting note from GW3LFM, who is radio officer aboard the m.v. *Cornwall*, tells of his recent visits to ZL and VK, with plans to call at U.S.A. ports in the near future. He is at present building for SSB, using a sideband unit offered by ZL1AAX, known as the Type 9A SSB Foundation Unit, which can be obtained very reasonably in New Zealand. It seems that the availability of this unit is the main reason why phasing-type rigs are so popular in ZL! GW3LFM hopes to obtain permission for maritime mobile operation, as he is at sea for ten months or more each year.

CN2DD, ex-KT1DD, a well-known 20-metre sidebander, will shortly pack up for a transfer to Germany. Your conductor has been running weekly skeds with Don for the last few years and is looking forward to his joining the Munich sideband group. CN2LS, the last of the Tangier SSB'ers, will be closing down about the same time—look for him from KH6.

OHØNC has been thinking about transistorizing the exciter, receiver and slicer. The high cost of power in OHØ presents quite a problem! OHØND, Liz, the XYL at this joint station, has finally taken to SSB with very pleasing results.

Speaking of transistors, GW2DUR has been experimenting with an all-transistor SSB exciter using OC-71's and OC-70's. A little trouble has appeared in the balanced audio circuits, which should be rectified when he substitutes some newer units. As there appears to be considerable interest in transistor applications for SSB, your conductor would appreciate receiving information from any reader who would care to pass along experiences and suggestions for the many interested Sidebanders.

K2MGE, who is one of our favourite YL sideband operators, advises that this is one of her favourite columns—nice! As a new reader, she finds that the European SSB news is of interest to the U.S. sideband group. It is hoped that Dorothy will send "SSB Topics" a photograph. (This will surely help to increase subscriptions!)

It has been suggested that a point has been

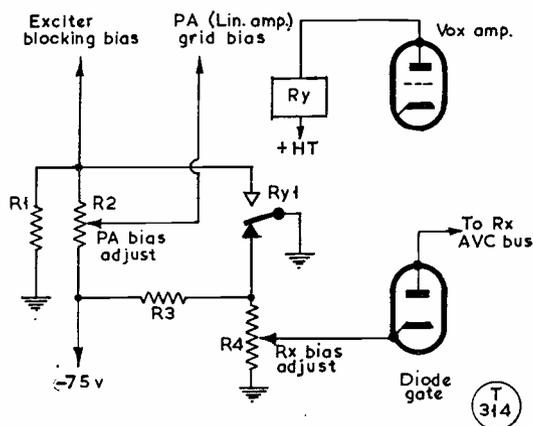


Fig. 5. A circuit, devised by YUIAD, for a voice-controlled operating system. It requires only a single-pole double-throw set of contacts on the relay; the latter should be the sensitive type, with a DC coil resistance of 5-15,000 ohms, operating at 1-2 mA only. The adjustable voltage-divider, R1-R2, sets the PA bias, and R4 the cut-off bias for the receiver. The diode may be any vacuum type. At YUIAD, this control circuit is used with parallel-6146's as the linear amplifier.

missed by the many amateurs who operate SSB exclusively. It would seem of interest to many if the statement "Single Sideband Station" appeared on each QSL, in addition to the entry "2-Way SSB QSO" in the confirming data. Several attractive QSL designs have been received featuring SSB on the face of the card. "SSB Topics" would very much like to see any card of this type, for possible reproduction in future issues.

A note of encouragement for the column has been received from a long-time protagonist for the art of amateur single-sideband, W1DX. His many contributions to *QST* and the ARRL's *Single Sideband for the Radio Amateur* are well known and have been the guiding light for many newcomers. Many thanks, By!

### New Year's Resolutions

As the end of the year approaches, one feels duty bound—by habit, choice or custom—to set down a few resolutions for readers' consideration. They apply to single-sideband, naturally. Shall we all abide by them? *It's up to you!*

- (1) Always listen on your own frequency before transmitting.
- (2) Don't be a "dog whistler" or "hello-o-o test" type.
- (3) Don't call in on a group who are listening for a DX station.
- (4) Don't call a DX station over the station who is working him.
- (5) Never, and never, overdrive your linear amplifier.
- (6) Don't be a die-hard—join the swing to sideband!

### In Conclusion

The writer wishes to acknowledge the many contributions received, both by letter and over-the-

air, from readers throughout the world. Your kind comments and encouraging response to "SSB Topics" are greatly appreciated.

The next appearance of this column will be in the February issue, for which all correspondence should be received by December 25(!). Address

"SSB Topics," c/o Editor, *Short Wave Magazine*, or direct to your conductor at Mauerkircher Strasse 160, Munich 27, Germany.

A Very Merry Christmas, a most happy and prosperous New Year—and Happy Sidebanding! *Vy 73 de Jim, DL4SV.*

## SOME NOTES ON AMATEUR D/F

*With acknowledgements to the North Kent  
Radio Society*

AT a recent meeting of the North Kent Radio Society, G3GKZ was the visiting speaker, to give a most fascinating talk on amateur direction-finding equipment and how it is used. G3GKZ hails from the well-known Slade Radio Club, one of perhaps half-a-dozen centres of amateur D/F activity. In a direction-finding event a small transmitter is thoroughly well concealed (fiendishly well is a more appropriate term, one gathers!) somewhere in the country. A number of competitors set out from an official starting point, usually fifteen or more miles away. The first person to locate the transmitter is the winner. This may not sound particularly difficult, perhaps, but, after hearing G3GKZ's talk, one began to wonder. The transmitter is only on the air intermittently, not at regular intervals. Only the frequency is known. Contestants take bearings on the transmitter, using specially-constructed portable receivers; each contestant has two colleagues, one of whom is the driver — cars are virtually essential, although results have been obtained using bicycles.

The other assistant is, until the final stages at least, the key man, having the task of transferring the bearings to a map and deciding on the route to be taken after studying the situation revealed by the map. The last part of the journey to the hidden transmitter is made on foot, and it is obviously most important to make the decision to leave the car at the right moment, as progress immediately becomes much slower. Transmitters are always located on land to which the public has free access, but, even so, the task of finding them is one requiring a great deal of patience, skill in handling the equipment and the ability to think things out clearly.

The receivers used are, of course, highly specialised. They incorporate a self-contained compass to facilitate the transfer of bearings to a map. The necessary directional receiving characteristics are obtained by the use of frame aerials, but special measures have to be taken to ensure that the horizontal polar diagram has the required "sharp" minima. Balanced input circuits and shielded aerial loops are commonly employed for this purpose. The remainder of the circuit follows fairly orthodox principles, although the usual output stage can be dispensed with, as speaker operation is not required. A BFO greatly facilitates taking bearings compared

with trying to listen to modulation. The receivers can be mounted on small turntables, again with the object of making it easier to align the set on the direction of transmission. Ideally, the frame aerial should have the well-known figure-of-eight polar diagram, and this is closely approached with careful design, but the existence of two minima means that there are two possible directions for the transmitter, 180 degrees apart (the minima are used in preference to the maxima, being very much sharper). Clearly, this ambiguity must be resolved, otherwise it is only too easy to set off in the wrong direction. This is achieved by coupling in a separate vertical rod aerial, the signal from which combines with that of the frame to produce the desired effect.

As might be expected, all sorts of pitfalls await the unwary operator. Certain receiver components, and even the LT circuits, can give rise to false compass readings, whilst the aerials must be carefully tested and calibrated under actual operating conditions. In use, the receiver must be kept well away (preferably a quarter-wavelength or more) from such objects as telephone and power lines, trolley-bus wires, railway lines and wire fences. Smaller objects, including motor vehicles, metal lamp standards and even the receivers of rival competitors can also give rise to false readings through re-radiation. A formidable list of difficulties, it may seem; but even at that, the game is not over even when the competitor gets within yards of the transmitter. At very close ranges, of course, visual searching is started, but this is far from easy, as the transmitter is usually wrapped up and stuffed in the middle of a bramble thicket, hidden up a tree or even buried in the ground, operation being by remote control.

Many and cunning are the ways in which organisers of D/F events make life difficult for competitors. Even so, many expert operators have found the transmitter within the hour, which says much for the quality of their equipment and skill in using it.

G3HKX

### "WORLD RADIO HANDBOOK" — New Edition

The 1959 issue of *World Radio Handbook* will shortly be in stock and, as always, is expected to be a fast seller. It gives the most complete details of the broadcasting systems and services of the whole world, from LF/MF to VHF, including FM and TV, with station addresses. *World Radio Handbook* is an essential buy for anyone with an interest, either amateur or professional, in BC station listening. The price of the new edition is 15s. 3d. post free, and we are expecting our first delivery by the end of this month. Orders, with remittance, to Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

# RADIO HOBBIES EXHIBITION

LONDON, NOVEMBER 26-29, 1958

THIS year's Amateur Radio Exhibition was opened at the Royal Horticultural (Old) Hall, Vincent Square, London, S.W.1, on Wednesday, November 26, by Air-Marshall Sir Raymund Hart, of the Air Ministry, supported by Vice-Admiral K. Edden, Admiralty, and Maj.-Gen. E. S. Cole (G2EC), War Office, representing the other Services, accompanied by Dr. R. L. Smith-Rose, of the Radio Research Board, and other distinguished guests. Sir Raymund stressed the importance of the radio amateur, and Amateur Radio, in the experimental field, with particular reference to the value of the knowledge and experience gained by "doing-it-yourself." And if Amateur Radio can be called a hobby rather than a serious scientific pursuit which, over the years, has made an important and lasting contribution to the science of radio communication, then from every point of view it is a hobby which is well worth fostering. The Services recognise this, and some of the greatest names in radio are proud to hold amateur call signs. After the opening, the official party toured the whole Exhibition.

By the closure at 9.00 p.m. on Saturday, November 29, last year's attendance had been far exceeded; in fact, the "Saturday crush," always a feature of the Amateur Radio Exhibition, had to be experienced to be believed; if you were not there, you will know what we mean—and if you were, you were in it!

Round the stands, a great deal of useful business was done by the 32 exhibitors who had paid for space and they were able to report themselves as well satisfied with results. It is important that good business should be done at these exhibitions, otherwise they will quickly die; directly and indirectly, it involves any trade exhibitor in a lot of money to put on a stand, and if he is to appear "next year," the results "this year" must justify the cost and effort entailed in running a four-day show. However, as it turned out, this year the whole Exhibition was on a larger scale and more lively than last year's—which itself was one of the biggest and best attended of recent years. This excellent result—for the visitors who paid to come in and the exhibitors who paid for stand space—was largely due to the energy and initiative of P. A. Thorogood, G4KD, who, having acquired the promotion rights, is now the organiser of the Exhibition.

## GENERAL REVIEW

Prominent across the Hall was the new **Minimitter** Telescopic Mast, surmounted by a shined-up Minibeam. The mast, which can be extended to a height of 34ft., weighs only 17lbs. complete, and is a one-man assembly that can be erected in a couple of hours; with production running at the rate of 50-a-week, delivery is about 14 days—all of which is not surprising when you find the whole thing only costs £10. With the "Minibeam 10/15," as shown at the Exhibition, the total cost, mast and beam, is £26.

Other **Minimitter** items on show included the M.R.38 communications receiver, giving continuous coverage over the range 1.7-30 mc, with full bandspread on the five amateur bands, costing £55; the M.R.38 is styled to match the well-known **Minimitter** five-band CW/phone transmitter, which has already been reviewed in **SHORT WAVE MAGAZINE**. And for those wanting a hot converter for the amateur bands, there is the M.C.8, which will work with almost any existing receiver to give an outstanding performance. Finally, in the /M context, **Minimitter** offer a range of mobile (whip) aerial assemblies, complete with loading coils and mounts. Altogether, a most interesting, comprehensive and enterprising display of high-grade, competitively priced gear for the amateur bands.

With the presence of **Racal** Engineering at the Exhibition, their remarkable RA.17 HF Communications Receiver—of which a production model was given, by the Exhibition promoter, as a draw prize—was a natural centre of attraction; this receiver, which embodies entirely new circuit techniques, tunes from a few kilocycles (the makers say "zero," but we find it hard to define this!) right up to 30 mc without band-switching. It has an overall stability, after warm-up, within 50 c/s and what amounts in effect to continuous band-spread throughout the whole tuning range. Though the one-off value of the **Racal** RA.17 is £400, it has found a ready market throughout the world in the military and commercial communication fields. And it will not surprise some readers to know that it can also be found in certain amateur stations as well.

## MORE NEW EQUIPMENT

With the success of the K.W. "Vanguard" already assured, the firm of **K.W. Electronics** now offer a new 100-watt CW/phone transmitter, on the same lines, called the K.W. "Victor." This runs a pair of 6146's in parallel for PA, modulated by 807's, and incorporates the new Geloso 4/104 VFO unit. In kit form for the home-constructor, the K.W. Victor, covering the 10-80m. amateur bands, costs 75 gns. complete, or 90 gns. wired up and ready to go on the air. The Victor in no way supersedes the Vanguard—one is a full 100-watt transmitter and the other a cheaper 50-watt job at 64 gns. ready wired. Both incorporate modern TVI-proofing techniques, with full screening, mains filters, and a harmonic trap circuit in the PA.

From the **K.W. Electronics** stable has also come a new receiver, the "K.W.55," which is a dual-conversion superhet with product detector (for SSB reception), IF's of 4.6 mc and 85 kc, and full coverage of the HF ranges; the price is 63 gns. In addition, they offer a converter, as a separate unit, which will make any vintage communications receiver into an excellent performer on the amateur bands, particularly 10 and 15 metres; this costs £23 complete, self-powered and in a cabinet, or £19 15s. as a kit for assembly and wiring out by the home constructor. Yet another K.W.

item of great interest is their new 150-watt RF amplifier, built as a separate unit and taking an 813, which can be run as a linear amplifier off the "Vanguard." On the aerial side, *K.W. Electronics* have recently acquired the sales agency for the Mosley 10-15-20 metre beams and vertical aerial assemblies, designed for single-line coax feed, as recently advertised in *SHORT WAVE MAGAZINE*.

Again on the theme of "do-it-yourself," the **Richard Maurice** Equipment Co. showed how over one hundred different types of TV/FM/VHF/UHF aerial assemblies could be built up from their standard components—whether for BBC/ITA reception or amateur VHF transmission. This is an ingenious and original approach to aerial construction for the frequency bands above 30 mc. Standard parts available include tube, die-cast fittings, insulators, brackets, clamps and mountings.

At last year's Exhibition, some of the "surplus market" equipment shown was—well, not very good. This year, **Relda** were showing and took the trouble to put on a display of good-quality, low priced "surplus," featuring in particular the Collins TCS gear (already discussed in *SHORT WAVE MAGAZINE*). They also showed power supply units for /M working, test apparatus, and receivers, together with a complete range of *Relda* transformers and chokes. This firm offers, in normal course of business, a same-day mail order service, and this applied to all purchases at their stand, not taken away.

A newcomer to the U.K. Amateur Radio market is the firm of **Daystrom**, handling the famous American range of "Heathkit" equipment. This is essentially factory-to-user apparatus in kit form—there is no other way of getting it. The items on offer included the DX100 and DX40 transmitters, VF1 VFO, V-7A valve voltmeter, and O-12 oscilloscope. It is a new venture for Heathkit in this country, with all the prestige of years of successful trading in the States behind it. Prices are competitive, and their stand was the focus of continuous interest.

#### TEST GEAR

An interesting item under this heading was the **Range** Electronic Treoscope, a very versatile test-bench oscilloscope with a 3-in. tube, priced at only 17 gns. This was continuously demonstrated, showing alignment procedures and the processes of fault tracing.

On the **Taylor** stand their new 172A 20-range testmeter attracted attention, by reason of the fact that it is the first "pocket-size" instrument to be produced in this country with a sensitivity of 20,000 o.p.v.; it has a fully calibrated 3½-in. scale, and resistance measurements up to 20 megohms can be made without an external DC source. In the bench-instrument size, the *Taylor* 100A has a sensitivity of 100,000 o.p.v., and can measure resistance up to 200 megohms, self-contained. Their 32A oscilloscope was being demonstrated, and another very useful instrument shown on this stand was the 68A signal generator, covering all radio and TV frequencies on fundamentals.

At the **Cossor** stand we saw their very fine 1071K double-beam oscilloscope kit, priced at £69, with excellent constructional plans and descriptive matter, making up into a handsome laboratory-type instrument.

For home-constructors, **Clare** offered kit assemblies for multi-range AC/DC meters—something which has not been done in the U.K. for a very long time—as well as transformer kits.

Enough has already been said to show that this was an Exhibition of outstanding interest in the field of Amateur Radio—and even at that we have not mentioned firms like Premier, Whiteley, Teletron, Enthoven, Philpott's Metalworks, Home Radio, Jason, and Lewcos, all showing or demonstrating the products for which they are well known.

#### GENERAL PICTURE

The side-shows included a remarkable demonstration of colour TV by G3ILI/T of Bush which, with the British Amateur Television Club exhibit, involved a quantity of complex rack-and-panel equipment; though nearly all amateur-built, it was right up to professional standards as regards presentation and picture quality. Actually, G3ILI's demonstration, for which the BBC provided some extra colour transmissions, was one of the first public showings of colour TV ever given in this country, and attracted considerable attention.

All three Services were well represented, as usual, and the R.A.F. Amateur Radio Society put on a most comprehensive exhibit, including kit and amateur-built equipment, SSB gear, and a high-power two-metre transmitter; they also had present, in person, VP8BO, who was in charge of radio communication at Shackleton Base in the Antarctic last year, and was in the crew of the little Otter aircraft which made the famous flight across the South Pole. The Army was represented by special Signals formations of the Territorial Army, showing several interesting items of equipment, including a high-power transmitter and RTTY gear, also an AR88 modified for FSK working. The Royal Navy's stand concentrated on the Communications Branch of the R.N. Reserve, for which suitable recruits are always wanted and which provides interesting training opportunities on land and at sea.

Supporting exhibitors included the Radio Society of Great Britain, with a large and comprehensive display covering all aspects of their activities; the London UHF Group, a body of specialists showing their own apparatus; the IGY Group, under G3FZL; the publishers of our respected contemporaries *Wireless World*, the *Electronic & Radio Engineer* and the *Radio Constructor*; and of the valve and CR tube manufacturers, **Brimar** and **Mullard**.

As for ourselves, we were happy to meet, once again, a large number of our readers, and business at the *SHORT WAVE MAGAZINE* stand was brisk and interesting throughout the Exhibition. And in the course of the next few months, we shall be publishing detailed test-reviews on certain items of the new amateur-band equipment mentioned in this brief report.

WHATEVER may have happened since the current dead-line, the story this time is mainly of the big October tropospheric opening, and the events flowing therefrom.

With some 40 movements claimed for the Tables, we are showing them all this month except the All-Time (which has been brought up-to-date on claims and will be included at the next opportunity). Of course, it is Countries Worked which will interest most people, as it shows a radical change, especially in the leading places. By reason of his fine QSO's with OK1VR/P (October 27) and SP6CT/P (October 28), G5YV goes to the top with 18 countries now accounted for on the two-metre band. ON4BZ got SP6CT/P, and is in second place with 17C. And here we must confess to being in a serious difficulty, thus: Several people, including ON4BZ, worked a station signing DM2ABK, from Sonneberg in Thuringen, which is in the Russian Zone of East Germany. While it would be logical to accept DM2ABK as representing a separate, new country (East Germany), in fact nobody else makes any distinction between the DJ, DL, DM stations for country-scoring purposes. Were we to do so at this delicate moment, it might upset the balance of power in Berlin, or drive a wedge between the N.A.T.O. allies—or something! As it happens, ON4BZ does not lose by this, because we gather that G5YV also worked DM2ABK, so that to accept the latter as a separate country would merely put them both up one—but, of course, there are certain stations further down Countries Worked who are affected, in that they lose a place. However, there it is—fair for one is fair for all, and your A.J.D. hopes that no bricks will be cast on this account. Indeed, Guy of ON4BZ says: "The country list is now changed for many, and it is my biggest pleasure to see again a sporting side on two metres competition"—very nicely put. As regards Harold of G5YV, he has not even claimed DM2ABK.

The contacts ON4BZ/SP6CT,

# VHF BANDS

A. J. DEVON

---

## More About the October

### Opening—

### Long-Skip Effect on EDX

### Signals—

### Big Movements in the Tables—

### Station Reports and News—

---

G5YV/OK1VR, and G5YV/SP6CT and G13GXP/OK1VR were, of course, "firsts" for their respective countries, and will be taken into "Two-Metre Firsts" accordingly—when we can get enough space to show that Table again.

A survey of all the reports received on this great opening of October 23-29 brings out a number of interesting facts. First, it is quite clear that long-skip conditions (for VHF) prevailed at certain times. When the U.K. stations were working OK1VR/P on the 27th, he could not be heard at all by ON4BZ, who was, however, getting a very weak and unworkable signal from OK1EH, not reported by any G operator. Similarly, on the 29th, the Scandinavians—LA and SM—working the London area and East Anglia quite comfortably, were just not audible at G5YV. Furthermore, many of the Midlands area stations say that for them the opening hardly existed, in that very few EU's could be heard and even fewer were worked. What these chaps found was that the whole of England was open to

them, on both bands, but hardly anything else. Again, the main Continental coverage did not extend to the West Country or the Channel Islands; GC2FZC was on, but was in the F-skip, and the more westerly G's did not hear much of the DL's. Yet another impression is that U.K. activity was not as high as it might have been; fortunately, however, there were enough stations on, sufficiently spread, for a good assessment to be made of the extent of the opening. Evidently, once again it did not extend into GM! Unfortunately, E12W could not be on at all, so that our only information from the direction of Ireland is about the G13GXP/OK1VR contact; it was G5YV who helped to hook them up, by passing the frequencies.

Another interesting and important point is that at the critical distance, the DX was very strong—in fact, G5YV says that he was doubtful about SP6CT/P because he was so loud and steady. Harold thought he was having his leg pulled until after a few overs, when SP6CT convinced him that he was a genuine /P station at Schneekoope, more than 5,000 ft. a.s.l.—which, under the conditions

---

## TWO METRES

### COUNTIES WORKED SINCE SEPTEMBER 1, 1958

Starting Figure, 14  
From Home QTH Only

---

Worked	Station
45	G5MA
39	G3HBW
38	G3JWQ
27	G3GSO, G3KQF, G3LTF
25	G3DVK
22	G3MAX
21	G3LTF/A
20	G2CIW, G3KPT, GW3MFY

---

*This Annual Counties Worked Table opened on September 1st, 1958, and will run till August 31st, 1959. All operators who work 14 or more Counties on Two Metres are eligible for entry in the Table. The first claim should be a list of counties with the stations worked for them. The list can be added to as additional counties accrue.*

---

prevailing, no doubt accounts for the S8 reports exchanged on the QSO. The location for OK1VR/P was given as Snezka, about 70 miles north-east of Prague.

What it comes to, therefore, is that if you happened to be at the right distance for the EDX, you got it good and strong; if you weren't, you hardly heard it at all. (Just like 40, in fact!).

The 70-centimetre results were also extraordinarily interesting; if anything, signals were stronger on that band than on two metres. This has happened before during a good tropospheric opening. For instance, G5YV worked ON4DW on 70 cm at S9 + 40, and there were so many stations on the band that it was not possible to log them all. Unfortunately, we have not had any very full 70-cm calls h/w lists, which would have filled out the story more—but the two-metre results are pretty well covered by the Activity Report.

### Obituary

Before going further, we have to report news which will come as a great shock to many of the VHF fraternity, and will sadden all. On October 28, Jack Wright, G3KUH of Rotherham, died very suddenly, at the early age of 36. He was taken ill over the weekend, just as the opening was developing, and was actually on the air shortly before his death. Those of his friends who have written us about this tragic occurrence all pay high tribute to him for the help he gave everyone interested in VHF in the Rotherham area, and his own unflinching interest and enthusiasm — as, indeed, we can well appreciate, as he was one of our most consistent and painstaking correspondents. G3KUH stood well in the Tables, and had made his call-sign known throughout the U.K. His constructional ability was outstanding and, apart from VHF, he was a strong supporter of the local Club and built most of their field-day equipment.

It also came as a great shock to hear of the death, on November 12, of John Hanson, G6YU of Coventry, at the age of 53, after many years of ill-health. He will be remembered as another keen

## TWO-METRE ACTIVITY REPORT

*Lists of stations heard and worked are requested for this section, set out in the form shown below, with callsigns in strict alphabetical and numerical order.*

### PEIPL, The Hague.

**WORKED:** G2CZS, 2HCG, 2NY, 3GGR, 3HAZ, 3IRS, 3JMA, 3JWQ, 3KEQ, 3LAY, 3LHA, 3LTF, 3MED, 5YV, 6AG, 6FO, 6LI, 8AL.  
**HEARD:** G6XM. (October 18 to November 15).

### G3JGJ, Paignton, S. Devon.

**WORKED:** F8RK, 9YJ, G2AHP, 2AHY, 2CIV, 2CZS, 2RY, 3AYC, 3BDQ, 3EGV, 3FIJ, 3FP, 3GKH, 3HBW, 3ICO, 3JHM, 3JMA, 3NR, 5LK, 5NF, GC2FZC, GW3MFY.  
**HEARD:** DJ3ENA, F3LP, G2ADZ, 2AUD, 2DDD, 3FCQ, 3FIH, 3FZL, 3HCO, 3LTF, 3MED, 4HV, 5CP/M (Bristol), 5OX, 5TP, 6FO, 6NB, GB3IGY, ON4ZK, PA0LQ. (October 18 to November 17).

### ON4BZ, Brussels, Belgium.

**WORKED:** DL6XA, 7FU (Berlin), LA4WC, 8KB, 8ML, 9T, OZ2BB, 3NH, 6PB, 6RI, 7DK, 9HW, SM4BIU, 5ABA, 5BRT, 5RT, 7ANB, 7BCX, 7ZN, SP6CT/P. (October 28-29 only).

### G2HDR, Stoke Bishop, Bristol.

**WORKED:** G3CCT, 3HAZ, 3HCU, 3IER, 3KPT, 3LAY, 3LHA, 6FO, GW8UH.  
**HEARD:** F8XT, G2DMN, 2NY, 3BA, 3EJO, 3EKK, 3GUX, 3HXN, 3HYH, 3IRS, 3LTF, 3MED, 5BM, 5DW, 5YV, 6NB, 8VZ, GW3HAW, 3MFY, 8SU. (Month to November 17).

### SWL Stokes, Week St. Mary, N. Cornwall.

**HEARD:** G2ADZ, 2ANT, 2CZS, 2DDD, 2DSP, 2HDR, 2JF, 2XV, 3AHY, 3BA, 3BDL, 3EKK, 3FCQ, 3FIH, 3FIJ, 3GHI, 3GKH, 3GYQ, 3HAZ, 3HCU, 3HXN, 3IRA, 3IRS, 3JMA, 3KEQ, 3LCS, 3LTF, 3MED, 4DC, 4HQ, 5BC/M, 5DW, 5KG, 5LK, 5MA, 8VZ, GW3MFY, 3MFY/P, 8UH. (October 23-29).

### SWL Karlsson, Malsryd, Sweden.

**HEARD:** DL6EZA, 0IGY, G2CZS, 3ENS, 3EVV, 3FZL, 3HBW, 3IIT, 3WS, 5KG, 5YV, 6LI, 6NB, 6YP, ON4BZ, 4ZH, 4ZK, PA0MU, 0TP. (October 28-29 only).

### SWL Davies, Prestatyn, Flints.

**HEARD:** G2ACT, 2BBU, 2NY, 2OI, 3AOS/M, 3GUX, 3HA, 3HWC, 3HYH, 3IEA, 3IKV, 3IWI, 3JAH, 3JZN, 3KYT, 3MAX, 3MED, 3MJU/A, 3MNM/A, 4GM, 5TH, 5VN/A, 5YV, 6MI, 6NP, 6XT, 6XX, GD3UB, G13GXP, 5AJ, GM3EGW, 3HLH/A, GW2FVZ, 2HY, 3JGA. (September 17 to November 17).

### G2CZS, Chelmsford, Essex.

**WORKED:** DJJXX, F8XT, G3EJO, 3EKK, 3HYH, 3JGJ, 3LHA, OZ2BB, 2EM, 3NH,

6CK, 6JI, PA0JMS, 0LQ, 0TP, 0WAR, 0WL, 0YVS, PEIPL, SM6ANR, 6BTT, 7BCX. (October 23-30).

### SWL Tomlin, Chepstow, Mon.

**HEARD:** DJ3HX, DL3VJ, F3LP, 8AV, 8QD, 8XT, 9YJ, 9LL, 9XG, G2AHY, 2BHN, 2FJR, 2HDR, 2JF, 2UJ, 3BDL, 3CO, 3EGV, 3GYQ, 3HCU, 3ICQ, 3IVX, 3JGJ, 3KPT, 3LOK, 3LTF, 3YZ, 4DC, 4PS, 5JO, 5NF, 6OU, 6YP, 8AL, 8DA, GB3IGY, GC2FZC, GW3ATM, 3HAW, 3MFY, 8UH, ON4BZ, PA0BU, 0LOP, 0WAR, 0MZ, 0TP, PEIPL. (October 1-31).

### G3WS, Chelmsford, Essex.

**WORKED:** DL3FM, 3NQ, ON4IW, 4RB, 4TQ, 4ZH, OZ2BB, 6CK, 3NH, PA0BL, 0BU, 0FB, 0MZ, 0TP, 0WU, SM6ANR, 7BAE, 7BCX, LA8MC.  
**HEARD:** LA9T, LX1SI, SM6BIU, 6BT, 7ANB, SP6CT/P. (October 22 to October 29).

### G3HBW, Bushy, Herts.

**WORKED:** DJ3OY, 4TE, DL3FM, 3VJ, 6SV, DM2ABK, F3AC, 8CT, G2BHN, 2FO, 2OI, 3AGS, 3APY, 3BA, 3ENS, 3FCY, 3GFD, 3GSO, 3HA, 3HAZ, 3HWC, 3HWS, 3HYH, 3ICQ, 3IER, 3IKV, 3ILX, 3IWI, 3JAZ, 3JGJ, 3KHA, 3KQF, 3KYT, 3MED, 3MJU/A, 3MNM, 3MNM/A, 3US, 5CP, 5YV, 6JS, 6JY, 6LI, 6SN, 6XM, 8KL, GD3UB, GM2EGW, GW2FVZ, 3MFY, LA4VC, 8MC, 9T, LX1SI, ON4FG, 4HN, 4RB, 4TO, 4ZH, OK1VR/P, OZ3NH, 7BR, PA0BL, 0CMH, 0FHB, 0JMS, 0LOD, 0MG, 0QT, 0ROB, 0ROX, 0TZ, 0WAR, 0YVS, SM6ANR, 6BTT, 7ANB, 7ZN.  
**HEARD:** DJ3HX, DL1RX, F3AK, 8AT, 8GH, 8XT, G13GXP, GM2FHH, GW2HY, 4LU/M, 8UH, ON4DW, 4HC, 4SA, OZ6RI, PA0BU, 0LQ, 0UG, SM5AY. (October 22 to November 17; All over 100 miles).

### G5MA, Great Bookham, Surrey.

**WORKED:** DL1RX, 3FM, 3YBA, F8CT, 8XT, G2AOK, 2CIW, 2DDD, 2DTP/O (Rutland), 2FJR, 2FNW, 2NM/P (Sussex), 3BDQ, 3CCH, 3ENY/M (Salon), 3GYQ, 3HA, 3HXN, 3HYH, 3ILX, 3IWI, 3JWO, 3KEQ, 3KHA, 3KPT, 3KUH, 3MAX, 3MED, 3MNM, 3MNO, 3MPS, 5JO, 5RZ, 5TP, 5VS, 5YV, 6JS, 6JY, 6UJ, 8DA, 8VZ, GC2FZC, GD3UB, G13GXP, GW2FVZ, 2HY, 3ATM, 3LJS, 3MFY, 8UH, LA4VC, ON4HC, 4TQ, OZ9AC, PA0LO, 0MZ, SM5ABA, 5BRT, 6ANR, 7ANB.  
**HEARD:** SM4BIU, 5BDQ. (October 11 to November 16).

G5CP/M, Devils Dyke, Sussex.  
**WORKED:** G2FNW, 3ADS,

3DVK, 3FIH, 3GNR, 3JWQ, 3KND, 3LAY, 3MLS, 5YV. (October 22).

### G5CP/M, 10m. S. W. Bristol, Somerset.

**WORKED:** F3LP, 8XT, G2AUD, 3IER, 3JAH, 3KPT, 3LAY, GW3ATM. (October 25).

### G5CP, Chesterfield, Derbys.

**WORKED:** DL3YBA, G3HZK, PA0CML. (October 26).

### G3KQF, Derby.

**WORKED:** DL3VJ, G2ANT, 2JF, 3EKK, 3GSO, 3HBW, 3IRA, 3JMA, 3JWQ, 3JXL, 3KPT, 3LSA, 3LVC, 3LTF, 3LHW, 3MGR, 3WS, 4MK, ON4ZK, PA0CML, 0LQ, 0TP. (October 18 to November 18).

### G3BDQ, St. Leonards-on-Sea, Sussex.

**WORKED:** DJ3ENA, DL1RX, 6WUA, F8GH, 8ME, 8NS, 8OH, 8QL, 8SX, 9QW, G2ANT, 2JF, 3ADS, 3BII, 3CNF, 3FIH, 3GNR, 3JGJ, 3LTF, 3VI, 5MA, 5MR, 5NF, 5YV, 6NB, 6YP, 8MW, LX1SI, ON4ZK, PA0BL, 0MZ. (October 22-29).

### GC2FZC, Guernsey, C.I.

**WORKED:** G2ADZ, 2AHP, 2ANT, 2BZ, 2CIW, 2DDD, 2DMN, 2FGD, 2FTS, 2HOP, 2JF, 2RY, 3DO, 3AYC, 3CCH, 3DKF, 3FE, 3FIH, 3GKH, 3GOZ, 3GSE, 3GUX, 3HBW, 3HCU, 3HTA, 3HWS, 3HXS, 3HYH, 3HAZ, 3IBI, 3IER, 3IRA, 3IRS, 3IUL, 3IWI, 3JWQ, 3JAZ, 3JGJ, 3JHM, 3JMA, 3KCB, 3KPT, 3KQC, 3KYT, 3LHA, 3LTF, 3MED, 3MEV, 3MNM/A, 3MNO, 3MPS, 4DC, 5BM, 5DW, 5MA, 5MR, 5NF, 5OB, 5YV, 6OX, 8MZ, GW8SU, 8UH, 3MFY, 3MFY/P, PA0FD, 0LO.  
**HEARD:** G2DSP, 2HDJ, 3FZL, 3ICO, 3IIT, 3IKV, GW3HAW. (August 26 to October 31).

### SWL Winters, Melton Mowbray, Leics.

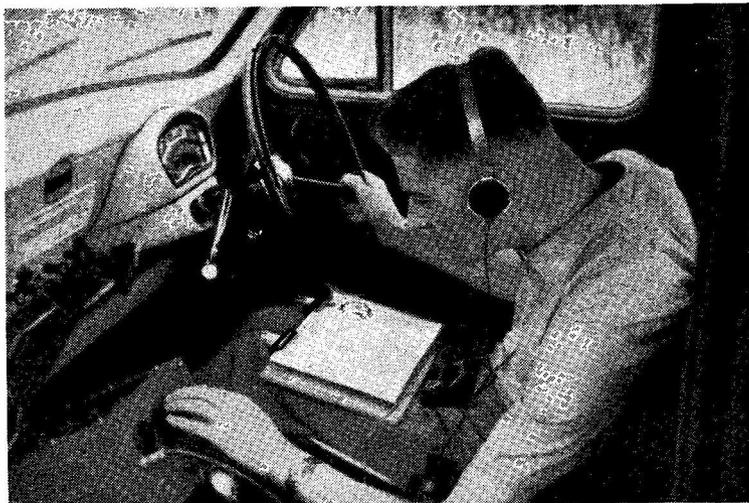
**HEARD:** DL3BJ, F3LP, G2AIO, 2ANT, 2BVW, 2FJR, 2FMO, 2FNW, 2HCG, 2HOP, 2NY, 2XV, 3ABA, 3APY/M, 3BA, 3DBM, 3DVK, 3EKK, 3EVV, 3FAN, 3GFD, 3GSO, 3HA, 3HBW, 3IRA, 3IYX, 3JAZ, 3JMA, 3JWQ, 3KEQ, 3KQF, 3KUH, 3KYT, 3LAY, 3LTF, 3LYD/A, 3MAX, 3MED, 4MK, 5CP, 5JO, 5KG, 5MA, 5ML, 5YV, 6LI, 6NF, 6SN, 6XM, 6XX, 8AL, 8VZ, GB2RS (Yorks. and Surrey), G13GXP, GW4UL/M, ON4TW, 4ZK, PA0CML, 0LQ, PEIPL, C.W: G2FNW, 3APY, 3BA, 3CCH, 3ENS, 3GSO, 3HBW, 3JMA, 3JGZ, 3JEO, 3KUH, 3MED, 5MA, 5YV, 6LI, 6NB, 6XM, 8AL, 8MW, GB3IGY, G13GXP. (October 10 to November 10).

and active VHF operator, as well as being one of our distinguished old-timers, licensed as long ago as 1923. Because of his health, G6YU had not been on so much of late, but he would come up on occasion to work anyone wanting a QSO. G6YU was engaged, in the pre-war period, in developing the police radio system in the Coventry area.

To the relatives and friends of G3KUH and G6YU we offer our sincere condolences, which we know will also be the feeling of many readers of "VHF Bands."

### The Six-Metre Band

It will be remembered that EI2W (Dublin) is licensed for 50 mc, and therefore in the happy position of being able to work real DX on a band which (these days) falls in that twilight zone between HF and VHF. Anyway, for Harry, six metres opened on October 19, when he worked K2RRG at 1323 GMT. The date and time are worth noting. It is the earliest USA/Europe opening ever recorded on 50 mc. On November 16, at 1620 GMT,



Interior installation for G3KEQ/P, CW or phone operation on two metres. The receiver is a 6BQ7A cascade and the transmitter runs a QQVO3-10 at 15 watts, the beam being a portable 4/4, slot fed, which can be pushed up to 27 feet.

EI2W had an exciting QSO with XE1PFE, for the first EU/XE contact on 6 metres—and, heaven knows, XE's are hard enough to work on any band! The 6-metre DX score at EI2W now stands at 37 States, including Delaware and West Virginia, and on the afternoon of November 22 he was working W6's. All this on phone, by the way.

This month's mail includes a number of SWL reports on 50 mc reception. F. W. Hattemore (Penarth), an old correspondent of ours, mentions 48 W/VE calls logged on November 16, including XE1PFE; but of his total, no less than 34 were from the W5 area, another instance of selective skip. SWL's Eddowes (Bournemouth), Button (Frome) and Winters (Melton Mowbray) comment similarly, except that SWL Winters also lists some W/VE stations heard on 6-metre CW during the week-end November 8/9.

### Reports and News

G6XM (Nottingham) got in with OK1VR and SP6CT and mentions that he also worked his "quota of DL, ON and PA, with the other boys." G3WS (Chelmsford) is able to advance to 14C in Countries Worked, by reason of contacts with LA8MC, OZ2BB and SM7BAE, all on October 29. It was his birthday, and "happening

to have a receiver on at work" (the bad lad!), he was hearing the Scandinavians as early as 1630; whereat G3WS put on his hat and went straight home to work them.

In a detailed summary of the events of October 23-29, G6LI (Grimsby) mentions that band-occupancy was never as great as has often been heard in the past; in fact, U.K. activity was low (which was also A.J.D.'s own impression at the time, though he allowed it that the peculiar skip condition might have been partly responsible for this). On the 25th, though many G's were working F8XT, a real-DX Frenchman, he was not coming in at all at G6LI; he was heard, but not worked, on the 26th. By the 27th, what G6LI describes as "a good mixed bag of Continentals could be heard, coming over in cartloads." At 2040 that evening, he got his QSO with OK1VR. On the 28th, G6LI worked SP6CT/P immediately after G5YV had finished with him. Another instance of skip occurred on the 29th, when G5KG was working LA8MC, who could not be heard in Grimsby. At 2126, G6LI raised SM4BIU (780 miles) and asked him if any OH's were on; SM4BIU's opinion was that the opening was not wide enough to include them.

G3GSO (Derby) was one of those apparently within the skip

## TWO METRES

### COUNTRIES WORKED

Starting Figure, 8

- |    |   |
|----|---|
| 18 | G5YV (DL, EI, F, G, GC, GD, GI, GM, GW, HB, LA, LX, OK, ON, OZ, PA, SM, SP)                               |
| 17 | ON4BZ (DL, EI, F, G, GC, GI, GM, GW, HB, LA, LX, ON, OZ, PA, SM, SP, 954)                                 |
| 16 | G3GHO, G3HBW, G5MA, G6NB  |
| 15 | G4MW, G6XM  |
| 14 | G2FJR, G2HDZ, G2XV, G3IOO, G3JWQ, G3KEQ, G3WS, G5BD, G6LI, G8OU   |
| 13 | G3BLP, G3CCH, G3DMU, G3DVK, G3GPT, G5DS, G6XX, PA0FB  |
| 12 | F8MX, G2HIF, G3FAN, G3GFD, G3GHI, G3HAZ, G3WW, G6RH   |
| 11 | EI2W, G2AJ, G2CZS, G3ABA, G3KUH, G3LHA, G4RO, G4SA, G5UD, GM3EGW  |
| 10 | G2AHP, G2FQP, G2HOP, G3BK, G3BNC, G3DLU, G3EHY, G3GSE, G3JZN, G3KQF, G5MR, G8IC, GW5MQ                    |
| 9  | G2DVD, G2FCL, G3DKF, G3FIJ, G3FUR, G3GSO, G3IUD, G5ML, GC3EBK, GM3DIQ                                     |
| 8  | G2CIW, G2DDD, G2XC, G3AEP, G3AGS, G3BOC, G3GBO, G3HCU, G3HWJ, G3KHA, G3VM, G5BM, G5BY, G8SB, G8VZ, GC2FZC |

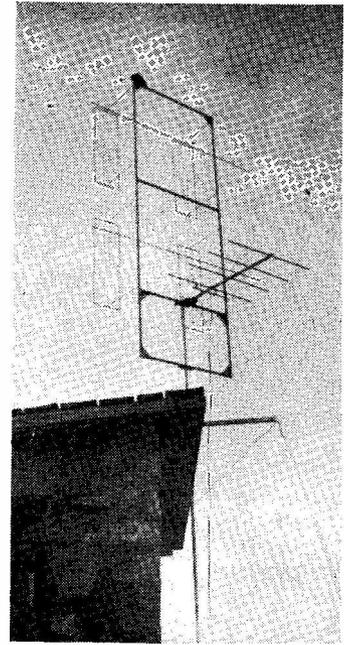
of the EDX, and only ON4ZK could be raised; he also remarks that they had to compete with the "S99-plus" signals of the more southerly stations. As already mentioned, for GC2FZC (Guernsey) the opening was U.K. only, with some PA's. G5CP (Chesterfield) says that conditions were certainly surprising and that he has never heard so much in the way of EDX being called. G2CIW (Cambridge) missed the good spell altogether, as he was away from home; however, operation /M brought him some interesting GDX contacts.

G3JWQ (Derby) got OK1VR/P and lists 12 other stations worked for the first time during the month, including F3NJ and F8XT, making his total 429S on two metres. G3BDQ (St. Leonards) remarks that the October event has done much to strengthen his interest and maintain his morale—and so it should; look at his

calls-worked list! G3BDQ is now on QRO with 100w. to a pair of 3C24 triodes, with coiled Lecher-line grid and tank circuits; this was all ready for the opening, and he was able to work the DX either on a 4-ele Yagi (EU's) or an indoor Quad (GDX); for him, a particularly interesting contact was LX1SI, on phone; it was also a thrill to work G5YV at last! G2XV (Cambridge) keeps ahead in the 70-cm Table, with G3HYH worked for a new one, and G3MAX (Manchester) is able to make some substantial claims for the Tables; during the opening, he worked two PA's, and reports ON's heard. G3JGJ (Torquay) found himself getting well into England when the two-metre band opened, and also heard some good EDX.

G3HBW (Bushey) got his OK contact by the co-operation of PAØBL, who found the frequency for him, and DL3YBA, who then asked OK1VR to listen for G3HBW. On the evening of October 29, Arnold knocked off eight LA/OZ/SM's in a row, a particularly interesting QSO being with OZ7BR, running SSB with only 35w. G3HAZ (Birmingham) writes in to remind us that he is still active and interested and managed to enjoy himself amongst the EU's during the opening—though it was a disappointment to miss both the OK and the SP, and likewise to find that few of the EU's were actually ready for 70 cm when the opportunity came; however, G3HAZ now has 60S in 20C on that band, with five countries worked and PA heard.

PE1PL (The Hague) found a few more U.K. stations to work during the month, and made a number of very interesting observations on GDX during the open spell—actually, on October 28 the two-metre band was wide open all day. Bob of G5MA (Gt. Bookham) was there, of course, and his list shows some excellent EDX worked, including SM5ABA at about 925 miles and SM5BRT at 880m. G3KEQ (Sanderstead) got in amongst the SM's and also had some nice 70-cm contacts—he goes to 27C in that Table. G3LHA (Coventry) found the opening only partial in that area, with F8XT



VHF aerial system of HB9LE, Winterthur, Zurich. Portable equipment is also operated by HB9LE, who has been to HE.

at 515m. as his best DX; he says the Continentals were only "leaking" into Coventry; however, 12 new G stations were worked, and GDX generally was very good all through the opening. G2CZS (Chelmsford) was able to get a good share of the EDX, and gives October 28-29 as the best two days—and it was quite a thrill to "work OZ's in rows"!

Reports and claims are also acknowledged from: G2DDD, G2HDR, G3DVK, G3GFD, G3KQF, GC2CNC, GW3MFY, and SWL's Davies (Prestatyn), Stokes (N. Cornwall) and Olof Karlsson (Malsryd, SM).

#### Season's Greetings

We are now at the end of the column, and dare not be late again with this piece! So, from your old A.J.D., it is every good wish for a very happy Christmas and all the best of everything for the New Year. The next issue is due on January 9, and we hope that there will be some reports for it—by **December 22**, if you can bring yourself to write in! 73 de A.J.D.

### SEVENTY CENTIMETRES

#### ALL-TIME COUNTIES WORKED

Starting Figure, 4

Worked	Station
32	G2XV
27	G3HBW, G3KEQ, G5YV
26	G3JWQ, GW2ADZ
23	G3BKQ, G6NB
22	G6NF
20	G3HAZ
18	G2CIW, G3IOO
15	G4RO
14	G2DDD, G2HDZ
12	G5BD
10	G2OI, G3IRW
9	G3LHA, G5DS
7	G2HDY, G3JHM, G3LTF
6	G3FAN, G3JMA, G3KHA G3MED, G3WW
5	G3FUL, G3IRA, G3IUD, G5ML
4	G3JGY, G3KPT

On working four Counties or more on the 70-Centimetre band, a list showing stations and counties should be sent in for this Table, and thereafter new counties worked notified as they accrue

# VHF PROPAGATION BY METEORIC IONIZATION

AMATEUR PROSPECTS ON TWO METRES

K. R. R. BOWDEN, B.Sc., A.R.C.S. (G3HQJ)

*With the approach of Geminids, and the results already obtained during the Perseids appearance, this article will be of particular interest. Our contributor has been engaged professionally on the subject.—Editor.*

**M**ETEORS are among the smaller of the bodies in the solar system. Like the earth and the other eight planets, the asteroids or minor planets, and the comets, they travel round the sun, each in its own regular path or orbit. But while the orbits of the planets are very nearly circular, and those of the minor planets are fairly circular, the comets and meteors have all shapes and sizes of elliptical orbits, with the sun at one focus—that is, near one end of the ellipse. The orbit of a meteor may therefore cross that of the earth, and a collision can occur.

The meteor, the size of a grain of sand, enters the atmosphere of the earth, at a speed of up to 45 miles a second, and is heated by friction until its surface evaporates; the whole meteor, unless it is unusually large, is quickly burnt away, emitting light and heat, and leaving behind it a trail of ionized air. The light emitted can be seen, at night, as a "shooting star." *The ionized air left behind can act as a reflector of radio waves*, in the same way as the ionosphere. The trail of ionization is typically about 10 miles long, and is formed at a height of about 60 miles, in the E-region of the ionosphere. The exact height and length of the trail depend on the mass, velocity, and direction of flight of the meteor. So does the amount of ionization produced, on which depend the strength and

duration of radio reflections. The ionization soon diffuses into the surrounding air, the maximum frequency of reflection falls, and reflection ceases, first at higher frequencies, then altogether.

### Occurrence

Because of this, the proportion of meteors which cause an appreciable reflection at 144 mc is very small; while at 36 mc the rate of one-second reflections might be one an hour, at 72 mc it would only be one every five hours, and at 144 mc perhaps one a day.

However, as well as the "sporadic" meteors which pursue their orbits singly, there are a few orbits in which an enormous number of meteors are moving approximately together. When the earth crosses such an orbit, the number of meteors hitting the earth is considerably increased for a period of a few minutes or a few days, depending on how widely the meteors are dispersed. These groups of meteors are called showers or streams, and are usually named after the constellation of stars from the direction of which they approach the earth. This direction is called the *meteor radiant*, as perspective makes the meteors appear to radiate from this point in the sky.

It is during these showers that meteor reflections can be expected with amateur equipment.

### Reflection

The strength of a reflected signal will depend on the equipment used, and on the size of the meteor which caused the ionization. The duration of the reflected signal depends on these, and also on the velocity of the meteor, which, however, varies only slightly from meteor to meteor.

It can be shown that for a communication system where the RF output power is 100 watts, the gain of transmitting and receiving beams is 10 each, the wavelength two metres, the distance between stations 600 miles, the noise-factor 4, and the receiver bandwidth 1 kc, the signal reflected from a meteor of sufficient size to give a one-second echo is 30 times noise, that is, 15 dB above noise, or about S5. Given

Occurrence of Meteoric Showers

SHOWER	DATE OF MAXIMUM	RADIANT BELOW HORIZON (GMT)	VISUAL RATE (per hour)	VELOCITY (km/s)	RADIO RATES FOR DURATION		
					1 sec.	10 sec.	100 sec.
Average 1 meteor in							
Perseids	Aug. 9-14	never	50	60	1 hour	3 hours	10 hours
Geminids	Dec. 13-14	1200-1700	60	35	1 hour	10 hours	100 hours
Quadrantids	Jan. 3	never	35	40	2 hours	20 hours	200 hours
Arietids	} June 1-16	1800-0300	—	40	2 hours	20 hours	200 hours
Zeta-Perseids				30			

Our five strongest regular meteor showers. The Arietids and Zeta-Perseids appear only in daytime, and so are not seen visually. The radio rates are approximate, being based on extrapolation from observations at lower frequencies, and are for an aerial having a 45° beam-width and useful acceptance down to 10° elevation.

good equipment, a reflection which lasts long enough to be useful will also be of sufficient strength, but only just! Note that a reflection lasting 100 times longer is only 5 dB, or one S-point stronger—so if you cannot hear the short ones you probably won't hear the long ones, either. But note also that a signal from half the distance is eight times stronger, that is, 9 dB (two S-points).

The reflected signals suffer from severe fading and fluttering, as high-altitude winds distort the ionized trail, giving multiple propagation paths with rapidly varying phases.

### Showers

The five strongest regular showers are listed in the accompanying table, with their dates of maximum activity, and times at which the meteor radiant is below the horizon in Europe (when, of course, no meteors can be seen). The rate of meteors seen by a visual observer at the shower maximum, and the velocity of the meteors relative to the earth, are also given, although they have no direct bearing on radio observations. The remaining columns show the approximate rate of reflections lasting longer than 1, 10 and 100 seconds, using aerials with a horizontal beam-width of 45° and useful radiation down to about 10° elevation. These rates are proportional to the horizontal beam-width, and are also increased by using a lower angle of radiation. In all cases but

the Perseids, it will be seen that if there are a certain number of reflections longer than one second, then there are only one-tenth as many longer than 10 seconds, and so on. In the case of the Perseids, however, there are one-third as many—the Perseid shower contains a relatively higher proportion of large meteors. This makes the Perseids by far the best shower for meteor reflection experiments.

In the past there have occasionally been other showers of exceptional intensity. For example, the Giacobinid stream gave visual rates of 5000 an hour, for about 10 minutes on October 9/10 in 1933 and 1946. It is possible that it will do so again in 1959, in which case meteor reflected signals should be *almost continuous for the period of the shower*.

The maximum distance that can be covered in a single-hop meteor reflection is 1400 miles, and this requires both aerials to radiate at 0° elevation! With radiation at 10°, the maximum distance is 600 miles, and at 20°, 300 miles.

### Other Bands

The discussion has so far been restricted to the two-metre band. However, it is worth noticing that a meteor giving a certain reflection on two metres will give one of four times the duration and 10 dB stronger on four metres, and 25 times the duration and 20 dB stronger on 10 metres.

### Conclusion

The requirements for successful experiments in meteor reflection may, perhaps, be summarized as follows:

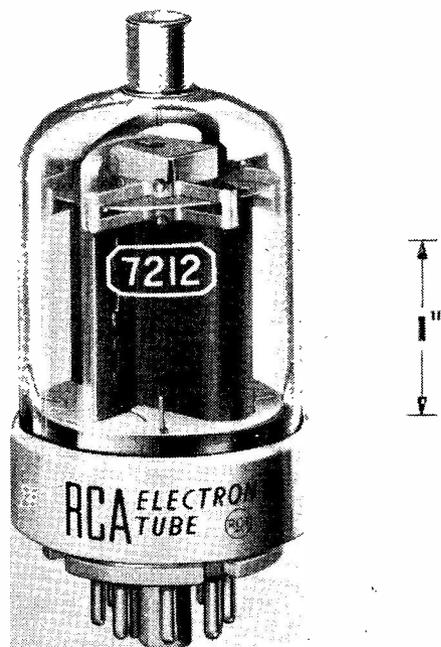
- (1) High transmitter power.
- (2) Aerial with wide horizontal beam, narrow vertical beam at low elevation, gain 10 dB or more.
- (3) Good receiver noise factor.
- (4) Narrow receiver bandwidth.
- (5) Stable receiver, accurately calibrated and set on required frequency.
- (6) Carefully-planned schedules.
- (7) Patience.
- (8) Luck.

For those with not-quite-so-good equipment, GDX schedules should be possible, and equally interesting, if not so spectacular.

It is to be hoped that more stations will organise tests of this nature, following the recent demonstration by G3HBW, SM5BDQ and SM6BTT that it is possible, and while the Perseids in August must take first place, the Geminids on December 13-14 might well be worth a try.

### "QST" PRICE INCREASE

We are informed by the ARRL that, consequent upon an increase in American postal rates to be effective from January 1st, the subscription rate for *QST* has had to be put up to \$6.00, or 43s. sterling for a year of 12 issues. It should be noted by those interested in *QST* that we can accept subscription orders, and renewals of subscriptions. As dollar-sterling exchanges and bank transfers are involved, orders can be placed only through an authorised agency, such as Short Wave Magazine, Ltd.



This is the new R.C.A. 7212 beam tetrode, which can be run at 90w. input, ICAS, up to 60 mc, and at 60w. up to 175 mc, with plate voltages of 750v. and 400v. respectively. As a modulated RF amplifier in Class-C, the 7212 calls for a grid driving power of less than ½-watt for an RF output of 50 watts.

# NEW QTH's

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

**DL2AH**, 4198075 SAC Tregale, A. D., Signals Section, R.A.F. Station, Geilenkirchen, B.F.P.O. 40.

**G3FFI**, Barnet and District Radio Club, c/o D. J. Bradford, 49 Elvendon Road, London, N.13 (*re-issue*).

**G13MMF**, B. W. McAleer, 42 Woodvale Avenue, Belfast.

**G3MPB**, A. R. Smith, 8 Quarry Road, Tupsley, Hereford.

**G3MRC**, B. Poole (*VS1FW/V52FW*), 53 The Walronds, Tiverton, Devon.

**G3MUT**, C. G. Tomkinson, Corris, Abbey Lane, Hartford, Northwich, Cheshire.

**G3MVF**, H. C. Probert, 5 Bromyard Road, St. John's, Worcester, Worcs.

**G3MXR**, J. Wood, 1 Beaumont Terrace, Gosforth, Newcastle-on-Tyne, 3.

**G3MZR**, G. W. Gay, 84 Bonner Road, London, E.2.

**G13MZX**, M. Pedreschi, 16 Park Road, Dungannon, Co. Tyrone.

**G3NAS**, W. K. Ginder, 122 Chester Road North, Sutton Coldfield, nr. Birmingham, Warks.

**G3NBI**, R. Smith, 3 Hunter Hill Road, Mixenden, Halifax, Yorkshire.

**G3NBT**, R. J. Burr, 64 York Avenue, Sidcup, Kent. (*Tel.: Footscray 5086*).

**G3NBX**, A. W. Phillips, 8 Merrifield Terrace, Torpoint, Cornwall.

**G3NCC**, D. J. Cousins, 3 Halcombe Estate, Chard, Somerset.

**G3NCH**, W. Houghton, High Ridge, Claremont Avenue, Clitheroe, Lancs.

**G3NCK**, W. Dennis, 54 Langley Crescent, St. Albans, Herts.

**G3NCL**, R. Ray, 16 Holystone Avenue, Gosforth, Newcastle-on-Tyne, 3.

**G3NCR**, D. Rae, Branting Balk, Shoppenhangers Road, Maidenhead, Berkshire.

**G3NCZ**, K. Heap, 138 New Bank Road, Blackburn, Lancs.

**G3NDD**, A. K. Tunnah, 16 Louvaine Avenue, Barrow Bridge, Bolton, Lancs. (*Tel.: Bolton 3381*).

**G3NDF**, R. Cathles, 4 Dawnay Road, Gt. Bookham, Surrey. (*Tel.: Bookham 3291*).

## CHANGE OF ADDRESS

**G2AQJ**, R. Collins, 93 Eldred Avenue, Brighton, 5, Sussex.

**G2BZQ**, R. Q. Marris, 52 Mill Street, Kidlington, nr. Oxford.

**G2DPD**, R. H. B. West, 3 Raymond Way, Stevens Lane, Claygate, Surrey.

**GW2OP**, G. C. Price, Hilcourt, Freshwater East, Pembroke, Pems.

**G3AFN**, W. E. Brown, 12 Manor Road, Teddington, Middlesex.

**G3AHE**, G. James, Basement Flat, 1 Clifton Terrace, Southend-on-Sea, Essex.

**G3AJX**, G. Stanton, 44 Lynford Way, Winchester, Hants.

**G3AWL**, C. N. Perry, 134 Mansfield Road, Warsop, Mansfield, Notts. (*re-issue*).

**G3BF**, H. F. H. Palmer, 57 Fellows Road, Hampstead, London, N.W.3.

**G3EGG**, W. L. Middlemiss, The Flat, Heathbourne House, Bushey Heath, Herts.

**G3FN**, Dr. A. H. B. Cross, 9 Moorbank Close, Sheffield, 10. (*Tel.: Sheffield 35140*).

**G3FYX**, R. W. Emery, 106 Queensholm Drive, Downend, Bristol.

**G3GKH**, M. D. Johnson (*ex-ZL3QC / HZ1XA / MM*), 20 Church End Lane, Tilehurst, Reading, Berks. (*Tel.: Reading 67876*).

**G3GZA**, D. J. West, 9 High Street, Wells, Somerset.

**G3HEV**, Ravensbourne Amateur Radio Club, Malory Secondary School, Launcelot Road, Downham, Bromley, Kent. (*QSL via G2DHV*).

**G3HLV**, J. W. Martin, 38 Clifton Road, Crouch End, Hornsey, London, N.8. (*Tel.: Mountview 4036*).

**G3HTN**, R. C. Fermor, 33 Burry Road, St. Leonards-on-Sea, Sussex.

**G3INQ**, W. J. Fuller, 35 Stokesley Road, Marton, Middlesbrough, Yorkshire.

**G3KEP**, D. M. Pratt, Glenluce, Lyndale Road, Eldwick, Bingley, Yorkshire.

**G3KSL**, D. G. Quarrington, 1 Madden Avenue, Chatham, Kent.

**G3KTX**, J. V. Tomlinson, 88 Linby Road, Hucknall, Notts.

**G3KVP**, D. Kitchen, 50 Rosefield Road, Woolton, Liverpool, Lancs.

**G3LCK**, D. J. Bradford, B.Sc., 49 Elvendon Road, London, N.13.

**G3LIL**, B. E. Folds, Tudor Cottage, Highclere, nr. Newbury, Berks.

**GM3LKF**, J. Farquhar, 30 Kirklands Road, Kirkwall, Orkney.

**G3LPA**, C. R. Coombe, c/o 15 Cleaves Close, Thorverton, nr. Exeter, Devon.

**GM3XO**, J. R. Macpherson, Leydene, Tarvit Avenue, Cupar, Fife.

**GM4GX**, F. W. Cole, c/o 32 Fuller Street, Cleethorpes, Lincs.

**G4NL**, D. G. Hammond, 15 Cockethurst Avenue, Leigh-on-Sea, Essex.

**G5FI**, G. R. Scott-Farnie, 803 Raleigh House, Dolphin Square, London, S.W.1. (*Tel.: VICTORIA 3800—Raleigh 803*).

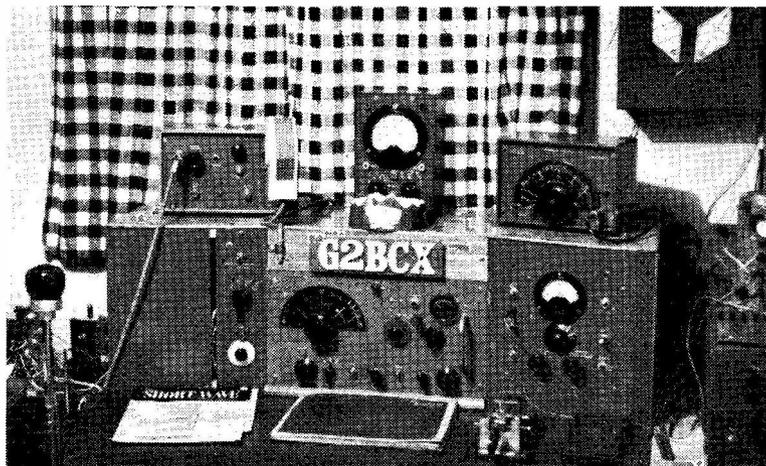
**G8TS**, J. St. C. T. Ruddock, 85 Grand Drive, London, S.W.20.

## CORRECTION

**GW3LXI**, G. H. Price, 1 The Parade, Pembroke, Pems.

# THE OTHER MAN'S STATION

G2BCX



THE station that is now G2BCX—operated by F. C. Judd at 152A Maybank Road, South Woodford, London, E.18—was first licensed AA (“artificial aerial”) as 2BCX in 1934, the full call being issued in 1946. A particularly interesting feature of the station is that all equipment is, and always has been, *entirely home constructed*.

The present-day layout, as the photograph shows, makes use of a console which houses all essential equipment including power supplies. The receiver, which can be seen directly under the call sign plaque, is a conventional superhet with the RF gain control calibrated in micro-volts. This and other facilities are used for field strength measurement in conjunction with a Teledeltos pen recorder which can be coupled to the receiver, for continuous recording of signal strength, CW signals and other transmissions. A low-level audio output is also provided for direct feed to a tape recording amplifier.

Other features of the station are a ferrite DF loop which is mounted on the roof and controlled from the operating position, and the frequency checking system consisting of a 100 kc oscillator and 10 kc co-sine

counter which can be locked to the BBC's Droitwich transmitter from a three-stage 200 kc amplifier.

The two similarly cased units above the receiver and control panel are a speech amplifier and VFO to the left and right respectively, with the 160/80-metre transmitter and oscilloscope just visible to the right of the photograph. A new transmitter for the HF bands is at present under construction.

Also part of the station equipment is the tape recording system, entirely home constructed, including the tape deck. This is housed in a console and has provision for stereophonic recording and playback and direct patching to the transmitter for high quality transmission of recordings.

The station main aerial is a vertical radiator 72ft. high for 160 and 80 metres (described in the June, 1958 issue of SHORT WAVE MAGAZINE). Other equipment includes a battery operated portable transmitter/receiver for emergency work and the mobile transmitter and receiver for 160 and 80 metres, mounted in the now-famous 1934 Morris Minor BMD-711 which has completed over 10,000 miles of mobile operating with Top Band contacts in nearly all the counties of England and Wales.

## RESULTS OF A POLL

A random analysis of our readership during the last six months discloses some very interesting facts. Of the total, 51% hold amateur call-signs and are not connected in any way with the radio trade or the industry. Of the remainder, 29% are professional radio engineers of one sort or another, and of *them* no less than 86% hold call-signs. Our SWL's account for 14% of the total readership, and the remaining 6% classify themselves as “just interested in radio.”

More than 20% of the total readership is overseas, mainly in the Commonwealth, but 73 countries outside the U.K. are represented. Practically all overseas readers hold call-signs.

Until we made this survey, our own estimate of “professional amateurs” was rather higher than it has, in fact, turned out to be. We also thought we had a larger proportion of SWL's. And it is interest-

ing to find that the bulk of the new readership during the last year or so has been drawn from overseas, mainly Canada and the United States.

## PAN-PACIFIC JAMBOREE

Further to the note on p.370 of the September issue of SHORT WAVE MAGAZINE, a specially licensed station signing ZL1PPJ will be installed at Auckland, where the Pacific Scout Jamboree is being held during January 3-10, and is to be manned by prominent ZL operators. Activity will be mainly on the 14, 21 and 28 mc bands, phone and CW, with the station on the air every day from midnight to 1000 GMT. All ZL1PPJ contacts will be QSL'd by a special card being minted for the occasion. Scout stations, and those interested in the Scout movement, are specially asked to look for ZL1PPJ.

# THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for February issue: JAN. 16)

---



---

*Note: Next month this space will be given over to a full report on MCC*

THE Thirteenth "MCC" will be over before you read these notes, but they were naturally being written during the early stages of the event. However, it was obvious that all was going well on the first Saturday and Sunday afternoons, with what sounded like a record entry—something over 40 Club callsigns were noted by the invigilators, and the LF area of the 160-metre band was throbbing with activity. The most pleasing feature was the number of new and unfamiliar calls logged, from Clubs who have never entered before.

This space, next month, will contain a full report on the event, with tabulated results, and therefore, as always, there will be no Club Notes in the usual fashion. Secretaries are reminded, therefore — **No Club Notes Next Month** . . . and see above for the closing date for the *February* issue, for which they should, of course, send details of meetings from February 7 onwards.

## Helping Hand

We are always glad to pass on good ideas to the Club fraternity, and this month we have one from **Torbay**. They have decided to undertake the repair of minor items of equipment used at Hawkmoor Chest Hospital, Bovey Tracey, for the patients' own internal "Radio Hawkmoor" programme. Difficulty has been experienced by the Hospital, in the past, over the repair of headphones, amplifiers, wiring and so forth, and this work is ideally suited to the efforts of a local Club such as Torbay. Many others could doubtless follow suit—think it over!

## Greetings

Finally, from your "Club Secretary," hearty Christmas wishes to all Club Secretaries, officers, committee members and Club members, wherever they may be, and however active they may be! We hear from a vast number of them in the course of the average year: so Greetings to them all, wishing them the merriest of Christmases and a Prosperous and Productive 1959.

And so to this month's Activity Reports . . .

**Bradford** meet on December 16 for a talk by G3IBN on Resistor/Capacity Bridges, and again on December 30 for a Film Show. At recent meetings they have had a demonstration of Hi-Fi Equipment by G3LZW, of VHF by G3GFD, a Quiz and a

Junk Sale. Meetings are at 7.30 p.m. with Morse practice for half-an-hour beforehand. Note secretary's new address, in panel.

**Brighton** recently held their AGM and elected Mr. E. Roberts secretary, Mr. R. T. Henley chairman and Mr. R. Langridge treasurer. They meet at the Eagle Inn, Gloucester Road, on Tuesdays at 8 p.m.: on December 9 for two Brooks Motor Films, on the 16th for a Tape Lecture (Capt. P. P. Eckersley) and on the 23rd for a talk on DX by G3YY.

The **British Two-Call Club** now publishes a roneoed magazine, available to its members for 5s. p.a., and application forms for membership are available from the secretary, G2DHV. It is open to all those who have held two or more call-signs, one of which must have been held overseas. The **Chiltern** Amateur Radio Club is a newcomer to these pages, and meets at the British Legion Hall, St. Mary Street, High Wycombe, on the last Thursday of the month. See panel for secretary's QTH.

The **Civil Service** Radio Society is the original Science Museum Radio Society, which has been re-named with a view to attracting a wider membership. Monthly meetings are held (usually the first Tuesday) in the Science Museum, South Kensington, and their scope embraces practically all aspects of radio. On December 8 they are holding a Film Show in the Lecture Hall, with five assorted films; on January 5 there will be a talk on Capacitor Techniques and Peculiarities (T.C.C.); and on February 9 a Hi-Fi and Stereophonic Sound demonstration (Tannoy).

**Clifton** held their Anniversary Social during October, which attracted a gathering of about 50 members and friends. On October 31 members took part in a competition, the object of which was to build an 0-V-0 receiver in one hour (the winner took 44 minutes!). **Cornish** held their November meeting at the YMCA, Falmouth, and report a steady growth and a membership of over 80. Exiles from the county are kept in touch through their publication *The New Link*.

Recent events at **Enfield** have included a talk on G9AED (the pilot station for ITA); a Technical Forum; and the Group's exhibition of home-built equipment, with a competition for the best exhibit.

**Halifax** met on November 4 for a lecture by

G3ADG on Transmitters. It was decided that future meetings should be held at fortnightly intervals instead of monthly, and these will now take place on the first and third Tuesdays. The first will usually be a lecture and the second an Open Meeting. The **International Ham Hop** Club circulate their news letter, *Ham Hop News*, to members. This contains lists of members, gossip items and many facts of general interest. Full details available from the hon. sec. (see panel).

**Hastings** recently held their AGM and elected Dr. T. H. Parkman, G3MGQ, as chairman, other officers being unchanged. Future policy includes the creation of a more attractive clubroom and the preparation of an organised programme of meetings with a view to increasing membership and improving attendances. The Horst Jens Trophy was awarded to the club's second sightless member, G3MTX, in recognition of his achievement in obtaining his licence with only five months' study. Meetings are held every Tuesday at the Clubroom, 22 Middle

Street, Hastings.

**Oxford** will be meeting on the second and fourth Wednesdays, 7.30 p.m. at the Cherwell Hotel, Water Eaton Road, Oxford. Starting at the end of January there will be a series of six lectures on Transistors for Amateurs. **Ravensbourne** now meets at the Malory Secondary School, Launcelot Road, Downham, Kent, Wednesdays at 8 p.m. in the Science Room. The Club transmitter G3HEV will be in use each week, and a Radio and TV instruction class will be held at the same time. Morse can be arranged if desired.

**Wellingborough** will meet on December 11 for a talk on Radio Counter-Measures during the last war. On the 18th they will be holding their Annual Christmas Party at the Peacock Inn. The AGM is arranged for January 8 at their Silver Street Clubroom.

**Lothians** are seeking new premises in which their activities can be carried out more successfully, and a club Tx is naturally part of the plan. In November they visited the Scottish TV studios in Glasgow, and on December 18 they will be hearing a talk on Electronics in Industry. Local amateurs and SWL's always welcome at the meetings at 25 Charlotte Square, Edinburgh.

**Tees-side** announce their annual Christmas Dinner, which will take place on December 13, 7.30 p.m., at Settlement House, Newport Road, Middlesbrough. Mobiles will be talked in at 6.30 p.m. by G3LXG/A. Raffles and prizes will be part of the festivities, but there will be no guest speaker this year; a new venture will be a "swap table" to which all guests are invited to bring surplus gear, all transactions being privately arranged. Reservations (10s. 6d.) to the hon. sec. before December 10, please. And the January meetings will be on the 9th and 23rd. **Torbay** are working on their new headquarters building, and an R.1155 has already been donated. At a recent meeting G5SY, their president, lectured on aerial propagation patterns, demonstrating miniature systems with a 2500-mc transmitter and receiver. The Club is growing rapidly and about 40 members were present. G3MYL has been appointed press and publicity officer.

**Aberdeen**, after a Junk Sale on December 5, proceed with a Mullard Film Strip in the RAE series on December 12, a repeat of last year's "Christmas Do" on the 19th; and for the following two Fridays, including Boxing Day, their Clubroom will be open for ragchews. **Leicester** held their AGM, electing G3GAP chairman and G3MCP secretary, and continue to meet every Monday, 7.30 p.m. at the Old Hall Farm, Braunstone Lane, Leicester.

**Port Talbot** meet fortnightly (first and third Tuesdays) at the Talbot Arms, Taibach, Port Talbot, for normal meetings on the first Tuesday and at GW5VX for RAE lectures and slow Morse on the third Tuesday.

**Ringwood** are progressing rapidly, and holding weekly meetings at 23 Merryweather Estate, Ringwood. They ran an exhibition (but without a fully-operative transmitter) at the Ringwood Carnival, to which there were 2,000 visitors: this brought them

**NAMES AND ADDRESSES OF CLUB SECRETARIES REPORTING IN THIS ISSUE:**

**ABERDEEN:** W. K. Heggie, 80 Leslie Terrace, Aberdeen.  
**BARNET:** E. W. Brett, G3LUY, 28 Edward House, Edward Grove, New Barnet.  
**BRADFORD:** D. M. Pratt, G3KEP, Glenluce, Lyndale Road, Eldwick, Bingley.  
**BRIGHTON:** E. Roberts, 9 Clifton Hill, Brighton 1.  
**BRITISH TWO-CALL CLUB:** G. V. Haylock, G2DHV, 63 Lewisham Hill, London, S.E.13.  
**CAMBRIDGE UNIVERSITY:** R. Kerley, G3MIK, St. John's College, Cambridge.  
**CHILTERN:** R. Barton, 11 Glade Road, Marlow, Bucks.  
**CIVIL SERVICE:** G. C. Voller, G3JUL, Science Museum, South Kensington, London, S.W.7.  
**CLIFTON:** C. H. Bullivant, G3DIC, 25 St. Fillans Road, London, S.E.6.  
**CORNISH:** J. Brown, G3LPB, Marlborough Farm, Falmouth.  
**COVENTRY:** A. Noakes, G2FTK, 4 Baron's Field Road, Coventry.  
**DERBY (A.R.S.):** F. G. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby.  
**DERBY (S.W.E.S.):** J. Anthony, G3KQF, 56 Sherwood Street, Derby.  
**EAST KENT:** D. Williams, G3MDO, Llandogo, Bridge, near Canterbury.  
**ENFIELD:** V. Croucher, G3AFY, 15 Nelson Road, London, N.15.  
**FLINTSHIRE:** J. Thornton Lawrence, GW3JGA/T, Perranporth, East Avenue, Bryn Newydd, Prestatyn.  
**HALIFAX:** A. Robinson, G3MDW, 7 Upper Brookholes, Ogden, Halifax.  
**HASTINGS:** W. E. Thompson, G3MQT, 8 Coventry Road, St. Leonards on Sea.  
**INTERNATIONAL HAM HOP CLUB:** G. A. Partridge, G3CED, 17 Ethel Road, Broadstairs, Kent.  
**LEICESTER:** P. G. Goadby, G3MCP, 535 Welford Road, Leicester.  
**LOTHIANS:** L. Lumdsen, 33 Hillview Drive, Edinburgh 12.  
**MEDWAY:** C. Cheesman, 265 Cliffe Road, Strood, Kent.  
**MIDLAND:** C. J. Haycock, 360 Portland Road, Edgbaston, Birmingham 17. (TV Hon. Sec.: F. J. Rawle, 16 Kings Road, New Oscott, Birmingham 31.)  
**OXFORD:** J. Hickling, G3GCS, 33 Chestnut Road, Botley, Oxford.  
**PORT TALBOT:** H. G. Hughes, GW4CG, 20 Austin Avenue, Porthcawl, Glam.  
**RAVENSBOURNE:** J. Wilshaw, G3MPX, 4 Station Road, Bromley, Kent.  
**RINGWOOD:** K. Cutler, 10a Moors Close Hurn, Christchurch.  
**NEWFORD:** L. S. Owen, G3MDP, 53 Applegarth Drive, Newbury Park, Ilford.  
**SLADE:** C. N. Smart, 110 Woolmore Road, Birmingham 23.  
**SOUTHGATE:** A. G. Edwards, G3MBL, 244 Ballards Lane, North Finchley, London, N.12.  
**SPEN VALLEY:** N. Pride, 100 Raikes Lane, Birstall, near Leeds.  
**TEES SIDE:** A. L. Taylor, G3JMO, 12 Endsleigh Drive, Middlesbrough.  
**TORBAY:** G. Western, G3LFL, 118 Salisbury Avenue, Barton, Torquay.  
**WIRRAL:** H. V. Young, G3LCI, 9 Eastcroft Road, Wallasey.

many new members. They are still looking round for a permanent clubroom.

**Slade** have a Hi-Fi demonstration on December 5 and a programme called "Fun and Games" on December 19. **Romford** will be hearing all about Semi-Conductors on December 9, and there will be a lecturette on Amplifier Design on the 16th. The 23rd is an Open Evening, and January 6 is the date for the AGM.

The December lecture for **Flintshire** was on December 1, concerning Receivers, by GW3JGA/T. On January 8, the next meeting, GW2CCU will be "Looking Back." **Derby** (S.W.E.S.) will see the film "Made for Life" on December 11, and will have an Open Evening on the 18th. On January 1 there will be a Tape Lecture on TVI and on January 8 a Junk Sale.

**Derby** (A.R.S.) have a Film Show on December 10, their Annual Christmas Party on the 12th, and meetings on the 17th, 24th and 31st. On January 7 there will be a Junk Sale. **Spem Valley** are booked for a Hi-Fi demonstration on December 10; on January 7 there will be a Film Show. Both meetings will be at a new venue they are trying—Heckmond-wike Co-op Library, Regent Street.

**Cambridge University** met on December 2 to see four films on Transistors. Their programme for the New Year is not yet announced. **Barnet** have a Junk Sale on December 30 and a talk on K-W Electronics products on January 27.

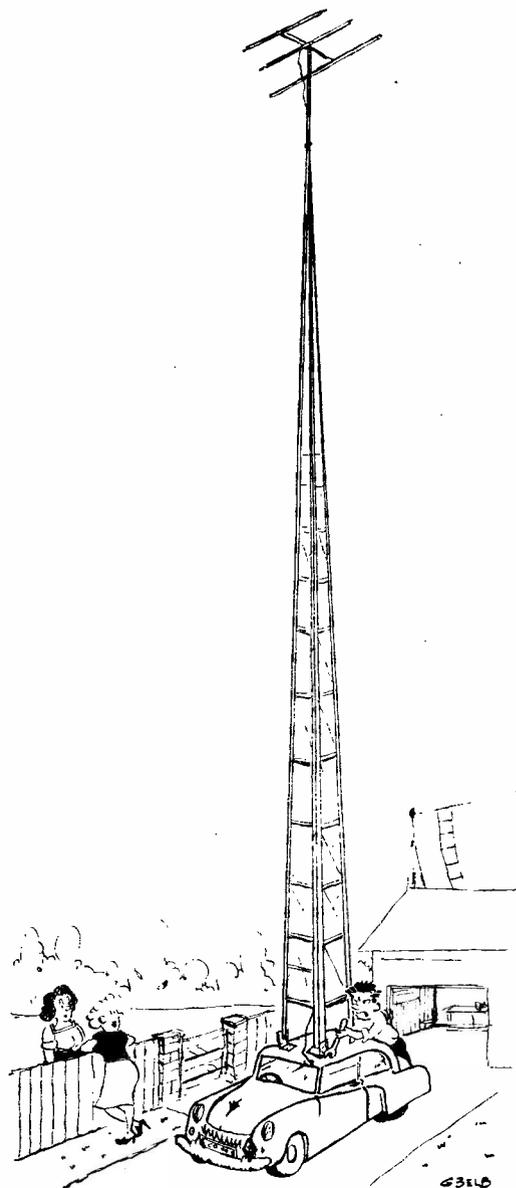
**East Kent** spent much of their time preparing for MCC, in which event they took part with a team of six operators, using a 200ft.-long wire, 80ft. up. **Southgate** attracted 60 members and visitors for the lecture and demonstration on Stereophonic Sound, by G6OT. ZS6VU of Johannesburg was a welcome guest. On December 11 they will meet at Bowes Road School instead of their usual QTH for the AGM. At this meeting they hope to have a tape-recorded "Surprise Item" in the Christmas spirit.

**Wirral** will be holding a Quiz Night on December 5, with members of the **Liverpool** club taking part. December 19 will feature SWL Evans on Modernising the HRO. A Morse Class is now being arranged, and the secretary would like to hear from all those interested.

The next meeting for **Coventry** (C.A.R.S.) is on December 8, for a recorded lecture on Receivers by G2IG, at 7.30 p.m., 9 Queen's Road, which is open every Tuesday for Morse practice and every Friday for the use of members. The C.A.R.S. annual dinner, the 26th of the series, was held on November 14, and was a great success; principal guest was G3HBE, the president of M.A.R.S., who handed over the inter-club trophy for which M.A.R.S. and C.A.R.S. fight it out annually; the club trophies were also presented, by Mrs. G2LU, to G2FTK, G3LNO and SWL Morton.

**Medway** hold regular fortnightly meetings at the "Viscount Hardinge," High Street, Gillingham, at 7.30 p.m. on Mondays, the next being on the 15th. For the next six months **Midland** (M.A.R.S.) have a fine programme of lectures and demonstrations, all being held on the third Tuesday of each month

at the Midland Institute, Paradise Street, Birmingham, at 7.30 p.m. Visitors are always welcome at these meetings. The B.A.T.C. (Midlands Group) has now come under the wing of the society and is known as the *M.A.R.S. TV Group*, meeting for lecture-demonstrations on the first Thursday in every month, at the Midland Institute. Other M.A.R.S. activities in hand are participation in the Midland Institute Conversazione during January and the organisation, jointly with Stoke-on-Trent, of the North Midland Mobile Rally next April.



"... Says he'll show 'em at the next Mobile Rally...."

## TOP BAND IN WESTMORLAND

### WIRRAL'S OCTOBER EXPEDITION

N. KENDRICK (G3CSG)

WE read a lot these days of expeditions, and one sometimes wonders what it is that sends people to out-of-the-way places. Some say that it is to become rare DX, others to give chances for county-chasers — but if we look facts in the face, we really go for the fun of it.

To this end eight members of the Wirral Amateur Radio Society decided on a week-end expedition to the county of Westmorland, one of the so-called "rare" counties for the *Short Wave Magazine* WABC Certificate. It was decided that the scope of the venture should be widened to include 144 mc and the HF bands, as well as the usual Top Band working.

Transport was always the problem, but eventually two vans and a saloon car were made available. The size of the vans precluded the taking of the masts and aerials desirable for the HF bands, but room was found for a three element rotary beam and mast for 144 mc.

Three transmitters and three receivers were taken, and the aerial problem was solved by using hydrogen-filled balloons. Two "Niger" tents were provided by G3FXC and power was supplied by the club's own 230 volt AC petrol-electric generator.

This equipment, plus the personal gear of the operators, was stowed into the vans early on the morning of Saturday, October 11. We had only been rolling ten minutes when we lost one of the vans. This was only a minor breakdown, however, though we never saw it again until we reached our destination at Appleby, some six hours later. It was rather galling to be told by the van crew, "We've been here an hour-and-a-half and had the radiator welded." One of the lessons learned here was that, whilst the car (G3EGX/M) was fitted with two-way radio, it would have been invaluable if the two vans had also been so fitted.

With the local assistance of G3JYP and G3MMY, the site decided upon was Orton Scar, 1,100 feet a.s.l., which lies nine miles south of Appleby, on open moorland. Once having reached the site no time was lost in erecting the tents and putting G3CSG/P, G3EGX/P and G3LCI/P on the air.

Some trouble was experienced with the petrol-electric set, but after half-an-hour or so this was overcome, when it was found that a faulty condenser in the suppressor was rendering the equipment it was supplying "live." (Several operators commented on this but their precise remarks had better not be recalled!).

#### Balloon-borne Aerial

The problem of erecting the Top Band aerial was solved by inflating a six-foot diameter balloon with hydrogen, and using this to support a 200-foot vertical.

It was very tempting to run out more wire but the Ministry of Transport and Civil Aviation rulings on this matter are precise. It may be of interest to other groups, who have it in mind to use a similar system, to quote from these regulations. Briefly they are as follows:

When a captive balloon is flown, at night, at a height exceeding 200 feet, it is necessary to display the following lights: On the aerial — A red light over a white light, showing all round, not less than five candle power. The lights to be eight feet apart and the distance from the red light to the top of the balloon not to be more than fourteen feet. On the ground — The mooring point of the aerial to be in the centre of a triangle of three flashing white lights, each leg of the triangle to be eighty feet long. The lights to show skywards.

In the event of the balloon breaking loose the local police have to be notified at once. It must be realised that it is necessary to ask the permission of the M.C.A. before any such project is put into operation. Failure to do this can incur heavy penalties. The Wirral experience was that the Ministry were most courteous and helpful over the whole matter. We took the added precaution of notifying the local police of our intentions on arrival at Appleby and received their blessing.

#### Results

From the first it was apparent that Top Band operation was going to be an outstanding success, and so it proved. Consistent reports of 5 and 9 were coming in from all parts of the country. It was obvious from the number of stations calling us that the prior publicity in the October issue of *Short Wave Magazine* had alerted many stations interested in WABC. Owing to this publicity, pileups were inevitable, and we tender our sincere apologies to those stations who had patiently to wait their turn. (We found out later that one operator waited for as long as six hours before he eventually got his QSO!). A remarkable feature was that the activity was maintained on Top Band, at high pressure, until 4.00 a.m. on the Sunday, and over 100 contacts, mainly on phone, were made altogether.

Owing to the unexpectedly good conditions on 160 metres, it was decided to sacrifice operating time on the HF bands, as it was only possible to run one station at a time owing to the limited supply available. This was the second lesson we learned — that in order to operate



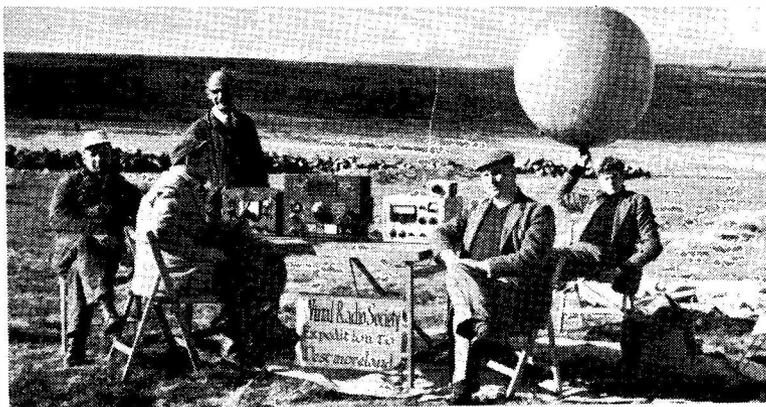
“. . . . Only a minor breakdown . . . .”

on all bands simultaneously more adequate power supplies must be taken. Even so, continuous calls were put out on the HF and VHF bands, but by that time conditions were such that we met with little success.

It is worthy of note that all the transmitters were home-built and the receiving equipment was supplied solely by members of the team; these receivers consisted of an HRO, a BC-348 with home-built crystal-controlled VHF converter and an Eddy-stone S640.

In direct contrast to the Merioneth expedition last August, the weather in Westmorland was superb. Some idea of this may be gained from the fact that there was not enough wind to blow the balloon aerial out of the perpendicular, and on Sunday morning the stations worked on tables out in the open air, although the site was in a completely exposed position.

In conclusion, we would like to thank all those Top Band stations who so ably supported us and made the whole thing worth-while. By this time, all should have received one of our special QSL cards through the bureau. SWL Evans from Shrewsbury went to a great deal of trouble in making a tape-recording of some of



Set up on Orton Scar, Westmorland. Wirral members G3LCI, extreme left, G3CSG (left front), and SWL's Schroeder, Fernandez and Tomkins. This was a very successful Top Band expedition, over one hundred 160-metre operators being given Westmorland for a new county.

our transmissions and posted the recording to us. We were thus able to include it in our account of the expedition when this was given to members of the Wirral Amateur Radio Society at a recent meeting.

We are looking forward to a future expedition to yet another "rare" county, details of which we hope to announce in the near future.

## G4GZ's BARGAINS

**VALVES:** 6AG5, 6H6M, 3/6. 6J6, 1629, TT11, EF36, EL32, 4/-, 3A4, 6B4G, EAC91, 6G6G, 4/6. 6AC7M, 6C4, 6AK5, 959, 1616, EF39, 5/-, 6CSM, 6FM, 6K7G, 6AL5, EB91, 12SK7M, 5/6. 615M, 6/-, 5Y4G, 6SK7M, 6AM6, 6SN7, 6X4, EF91, Z77, 6/6. 1R5, 1S5, 1T4, 3Q4, 6BE6, 6BH6, 6BJ6, 6K8G, 6SA7M, 6SG7M, 6SJ7M, 6SL7, 6SQ7M, 6X5GT, 6Q7G, 12A6, 12C8, 42, 801A, EBC33, EF55, VR150/30, 7/6. 6AT6, 12AT6, 8/-, 2A3, 354, 6AQ5, 6AU6, 7Y4, 12AU7, 12BE6, 12Q7G, 12K7G, 12SQ7, 35Z4, 35Z5, 80, EZ40, EZ80, UY41, 6J7G, UY85, 8/6. 6L6G, 7B7, 7C5, 7C6, 12AT7, 12AX7, 12AU6, EF80, EL84, 6BW6 9/-, 5R4GY 15/-, 6Q7GT, 35L6GT, 50L6GT, ECC82, KT33C, PL82, PY80, PY81, EZ81, 9/6. 7S7, EB780, EBF89, ECH81, EF85, EF89, EL41, EM80, GTIC, UCC85, 10/-, 6K8M, 6L6M, 446A, EBC41, ECC85, ECH42, EF41, PCC84, PL83, EAF42, UAF42, UBC41, UBF89, UCH42, UF41, UF89, UL41, UABC80, EABC80, 10/6. ECC84, 11/-, ECF82, PY83, 11/6. 5763, ECF80, ECL82, R19, PCL82, 12/6. PCF80, ECL80, EY51, EY86, 13/6. 830B, 866A, 15/-, EF86, PL81, 15/6. 803, HK24G, 20/-, 53A, 45/-, CV15, 10/-, GZ32, 12/6. ECC83, 10/-, 805, 45/-.

**PARMEKO MAINS TRANS.** Just the job for that new table topper! 230v. 50 c/s. input. Sec. 620-550-373-0-375-550-620v. Current rating 200 m/a. on 620 and 550v. taps and 250 m/a simultaneously on 375v. tap, plus 2, 5v. 3A windings. BRAND NEW only 50/-, carr. paid.

**R107 RF UNITS** comprising RF, Mix., Osc. 1.2-18 m/cs. in 3 switched bands with large half moon calibrated slow motion dial and drive. (IF 465 kc/s.), 40/-, carr. paid. (Less valves).

**BENDIX TX's. TAJJ.** Partly stripped but containing mod. xfmr. (PP830B-803) Driver xfmr. 24v. reversible motor. Res. cer. UX bases, etc., 19/6, carr. paid.

**PERFORMANCE METERS, No. 2.** 230v. 50 c/s. input. Trans. 250-0-250v. 30 m/a. (60 m/a. can be taken safely). 6.3v. 1 1/2A. with 20H choke, 5Z4, Y65, 2, EF50, 1, EC52, 1, EA50, dozens of components all in smart grey louvered case 10" x 9" x 9". BRAND NEW, BOXED, only 32/6 each, carr. paid, or 22/6 less valves.

**FREQUENCY METERS BC906D.** 145-235 m/cs. BRAND NEW in transit case at only 45/- each, carr. paid.

**TRANSISTORS.** Audio, OC70, 12/6; OC71, 15/-, Yell./Green, 7/6; Yell./Red. RF up to 8 m/cs., 15/-, Holders 1/-.

**COMMAND RX's.** BC454B, 3-6 m/cs. BRAND NEW, 45/-.

**WAVEMETERS, No. 4.** (Marconi TF643). 20-300 m/cs. with 4 plug-in coils and 50 micro-ammeter. NEW, BOXED, £5/10/-.

**RESISTANCE UNITS 231** with 12, heavy duty 80- non-inductive carbon resistors. Ideal dummy load, 32/6 each, carr. paid.

**MC METERS.** 2 1/2" rd 0- fl. (2" dial) 500 micro-amps, 17/6. 0-1 m/a, 21/-, Ditto but scaled 0-30v., 16/6. 2 1/2" rd. plug-in electrostatic 0-1500v., 16/6. 3 1/2" rd. fl. 0-30 m/a, 0-200 m/a, 0-500 m/a, 0-2 amps., 13/6 each. 2" sq. fl. 0-300v. 50-0-50 amps., 11/6. 0-50 m/a., 9/6, all post paid.

**MIDGET ROTARY TRANSFORMERS.** 12v. DC input. 310/365v. 30 m/a. O/p. Size: 4 1/2" x 2 1/2", 13/6 each, post paid.

**ACOS STICK MIKES.** Latest model MIC39-1. List price £5/5/-, Our price, brand new, boxed, 67/6 or 55/- less stand. MIC33-1, 32/6 each (List 50/-). 100 k/cs xtals 3-pin U.S.A., 17/6 each.

**ET4336.** Mains trans. 190-250v. input. 10v. 10A, 2 1/2v. 10A twice all CT and HV ins., 28/6 each, carr. paid.

**WHIP AERIALS.** 4 section, screw-in, 12ft. 6in. long. (Part of BC610 whip), 15/6 each, carr. paid.

**AR88** Wavechange switches and coil screens, 15/- each, post paid. Smoothing chokes for AR88, 15/-, Johnson 500 PF Tx variables, 15/6 each, post paid. Pyranol 10mfd. 2kv. wkg. 25/-.

12v. 4-pin UX VIBRATORS, 5/- each, 36/- doz.

**SPECIAL VALVE OFFER.** All per doz. 12SC7M, 1A3, XP1.5, 18/-, 6AG5, 2X2, EL32, 688G, TT11, 24/-, 616, 6AC7M, 1629, 959, 6C4, 37/6.

Post 9d. Free over £2 except where stated. SAE enquiries

## JOHN ANGLIN

385, CLEETHORPE ROAD, GRIMSBY, LINCS. Tel.: 56315.

# G3EKX

## THE SPOT

## DERBY TEL. 41361

## THE SPOT

**EDDYSTONE.** 888A, £110; 680X, £120; 840A, £55; 870, £34 16s. Full range of components in stock. Largest in the Midlands.

**GELOSO.** G209, latest Rx., 83 gns.; G212 Tx, 60w. 1/P. 75 gns. **20 COMMUNICATION RECEIVERS ALWAYS ON DISPLAY.** New and reconditioned.

**"BIRKETT'S BETTER BEAMS."** 2 metre, 5 element, wide spaced Yagi, approx. 10 dbs. over a dipole, includes 1" to 2½" mast bracket. Sent in special box by return, 45/-, 3/- P. and P.

**COMMAND RECEIVERS.** As New. Never been used. 3-6 mc/s. BC454 and 6-9 mc/s. BC455, 37/6 each. BC929 scope units. Uses 3BP1 and as new, 49/6 each. CR300 unused, £16. Eddystone 840, £30, excellent order. AR88LF, £45. R107, £10. B36, £12 10s. S27, £17 10s. R208, £8. RA10, £5. 120 watt Tx., 1.5 to 13 mc/s., as new, £7 10s. TA12 Mod. Trans., 9/6 each. Driver Trans., 5/9.

**TRANSISTORS.** Mullard OC72, 22/6; yellow/green, 8/9; yellow/red, 16/6; goldtop, V30/10LP, 19/6; Mullard, OC71, 19/6; OC45, 22/6. (Guaranteed tested).

**GELOSO VFO's** 4/104 latest, £5 16s. 6d. Dial ass., £2 7s. 6d. or with valves 6CL6 and 5763, £9 10s., as used in G212 Tx. Receiver front end. Complete unit. Including: coil pack with valve bases already wired, tuning condenser, dial ass., brackets and cover, £13 19s. 6d. This is similar to the front end as in G209 Geloso double superhet. 4.6 mc. I.F. as used with these F.E.'s., 18/6. 60w. pi-tanks, latest, 23/3 each.

**VALVES.** 5763, 15/6 each; 6AU6, 7/6 each; IT4, 4/6 each; ARPI2, 4/6; ATP4, 5/6 each; 6K8G, 6/6; 807, 7/6 each; 6K7 metal, 7/6 each; KTW61, 3/-; DH63, 6Q7, 6/6; X66, 6/6; 6V6G, 8/6; 6SG7 metal, 6/6; 6J6, 7/-; EL91, 7/6. All brand new, guaranteed. 6d. per valve P.P.

**2 METRE.** 4/103 VFO by Geloso. **JUST ARRIVED** (VFO or Xtal) with calibrated dial assembly. Uses 2-6CL6, 1-5763, 1-12AT7. VFO, £5 9s. 6d. Dial ass., £2 6s. 9d., complete with valves, Special Price, £10 19s. 6d.

**EDDYSTONE.** New geared dial 898. Ratio 110 to 1. Flywheel. Similar as fitted in 870 Rx., price 58/-, FB for VFO's. and 2 metres.

**I/M/A METER RECTS.,** 6/9 each. ARR2X, VHF Rx., with Genny, suitable 12v. packed in case unused, mint condition, 82/6 each with manual. 5" P.M. Speaker, 12,000 lines, 18/6 each. 1155 power pack and O/P stage ready to plug in. New, £4 19s. 6d. **19 SETS** with valves, £2/19/6 each, P. and P. 10/6 each.

**VARIOMETERS,** 17/6 plus 2/6 P. and P.

**ALLOY TUBING.** ⅜" O/D. 8d. per foot: ½", 11d.; ⅜", 1/1; 1", 1/6; 14 foot, 2" O/D strong alloy masts, 63/9 each. Cast brackets for joining two or more masts together, 8/6 each. Guy support clamps, 4/9 each. ⅜" to 1" element supports, 2/- each. Full range of castings for aerials. All shapes and sizes, send us your requirements, S.A.E.

All goods despatched same day. Add 2/6 in the £1 for P. and P. **When in town ask for The Spot (a well-known shopping centre) we are next to Lloyds Bank!** Send for New Illustrated Catalogue. Glossy pages, over 100 photographs, thousands of components, etc., 2/3, post free.

# NORMAN BIRKETT LTD

THE SPOT - 26 OSMASTON ROAD - DERBY

## HOME RADIO OF MITCHAM



### HEADPHONES

Brand new and boxed B.T.H. lightweight high resistance headphones. Resistance 4,000 ohms, impedance at 1 kc approx. 17,000 ohms. Weight 7 ozs. Manufactured to highest specification. These are not Ex-Government. Originally made to sell at 45/- a pair, we are able to offer these while stocks last at the give-away price of **only 15/-** Without doubt the best offer of high-grade phones ever made. plus 1/- post

### SPECIAL BARGAIN LINES

Woden smoothing chokes, 10 Henry, 300mA 100 ohms, open type 5/- plus 3/6 post. Ex Govt. EL32 and TT11 valves, 2/6 each. 6-way bakelite connecting blocks, 1/- each. Cossor S130P voltage stabilisers, 2/6 each. 1000 + 1000pf. padders, 9d. each. 1000 - 300pf padders, 6d. each. Moulded mica condensers .01, .002, .005mfd, 3/6 dozen. 500mfd 25v. TCC 1½" cans, 1/- each. 16mfd 375v. TCC 1½" cans, 1/- each. 16mfd 350v. and 450v. small tubulars, 1/6 each. 16 - 16mfd 500v. (600 surge) 1½" cans, 2/- each. 16 - 32mfd 350v. 1½" cans, 2/6 each. 32 + 32mfd 350v. 1½" cans, 2/6 each. Valveholders B9C ceramic (EF50), 2/6 dozen. Colvern 6 watt wirewound pots 1,000 ohms, 3/6. Colvern 3 watt wirewound pots 5,000 ohms, 3/6. Colvern 3 watt wirewound pots 50,000 ohms, 2/6. Preset Controls 5K, 1 meg, and 2 meg, 1/- each. Colvern 5K slider resistors CLR801, 1/- each. Carbon controls 10K, 50K, ½ meg and 1 meg, 1/6 each. Philips special controls, ½ meg and 2 meg, 1/6 each. Philips special control ½ meg with DP switch, 2/-. Dubilier 500K and 2 meg with D.P. switch, 2/6. 4 gang 350pf condenser, 5/- .1mfd 500v., 7/6 doz. **ADD 1/- POST AND PACKING UNLESS OTHERWISE STATED.**

Wire wound resistors 5 watt in following values at 9d. each - 5.6 ohms, 33, 47, 62, 100, 150, 180, 500, 820, 1,000, 2,500, 2,700, 3,300, 3,900, 6,800, 8,200, 12,000.

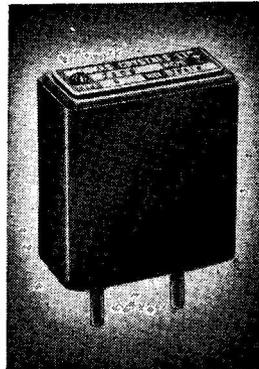
### THE "BUCKLEY" T.R. SWITCH

We now stock this automatic transmit/receive switch and can offer immediate delivery. Price £3. Size 5½in. by 4½in. by 2½in. completely enclosed and self-contained. Operates on 50 to 100 ohm line at power levels up to 300 watts. No power supply needed. Leaflet on request.

Dept. S, 187, LONDON ROAD, MITCHAM, SURREY  
Shop Hours: 9-6.30 p.m. Wednesday 1 p.m. MIT 3282

## BROOKES Crystals

mean  
DEPENDABLE  
frequency  
control



Illustrated is a Type S Crystal unit from a range covering 100 kc/s to 15 Mc/s.

- Black bakelite case.
- 1½" high x 1½" wide x ⅜" thick.
- Two ¼" dia. pins spaced ⅜" centres.

ALL Brookes Crystals are made to exacting standards and close tolerances. They are available with a variety of bases and in a wide range of frequencies. There is a Brookes Crystal to suit your purpose — let us have your enquiry now.



## Brookes Crystals Ltd

Suppliers to Ministry of Supply, Home Office, BBC, etc  
LASSELL STREET, GREENWICH, S.E.10  
Tel. GREENwich 1828/4482 Grams: Xtals Green, London

**SMALL ADVERTISEMENTS**

("SITUATIONS" AND "TRADE")

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

**TRADE**

**A**ERIAL WIRE, 14-gauge toughened aluminium alloy. Specially made to withstand heavy strain. Note the weight: 160 ft., 15 ozs., 12/6; 280 ft., 26 ozs., 22/6; post free; C.W.O.—A. E. White, 408 High Road, S.W.16. (Str. 4289.)

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

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

**W**ANTED FOR CASH: Good clean Communication Receivers and SSB Equipment.—Short Wave (Hull) Radio, 30/32 Princes Avenue, Hull. (Telephone No. 18953.)

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

**G**3CGD QSL's. Fixed and mobile samples on request. Printing enquiries welcome.—30 St. Luke's Road, Cheltenham.

**READERS' ADVERTISEMENTS**

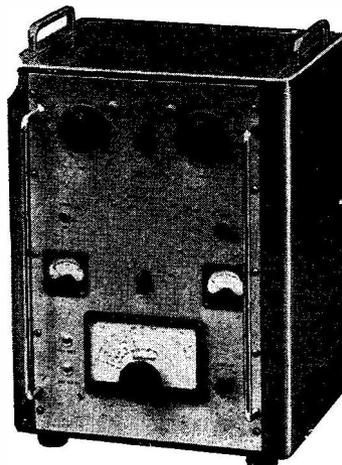
3d. per word, min. charge 5/-. payable with order. Please write clearly, using full punctuation and recognised abbreviations. No responsibility accepted for transcription errors. Box Numbers 1/6 extra. Replies to Box Numbers should be addressed to The Short Wave Magazine, 55 Victoria Street, S.W.1.

**E**X-GM3GIK offers Hallicrafters SX-28, with manual and speaker; nice condition and FB working order; £27 10s. 0d. (no offers); buyer collects.—Stevenson, 653 Maryhill Road, Glasgow, N.W.

**F**OR SALE: Gelo Receiver front-end, complete with dial; valves 6BE6, 6BA6, 12AU7; £10 (o.n.o.). **W**ANTED: B2 Tx tuning condensers.—G3FDW, 23 Victor Way, Waddington, Lincoln.

**W**HAT OFFERS? (gone QRT): "Commander" Double Superhet Rx, mint condition; Class-D wavemeter, ditto; 150-watt home-built Tx, power packs, valves, etc. Inspect any time after 6 p.m.—Hasler, 3 The Oval, Chester Moor, Chester-le-Street, Co. Durham. (Tel.: Chester-le-Street 3300.)

**THE TRANSMITTER Used By Britain's Leading Amateurs**



Model LG300

813 P.A.

BETTER QUALITY — BETTER PERFORMANCE — MORE POWER — GREATER MARGIN OF SAFETY — BETTER OPERATING FACILITIES — GUARANTEED and ONLY 66 Gns. (in U.K.). No wonder everyone wants the LG300 — Send S.A.E. for full details including attractive hire purchase terms:—

**Labgear Limited**

WILLOW PLACE, CAMBRIDGE, ENGLAND. Tel. 2494/5.

*Officially recommended by Collaro*

**TAPE RECORDER COILS**

- Type Price
- Bias Osc QT9 7/6
- Bias Filter QT6 7/6
- Treble Boost QT7 27/6
- Bias osc. for push-pull circuit 7/6

Also recommended types for other makes



**New SUB-MINIATURE HIGH Q COIL RANGE**

Type S.M. Ferrite Core 5/- each For All Circuits

Send 1/- stamps for literature including a generous helping of cts. & wir. dgms. of various receivers, tuners & useful gadgets. Also price list and information of cts. appearing in "R. Constructor," "W.W." and "P.W."



418 Brighton Road, South Croydon, Surrey Tel: Croydon 5148/9



**TAKE THE PROBLEMS  
OUT OF  
SOLDERING**

**RELIABLE  
SPEEDY  
LONG-LASTING**

*65 watt round pencil bit (Illustrated)*

**HENLEY  
SOLON**  
TRADE MARK

**FOR 25 YEARS  
THE BEST ELECTRIC  
SOLDERING IRON**

*Leaflets on request from:*

**W. T. HENLEY'S TELEGRAPH WORKS CO. LTD.**  
Engineering Sales Department,  
59-62 High Holborn,  
London, W.C.1  
Telephone: CHAncery 4361

SMALL ADVERTISEMENTS, READERS—*continued*

**R**107 RECEIVER, £10 (o.n.o.). Free delivery London area, or buyer collects. Also other gear at low prices.—Write Hefferman, 36 Oakwood Avenue, Boreham Wood, Herts. (Phone: Elstree 1040.)

**P**ANDA CUB, netting switch; little used; mint condition; £39 10s. 0d. Eddystone S.680/2, similar condition; 8 new valves this month; £42 10s. Delivered Birmingham area.—G3HHM, 15 Hanson Grove, Sheldon, Birmingham. 26. (SHE-2980.)

**E**DDYSTONE 640 Rx, speaker and manual, in excellent condition. £10. Buyer collects.—Cameron, 10 Moor Park Road, Northwood, Middx. (Northwood 2554.)

**BC**1147A, 13-valve communications Rx, 1.5-30 mc; two RF, two IF; built-in speaker, power pack, meter, and instructions; excellent condition; £30.—R. Andrew, Firlie Cottage, Seaford, Sussex.

**P**ANDA CUB, as new; accept £45. HRO, slight attention, all coils, £10. Minimitter, £5. RSA ribbon mike, £2. Oscilloscope, no p/pack, £2. Delivered N.W.—G3HFP, 38 Wyresdale Avenue, St. Helens, Lancs.

**F**OR SALE: Transmitters, Types RCA ET-4332, £18; T-1131, £12; Marconi AD67B, £18; Walkie-Talkie WS58, £11; Tx/Rx SCR-828, £28; TS12/AP, £7 10s. 0d. Bendix Receivers RA-10, £4 10s. 0d. Test Set IE19A, £15. UHF signal generator, RCA type 710A, £26. Buyer collects, Midlands.—Box No. 2037, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**S**ALE: Woden 120-watt Modulator, Labgear 5-band coupler with 5763 valves, high-voltage power packs, transformers, chokes, etc. Also quantity of valves, m/c meters, short wave components. All at low prices.—Ellis, G3SN, 47 Victoria Road, Saltash, Cornwall.

**RF**26 19/6, RF24 12/6, RF25 9/6, brand-new, in original cartons; postage 3/6.—R. Jay, 69 Church Road, Moseley, Birmingham 20.

**TR**1985 and TR1987 VHF Transceivers, £20 each, or offers? R1155, with mains p/pack and output stage, £6 10s.; TCS12 Rx, £10. Single rack for Command Rx, 15/-. Three 813 with base, 45/-; nine P624, 5/-; ten 9D6, 5/-; five 1611, 3/-; four 6A4Q, 5/6. Please add carriage.—Clarke, 29 Leighimohr Avenue, Ballymena, Co. Antrim, N. Ireland.

**S**ALE: AR88D with handbook, excellent condition, £50; S.27 with handbook, good condition, £25. Buyer collects, London.—Box No. 2057, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**DC/AC:** Valradio Vibrator Converter, 230v., 200w., nearly new, cost £16; sell £8.—Brown, 49 Natal Road, Ilford, Essex.

**AR**88D Communications Receiver in fine condition, with manual; worth much more than price asked: £48.—G3IWB, 493 Sutton Road, Prittlewell, Southend-on-Sea, Essex.

**S**ALE: Selsyns and prop pitch motor; best offer over £5. — G3KOO, 11 North Street, Ripon, Yorks.

SMALL ADVERTISEMENTS, READERS—*continued*

**S**ALE: CR100/2 Rx; working but needs alignment and check; model as muting circuit; offers? Also MW22/18, CRT burn, but OK. Scan coils, 15/-(o.n.o.).—Box No. 2058, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**L**ODGINGS WANTED. in Canterbury area of Kent, by shift working ham, for about 6 months; preferably with another ham.—Box No. 2059, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**SX**25 Hallicrafters, Super-Defiant receiver, 42 mc to 550 kc; good working order; condition fair; £15, carriage paid. Scotland.—Box No. 2060, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**R**107 and manual, in good condition, £10 (o.n.o.); willing deliver 20 miles radius. — Thom, 12 Willow Road, Redhill, (Tel.: Reigate 5033.)

**E**ITHER OF THESE YOUR FINEST CHRISTMAS PRESENT!—Two AR88D (540 kc to 32 mc), mint, £52 each, cash (no offers); genuine bargain.—Box No. 2061, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**S**ALE: R1132A, new, with power unit, less voltmeter, £3 15s. 0d.; RF26 and RF27 unit, 15/- each; carriage extra.—H. Crowther, 22 Mandale Road, Bradford, 6, Yorks.

**W**ILL EXCHANGE mint AR88D for your Gelson Tx or LG.300.—Box No. 2062, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**W**ANTED: Genuine RCA S-Meter for AR88. Your price paid.—Box No. 2063, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**E**DDYSTONE 640, splendid condition, £20; Gelson based Tx, 807 PA, two 6V6 Mod., no pack, £7 10s. 0d.—G3COI, 43 Mount Road, Penn, Wolverhampton.

**S**640 WANTED; state price and condition.—Box No. 2064, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**S**ALE: Rotary Transformer, 12v. input, 350v. 145 mA output; ideal outside work; 35/-.—Box No. 2065, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**W**ANTED: VRL Rx output IF transformer, 0-100 microammeter, 1131 Tx handbook, valves 813, Det-12. — Miles, 76 Vicarage Road, Morrision, Swansea.

**F**OR SALE: Panda PR120V table-top transmitter; recent works check-over; as new; £70.—G3AMH, No. 1 Darley Cliffe Cottages, Worsborough Dale, Barnsley, Yorks.

**W**ANTED: 4 units: G.E.C. GC12 Mobile T/R BRR. 175 Transmitter/Receivers.—GW3ATM, Silverden, Portskewett, Nr. Chepstow, Mon.

**H**RO SENIOR, seven coils (4 bandsread), noise limiter, power pack, manual; RME DB20 Pre-selector, manual; Q5'er; power pack; also CO/PA 10-watt Tx.—Offers to Box No. 2067, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**RADIO AMATEURS . .**



You *must* be a good MORSE Operator to possess an Amateur Radio Transmitting Licence. A "slap-dash" 12 w.p.m. neither satisfies the authorities, yourself nor your operator friends. Morse operating is an exacting art unless your training is made simple and is based on sound fundamentals. For this reason the Candler System was invented to take the "grind" out of Code tuition and to turn a tricky subject into a pleasurable pursuit.

Send 3d. stamp for full details.

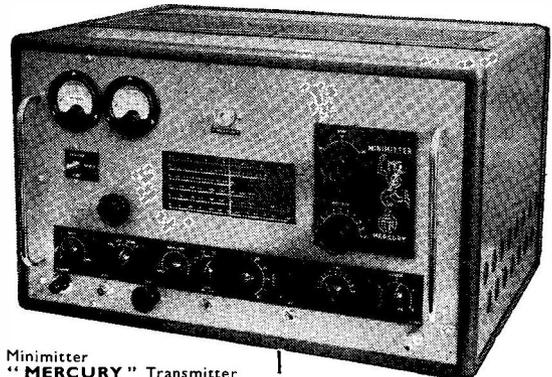
**CANDLER SYSTEM CO.**

(Dept. 55SW) 52b ABINGDON ROAD, LONDON, W.8.  
Candler System Company, Denver, Colorado, U.S.A.

**MINIMITTER**

BRITAIN'S FINEST RANGE

The Amateurs of 20 Countries say: "THIS IS THE TOPS"



Minimitter  
"MERCURY" Transmitter  
99 gns. complete

Announcing the NEW Minimitter Mobile Equipment.  
Band-Switched Mobile Transmitter £16.10.0 complete  
Mobile Whip Antenna £5. 0.0 complete  
MC8. Mobile Converter (8 Band) £19. 0.0 complete  
Transistor Mobile Power Supply £11.11.0 complete

As shown at the Radio Hobbies Exhibition.

The new "Minibeam" 10/15' (G4ZU Pat.)

The Minimitter Telescopic Aerial Mast.

The outstanding MC8 8 Band Converter.

For full details of any of these, please send S.A.E. to:

**AT LAST !!!** Compact, Efficient, "Mileage Proved" Mobile equipment for the amateur at low cost.

**MINIMITTER Co. Ltd.**

37 DOLLIS HILL AVENUE, LONDON, N.W.2 Tel. PAD 2160

**AMERICAN POLICE CAR TRANSMITTERS** for 6v. input, output 30 watts, 30-40 crystals, controlled, £12/10/- (20/-\*); **AMERICAN PORTABLE TRANSMITTER-RECEIVERS** for 6, 12 or 24v. input 27/39 mc/s. F.M. output 2 watts, crystal controlled, £17/10/- (20/-\*). **30 ft. ONE PIECE WOOD POLES** perfectly round, straight and smooth, 4" dia. throughout, hollow, light and very strong, specially made for radio, 35/- (special cheap rate). **MICRO-AMMETERS** 2½/0/500, 20/- (12/6). **MILLIAMMETERS** 2½/0/30 or 0/100, 12/6 (2/6). **VENTAXIA 8'** fans 230v. A.C. 120/- (5/-). **POWER UNITS.** 12v. input 300v. 260 m/a and 150v. 10 m/a smoothed out, 35/- (7/6). 230v. A.C. input 800v. 450 m/a smoothed out, Bendix rack mounting, 1 cwt. £8 (20/-) 230v. A.C. input, 1200v. 200 m/a smoothed D.C. out, 1 cwt. £6 (20/-). **CABINET RECTIFIERS** 100/250v. A.C. to 110, 750 m/a; 50/- (10/-). **R.C.A. 30 WATT PROJECTOR LOUD SPEAKERS** with universal transformers one mile range, £4 (20/-). **230/115v. STEP-DOWN TRANSFORMERS**, double wound enclosed 1350 watts, £6 (20/-) 250 watts 40/- (5/-). **MODULATION TRANSFORMERS R.C.A. ET-4336 driver, 15/- (2/6).** T-1131 Driver or Intervalve 7/6 (2/-). **Wooden 85w., 45/- (5/-), Marconi 200 watts, 65/6 (7/6).** **TECHNICAL MANUALS** (not photostats) DST-100, BC-221, No. 19, AR-88, No. 22, XS-28, BC-611 all 30/- (paid). **TRANSFORMERS** by Marconi, 190-250v. to 475v. 100 m/a and 6.3v. 6.3/22/6 (5/-). 190-260v. input 1000-0-1000v., 500 mA, 75/- (10/-). **CHOKES**, Wooden 20H, 400 mA, 20/- (7/6). **DOOR SAFETY SWITCHES**, enclosed D.P., 3/6 (2/-). **MILLIAMMETERS**, 2½in. flush 0/100 or 0/30, 12/6 (2/6). **VOLTMETERS**, 2½in. flush, 0/15, a.c./d.c., 15/- (2/6). **R.C.A. ET-4332 TRANSMITTER CABINETS**, totally enclosed, 52" high x 23" x 22", full-length rear door with latch, £9 (20/-). **E.H.T. POWER UNITS**, 200-250v. A.C. to 3000v. 500 m/a D.C. in cubicle, £25 (cost). **RACK MOUNTING TABLES**, 20" deep standard 19" wide, 25/- (5/-). **ARMOUR RECORDING WIRE**, new spools in sealed boxes, ½ hour music, 10/- (2/6). **6 ft. BENDIX TRANSMITTER CABINETS**, standard rack width, £6 (20/-), 6 ft. high, T.B.S. **TRANSMITTERS** 60/80 mc/s. new, less valves and extal, £4/10/- (30/-\*). **T.B.S. RECEIVERS**, new, less valves, 90/- (30/-\*). **TRANSMITTER, VARIABLE CONDENSERS**, 100pf, 10/- (2/-); 75pf, 9/- (2/-); 50pf, 8/- (2/-); 40pf, 7/6 (2/-).

Amounts in brackets are carriage England and Wales. \*includes 10/- returnable wood case.

40 page lists of over 1,000 different items available.

We have vast quantities of "bits and pieces"  
Send your requirements

## P. HARRIS

ORGANFORD DORSET

# Wilkinsons

EST.  
1921

## FOR ALL YOUR RADIO AND ELECTRONIC REQUIREMENTS

### LOUDSPEAKER BARGAINS

**ELAC 5" Permanent Magnet** 3 ohms 9,700 gauss. **ABSOLUTELY BRAND NEW** only 18/6, post 1/6. A High Quality Speaker at a Low Price.

**AXIOM 150 Double Cone 12"**, 15 watts-15 ohms. A High Fidelity P.M. Speaker, fully dustproof. Extremely smooth response coverage with bass modulation effects reduced to an absolute minimum. **ABSOLUTELY BRAND NEW, Our Special Offer, £7, 19/6**, packing and carriage, 7/6.

**P.M. SPEAKERS.** 12in. Goodmans 15 ohms, £5/10/-, Post 3/-.  
**P.M. SPEAKERS.** 10in., in portable case with flex and plug, 50/-.



### HEADPHONES

Balanced Armature Type DHR, 17/6 per pr., post 1/6.  
High Resistance 4,000 ohms Type CHR, 12/6 per pr., post 1/6.

### METERS

**AMMETERS** 0/3 Moving Coil D.C., 6in. Flush Round with a fine open scale with divisions of 50 mA, B.S.S. 89, 90/-.  
**VOLTMETERS** 0/300 Moving Iron, A.C., 6in. Flush Round, 110/-.  
**VOLTMETERS** 0/100 Moving Iron, A.C., 6in. Flush Round, 90/-.  
**AMMETERS** 0/300, Moving Iron, A.C. 2½in. Flush Round, 25/-.  
**VOLTMETERS** 0/300, Moving Iron, A.C. 2½in. Flush Round, 25/-.  
**MICROAMMETER**, 250 F.S.D., 3½in. Flush Round, Sangamo Model S37. Scaled for valve voltmeter, circuit available free, 55/-.

### TEST EQUIPMENT

**CIRCUIT TESTING OHMMETER.** 2 scales 0/1000 ohms and 100/200K ohms inf. with test prods. Brand new, £4/17/6. Post 3/-.

**AVO TEST BRIDGES.** 220/240 volt A.C. Measures capacities from 5 pf. to 50 mfd. and resistances from 5 ohms to 50 megohms. Valve voltmeter range 0.1 to 15 volts and condenser leakage test. **BRAND NEW.** Full working instructions supplied with instrument, £9/19/6. Post 3/-.

**OSCILLOSCOPE.** Type 43. With 3½in. CRT, 4-617, 3-VR54, 1-5Z4, 1-VU120. Brand new and complete with power pack and leads, £10/10/- Carriage 15/-.

**ROTARY CONVERTERS.** Input 12 volts D.C. Output 230 volts A.C., 50 cycles, 135 watts. In fitted case with variable resistance, 0/300 voltmeter, mains switch, £10. Carriage 15/-.

**L. WILKINSON (CROYDON) LTD.**  
19 LANSDOWN RD. CROYDON SURREY  
Phone: CRO 0839 Grams: WILCO CROYDON

### SMALL ADVERTISEMENTS, READERS—continued

**COMPLETE VHF STATION**, 2 metres and 70 centimetres, for sale, comprising Eddystone 358 Rx complete with 10 coils covering 40 kc to 31 mc, speaker and power supply; 2-metre 6J6 converter; 2-metre Tx, line-up 18 mc xtal, EF91, EL91, EL91, 5763, 829B, 70 cm tripler stage 832, 70 cm "3BKQ" converter, complete with all power supplies and p/p 807 modulator. All on 5 ft. GPO rack. Glasgow area. First £50 secures.—Box No. 2066, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**FOR SALE:** 19 Set, TA12G, T1403, R1155, Power Unit 247, Monitor Type 36, Indicator APW 9922, Test Set 5A. S.a.e. for details.—G3LUV, 17 Low Escomb, Bishop Auckland, Co. Durham.

**5 HRO COILS** in box, £4; one E19 Test Set, £12 10s. 0d.; Panadaptor BC-1023B, for S27, etc., £25; 1-177-B, mutual cond. valve-tester, meter needle bent, £5; TCS Tx and Rx, pair, £13 10s. 0d. Carriage extra or collect.—G3IMD, 129 Carr Forge Road, Sheffield, 12.

**GM3BQA 10/15 Quad**, as new; BC-640a modulator unit and manual. Offers or exch. Sky Champion Rx or similar. Lancs.—Box 2068, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**SKY CHAMPION.** good condition, with manual £15 (o.n.o.); carriage extra.—Tonkyn, 19 Treyew Road, Truro, Cornwall.

**EDDYSTONE 670**, £20; **AVO 7**, working (readings low), £5; **TUSB VFO**, £2; p/pack, £1.—GW3CDP, Bank House, Resolven, Neath, Glam.

**NO. 19 Wireless Set**, manuals (not photostats), 12/- each; p/p. — G. Eaton, 54 Yoxhall Road, Shirley, Warwickshire.

**WANTED:** CR100, S27, S27CA; also Panoramic Adaptor for 455 kc IF and Sweep Generator; must be in perfect condition. Sell AR88D, AR77E, AVO 40, other meters; perfect condition. — BM/HGBK, London, W.C.1.

**CR 100**, spotless condition. alignment correct throughout. £18; high resistance AVO, large 20,000 o.p.v. model, perfect, £8; T1131 modulator. driver and power pack, brand-new, offers for complete units or parts? **WANTED:** Taylor output meter.—Box No. 2069, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**TROJAN MODULATOR**, 30w. audio, as per *Short Wave Magazine*, excellent job, £12. Lab-gear wide-band multiplier, 80-40-20-15-10, £2. Power unit type 247, £3; 813, £1.—W. Wright, The Flat, High Street, Warsaw, Mansfield, Nottingham.

**WANTED:** HRO Receiver. **FOR SALE:** B-46 Admiralty Receiver, 1.4-15 mc, re-valved, p/pack and RF-24 converter, £8. Wilcox-Gay VFO, £3. R.1155 Receiver, p/pack, output stage and speaker, £7 (o.n.o.?) Pye 13-channel Tuner Unit, Type 47, 16-20 mc, with circuit, £2. — G3JYJ, 2 Madden Avenue, Chatham, Kent.

**HRO SENIOR**, 4 B/S coils, 10-80m.; built-in S-meter, power pack, recent laboratory performance overhaul; north-west England. Best offer within 7 days secures.—Box No. 2070, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

## SMALL ADVERTISEMENTS, READERS—continued

**D**ST-100, double superhet, 50 kc to 30 mc. 7 bands, highly selective, complete with manual.—31 The Crescent, Donnington, Wellington, Shrops.

**AR** 88, recently overhauled to better than maker's specification, £40; AR88, Super/Pro and SX37 cabinets; ball and biscuit mike; prop pitch motor, modified for 10 volts; Variacs 3.5 and 20 amps.; Webb's 2-valve pre-selector, 160 to 30 mc. Two Eimac 4/65A, boxed; unused qty. 1-inch dural tubing; 2-in. square dural boom, 24 ft. Must sell; posted offers.—Edwards, 23 Keogh Close, Keogh Barracks, Ash Vale, Aldershot.

**A** MERICAN ZENITH Trans-Oceanic mains/battery portable, 5 wavebands, bandsread, etc.; cost 114 dollars; perfect order and condition; £19 10s. 0d. — Richardson, 10 Broadstone Road, Hornchurch, Essex.

**W**ANTED: Class-D Wavemeter, No. 1, Mk. II, cat. No. ZA-14269, preferably modified for AC; good appearance and working order essential, and must be complete with manual. — Watts, 62 Belmore Road, Thorpe, Norwich.

**AR** 77E Rx, good cond., L/S, manual, some spare valves, £25.—G3HRC, 8 Beech Court, Kingsground, Eltham, London, S.E.9.

**E**DDYSTONE 358x, p/pack, speaker, set new coils, in mint condition, unmodified; all units match; £13 for good instrument.—(Ring Rel. 4998, Evenings.)

**CR** 91 (AR88), £42; Collins TCS15, complete, £25; S27, slight attention, £9; F10C Tx/Rx ideal small rig 2-20 mc (as sold for £30), £14. Collins TCS power pack and cables (originals), £8; Bendix TA12C Tx, £3 10s. (unmodified); AR88, requires three IF's (these available), best offer? Set of AR77 spares, £3; Class-D Crystal, 100/1000 kc, £1.—Advertiser, 31 Beacon Road, London, S.E.13.

**H**RO for sale, good condition; 8 coils, separate power pack, accessories, £16.—Calderbank, 30 Jackson Street, Whitefield, Nr. Manchester.

**F**OR SALE: Panda Cub (little used), £45; Eddy-stone 640, £19. Both in excellent condition; carriage extra.—Bailey, 13 Heywood Road, Alderley Edge, Cheshire.

**BC** 659 FM Receiver-Transmitter, 28-38 mc, built-in speaker, dual meter, less valves, 40/-, Power supply PE-120, 6-12v., 40/-, AN/FRC FM Receiver, 70/-; Transmitter, 60/-, 28 mc, both 6v. input, TU6 units, 6/-, BC-1203 audio amplifier modulation, 20 valves, 100/-; AR88, £35; Collins 51-J-2 receiver, 3-waveband. — Wright, 4a Nepal Avenue, Atherton, Manchester.

**H**URRY! Many valves cheap, i.e. 5763, 10/-, AVO Sig. Generator, microphones, etc. Send s.a.e. list.—G3LHA, 112 Attochall Road, Coventry.

**T**RIPLE BAND QUAD, 10, 15, 20 metres, new and unused, £12, delivered 20 miles (or buyer collects)—G8DT, 32 Homecroft Drive, Uckington, Cheltenham.

**R**. 107 Communications Receiver for sale; recent overhaul, excellent condition, £11; carriage paid.—Write Thompson, Ivy Cottage, Malvern, Worcester-shire.

**IN SAFETY**

with AVO "PRODCLIPS"

Patent No. 748811

Safety first every time with these patented spring-loaded AVO "Prodclips."

Cleverly designed for use as insulated prods, they are invaluable for reaching and holding test points which are difficult of access.

post free

**15/-**

per pair

**AVO LTD**

AVOCET HOUSE · 92-96 VAUXHALL BRIDGE ROAD · LONDON · S.W.1

Telephone: VICTORIA 3404 (9 lines)

**SOUTHERN RADIO'S WIRELESS BARGAINS**

**TRANSRECEIVERS**, Type "38" (Walkie Talkie) complete with 5 valves, etc. New condition untested by us but serviceable, no guarantee..... **22/6** each

**ATTACHMENTS** for Type "38" Transreceivers: ALL BRAND NEW PHONES, **15/6**; THROAT MICROPHONES, **4/6**; JUNCTION BOXES, **2/6**; AERIALS, No. 1, **2/6**, No. 2, **5/-**; WEBBING, **4/-**; HAVERSACKS, **5/-**; VALVES, A.R.P. 12, **4/6**; A.T.P.4, **3/6**. Set of FIVE VALVES **19/-** the set.

**TRANSRECEIVERS**, Type "18" Mark III. Two Units (Receiver and Sender). Six Valves, Microammeter, etc. Metal Case. Untested. No guarantee, but COMPLETE..... **£2 18s. 6d.**

**ATTACHMENTS** for "18" Transreceivers: ALL BRAND NEW HEADPHONES, **15/6**; HAND MICROPHONE, **12/6**; AERIALS, **5/-**; SET OF 6 VALVES, **30/-**.

**RESISTANCES**, 100 Assorted useful values. New wire end **12/6**

**CONDENSERS**, 100 Assorted. Mica, Tubular, etc..... **15/-**

**LUBBRA HOLE CUTTERS**, Adjustable  $\frac{1}{8}$ " to  $3\frac{1}{2}$ ". For Metal, Plastic, etc..... **7/-**

**QUARTZ CRYSTALS** Types F.T.241 and F.T.243, 2-pin,  $\frac{1}{2}$ " Spacing. Frequencies between 5675 Kcs. and 8650 Kcs. (F.T.243) 20 Mcs. and 38.8 Mcs. (F.T.241, 54th Harmonic), **4/-** each. ALL BRAND NEW, TWELVE ASSORTED CRYSTALS, **45/-**. Holders for both types **1/-** each. Customers ordering 12 crystals can be supplied with lists of Frequencies available for their choice.

**TRANSPARENT MAP CASES**, Plastic,  $14" \times 10\frac{1}{2}"$ . Ideal for Maps, Display, etc..... **5/6**

**STAR IDENTIFIERS**, Type I A-N Covers both Hemispheres **5/6**

**CONTACTOR TIME SWITCHES**, 2 Impulses per sec, in case..... **11/6**

**RECORDING BLANKS**, Brand new "Emidisc" ready for cutting:  $13"$  **6/-** each,  $15"$  in metal case, **£4**.

**REMOTE CONTACTOR**, For use with above..... **7/6**

**MORSE TAPPERS**, Midget type, **2/9**; Standard, **3/6**; Heavy type on base, **5/6**. ALL BRAND NEW.

**MORSE PRACTICE SET**, TAPPER with BUZZER on base. Complete with battery. Brand New..... **12/6**

**MAGNETS**, Strong Bar Type,  $2" \times \frac{1}{8}"$ ..... **1/6** each

**PACKARD-BELL AMPLIFIERS**, Complete BRAND NEW with valves; relay, etc., etc..... **17/6** each

**SPECIAL OFFER**, 12 ASSORTED METERS, Slightly damaged. Mainly broken cases (perfect movements). Including 3 Brand New Aircraft Instruments..... **12 for 45/-**  
Post or Carriage Extra, Full List of Radio Books, etc., 3d.

**SOUTHERN RADIO SUPPLY LTD**

11 LITTLE NEWPORT ST., LONDON, W.C.2. GER 6653

SMALL ADVERTISEMENTS, READERS—continued

**R.** 1155F, new condition. p/p, OS 7-in. speaker ; R. bargain, £6 ; 1392. £3. Buyer collects.—G3KUG, 182 Cavendish Road, Walsall, Staffs.

**BC** 348, int. mains p/pack, Q5'er, 700-1400 kc. £14. Signal Generator, Hunts 4002, 10-3000 metres. 50/- . Signal Generator, American 1-222-A, 8-15 mc, 150-230 mc, xtal check. 117v., £7 10s. 0d. Prefer buyer collect.—Dent, 65 Tibbs Hill Road, Abbots Langley, Watford, Herts.

**CR** 100, excellent condition, S-meter, copy manual, servicing diagrams, spare valves. £15.—Stratton, 14 Kingsthorpe Grove, Northampton.

**FOR SALE:** Genuine AR88 S-meter, brand-new. boxed, £3 ; S27 Rx, 27-143 mc, mint condition, completely overhauled and re-aligned, £35 ; Pullin Multi-range Meter, Series 100, as new, £9. **WANTED:** AR88 front panel.—A. J. Reynolds, 149 Waller Road, New Cross, London, S.E.4 (Phone: New Cross 1443, after 7 p.m.)

**EDDYSTONE** 750 Rx. Little used, £40. Grundig TK5 Tape Recorder and accessories, as new, £40. Carriage extra, delivery arranged, South Lancs Area.—Box No. 2071, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**WANTED:** Communications Receiver R.88 (R1475) coverage 2 or 20 mcs. State condition and price.—Jackson, 68 Franklin Avenue, Tadley, Basingstoke, Hants.

**EXCEPTIONAL** AR-77E. grey hammer finish. Eddystone speaker to match, handbook £26 10s. 0d. Gelson Recorder, carrying case, tapes, £21. Gelson 4/102 with dial, valves, £5 5s. 0d. Pullin 100 Test-meter, £7. 20m. 70w. Table Topper 6146 PA 807's mod. best components. TVI Proof, volts required. £10. 600v. 6.3v. power pack, £2 5s. 0d. 24v. 6a. Rectifier, £1. Multi LT's Transformer, £1, add carriage.—Box No. 2072, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**COMMUNICATIONS RECEIVERS** R88 2—20 Mc/s. with Power Unit 12 volt D.C. or 230 volt A.C. Mains.  
**SWITCHBOARDS :** P.O. Mobile, type AD-1240 (3-6-9), Universal Call 10-line, Magneto 10-line.  
**FIELD TELEPHONES :** Types D, F, L and EE8.  
**WIRELESS SET 19**—With all ancillary equipment including Rotary Plus Vibrapack Power Unit, RF Amplifier, etc.  
**WIRELESS SET 31**—Manpack Walkie-Talkie 40-48 Mc/s.  
**WIRELESS SET 58**—Canadian Walkie-Talkie 6-9 Mc/s.  
**WIRELESS SET 88**—Walkie-Talkie 4-Channel 40/42 Mc/s.  
**RCA TRANSMITTERS** CRV52093 — 60-80 Mc/s. Power Supply 115 volt A.C.  
**RCA RECEIVERS** CRV46068-A — 60-80 Mc/s. Power Supply 115 volt A.C.  
**MARCONI RECEIVERS** B28/CR100 — 60 Kc/s. to 30 Mc/s. (Gap 420-500 Kc/s.) 230 volt A.C.  
**HALLICRAFTERS RECEIVERS** S-27 and SX36.  
**I.F. TRANSFORMERS** FOR NATIONAL H.R.O. SETS.  
**MORSE KEYS** 2/6 each. **MAGSLIP HUNTERS**, 3 inch, 4/6 each. We have a large variety of the following. Please ask for lists. Switches, toggle and wafer. Fuses, various types and values. Jack Plugs and Sockets. Capacitors, fixed and variable. Ball-races. Potentiometers. Transformers. Rectifiers. Vibrator, synchronizing and non-synch. Uniselectors. Relays. Carbon brushes for generators and dynamotors.

**H.P. OR CREDIT FACILITIES AVAILABLE**  
 Carriage charged extra—S.A.E. for lists

**R. GILFILLAN & CO., LTD.**

National Provincial Bank Chambers, 29 South St., Worthing, Sx.  
 Tel : Worthing 8719 or 30181

**GM3BQA CUBICAL QUADS**

Protected by British Patent 25132/57 and Regd. Design 885769

**AS USED BY LEADING DX STATIONS**  
**TRIPLE QUAD 10-15-20 METRES**

- The most powerful multiband aerial available today—giving 4 element beam performance on each band.
- No coils, traps or gadgets to absorb power or break down.
- Direct coax feed giving a low and level SWR over each band.
- No tuning required—very high front to back ratio.
- Strongly made with alloy booms and "X" castings.
- Compact dimensions—easily assembled—will handle any power.

THE STRONGEST SIGNALS COME FROM CUBICAL QUADS (listen for yourself on the DX bands)

Triple Quad 10-15-20	...	£17	Carr.
Dual Quad 10-15	...	£15	Extra
Single Quad 10	...	£8	

S.A.E. for full details

**FORTH MOTOR CO.**

Edinburgh Road, Cockenzie, East Lothian, Scotland.

**G2ACC offers you—**

**EDDYSTONE PRODUCTS**

Cat. No. 898 Geared Slow-Motion Drive Assembly. A high grade newly designed dial for V.F.O. and receiver applications. 7 inch scale with 5 lines for individual calibration. Vernier scale provides 500 divisions. Ratio 110 to 1. Diecast escutcheon 9 3/8" x 5 1/2", £2/18/6. 598 Full Vision Dial 6" x 4 1/2". For individual calibration. Ratio 10 to 1, 24/6. All other Eddystone components stocked. 888A Communications Receiver. 11 valves double conversion. Procure free on request. £110. Postage extra on orders under £3.

SEND FOR CATALOGUE No. 11

56 pages, 108 illustrations, over 2,000 lines, 9d. post free.

**Southern Radio & Electrical Supplies**

SO-RAD WORKS . REDLYNCH . SALISBURY . WILTS

Telephone : Downton 207.

**PETER SEYMOUR**

FOR COMMUNICATIONS EQUIPMENT

Wishes its old and new customers a very Merry Xmas and offers for December the following :

	£	s.	d.
<b>COLLINS.</b> 51J-2.5 to 30.5 Mc/s. in 30 I Mc bands. A really wonderful Receiver. 110/230 A.C. (P/P £2)	180	0	0
<b>RCA</b>			
AR88D .54 to 32 Mc/s. 230 A.C. ... (P/P £1)	55	0	0
AR77E .54 to 32 Mc/s. 230 A.C. ... (P/P £1)	30	0	0
82C4 Monitor Amplifiers, P.P. 6L6 230 A.C. (New) ... (P/P £1)	12	10	0
<b>HAMMARLUND.</b> HQ129X .54 to 30 Mc/s. 230 A.C. ... (P/P £1)	65	0	0
<b>EDDYSTONE</b>			
S750 .5 to 30 Mc/s. Double superhet. 110/230 A.C. ... (P/P £1)	45	0	0
840A .5 to 30 Mc/s. As new. 110/230 A.C.-D.C. ... (P/P £1)	38	0	0
840 .5 to 30 Mc/s. As new. 100/230 A.C.-D.C. ... (P/P £1)	30	0	0
<b>FISHER LABS, U.S.A.</b> Top band and 80 Tx and Rx in two cabinets: Tx—6L6, 6L6 mod. 6K6 driver 807 final. Rx—6SK7, 6K8, 6SK7, 6SK7, 65SQ, 65Q7, 6K6, built-in speaker. Switched pre-set frequencies. Brand new ... (per pair)	11	0	0
<b>G.E.C. POWER UNITS.</b> 200-250 A.C. input. 300 or 350 D.C. out. at 350 mls. 6.3v. at 6A. (P/P 15/-)	2	0	0
<b>TBY8.</b> 28-80 dry battery operated Tx. Rx complete with phones, mike, key, whip aerial and case ...	9	0	0
Brand new <b>SCOTT SLRM</b> Marine Radio. 110/230 A.C. .54 to 18 Mc/s. Variable selectivity, 12 valve etc custom built, 65w. C.W. 50w. phone, table top Tx. with Acos table mike, Eddystone bug key and absorption wavemeter in excellent condition (P/P £2)	42	0	0
<b>G4ZU.</b> 10-15-20m. beam with 30' mast, guys, matching unit, etc. ... (P/P £1)	18	10	0
<b>HALLICRAFTERS.</b> 538D .54 to 30 Mc/s. 110/230 A.C.-D.C. ... (P/P 10/-)	18	0	0
<b>NATIONAL</b> SW54 .54 to 30 Mc/s. 110/230 A.C.-D.C. ... (P/P 10/-)	15	0	0
<b>CANADIAN STAFF CAR RADIO.</b> 6v. D.C. input. 1 to 16 Mc/s. BFO, etc. As new (P/P £1)	15	0	0
<b>BTH</b> P58 UHF Rx. 280 to 650 Mc/s. Fully tunable, 17 valves, 230 A.C. input. As new (P/P £1)	9	0	0
<b>HALLICRAFTERS.</b> S39. Mains/battery .54 to 30 Mc/s. BFO noiselimiter, etc. ... (P/P 15/-)	15	0	0
<b>TAYLOR</b> 65B sig. gen. 230 A.C. 100 K/c to 45 Mc/s.	6	5	0

CALLERS WELCOME. PART EXCHANGES. OVERSEAS.

Enquiries : 'phone Hull Central 41938.  
 410 BEVERLEY ROAD, HULL, YORKSHIRE

# H. WHITAKER G3SJ

**Court Road, Newton Ferrers, SOUTH DEVON**  
(A.R.B. APPROVED)

Telephone 320  
Newton Ferrers

Precision crystals of all types in a wide variety of bases covering the complete range 50 kc/s to 18 mc/s in fundamental frequencies. All are made to extremely fine tolerances and frequency adjustment can be given up to .005%. Plated electrodes of gold, silver, or aluminium with wired in spot welded contacts are available. Quotations can be given for any type of cut, or mode of oscillation, including a complete range for filters with zero temperature co-efficient over a sensibly wide temperature range.

## Special Offer:

400 crystals in the range 7100 to 7150 kc/s inclusive. Brand new and unused post-war production. Specification: BT cuts, zero temperature co-efficient, gold plated electrodes, wired into FT 241 type holders with standard  $\frac{1}{2}$ " pin spacing. Accurately calibrated, Better than average activity, EPR is better than 14 K. Ohms at 30 pf. input capacity. Price 18/- each, post free. All fully guaranteed and unrepeatable at today's prices. The offer applies only to the range mentioned above, all frequencies between 7100 and 7150 kc/s available.

### VHF ENTHUSIASTS

No more change of doublers! A complete new range of crystals for DIRECT output up to 74 mc/s when using only a simple RF pentode oscillator such as Z77, EF80, etc. full details of this range on request.

## G2AK sends Season's Greetings

HEADPHONES, H.R. type, 4000 ohms, very sensitive. Only 12/6 pair. P. & P. 1/6. C.L.R. (low res.) 8/6 P. & P. 1/6.

### GELOSO, V.F.O.'s.

Front ends and components, from stock.

MULTI-WAY CABLE  $\frac{1}{4}$ " diameter. 7 coded wires. Ideal for inter-chassis connections or beam control. 1/3 per yard. Ditto, 10-way (5 pairs). Screened and plastic covered. 2/- per yard. P. & P. min. 1/6.

Don't miss this

### SPECIAL OFFER

12 VOLT MINIATURE  
ROTARY TRANSFORMER

Size only  $4\frac{1}{2}$ " x  $2\frac{1}{2}$ " overall

Output  
360v. 30mA. cont.  
or  
310v. 70mA.  
intermit.

Price only  
**12/6** ea.  
or **22/-** for 2

Post and packing 2/-.

Special quotations for quantities.

Full range of DENCO, REPANCO and EDDYSTONE coils and components available.

### AERIAL EQUIPMENT

TWIN FEEDER. 300 ohm twin ribbon feeder similar K25, 6d. per yard. K35B Telcon (round) 1/6 per yard. Post on above feeder and cable, 1/6 any length. COPPER WIRE. 14G, H/D. 140 ft., 17/-; 70 ft., 8/6, post and packing 2/-. Other lengths pro rata. Stranded 7/25 140 ft., 10/-; 70 ft., 5/- P. & P. 2/-. RIBBED GLASS 3" AERIAL INSULATORS. 1/6 each or 6 for 7/6. P. & P. 1/6. FEEDER SPREADERS. 6" Ceramic type F.S., 9d. each or 8/- doz. Postage 1/6. CERAMIC CENTRE PIECE for dipoles, Type AT, 1/6 each. 2 METRE BEAM, 5 element W.S. Yagi. Complete in box with 1" to 2 1/2" masthead bracket. Price 49/- P. & P. 3/6. SUPER Aerial cable, 1/8 per yd. P. & P. 1/6.

METERS. All flush mounting round  $3\frac{1}{2}$ ", with  $2\frac{1}{2}$ " scale 0-100 micro amp. £2.0.0. Ditto, 0-50 micro amp. (plain scale) £2.0.0.  $4\frac{1}{2}$ " with  $3\frac{1}{2}$ " scale, 5-0.5 mA (scaled 50-0-50), 30/- Ditto, 100-0-100 micro. amp. £2.10.0. DUAL RANGE VOLTMETERS. 0-5V and 0-100V., moving coil, 1,000  $\Omega/V$ ; ranges easily extended. Complete with leads and prods; solid leather carrying case,  $6\frac{1}{2}$ " x 5" x  $2\frac{1}{2}$ ". A gift at 25/-, post free. ABSORPTION WAVEMETERS. 3.00 to 35.00 Mc/s in 3 Switched Bands. 3.5, 7, 14, 21 and 28 Mc/s Ham Bands marked on scale. Complete with indicator bulb. A MUST for any Ham shack. Only 17/6 each, post free. CONDENSERS. 8 mid., 750 V, 5/6 each, post 1/6.

### FOR THE DX ENTHUSIAST MOSLEY TRAP BEAMS

Vertical 3 Band V3 ... .. £8  
3 Band 3EL Beam TA 33 dr ... .. £25  
Deliveries in rotation

SHADED POLE MOTORS. For tape decks or gram units, 3 hole fixing, twin coil, closed field type. 200/240V, 50c/s. 15/- each or 27/6 for 2. P. & P. 2/-.

RACK MOUNTING PANELS: 19" x  $5\frac{1}{2}$ ", 7", 8 1/2", or 10 1/2", black crackle finish, 5/9, 6/6, 7/6, 9/- respectively, P. & P. 2/-.

HEAVY DUTY adjustable rheostats, 0.4 ohm, 25 amp. Beautifully made, 5/- each. P. & P. 2/-.

HEAVY DUTY CHOKES. 10H, 150mA, 80 ohms. Only 10/- P. & P. 2/6.

R. F. CHOKES. National Type. R-100U pillar mounted, 1 mH, 300 mA, 3/- ea. or 6 for 15/-. BRITISH 2.5 mH, 120 mA, pie wound 2/- ea. 3 or more — post free.

AMERICAN 807 VALVES. New, boxed, 7/6 each, or 4 for 25/-, post free.

ACOS. Mic. 33/2. NEW in makers carton. List 55/-. OUR PRICE 35/- P. & P. 1/6

### NOW READY

Our NEW 56 page Illustrated  
Catalogue

Send P.O. or stamps for 1/6

## CHAS. H. YOUNG LTD.

Dept. 'S', 110 Dale End, Birmingham. CENTRAL 1435

No C.O.D. on  
Orders under £1.

Please print  
your name  
and address.

# HENRY'S (Radio) LTD

(Dept. SWD)

**5 Harrow Rd., Paddington, W.2**

Opposite Edgware Road Tube Station

PADddington 1008/9

Open Monday to Saturday 9-6. Thursday 1 p.m.

Send 6d. for 28-page Catalogue



**QUARTZ CRYSTALS**



FT243 ; FT241A ; 10X ; Type 4B ; 7A ; Quartz blanks, etc., etc. Fundamentals : 54th and 72nd harmonics. Send for FREE complete list of frequencies and types.

## EVERSHED VIGNOLLES WEE-MEGGERS

500 volts, 50 meg. Brand new, sealed in cartons ; includes leather case and booklet, £12/10/-, 100 volt type in new condition. £6.

## VIBRATOR PACKS

Input 6v. D.C. Output approx. 100v. D.C. at 30 m/amps., fully smoothed and R.F. filtered. Size 6½ x 5 x 2in. Fitted with Mallory 629C vibrator. BRAND NEW. Boxed, 12/6.

## CRYSTAL CALIBRATOR

For No. 19 set

10 Kc/s. ; 100 Kc/s. ; 1 Mc/s. spot frequencies. Crystal controlled oscillators ; includes 5-125C7 valves, neon modulator, handbook, etc. Brand New, £4/19/6 post free.

## RF UNITS

Type 25. Switched tuning 30 to 40 Mc/s. Includes : 3-SP61, etc., 10/-, carriage 2/6. Circuit 9d. Type 26. Variable slow motion tuning 50 to 65 Mc/s. Includes : 2-EF54 and EC52, 25/-, carriage 2/6. Circuit 9d.

## PYE 45 Mc/s. STRIP. Type 3583

Complete with 12 valves ; 10-EF50 ; EB24 ; EA50 ; tuned circuits, etc., 39/6, includes modification data. P.P. 5/6.

## INDICATOR UNIT TYPE 247

R.F. Power Wattmeter. Complete with large 1 MA Meter, Magic Eye indicator ; 2 EF50 diodes and rectifiers. Inputs —12v. ; 80v. D.C. or 100/240v. A.C., 50 c/s. **£3. 19. 6**

Post free.

## WALKIE/TALKIE TYPE 38 TRANSMITTER RECEIVER

Complete with 5 Valves. In new condition. These Sets are sold without Guarantee, but are serviceable. P.P. 2/6 **22/6**  
H/Phones 7/6 pair. Junction Box, 2/6. Throat Mike, 4/6. Canvas Bag, 4/-, Aerial Rod, 2/6. Batteries Regd.: 120v. HT and 3v. LT.

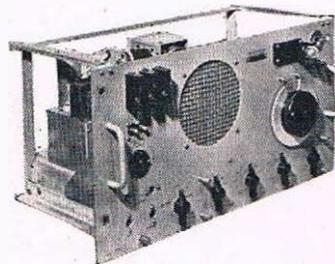
## BATTERY CHARGER

Input 200/250 volt A.C. Output for 12 volt batteries at 1½ amp. trickle charge. BRAND NEW **27/6** P.P. 2/6.  
In metal case

## SHORT-WAVE COMMUNICATION RECEIVER

10-60 Mc/s (5-30 Metres) RECEPTION SET TYPE 208

I.F. FREQUENCY 2 MC'S



Complete with 6 valves, 2-6K8G, 2-EF39, 6Q7G and 6V6G. Internal mains and 6v. vibrator pack. Built-in 6½" P.M. speaker. Muir-head slow motion drive. B.F.O. and R.F. stage. Provision for Phones and Muting and 600 ohms line and input, 100/250v. A.C. 40 to 60 c/s, or 6v. D.C. All sets in new condition and air tested.

**£6. 19. 6**

Carr. 15/6

Size : 24 x 18 x 12. Weight 80 lbs. (including Transit Case)

## RADAR TX UNIT, TYPE 1683

Includes : 832A ; 829B ; 2-5R4G ; 2-6C4 ; 6X5GT ; 3-6AC7 ; 6V6GT ; 931A Photo-multiplier and network ; 2 blower motors ; chokes ; transformers, etc.

BRAND NEW **£6/10/-** P.P. 5/-

## MIXER UNIT TYPE 79

Includes : VCRI39A tube ; 7-EF50 ; EF55 ; 4-EA50 ; 5U4 ; VU120 ; EC52 ; 2-E891 ; transformers, chokes, etc. **£5/10/-** P.P. 5/-  
Input 200/250v. 50 c/s.

## SYNCHRONIZER UNIT

Includes : 3-6L6M ; 12-6AC7 ; 1-65Q7 ; 5-717A ; 6-65N7GT ; 1-6H6 ; slow motion drive ; transformers ; blower motor ; chokes, etc.

BRAND NEW **£4/19/6** P.P. 5/-

## TRANSMITTER/RECEIVER, Army Type 17 Mk. II

Complete with Valves, High Resistance Headphones, Handmike and Instruction Book and circuit. Frequency Range 44.0 to 61 Mc/s. Range approximately 3 to 8 miles. Power requirements : Standard 120v. H.T. and 2v. L.T.

Ideal for Civil Defence and communications.

BRAND NEW

Calibrated Wavemeter for same 10/- extra. (may be purchased separately)

**45/-**

P.P. 5/-

## PACKARD-BELL PRE-AMP

Complete in screened case with 6SL7GT ; 28D7 ; leads ; jack ; plug, etc. Handbook. Sealed in carton.

ONLY **12/6** P.P. 2/-

## STROBE UNIT

Complete with : 6-EF50 ; 5-EA50 ; SP61 ; relays, etc. P.P. 2/6. **35/-**

## U.S.A. R.F. WATTMETER TS-87/AP

3 position 0-10/15/30 watts Complete with photo-cell, 2 spare lamps and leads, with transit case. BRAND NEW £8/19/6. P.P. 7/6.

## DYNAMOTORS

Input 12 volt d.c. Output 230 volts, 165 mA, 32/6 post free.

VCRI39A tubes, 35/-, bases 2/-

VCR97, 40/- ; with cut-off, 15/- bases 2/6

Mu-metal screen, 10/- for UCR97. 3BP1 tube, 35/-

## BC929A UNIT

Includes : 2-6H6GT ; 2-65NTGT ; 6G6G ; 6X5GT ; 2X2G and 3BP1 cath. ray tube ; large 24 volt motor driver switch, etc., 65/- P.P. 5/-

## RCA 6-inch P.M. SPEAKER in Cabinet

With vol./control and 600v. Line Trans. 27/6. P.P. 2/6.

## WAVE-GUIDE WATTMETER

Type W8921 10 cm. Complete in transit case. BRAND NEW, £5/10/-, P.P. 7/6.

## CRYSTAL MIC. INSERTS.

¾" Square 3/6 each.

Acos ¾" Round 5/- each

" 1½" " 7/6

" 2" " 12/6

" BRAND NEW!

Moulded plastic Hand Mike Case suitable for any of the above inserts. ONLY 2/6

## BOTHORPE CONTINUITY METER

BRAND NEW in portable case reads 0/500 ohms and 0/200,000 ohms. **£3/5/-** Including Internal Battery and leads.

## 182A INDICATOR

Includes : 517C tube, 4-SP61 ; 5U4G ; transformers, etc., 57/6. P.P. 5/-